MENTAL HEALTH CLASSIFICATION AND SERVICE COSTS PROJECT

Developing a Casemix Classification for Mental Health Services

Volume 1
Main Report

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Shane Solomon & Associates Pty Ltd
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For further detail, see the Mental Health Branch website at:

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Foreword

MH-CASC is a project that breaks new ground in casemix research and development. Its simple objective, to create a casemix classification for specialised mental health services, was ambitious for various reasons.

Classification systems development in the past has been setting specific, and finding a recurring set of patient attributes that predict resource use in different settings has been very much unchartered waters. We do not find Diagnosis Related Groups (DRGs) being used to fund community episodes, or the Commonwealth Medicare Benefits Schedule to determine bed day reimbursement. Few casemix studies have tried to track patients across settings. In the absence of a single medical record and comprehensive case management systems, this tracking dimension created challenging logistics and data consistency issues.

The mental health community has been very sceptical of casemix in general, and DRGs in particular. The task of persuading sites to participate in the study was not taken as a given.

The core data items were not already collected. The only standardised clinical data was ICD-9-CM codes in the acute inpatient setting, and there were even inconsistencies between sites in this data set, particularly in relation to recording of patients as 'intended same day'. In the community and non-acute inpatient settings, there were no standardised sets of patient attribute data that could be peeled off existing patient information systems. All data items collected were new, and staff had to be trained and encouraged to add these data collection tasks to an already pressured workplace.

Finally, MH-CASC was ambitious because it was assumed, in the mental health sector, that there is a pattern in the way people with mental disorders are treated in specialised mental health services, and that this pattern has something to do with patient attributes or needs. The reality may be that provider variation is so dominant that there is little about the 'case' which can predict resource use.

So it is important to restate why, under the National Mental Health Strategy and Casemix Development Programs, the Commonwealth Department of Health & Family Services allocated substantial resources to such an ambitious undertaking over a three year period between 1995-98.

Firstly, the National Mental Health Strategy vision is that specialised mental health services will be part of the mainstream health system. Whilst the Australian health system has progressed towards casemix funding of acute inpatient services, Australian National DRGs (AN-DRGs) had not gained wide acceptance in the mental health system, both for clinical and technical reasons. At a minimum MH-CASC sought to test the clinical view that other factors besides diagnosis, such as severity and functioning levels, could better predict resource use in acute inpatient settings.

Secondly, even if we could obtain an acceptable classification and activity funding system for acute inpatient settings, we might then create distorted payment incentives. With community mental health services continuing to be funded on a fixed basis, regardless of the level and type of patients treated, the incentive would be to hospitalise because this would generate greater revenue for the health service.

Thirdly, the clinical view is that there is a high level of substitutability between mental health service settings. Many people once resident in the stand alone psychiatric hospitals are now living in community settings, with the support of community teams, and acute inpatient units when admission to hospital is needed. The MH-CASC aim of developing a classification that can be used across settings would create the incentive for substitutability. If a person can be kept out of hospital, then these savings can be available to build up community services to prevent unnecessary hospitalisation.

This underpins the National Mental Health Strategy principle that specialised mental health services should be integrated, to promote continuity and substitutability across settings. A key aim of MH-CASC was to create a classification that can support the integration principle.

Fourthly, there was a perceived need to improve one of the poorer performing sets of AN-DRGs.

These then were the ambitions. What about the results?

Detailed socio-demographic and service use data on all patients attending one of 22 integrated mental health services (18 public sector and 4 private sector) between 1 September and 30 November 1996 were collected for the MH-CASC project. Data were collected on approximately 18,000 patients. This project studied about 25% of Australia's specialist mental health sector, a scale with neither Australian nor international precedents.

I would like to acknowledge the cooperation and participation of all those involved. Without their efforts the project would not have been possible.

This document presents a brief report on the findings of the study. I commend the report to you.

What MH-CASC studied is a good reflection of the current mental health system. The project found that there is an underlying clinical logic as to which patients receive more or fewer resources, but the pattern is weakened by provider factors. It is reassuring that the level of services received by patients is related to the severity of their conditions, but clearly, it would be better if the 'clinical/patient signal' was stronger.

This cannot happen, however, until there is greater consistency between clinicians about which treatments are most effective for which patients. One issue for the next period of mental health reform in Australia is how such consistency will develop 'naturally' and what the leadership role of mental health policy makers is in promoting 'good practice'.

Implementing some casemix monitoring system is a fundamental step. Protocols that are about 'cost effectiveness' cannot begin until we have a way of talking about cases that blends data on costs, patient characteristics and service providers. Such a system must cover the whole range of services funded in mental health, as was done in the MH-CASC study. Any assessment of the MH-CASC classification needs to consider this advantage, in comparing the classification with the current AN-DRG mental health casemix model.

The MH-CASC classification also has the advantage of advancing some other important elements of the mental health agenda – such as promoting a focus on outcome measures, and strengthening treatment in community settings. It is arguable that any casemix system that does not advance the bigger issues of mental health services development is of limited value to providers, policy makers and practitioners alike. It is worthwhile reiterating what the Secretary of the Department of Health and Family Services, Mr Andrew Podger, said when opening the 1996 Casemix conference: *"The issue we now need to concentrate upon is the future direction of casemix and its role in improving the focus of the health system on patient outcomes and better cost management"*. The significance of this message is even stronger today.

At this stage, the Commonwealth Mental Health Branch is releasing the MH-CASC Project report for widespread review and discussion.

In its current form, the classification is likely to be useful as a management and clinical information tool that can inform funding decisions by providing more information on who is receiving mental health resources. This would allow it to be exposed to the necessary clinical modifications and begin to focus funding discussions on the important issues - care for patients.

Nothing will happen in this country until a lead is taken by one or more of the jurisdictions, which fund the services. The Commonwealth has an important part to play in supporting initiatives, and will consider how to best resource these under the Second National Mental Health Plan. The real impetus, however, now lies with the States and Territories.

I am convinced that mental health will lose the running unless it develops a coherent funding plan that embraces some form of 'casemix'. This needs to be combined with other tools, like population funding and, in some circumstances, grant funding based on agreed benchmarks. Most importantly, it needs to be put in a quality and outcomes framework.

We need a start, and as a first version system, MH-CASC offers us a platform to build on.

Dr Harvey Whiteford
Director of Mental Health
Commonwealth Department of Health and Family Services
Canberra, Australia
August 1998

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- The 18,000 mental health consumers who were the subject of the study.
- The 22 mental health service organisations which participated in the study.
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- The mental health clinicians and consumers, chaired by Dr Alan Rosen, offered invaluable support and guidance throughout the Project as members of the MH-CASC Clinical Reference Group.
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- The National Mental Health Funding Models Steering Committee, chaired initially by Ms Joan Lipscombe of the Community Department of Health and Family Services, and later, by Dr Harvey Whiteford, Director of Mental Health, Community Department of Health and Family Services.
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The MH-CASC Project benefited significantly from the contributions of all of the above individuals and organisations. Responsibility for the design, conduct, analysis, and reporting, however, remains with Project Team.

The MH-CASC Project Team

The MH-CASC Project Team comprised a consortium of individuals, drawn from several organisations, who came together specifically to conduct the Project under the management of the consulting company Shane Solomon and Associates. The team personnel and their respective roles are listed below.

Person	Project Role	Organisation
Mr Shane Solomon	Project Director	Principal, Shane Solomon & Associates Pty Ltd Currently Group CEO, Mercy Health and Aged Care
Mr Bill Buckingham	Principal Consultant	Principal, Bill Buckingham and Associates Pty Ltd
Assoc Prof Philip Burgess	Principal Researcher	Head, Policy & Analysis Group, Mental Health Research Institute of Victoria
Assoc Prof Kathy Eagar	Consultant, all aspects of study	Director of the Centre for Health Services Development, University of Wollongong Principal, Kathy Eagar and Associates Pty Ltd
Ms Jane Pirkis	Consultant, study design, site coordination, data analysis, report preparation	Consultant, Centre for Health Program Evaluation, University of Melbourne
Ms Rita Brewerton	Costing Director	Principal, Brewerton and Associates Pty Ltd
Mr Adam Clarke	Consultant, data base development	Principal, Strategic Data Pty Ltd
Ms Amanda Price	Consultant, study design and clinical measurement	Principal, Strategic Data Pty Ltd
Ms Helen McCluskey	Consultant, Costing	Principal, McCluskey-Chen & Associates Pty Ltd
Ms Jenni Bowen	Consultant, Costing	Consultant, Brewerton and Associates Pty Ltd
Mr Bernie McKay	Consultant	Principal, Bernie McKay and Associates Pty Ltd
Dr Thomas McGuire	Consultant, Data analysis	Principal, Analytic Solutions, Inc
Dr Alan Rosen	Chair, Clinical Reference Group	Royal North Shore Hospital and Community Mental Health Service, New South Wales
Ms Sandra Padova	Executive Officer	Currently Executive Officer, Early Psychosis Program, Victoria

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Overview

This report presents the findings of the Mental Health Classification and Service Costs (MH-CASC) Project, a major service utilisation study conducted under the National Mental Health Strategy. The aim of the Project was to develop the first version of a national casemix classification, with associated cost weights, for specialist mental health services that:

- is consistent with the National Mental Health Strategy;
- can be used to classify mental health patients in the various treatment settings; and
- includes an appropriate number of casemix classes, each of which comprises consumers with similar clinical conditions and similar resource requirements.

The MH-CASC Project commenced in 1995 and continued over the next three years. The study collected detailed clinical, socio-demographic and service use data on approximately 18,000 consumers attending specialised mental health services. Clinical measures were selected to cover the broad domains of diagnosis, clinical severity and level of functioning (disability). The sample was significant, covering 25% of Australia's private and public mental health services. Service utilisation data were provided by approximately 4,500 staff who maintained daily diaries of all activities over the three month period 1 September to 30 November 1996. The scale and complexity of the study has no international precedent.

The key questions addressed by the Project, and findings in relation to those questions, are summarised in Table A. In summary, the Project found that there is an underlying episode classification, not just in inpatient services but also in community mental health care. The level of service provided to patients does in fact bear a clinically and statistically logical relationship to the patient's clinical status. However, the relationship between clinical factors and cost is often confounded by variations in the practice of different providers. Some of these provider factors may be structural or financial, and others may be under the control of individual clinicians. Further work is required to disentangle these factors.

The Project recommends a first version casemix classification model which includes 42 patient classes - 19 for community episodes, and 23 for inpatient episodes. While explanation of variance was found to be lower than Australian National Diagnosis Related Groups (AN-DRGs) standards in the general health system, the overall performance of the classification is substantially above that achieved using the AN-DRG mental health classification system.

Adoption of this classification schema would require routine use of a small number of clinical scales, applied at periodic intervals. The classification may be used for both management information and funding purposes and has considerable potential to advance the National Mental Health Strategy. As a first version casemix classification, it will benefit from ongoing clinical refinement and further research.

This report presents the detailed methodology and results of the study. In view of the unprecedented nature of the Project, every attempt has been made to provide sufficient detail to enable verification and replication of various aspects of the study.

The remainder of this summary outlines the main content from each chapter of the report.

Table A: Answers to the key questions addressed by the Project

Key questions addressed by the Project		Summary of Project findings
1. Is there a relationship between patient attributes, or need, and service costs?	• Do higher need patients cost more?	Higher treatment costs are associated with indicators commonly used to assess individual patient need such as: • clinical severity; • level of 'psychosocial functioning'; • age; • diagnosis; and • dependency for activities of daily living.
	• How do we classify patient need?	No single measure is suitable to determine need. The classification uses a combination of instruments and measures that assess demographic, clinical and level of functioning characteristics. Similar measures are used in inpatient and community services.
	• Is there a normative clinical pattern in Australia's specialised mental health services?	There is an underlying 'patient signal' upon which a casemix classification can be developed, but the costs being driven by 'casemix' are often confounded by the costs driven by provider variations.
2. Is the pattern sufficiently strong to use it for funding?	• Is it consistent with casemix statistical standards?	Ultimately a question for funders - is it better than what we have now? • RIV competitive: Higher than the AN-DRG mental health classification but is restricted by limited cost variation between patients and is lower than the AN-DRG standards used in the general health system. • CVs for individual classes are lower than those for the AN-DRG mental health classification, indicating more homogeneous groups. CVs for all 42 classes are less than 1.0. • Sufficient numbers are in each class when translated to the national level.
	• Is there clinical logic in the statistical pattern?	The classification has clinical logic. For example: • people in non-acute inpatient settings have higher levels of clinical severity and disability than those living in the community and those who use acute inpatient services; and • the costs go in the clinically expected direction.
3. Can the classification advance the National Mental Health Strategy?	• Can the classification be used to reward continuity of care in the community, by: - reducing the separation of inpatient and community services? - facilitating the movement of patients between hospital and the community?	The classification covers both inpatient and community services. The variables driving costs in inpatient settings are also driving costs in the community but: • the patterns of care are different, so …. • the importance of the variables differs across the two settings.
	• Would its use support integration and mainstreaming?	Adoption of this classification for mental health services may create challenges for mainstreaming but is consistent with a broader recognition that a single classification based on AN-DRGs is inappropriate for many health services, not just mental health. Integration would be facilitated by the use of a classification that covers both inpatient and community mental health care.
	• Does it give priority to high need groups?	The classification provides management and clinical information that can inform funding decisions by giving a greater focus on the different needs of those receiving mental health resources.
	• Can it be used to promote a focus on consumer outcomes?	The classification is built upon the use of measurement instruments explicitly designed for outcome measurement in mental health. Provides a basis for casemix-adjusted outcome measurement.

Background

The bulk of public specialised mental health services are currently funded either on an historical basis or through specification of a range of 'inputs', such as number of beds and staff. Private mental health services are funded per bed day or occasion of service. Neither approach provides financial incentives for efficiency, quality, improved outcomes, or for substitution of inpatient care by community-based care.

Under the Medicare Agreements between the Commonwealth, States and Territories, effective from July 1993 to June 1998, Australian Health Ministers agreed to move towards the establishment of a nationally consistent casemix-based management and information system, which could serve as the basis for alternative funding arrangements. Such funding schemes are believed to:

- be inherently fairer than historical funding because they pay health services on the basis of their activities, measured in terms of the number of patients treated and the type and severity of their conditions;
- have superior incentives for productivity; and
- reinforce best practice (e.g., reduce excessive hospital stays).

Achieving this potential is contingent on the tools available for classifying and setting prices for services. Several classifications exist, but none are regarded as being suitable for the Australian mental health care setting. Australian National Diagnosis Related Groups (AN-DRGs), the classification adopted in acute inpatient settings in the general health sector, is based primarily on diagnosis and does not explain adequately the variation in the care needs of mental health consumers. Other classifications developed elsewhere perform poorly in terms of predicting resource use, or have an unwieldy number of classes. . Another common feature of existing classifications, including AN-DRGs, is that they are limited to specific service settings (primarily acute or long-stay inpatient settings) and would thus provide an incentive to admit patients, a practice contrary to the National Mental Health Strategy's aim of treating people in the most appropriate setting, including in the community.

Project aim and scope

The MH-CASC Project aimed to determine whether clinical factors predicted service costs, and whether these could be used to build a patient classification that was both clinically meaningful as well as resource homogeneous.

The study covered public specialised mental health services and specialised private hospital acute units. Private psychiatric practice was excluded from the costing aspect of the Project, but Medicare Benefits Schedule (MBS) data were sought on the use of private psychiatrists by study participants. Mental health services provided by general hospitals without specialised psychiatric units and by general practitioner services were outside the scope of the study.

Generating hypotheses on predictors of resource use

The initial stage of the MH-CASC Project involved generating hypotheses about which patient attributes would be likely to predict resource use by consumers of mental health services. This involved three key elements.

Firstly, a review of the international literature was conducted. From this review, the following attributes were identified as likely to have an impact on resource use: diagnosis; severity of symptoms; risk of harm to self or others; level of functioning and social support; co-morbidity; socio-demographic characteristics; and stage of illness.

Secondly, a number of Clinical Panels were convened, at which clinicians representing a mix of sub-specialties and disciplines were asked to identify patient attributes that they thought would be likely to predict resource use and to generate patient classes based on these characteristics. The Clinical Panels identified a total of 50 initial consumer classes, distributed across nine 'diagnostic super classes' which were used as working hypotheses for classification development. There was strong correspondence between the attributes identified by the literature and those identified by the clinical panels.

Finally, a preliminary validation study was conducted using the classes within two of the Clinical Panels' 'diagnostic super classes', namely 'schizophrenia and related disorders' and 'mood disorders'. The results of this preliminary validation study indicated that: there was a reasonable distribution of cases across the initial patient classes (consistent with a requirement for adequate numbers in each class in the classification); there was reasonable differentiation of resource use between classes (consistent with the requirement that classes be resource homogenous); and that the initial classes were workable, and acceptable to the clinical community as a hypothesis to be tested (consistent with the requirement that classes be clinically meaningful).

The results of this stage were used to inform the selection of measures used in major empirical study of the Project.

Study methodology

Twenty two sites participated in the study, selected according to statistical and clinical criteria. Study sites represented approximately 25% of the Australian mental health sector in terms of inpatient beds, workforce numbers and expenditure, and were broadly representative of public and private sector services nationally. Data collection occurred over the three month period 1 September to 30 November 1996.

In total, the study sites collected detailed clinical and service utilisation profiles on 18,002 patients over the study period. The study cohort covered all age ranges, and had roughly equal numbers of males and females. These patients received 20,553 episodes of care (5,449 in acute inpatient units; 1,055 in non-acute inpatient units; and 14,049 community). These episodes comprised a total of 318,309 patient care days. The vast majority of patients (90%) had one episode only, and a further 7% and 2% had two and three respectively.

Four core 'data blocks' were collected for use in the development of the classification system. These included:

- Patient attribute data, covering key clinical and socio-demographic characteristics hypothesised as being likely to influence resource use;
- Staff activity data, particularly identifying time and services which could be attributed to individual patients;
- Hospital morbidity data; and
- Financial data, drawn from the study sites charts of accounts.

Clinical variables were selected on the basis that they were hypothesised to influence resource utilisation and included:

- Psychiatric diagnosis, using a tailor-made system of 16 major categories and 61 individual codes based on ICD-10 clinical terms
- Severity and level of functioning, which were measured by:
  - The Health of the Nation Outcome Scales (HoNOS) (all patients in Adult services);
  - The Abbreviated Life Skills Profile (LSP) (all patients in Adult services);
  - The Resource Utilisation Groups – Activities of Daily Living (RUG-ADL) (patients aged over 65 or with chronic organic brain syndrome in Adult services);
  - The Resident Classification Instrument (RCI) Behaviour Scale (patients aged over 65 or with chronic organic brain syndrome in Adult services);
  - The Health of the Nation Outcome Scales for Children and Adolescents (HoNOSCA) (all patients in Child and Adolescent services);
  - The Children's Global Assessment Scale (CGAS) (all patients in Child and Adolescent services);
- Focus of care, which classified the patient's primary need for treatment and the treatment objective as acute, functional gain, intensive extended or maintenance;
- Legal status, which identified whether a consumer had received involuntary treatment at any point during the period rated; and
- Factors influencing health status and contact with health services, which was assessed in Child and Adolescent services only, and gauged the degree of 'complicating psychosocial factors', such as contact with the juvenile justice system or the presence of a legal guardian, that required additional clinical input during the episode.

Data on patients' use of private psychiatrists during the three month study period (as identified by Health Insurance Commission statistics) were also collected to supplement staff activity data provided by private hospitals included in the study.

The data collection cycle revolved around the notion of an episode of care. For the purposes of data collection, an episode of care was defined by treatment setting. Movement to a new treatment setting was defined as a new episode of care, and triggered a new cycle of data collection. Three types of treatment setting were identified: Acute inpatient units, Non-acute inpatient units, and Community services.

Within each episode, there were three critical points in the patient attribute data collection cycle. At the beginning of an episode, socio-demographic data and information about the episode were collected. Every 14 days of the episode, repeat clinical ratings were made. At the end of the episode, a final clinical rating was made, and a small number of additional socio-demographic items were collected.

All patients who received a significant face-to-face service at any of the participating sites were registered to the study.

Consumer privacy was formally protected by several arrangements stipulated in a Privacy Protocol prepared jointly by the Commonwealth and the Project Team. Essentially, consumer privacy was protected by the de-identification of patient data, a data flow which ensured that data security was maintained at all times, consumer information pamphlets, data protection agreements between each of the sites and the Project Team, and contractual obligations between the Project Team and the Commonwealth.

The Project Team also guaranteed staff confidentiality, by undertaking that no information regarding an individual staff member would be returned to management, or any other party; and site confidentiality, by guaranteeing that data would not be presented in a way which enabled individual sites to be identified.

The Project received Ethics Committee approval from the Commonwealth Department of Health and Family Services Ethics Committee, University of Wollongong Ethics Committee, and the Ethics Committees of 14 individual sites.

Costing approach

The costing process distributed 'core' costs (salaries, wages and on-costs for direct care staff, MBS costs for private psychiatrists' services provided to private inpatients, administrative infrastructure costs, overheads and goods and services) to two categories of 'products':

- Patient care products – costs were allocated to individual patients according to a range of statistics and subsequently aggregated to form episode costs. The unit of counting for patient care products was the 'patient care day'. This was 'rolled up' into cost per episode of care, which became the dependent variable used in the development of the MH-CASC classification.
- Non-patient care products – costs were also distributed to the four 'non-patient attributable activities' reported by staff (i.e., teaching, training and research; consultation-liaison; services to unregistered patients; and community development). Total costs assigned to these four activities became separate 'final products'.

Developing the costing methodology required the Project Team to cross new ground, since there were no precedents for distributing common pools of staff time (and associated costs) across inpatient and community settings. The costing data were combined with the clinical attribute and service utilisation data to form an integrated database for analysis. Prior to the analysis, a comprehensive series of data quality checks and edits were applied.

Overview of the dataset

Most patients in the study had significant histories of psychiatric treatment. Patients for whom psychiatric treatment commenced more than two years prior to the current episode accounted for 43% of total episodes. In 61% of episodes, the patient had at least one prior admission to a psychiatric inpatient unit. Only 14% of episodes were provided to patients who were reported to have no prior history of psychiatric care. The extent and type of prior psychiatric treatment varied between the episode types. Patients admitted to acute inpatient units had generally been in contact with mental health services for a shorter period of time than patients receiving non-acute inpatient or community care.

The most common diagnosis across all episode types was schizophrenia and related psychotic disorders, followed by mood disorders. There was an interaction between diagnosis and episode type, with particular diagnoses occurring more frequently in particular settings.

Approximately 4,500 clinical staff participated in the study. Compliance with recording staff activity data was high, with activity reported for an estimated 87% of time worked by clinical staff over the study period. Collectively, these staff reported 1.3 million hours of activity, spread across 158,000 person days worked during the study period. Approximately 75% of all staff were nurses; one quarter of staff participating in the project were based in settings primarily dedicated to providing community-based care.

Patient attributable activities accounted for 46% and non-patient attributable activities for 8% of time recorded by staff, with the residual 46% described as 'general time'.). Of the patient attributable time, 60% was spent on hospital or community health centre-based individual patient care, 10% on group based care, 9% on mobile treatment or support services, and 22% on "services on behalf of patients", defined as those services delivered on behalf of a person in their absence (e.g., interagency liaison, clinical notes). Of the non-patient attributable time, 41% was spent on teaching, training and research, 26% on consultation-liaison, 24% on services to unregistered patients, and 9% on community development. Patterns of activity varied by labour class, setting and site.

Total expenditure by sites during the three-month study period was $82.2 million, 9% of which was allocated to 'out of scope' services. The majority of 'in scope' expenditure - $65.8 million, or 88% - was directed to patient care, with the balance distributed across the four 'non-patient attributable' activities.

Salaries and related costs for clinical staff accounted for approximately two thirds of the total amount spent on patient care activities, with the proportions contributed by patient attributable time and general time roughly equal. Overhead and administrative infrastructure expenditure made up the remaining one third of patient costs. These figures varied substantially from site to site, and between different settings.

Nursing salary and wage related costs comprised 70% of expenditure on clinical staff providers, followed by medical staff at 17%.

Forty eight per cent of patient care costs were directed to acute inpatients, 29% to non-acute inpatients and 23% to community patients. Patient care costs within the three treatment settings differed both in the relative share of costs accounted for by overheads/infrastructure, and in clinical staffing 'ingredients'.

Costs per day of patient care varied significantly between setting types, ranging from an average of $95 in the community to an average of $334 in the acute inpatient setting. Within each setting, there was considerable variation across sites. Total episode costs were highly correlated with patient attributable time recorded by clinical staff.

Episode definitions used for class finding

Casemix classification systems are typically tied to specific treatment or care events, referred to as 'episodes of care'. A major conceptual issue to resolve in the study was how to define episodes of care in a way that was congruent with the range of illnesses treated by specialised mental health services. In contrast to most classification systems which only deal with one episode type or 'funding product', the MH-CASC Project had the difficult task of covering numerous potential episode types, because its scope crossed the traditional inpatient/community and acute/non-acute boundaries. Work completed elsewhere (e.g., the National Health Data Dictionary) proved difficult to operationalise and make relevant to the mental health field.

The low level of multiple episodes by individual patients over the three-month period, described above, was unexpected. Of particular note was the high proportion of patients who had acute inpatient episodes neither preceded nor followed by community care. This feature of the data limited the project ambition to explore concepts of 'bundled episodes' across settings. Class finding was therefore primarily concentrated on within-setting episodes, with bundled episodes considered subsequently on an exploratory basis.

A key issue was how to deal with incomplete episodes, defined as those which started and/or ended outside the 3 month study frame. In the AN-DRG classification, this is dealt with simply, by the exclusion of incomplete inpatient episodes from the classification development. However, in developing a classification for the mental health industry, with its mix of short and long term cases, such an approach was not considered appropriate. Incomplete episodes accounted for 71% of total patient care costs reported by the study sites. Episodes that had both the start date and the end date occurring within the three month study period ('completed' episodes) represented only 29% of total episodes in the study database.

Review of the data suggested that a classification based only on completed episodes was feasible for the majority of inpatient episodes. These typically occur in units referred to as 'acute units' and have relatively short length of stays. However, the definition of episode for community needed to recognise that the majority of patients are under relatively longer term ('ongoing') care, as are a small but significant group of patients treated in inpatient units.

For both the community and longer term inpatient episodes, analysis of the study data indicated that episodes were best defined as a fixed periods of care (e.g., 1 month, 3 months etc). This recognises the ongoing nature of mental illness for many people under care and that the major cost difference between patients is in the intensity of care received over a given period rather than the length of time the person is considered to be 'under care'. For example, in the community, 20% of patients treated in the community were seen on 2 days or less over the 3 month period. By contrast, the top 20% of patients were seen on 14 or more days over the same period. Defining an episode of care in the community as the total care received over a given period reflects these differences, and were regarded as a more appropriate approach than classifications based on the cost of each occasion of service.

For the class finding analysis, costs for community and ongoing inpatient episodes were scaled to 8 week periods of care. However, these costs (and associated cost weights) could be adjusted to any period when applied in a funding system.

In summary, three setting-specific episode types were defined for analysis purposes as shown in Table B below.

Table B: Episode types used for developing the MH-CASC classification

Episode Type	Unit of Counting
Completed Inpatient Episodes	Total Episode Cost
Ongoing Inpatient Episodes	8 week period cost
Community Episodes	8 week period cost

Episodes defined as 'intended same day' by hospitals participating in the study were examined and found to be more similar to community days of care than inpatient days, in terms of cost and type of care provided. These were counted as components of community episodes. Separate classification analyses were conducted for adult mental health services and child and adolescent mental health services, with the exception that a classification was not possible for child/adolescent ongoing inpatient episodes due to the low volume of cases.

For the exploratory analysis of adult 'bundled episodes', the Project Team conducted initial analyses that could provide a foundation for future work. The approach aimed to explore whether a classification could be developed that explained the total costs received by all patients over the study period, regardless of the setting in which they were treated. In this approach, the episode was defined as an 8 week period of care, similar to the definitions used for Community and Ongoing Inpatient Episodes, but where costs of the treatment received in all settings is pooled. This approach to episode definition allows for the prospect of a capitated casemix model of funding, where a service provider would be funded for providing comprehensive care to particular patient classes over a defined time period.

For each of the episode types, a final series of adjustments and edits were made, and data reviewed to determine the best analysis approach to handling repeat observations for particular clinical variables (e.g., HoNOS). In summary, preparation of the final analysis datasets involved:

- Selection of the first rating as the independent variable for most multiply-rated clinical items, as there was minimal difference in scores between rating periods. This approach also ensured retention of the maximum number of cases;
- Standardisation of labour costs to remove the substantial variation between sites in hourly rates and reduce the overall influence of 'site' as a cost driver; and
- Culling of episodes provided by a small number of service areas where staff reporting compliance was low.

A total of 16,611 setting-specific episodes were retained in the class finding analysis, with 72% of these being community episodes. For the exploratory 'bundled episodes' analysis, 8,067 adult episodes were included. Table C presents summary descriptive statistics for each of the episode types.

Table C: Summary resource use statistics on the analysis cohorts

	Adult Cohorts				Child & Adolescent Cohorts	
	Completed Inpatient Episodes	Ongoing Inpatient Episodes (8 week period)	Community Episodes (8 week period)	'Bundled Episodes' (8 week period)	Completed Inpatient Episodes	Community Episodes (8 week period)
Number of Episodes - Trimmed	3,613	949	9,806	8,067	145	2,098
- Untrimmed	3,426	919	9,096	7,244	139	1,956
Av. Episode Cost*	$3,900	$13,722	$526	$1,007	$6,048	$377
Av. Length of Stay/ Treatment Days*	12.4	54.1	6.3	10.4	16.6	4.1
Av. Cost per Treatment Day*	$331	$254	$94	$77	$415	$95
Av. Total Episode Time (hrs)*	31.8	110.5	5.6	23.8	46.4	4.1
Av. Time per Treatment Day (hrs)*	2.6	2.0	0.9	1.1	3.1	1.0

Note: These statistics refer to trimmed data.

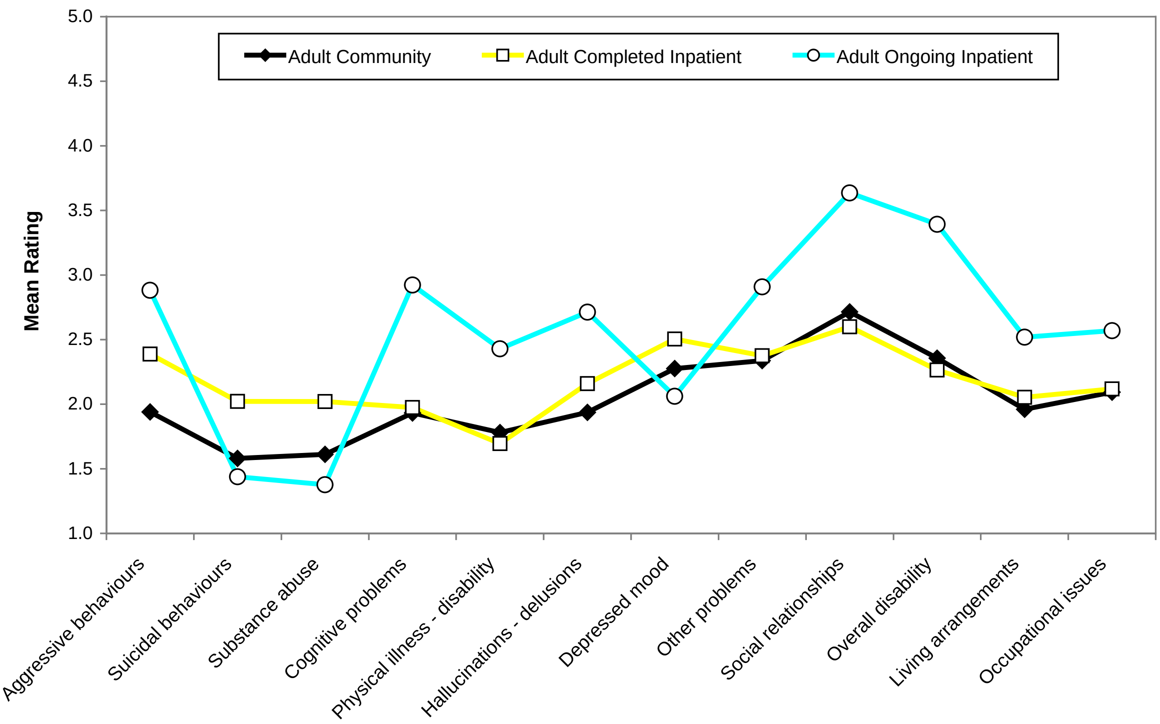
A key feature of the cost data was the restricted variation between patients in terms of episode costs, indicated by relatively low Coefficients of Variation (CVs). Most variation occurred in community episodes, but even here the distribution of costs was limited (CV=1.22 for adults; CV=1.24 for children/adolescents). By comparison, the overall variation in the untrimmed AN-DRG dataset collected in the wider health system (CV=3.3) is approximately three times that of the MH-CASC sample. Even at the individual Major Diagnostic Category (MDC) level, the lowest CV (CV=1.2 for MDC 14: Pregnancy, Childbirth and Puerperium) is greater than the largest CV of the three MH-CASC inpatient cohorts (CV=1.01 for adult completed inpatient episodes).

In summary, there is less variability between patient costs in the mental health system than there is in the broader health system. This is hardly surprising. An important implication of the limited variation in the MH-CASC episode costs is that the application of classification tools could only be expected, at best, to achieve a modest reduction in variance (RIV) as there is less variation to explain.

On the clinical measures, adult patients in Ongoing Inpatient episodes were rated as more severe in their overall level of symptoms and disability than their counterparts in Completed Inpatient episodes and Community episodes. Patients in ongoing inpatient care showed higher average scores on all HoNOS items (with the exception of Suicidal behaviours, Substance Abuse and Depressed Mood), and on all LSP items. Patients profiles in Completed Inpatient and Community episodes were less differentiated, although those in Completed Inpatient episodes had slightly higher HoNOS scores than those in Community episodes on the Aggression, Suicidal behaviours, Substance Abuse, Hallucinations and Delusions, and Depressed Mood scales. This may reflect a limitation in the extent to which the scales differentiate degrees of severity in clinical conditions, or suggest that there is still considerable scope for substitutability between community and acute inpatient settings.

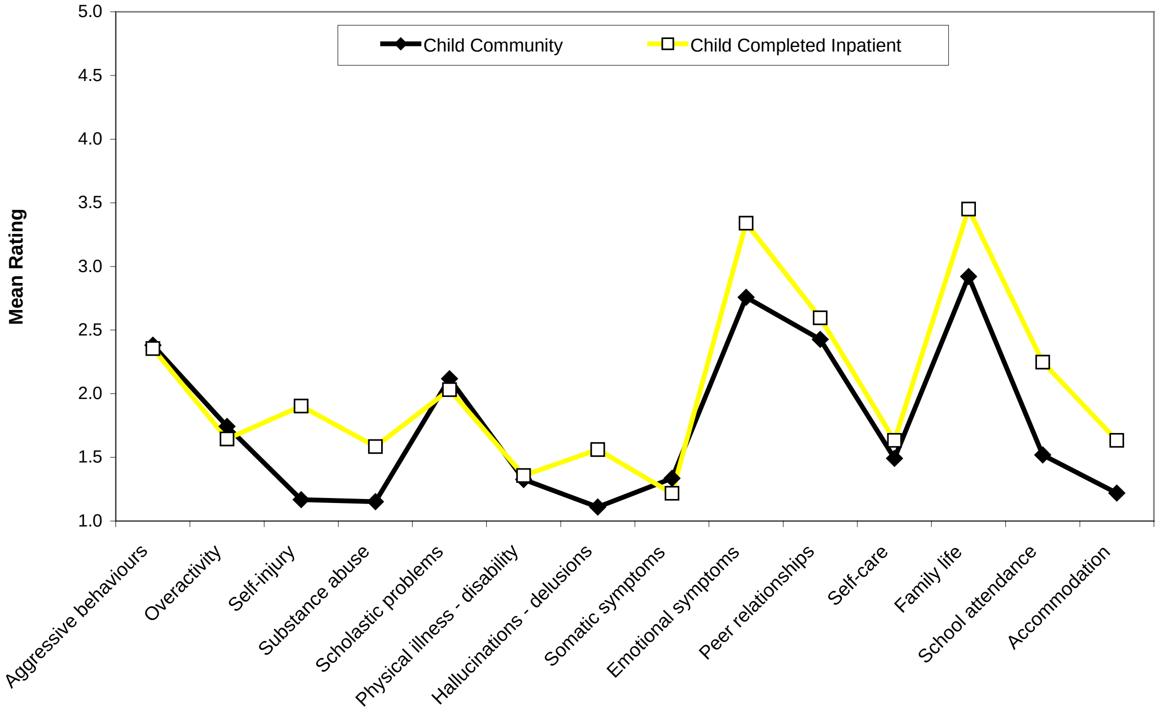
Within each of these cohorts, however, there was considerable variation in HoNOS and LSP scores. Figure A compares the HoNOS profiles of patients in the three adult setting-specific episode types.

Figure A: HoNOS Scores for Adult Community, Completed Inpatient and Ongoing Inpatient Episodes



For child/adolescent patients, Completed Inpatient and Community episodes were similar in their clinical profiles, although the completed inpatient cohort tended to score slightly higher on some HoNOSCA scales: Self-injury, Substance Abuse, Hallucinations-Delusions, Somatic Symptoms, Emotional Symptoms, Family Life, School Attendance and Accommodation. Figure B compares the HoNOSCA profiles of child and adolescent patients in community care with those in Completed Inpatient episodes.

Figure B: HoNOSCA Scores for Child/Adolescent Community and Completed Inpatient Episodes



The MH-CASC Classification Model

Classification analyses first assessed the performance of AN-DRGs in the MH-CASC completed inpatient cohort. As the AN-DRG model represents the only partial classification for mental health services, this was seen as an important initial benchmark. MH-CASC also provided the first opportunity for MCD19 AN-DRGs to be tested using costing data and drawing only on specialised mental health services.

The hypotheses generated by the clinical panels in the first part of the Project were tested as the next step in the analysis. Finally, new classification models were formulated in attempt to improve on the results obtained by each of the above approaches.

Overall, the AN-DRG3 and Clinical Panels' classifications provided only limited understanding of how patient factors contributed to cost variation in the MH-CASC dataset.

Assessment of AN-DRG performance took all adult and child/adolescent inpatient episodes with a MDC19 diagnosis, distinguishing same day admissions. In addition, a further set of same day admissions were identified from morbidity data, which had been considered to be part of community episodes for the purposes of MH-CASC. In total, 4,580 episodes were available for analysis (2,489 not intended same day; 2,091 intended same day).

The data were first analysed by AN-DRG only (excluding the same day episodes from morbidity data; n=2,541), and then with the addition of intended same day status (including the same day episodes from morbidity data; n=4,580). Results were similar to those published by the Australian Casemix Clinical Committee, indicating that the MH-CASC dataset was not atypical. Using trimmed data, the analysis indicated that AN-DRGs alone accounted for a relatively small proportion of the variance in resource use in inpatient episodes, whether resource use was measured in terms of length of stay (RIV=11.3%, trimmed data) or cost (RIV=9.9%, trimmed data).

The predictive value of AN-DRGs increased considerably when intended same day status was added in to the mix, increasing the RIV for length of stay to 44.1%. However, this would be expected, since the independent variable and the dependent variable in this approach are highly related.

Performance of the classification system developed through the Clinical Panels was variable but, similar to AN-DRGs, unsatisfactory overall. The groups performed best in predicting the total episode costs of Adult Inpatient Completed episodes (RIV=11.6%). Elsewhere, their performance was only moderate. The Clinical Panels classes accounted for only 6.8% of the variance in 8-week period costs for Adult Ongoing Inpatient episodes, 7.1% of the variance in 8-week period costs for Adult Community episodes, 0.3% of the variance in total episode costs for Child/Adolescent Completed Inpatient episodes, and 6.5% of the variance in 8-week period costs for Child/Adolescent Community episodes. Despite their variable performance, the factors that formed the basis of the clinical groups made clinical sense, and in general the episode costs increased in magnitude in an intuitively reasonable fashion across groups (i.e., costs increasing with the complexity of the group). As such, the clinical groups formed a sound basis for the subsequent class-finding work.

The AN-DRG3 and Clinical Panels' classifications provided only limited understanding of how patient factors contributed to cost variation in the MH-CASC dataset. The primary analysis task was to develop an alternative model.

Development of the MH-CASC classification followed four criteria.

1. *Use of patient related variables to explain cost.* A casemix classification should define patient classes by patient characteristics, not provider characteristics.

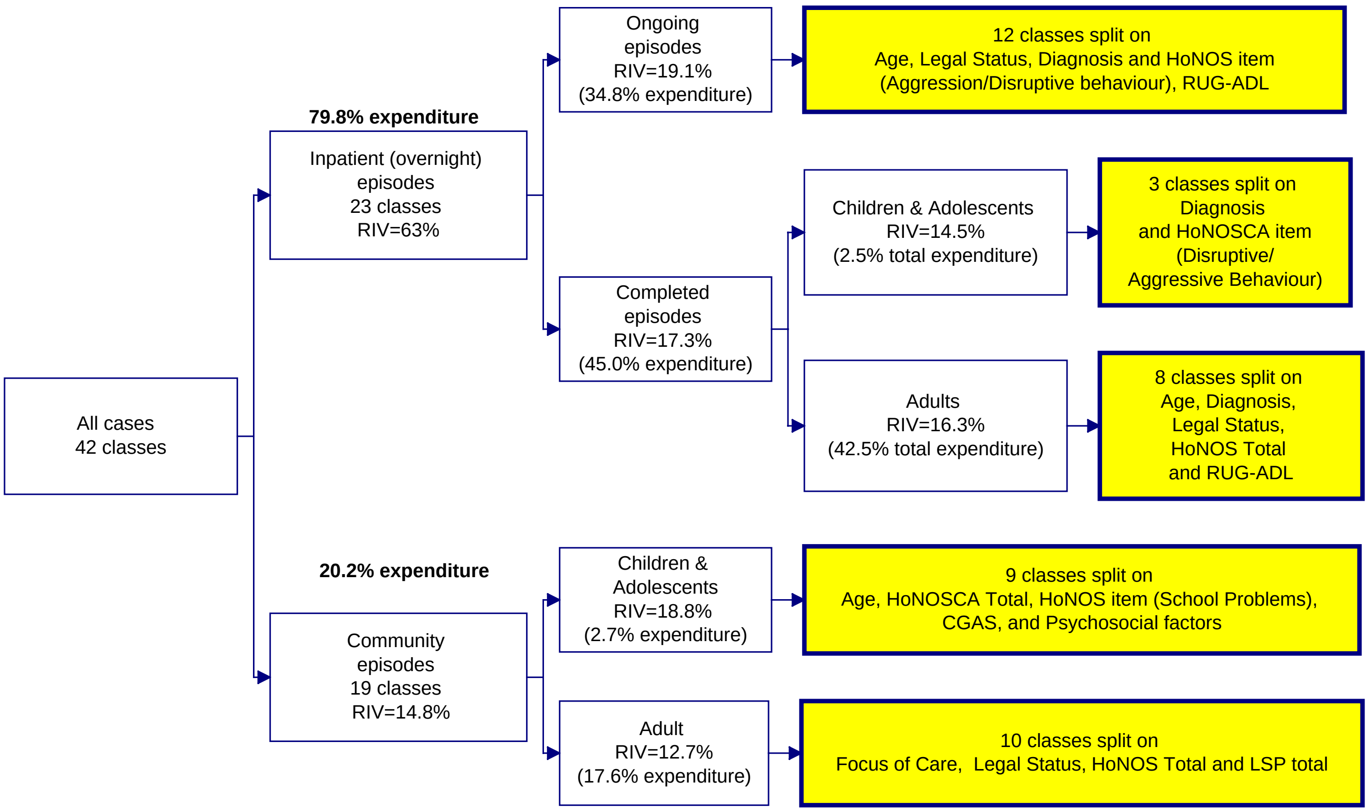
2. *Variance reduction.* The classification should give minimum variation within each class and maximum variation across classes. Reduction in variation within classes is normally measured by the Coefficient of Variation (CV) measure, with the accepted standard being that each class should have a CV of less than 1.0. The reduction in variance (RIV) statistic is used to assess the overall performance of the classification, or parts of the classification. The more classes, the higher RIV one would expect to see. The level of RIV that can be achieved is also related to the amount of variation within the data that requires explanation. As noted above, the MH-CASC dataset was relatively homogeneous, compared with the variation observed in the more diverse general health sector. It follows that the best result that could be achieved with the MH-CASC dataset could only be at the lower end of the RIV range achieved in the general health sector.

3. *Sensible clinical groups.* In order for a classification to be useful as a management information tool, the clinical groups should make sense to clinicians. Clinical factors have therefore to be balanced alongside statistical criteria.

4. *Ease of data collection.* The variables used to define the patient classes should be capable of routine data collection, coding and data entry, and ideally be a by-product of clinically related information needs.

Figure C presents a summary view of the setting-specific classification model. In total, the classification proposes 42 classes, accounting for 78% of the variance in episode costs at the 'top of the tree'. Of these, 23 are inpatient episodes (representing 79.8% of total expenditure) and 19 are community episodes (representing 20.2% of total expenditure). The five branches of the tree are based on the setting-specific episode types, each of which ultimately split into end classes on the basis of the indicated patient attributes

Figure C: Summary of MH-CASC setting-specific classification



Adult Completed Inpatient Episodes

Patients in this cohort had an average age of 39.8 years; 11% were 65 years or older. Mood Disorders was the most frequent diagnosis recorded, accounting for approximately one third of episodes, followed by the Schizophrenia, Paranoia and Acute Psychotic Disorders diagnostic cluster.

Table D summarises the Adult Completed Inpatient classification. The model assigns patients to 8 classes, accounting for 16.3% of variance. Classes are split on age, diagnosis, clinical severity, legal status and ADL dependency. Key features of the model include:

- The classes shows a reasonable distribution in costs and lengths of stay. Fifty one per cent of cases are in the two low cost classes (Class ACI-1, $2,484, and Class ACI-2, $2,864) and the remaining cases are in classes with at least 53% higher than average costs (over $4,386), The three highest cost classes (Classes ACI-5, ACI-7, and ACI-8) have more than double the costs of the bottom two classes.
- Those patients with higher severity and dependency (measured by the HoNOS and RUG-ADL) and with involuntary status consume more resources than those patients with lower dependency and severity. The most expensive diagnostic groups are Schizophrenia, Mood Disorders, and Eating Disorders.

- Higher costs are associated with patients aged over 65 years, with people over 85 years comprising the most expensive class.
- Coefficients of variation range from 0.54 to 0.90, with most around the 0.7-0.8 level. These CVs are regarded as acceptable, and suggest that the classes are homogeneous.
- When the MH-CASC sample is scaled to the national level, the estimated number of people in each class is sufficient to satisfy the national standard of 200.

Table D: MH-CASC Adult Completed Inpatient Episodes

Code	Class	Cost per episode	CV	Episode Cost Weight	Length of Stay (Days)	Cost per Day	Time per Day (Hours)	National annual sample estimate
ACI-1	Age < 65 years, diagnosis other than schizophrenia or mood or eating disorder	$2,484	0.83	0.64	7.8	$342	2.6	17,550
ACI-2	Age < 65 years, schizophrenia or mood or eating disorders, voluntary status, low-medium severity	$2,864	0.74	0.73	10.4	$292	2.0	12,300
ACI-3	Age < 65 years, schizophrenia or mood or eating disorders, voluntary status, high severity	$4,386	0.90	1.12	14.7	$306	2.4	3,100
ACI-4	Age < 65 years, schizophrenia or mood or eating disorders, involuntary status, low/medium severity	$4,591	0.75	1.18	14.0	$348	2.9	9,850
ACI-5	Age< 65 years, schizophrenia or mood or eating disorders, involuntary status, high severity	$5,727	0.79	1.47	17.0	$364	3.1	8,350
ACI-6	Age 65-85 years, low ADL dependency	$5,426	0.74	1.39	17.8	$308	2.6	5,100
ACI-7	Age 65-85 years, high ADL dependency	$6,655	0.72	1.71	18.6	$362	3.9	950
ACI-8	Age > 85 years	$8,710	0.54	2.23	26.3	$347	3.8	550
	TOTAL (trimmed)	$3,900	0.89	1.00	12.4	$331	2.6	57,750
	RIV Trimmed	**16.3%**						

Adult Ongoing Inpatient Episodes

This group was significantly older than the completed inpatient cohort, with an average age of 53.7 years. Thirty-nine per cent of patients were 65 or more years old. Approximately two-thirds of patients were male. Schizophrenia, Paranoia, Acute Psychotic Disorders was the most frequent diagnostic category recorded for patients in the cohort, accounting for 55% of episodes, with Organic Disorders being the second largest group, accounting for 22% of episodes. As indicated earlier, the ongoing inpatient cohort had the most 'severe' problems, based on their elevated HoNOS and LSP profiles.

Table E summarises the Adult Ongoing Inpatient classification. The model proposes 12 classes, accounting for 19.1% of variance. Classes are split on age, diagnosis, legal status, aggressive/disruptive behaviour and ADL dependency. As with the Adult Completed inpatient classification, the classes have a clinical logic, with costs moving generally in the expected direction. Key features of the model include:

- Younger patients are more expensive, reflecting current practice that to be admitted to a non-acute inpatient unit a person now must need intensive support.
- Those patients with schizophrenia or organic disorder are less costly than patients with other diagnoses.
- For the young and middle-aged group, higher aggression and involuntary legal status are associated with more expensive episodes. Splits within the younger groups, based on aggression/disruptive behaviour, are consistent with a growing body of clinical research indicating that young adult patients with high levels of aggressive or socially disruptive behaviour are replacing the older patient group in long stay psychiatric units. Recent research suggests that these patients account for a substantial proportion of total public mental health costs.
- For the older group, Activities of Daily Living is the key differentiator, with patients with higher ADL scores being more costly. This is consistent with experience in the general aged care health area.
- All classes have excellent CVs (mostly around 0.2), pointing to very resource homogeneous classes.

Table E: MH-CASC Adult Ongoing Inpatient Episodes (8 week period)

Code	Class	Cost per episode	CV	Episode Cost Weight	Cost per day	Time per day (Hours)	National annual sample estimate
AOI-1	Age ≤ 33 years, schizophrenia or organic disorder, voluntary	$10,229	0.40	0.75	$202	1.8	100
AOI-2	Age ≤ 33 years, schizophrenia or organic disorder, involuntary, low aggression	$14,145	0.24	1.03	$265	2.0	250
AOI-3	Age ≤ 33 years, schizophrenia or organic disorder, involuntary, high aggression	$15,624	0.26	1.14	$289	2.3	400
AOI-4	Age ≤ 33 years, diagnosis other than schizophrenia or organic disorder	$17,632	0.27	1.28	$329	2.8	200
AOI-5	Age 34-64 years, schizophrenia or organic disorder, no aggression	$12,110	0.22	0.88	$225	1.6	560
AOI-6	Age 34-64 years, schizophrenia or organic disorder, with aggression	$13,088	0.21	0.95	$239	1.9	800
AOI-7	Age 34-64 years, diagnosis other than schizophrenia or organic disorder	$14,989	0.25	1.09	$281	2.3	300
AOI-8	Age 65+ years, schizophrenia or substance abuse or mental retardation, no ADL dependency	$11,787	0.23	0.86	$219	1.4	330
AOI-9	Age 65+ years, schizophrenia or substance abuse or mental retardation, with ADL dependency	$13,917	0.18	1.01	$257	2.0	260
AOI-10	Age 65+ years, organic disorder, low-medium ADL dependency	$13,242	0.19	0.97	$241	2.1	500
AOI-11	Age 65+ years, organic disorder, high ADL dependency	$15,352	0.22	0.97	$284	3.0	200
AOI-12	Age 65+ years, diagnosis other than organic disorder or schizophrenia	$14,559	0.20	1.06	$270	2.2	370
	TOTAL (trimmed)	$13,722	0.25		$254	2.0	4,270
	RIV Trimmed	**19.1%**					

However, a defining characteristic of the adult ongoing inpatient cohort is the low level of variation between patients in costs (CV=0.32, untrimmed), severely restricting the scope for further variance reduction. Nevertheless, over a 12 month period, a long-stay unit would receive $48,100 more for treating a person in the highest cost class compared with the lowest cost class, an aspect that would be significant to funders.

Adult Community Episodes

Patients treated in community services were similar to the adult completed inpatient cohort in their age and sex distributions. The average age of the cohort was 42.7 years, with 14.3% of episodes accounted for patients 65 years and older. The cohort comprised roughly equal numbers of men and women. Approximately 50% of episodes were accounted for by patients assigned a Principal Diagnosis of Schizophrenia, Paranoia, Acute Psychotic Disorders. Mood Disorders was the second most common diagnosis, accounting for 26% of episodes.

Explanation of variation in the community proved more difficult than in inpatient settings, possibly reflecting the greater complexity of community care. It is arguable that the inpatient environment is more controlled, with key decisions that drive resource consumption being more under the control of the service provider. A range of factors other than patient attributes may be important cost drivers in the community, such as the variable availability of core treatment programs (e.g., 24 hour crisis teams), variations in provider practice or the level of available social and family support.

Similar patient variables driving costs in the community are also important in the community (with the exception of diagnosis and ADL dependency) but, because the patterns of care are different, the relative importance of the variables differs across the two settings.

Table F summarises the Adult Community Episode classification. The model proposes 10 classes, with splits on focus of care, legal status, clinical severity and disability. Although there is an underlying clinical logic to the community episodes classification, and the classes/costs move in 'the right direction', the overall statistical performance was only moderate. The CVs are acceptable at around 0.8, but the RIV is 12.7%. This suggests the groups are internally homogeneous, but not sufficiently different from each other to achieve a high RIV.

Adult community episodes are much lower in cost than inpatient episodes, but are higher in volume, making the financial implications of applying the classification still significant. Key features of the model include:

- The highest cost community episodes are for people with an intensive extended focus of care. The variable has clinical logic, identifying the group of the people living in the community who require constant follow-up if they are to continue outside the inpatient setting. The number of days on which treatment is provided for the intensive extended group with involuntary legal status (Class AC-10) is 11.9, nearly double the average community episode, and three times that provided to the lowest cost class (Class AC-1).

- As in inpatient settings, the HoNOS proved to be a useful tool in explaining cost variation between patients. In the community, a group of 5 (out of the 12) HoNOS measures of clinical severity differentiated classes and costs, covering: Aggressive behaviour; Suicidal behaviours, Substance Abuse; Cognitive Problems; and Hallucinations and Delusions. The higher the score on these, the more a patient class costs in the community.

- Consistent with clinician views, level of functioning or disability is also an important influence on costs in the community, as measured by the Life Skills Profile total score.
- The HoNOS clinical severity scales and Life Skills Profile interacts in a clinically logical manner. . For example, the combination of moderate clinical severity/high disability costs almost twice the class with low clinical severity and low disability ($572 and $304 respectively).
- As with inpatient episodes, involuntary legal status is an important predictor of resource use.

Table F: MH-CASC Adult Community Episodes (8 week period)

Code	Class	Cost per episode	CV	Episode cost weight	Treatment days	Cost per Treatment Day	Time per Treatment Day (Hours)	National annual sample estimate
AC-1	Other focus of care, voluntary, low clinical severity, low disability	$304	0.74	0.58	3.6	$99	0.9	11,590
AC-2	Other focus of care, voluntary, low clinical severity, moderate disability	$397	0.75	0.75	5.3	$84	0.8	3,860
AC-3	Other focus of care, voluntary, low clinical severity, high disability	$442	0.79	0.84	5.0	$94	0.9	2,390
AC-4	Other focus of care, voluntary, moderate clinical severity, low-moderate disability	$443	0.78	0.84	5.6	$90	0.9	18,030
AC-5	Other focus of care, voluntary, moderate clinical severity, high disability	$572	0.76	1.09	7.0	$88	0.8	9,500
AC-6	Other focus of care, voluntary, high clinical severity	$556	0.80	1.06	6.3	$102	1.0	11,750
AC-7	Other focus of care, involuntary, low clinical severity	$444	0.86	0.84	5.7	$86	0.9	2,540
AC-8	Other focus of care, involuntary, moderate-high clinical severity	$679	0.76	1.29	8.0	$99	1.0	9,450
AC-9	Intensive extended focus of care, voluntary	$717	0.77	1.36	8.5	$90	0.9	6,680
AC-10	Intensive extended focus of care, involuntary	$1,068	0.79	2.03	11.9	$94	1.0	2,660
	TOTAL (trimmed)	$526	0.87	1.0	6.3	$94	0.9	78,450
	RIV Trimmed	**12.7%**						

Child/Adolescent Completed Inpatient Episodes

Average age of the group was 14.4 years. The majority (59%) were adolescents in the 15-19 year age range. Depressive Disorders was the most frequent diagnosis recorded for patients in the cohort, accounting for 20% of episodes, followed by Mixed Disorders of Conduct and Emotions (16%). The low number of episodes in the child/adolescent inpatient sample limits the extent to which the diagnostic profile can be generalised.

For completed inpatient episodes only diagnosis and the disruptive/aggressive behaviour item of the HoNOSCA were used to create 3 classes. The trimmed RIV of 14.5% was comparable with the other classification branches of the MH-CASC model, and CVs around 0.7.

Table G summarises the key features of the model.

Table G: MH-CASC Child and Adolescent Completed Inpatient Episode classification

	Class	Cost per episode	CV	Episode Cost Weight	Length of stay (days)	Cost per Day	Time per Day (Hours)	National annual sample estimate
CCI-1	Other diagnoses, low disruptive/aggressive behaviour	$3,802	0.72	0.63	10.5	$417	2.9	940
CCI-2	Other diagnoses, high disruptive/aggressive behaviour	$6,839	0.73	1.13	17.3	$446	3.5	740
CCI-3	Mood, somatoform, or eating disorder	$8,339	0.75	1.38	24.6	$376	2.8	640
	TOTAL (trimmed)	$6,048	0.83	1.00	16.6	$415	3.1	2,320
	RIV Trimmed	**14.4%**						

Child/Adolescent Community Episodes

Child and Adolescent patients treated in community services were, on the whole, a younger group than their inpatient counterparts, with an average age of 11.0 years (c.f. 14.4 for inpatients). Seventy two per cent of the cohort was 14 years of less. Approximately two of every three patients were males. Mixed Disorders of Conduct and Emotions was the most frequent diagnosis recorded for Child and Adolescent community patients, accounting for 21% of episodes, followed by Conduct Disorders and Hyperkinetic disorders (9% each).

Table H summarises the Child/Adolescent Community Episode classification. The model proposes 9 classes, with splits on age, severity, global functioning, psychosocial complications and a single HoNOSCA item (School Attendance Problems). These factors were identified by the clinical panels as likely to have significance in the child and adolescent area. The CVs were mostly around the 0.6-0.7 level, and RIV was 18.8% (trimmed), significantly above that achieved in the adult community branch of the model.

Table H: MH-CASC Child and Adolescent Community Episode classification

Code	Class	Cost per episode	CV	Episode Cost Weight	Treatment days	Cost per Treatment Day	Time per Treatment Day (Hours)	National annual sample estimate
CC-1	Age < 6 years, high functioning	$165	0.67	0.44	2.3	$77	0.9	310
CC-2	Age < 6 years, not high functioning	$294	0.67	0.78	3.5	$86	1.1	1,170
CC-3	Age 6-12, low-moderate school attendance problems, low disruptive/antisocial.	$304	0.64	0.81	3.6	$88	1.0	6,570
CC-4	Age 6-12, low-moderate school attendance problems, high disruptive/antisocial	$404	0.60	1.07	4.6	$91	1.0	1,590
CC-5	Age 6-12, high school attendance problems	$547	0.65	1.45	5.9	$103	1.2	420

Table H: MH-CASC Child and Adolescent Community Episode classification

Code	Class	Cost per episode	CV	Episode Cost Weight	Treatment days	Cost per Treatment Day	Time per Treatment Day (Hours)	National annual sample estimate
CC-6	Age > 12 years, low severity, low functioning	$439	0.59	1.16	4.2	$116	1.0	260
CC-7	Age > 12 years, low severity, high functioning	$333	0.75	0.88	3.5	$100	1.0	3,940
CC-8	Age > 12 years, high severity, low psychosocial complications	$445	0.89	1.18	4.3	$110	1.1	1,050
CC-9	Age > 12 years, high severity, high psychosocial complications	$817	0.86	2.16	7.1	$118	1.1	1,460
	TOTAL (trimmed)	$377	0.90	1.00	4.1	$95	1.0	16,770
	RIV Trimmed	**18.8%**						

'Bundled Episodes'

Classification development in which episodes of care are defined across treatment settings is unexplored territory in Australian casemix research. Few precedents were available to guide the analysis approach taken by the Project Team. The exploratory work undertaken in this area by aimed at demonstrating the potential for further development of cross setting models.

Those patients in the adult patient cohort who were under care for a minimum of four weeks during the study period, and who were treated within integrated mental health sites, were included in the analysis cohort (n=8,067). For each patient, 8-week period costs were calculated, with upward and downward scaling applied to patients who were under care during the study for less than or greater than 8 weeks, respectively.

The optimum classification contained 12 classes that accounted for 27.9% of variation in the 8-week costs, using trimmed data. However, the statistical performance is below the setting-specific episode classification when trimming and CV levels are taken into consideration.

Three features of the classification are prominent. Firstly, there is considerable heterogeneity in the untrimmed cost data, primarily due to the fact that high cost admitted patients and low cost community patients have been brought together. Related to this, standard casemix trimming formulae bring the intra-group variation to reasonable levels, but exclude 10.8% of high cost cases. Finally, the imbalance in the volume of cases between the 12 classes is significant.

Patient variables found to predict 'bundled' 8-week costs included legal status, clinical severity, age, diagnosis, psychotic symptoms, suicide risk and aggressive/disruptive behaviour. Of these, legal status was the best single predictor of costs. However, in this analysis, legal status acted as a proxy to indicate whether the patient had been admitted for an inpatient stay. Inpatient status alone accounted for 42% of the variation in 8 week costs, but this was excluded from the analysis because it is a service attribute rather than a patient attribute. The preferred approach is to isolate those patient factors associated with inpatient status and involuntary legal status.. Initial exploratory work to identify the clinical indicators of involuntary legal status was, however, unsuccessful.

Suggested directions for further work on 'bundling' episodes of mental health care are outlined in the final chapter of the report.

Summary of patient cost drivers

In summary, the study found there is a clinically logical relationship between patient attributes and resource use in Australian mental health services. Patients who are expected to cost more usually do cost more.

Table I summarises the patient cost drivers found to be influential in each of the episode types.

Table I: Patient cost drivers for each of the episode types

	Inpatient Episodes	Community Episodes
Adult services	*Completed Inpatient Episodes* • Age (very old = highest cost) • Diagnosis, with Schizophrenia, Mood and Eating disorders the highest costs • Overall severity (as measured by HoNOS total score) • Involuntary legal status • ADL dependency (for >65 years only) *Ongoing Inpatient Episodes* • Age: Young adults more expensive (when combined with other attributes) • Diagnoses other than Schizophrenia and Organic Disorders associated with higher cost • Aggressive/disruptive behaviour • Involuntary legal status • ADL dependency (for > 65 years only)	• Clinical Focus: Intensive Extended Care vs Other • Involuntary legal status • Overall clinical severity (as measured by HoNOS clinical scales) • Disability (as measured by LSP)
Child and Adolescent Services	*Completed Inpatient Episodes* • Diagnosis: Mood, Eating and Somatoform disorders more expensive • Disruptive/Aggressive behaviour	• Age: Distinguish pre-school, primary and secondary • Overall clinical severity • Level of functioning • Disruptive/aggressive behaviour • 'Psychosocial complications' • Problems at school

Comparative performance of the MH-CASC Classification Model

The AN-DRG3 classification offers the only benchmark for comparing the MH-CASC model. To place the MH-CASC finding alongside AN-DRG3, both adult and child & adolescent completed inpatient episodes were combined in the comparison samples. Table J summarises the comparison of the two classification approaches. It indicates that the MH-CASC classification achieves both a higher RIV and lower CVs than those achieved by the AN-DRG3 model.

Table J: Comparison of AN-DRGs and MH-CASC classifications for Completed Inpatient Episode costs (adult and child/adolescent combined)

	AN-DRG	MH-CASC
Number of cases	2,541	3,758
Number of classes	8	11
Reduction in variance (RIV)		
- Untrimmed	3.8%	8.7%
- Trimmed	9.9%	17.3%
Range of Coefficient of Variance (CV)		
- Untrimmed	0.71 to 1.24	0.60 to 1.15
- Trimmed	0.63 to 1.15	0.54 to 0.90

The 9.9% RIV finding, resulting from application of the AN-DRGs to the MH-CASC data set, is comparable with the 11.7% RIV published by the Australian Casemix Clinical Committee (ACCC). The ACCC used length of stay as the dependent variable, and drew on the national hospital morbidity dataset, including non-specialised mental health services. Same day admissions were included in the ACCC but excluded in the results presented above.

Subsequent adjustments to AN-DRGs for the fourth version used 'intended same day' status to partition episodes in the revised AN-DRG4, with RIV results of 35.6%. The MH-CASC dataset confirms this finding. When the MH-CASC cohort included the 'intended same day' group in the acute inpatient cohort, it found untrimmed RIV for AN-DRGs of 36.6% and a trimmed figure of 44.1%.

This line of analysis was not pursued in MH-CASC study, as the Project Team decided that intended same day patients were more appropriately included in the community cohort. This decision was taken for several reasons.

First, there is ambiguity in how 'intended same day' is defined by mental health service agencies, with day programs being defined by some as community services and other as inpatient admissions. Second, data collected in the MH-CASC study revealed that there is no obvious difference between community and intended same day in the amount of treatment time provided to the patient. Third, use of same day inpatient classes could create a funding incentive to bring patients in for hospital based programs, rather than treat them in the community. Finally, the approach was considered to lack statistical credibility as it uses a dependent variable (one day length of stay) to predict a dependent variable (length of stay). The standard casemix approach uses patient characteristics as the independent variable, so that resource input (dependent variable) can be matched to patient need (independent variable).

The role of provider factors

Although patient factors were shown to drive costs, the "signal" was relatively weak. Other factors may have contributed to the study findings, such as variations in providers' practices which was unrelated to clinical needs of patients

The variable 'Site', used as proxy for provider, was shown to be a significant predictor of patient cost variation, even after cost standardisation adjustments to reduce its effects. In isolation, this finding is ambiguous because it provides only indirect evidence of genuine provider differences. It might be, for example, that 'Site' was a good predictor of costs because sites differed in their casemix.

For this reason, provider factors were explored further in an effort to disentangle the provider factors and patient factors more fully. This was done by examining the level of servicing to patients within two of the MH-CASC classes (Class ACI-5 and Class AC-6). This method controls for variations between sites that are attributable to patient differences and allows provider variation to be isolated.

Within these classes, there was still significant variation across sites. For example, average length of stay for patients in the adult class ACI-5 (completed inpatient episodes, age less than 65 years, with a diagnosis of schizophrenia, mood or eating disorders, of high clinical severity, and involuntary at some point in the episode) varied from 10.7 days to 30.0 days. Likewise, average treatment time per day dedicated to patients of this class varied from 1.6 to 5.1 hours. These differences were unrelated to the overall casemix complexity of each site.

Similarly, patients in the adult class AC-6 (community episodes where the Focus of Care was recorded as other than Intensive Extended Care, high clinical severity, always voluntary) varied considerably across sites in terms of the care they received. The number of days that a patient was seen over an 8 week period varied between sites from 4 to 10.5 days, and total treatment time ranged from 4.5 to 9.4 hours. Again, these differences were independent of the sites' casemix complexity.

Some provider factors may be structural (e.g., types of service available, overall resource availability) and others may be under the control of individual clinicians (e.g., differences in clinical practices). Further work on the impact of levels of resourcing and service structures is required to disentangle these factors.

The challenge for the mental health community is to work together to strengthen the patient 'signal'. This may be assisted by a range of strategies, including clinical protocols developed by the professions, use of the MH-CASC classification for management information and review, and perhaps piloting of the classification for funding purposes.

Implications for funding and the National Mental Health Strategy

The MH-CASC Project has wide ranging implications for both the funding of mental health services and, more generally, the National Mental Health Strategy. Additionally, the MH-CASC classification model raises a number of issues that need to be considered as part of a general review of its suitability for use in a funding context.

The suitability of the MH-CASC classification for application

The central question to be asked is whether the MH-CASC classification, developed from current patterns of service use, is suitable for use in a funding or management information context. There will be different views on this issue.

While the adoption of the classification is ultimately a decision for funders of mental health services, a range of issues should be considered in reaching a final judgement.

The most important of these concerns the purposes of a casemix classification. Casemix systems have become synonymous with funding models for health services in Australia. However, their origin was motivated not by a desire for new funding arrangements, but instead, by the need for tools to support quality assurance and utilisation review.

They do this by providing a method to describe the products of health care delivery that controls for differences between providers caused by those providers treating different types of patients. By controlling for patient differences, the contribution made by provider differences to patient costs and outcomes can be better understood.

It is important to recall that this was the development path taken with the AN-DRG classification in Australia, with it first being introduced in the mid 1980's for management purposes long before its application in a funding context. The experience gained through this process allowed clinical refinements and improvements in precision to be made, along with modelling of the implications of using casemix for funding purposes.

In reviewing the early years of casemix in Australia, the March 1997 edition of the Australian Casemix Bulletin commented that the current Australian approach " did not emerge out of the ether fully formed. It was built on the foundations of many years thought, work and research."

The point here is that mental health services in Australia are only at an early stage of the casemix development cycle. The types of issues confronting the mental health industry, such as apparent wide variation between providers, the absence of clinical protocols, lack of national benchmarks and other tools to support service reforms, are comparable to those that initially drove the DRG development program. Distinguishing the role of a casemix classification in resolving these issues, from its more narrow use as a tool for funding, is critical in the decision about how to apply the MH-CASC classification model. Most important is the need to recognise that improvement only comes with practice experience, and that a start often needs to be made using imperfect solutions.

In deciding whether the MH-CASC classification should be pursued, national and state jurisdictions will need to assess the range of uses of the model. These include:

- **Funding purposes**. The utility of the classification for funding will need to be assessed by individual funding authorities, taking account of the adequacy of their existing approach to funding.

  Funders are likely to be cautious of immediate use for funding purposes because of the comparatively low RIV statistics when compared with AN-DRGs for acute inpatient services. However, this will depend on whether they regard the current historical or input based funding as preferable.

  As indicated in Table J, the classification performs better than the AN-DRG mental health classification both in terms of its capacity to explain patient cost variation and the statistical homogeneity of its classes. Perhaps more importantly, it provides coverage of both inpatient and community services, and avoids the potential for distorted incentives created when a classification is implemented that covers only the acute hospital sector.

  In its current form, the classification is likely to be useful as a management and clinical information tool that can inform funding decisions by providing more information on who is receiving mental health resources.

- **Costing and benchmarking purposes**. The classification may be used to develop cost benchmarking information, enabling service agencies to make comparisons with other sites on the costs, length of stay and treatment days for similar cases. This can have an influence on practice, and by itself strengthen the statistical result of the classification.

- **Quality management**. Services may wish to collect the data to monitor the quality of services over time.
- **Clinical protocols**. The classification provides a base for the development of clinical protocols, in terms of establishing a framework for determining what package of services each group should receive. The objectives here would be to amplify the classification/costing signal, and encourage more normative practice.
- **Outcome measurement.** A longer term monitoring of clinical attributes will assist in determining the outcome of treatment interventions. Several of the measurement instruments upon which the classification is based were designed explicitly to monitor change over time.

Overall, the Project Team believes that the combined benefits to the National Mental Health Strategy of the MH-CASC model are sufficient to justify its adoption as the first version of an Australian mental health casemix classification.

Implications for data collection

The MH-CASC classification model has implications for data collection, since the majority of the variables which define the 42 MH-CASC patient classes are not routinely collected. Considerable change in collection and reporting arrangements would be required. Table K summarises the recommended data collection cycle required to implement the MH-CASC classification.

Further development of the classification

Ongoing refinement of the classification is necessary. Development work leading to the second version of the classification should include:

- **Clinical review and refinement.** Similar clinical review processes should be put in place as those that exist for the ongoing refinement of the AN-DRG classification.
- **Relevance to the non-specialised mental health sector and linkages with other classification systems.** MH-CASC was limited to specialised mental health services. As such, it is not possible to state whether the classification would perform in the same manner in mental health services provided within the general health sector. Given the mainstreaming objective of the National Mental Health Strategy, it would be desirable to explore this question. As an initial step, it would be valuable to determine how the MH-CASC classification interfaces with other classifications from different sectors, specifically AN-DRGs and AN-SNAP (Australian National Sub-Acute and Non-Acute Patients.)
- **The place of 'intended same day' admitted patients in the classification.** 'Intended same' day admitted patients are included in the MH-CASC community classification, rather than with inpatient episodes, because the 'intended same day' and 'community' product looked similar to each other in terms of staff input. This deviates from the approach advocated by the Australian Casemix Clinical Committee in 1997 with regard to the revised Version 4 of AN-DRGs, which distinguishes them from community patients. To resolve this issue, the Project Team suggests that a review of a representative sample of intended same day programs should be undertaken, both from a clinical 'appropriateness' and a costing perspective.

Table K: Recommended data collection cycle required to assign episodes to classes within the MH-CASC classification

Adult Mental Health Services :	
a. Inpatient settings	**Data collected at:**
Age RUG-ADL (for over 65 years only – within 24 hours of admission)	At admission
Health of the Nation Outcome Scales Legal Status	14 days following admission, or discharge if this occurs sooner. If Episode continues beyond three months: • reassess at three months and • repeat at 3 monthly intervals thereafter; and • repeat at discharge.
Principal Diagnosis	At discharge. If Episode continues beyond three months: • collect at three months and • repeat at 3 monthly intervals thereafter; and • repeat at discharge.
b. Community settings	**Data collected at:**
Age	At registration
Health of the Nation Outcome Scales Focus of Care Legal Status Life Skills Profile (abbreviated version)	4 weeks following registration, or discharge from care if occurs sooner. If Episode continues beyond 3 months: • reassess at 3 months; and • repeat at 3 monthly intervals thereafter; and • repeat at discharge from care.
Child and Adolescent Psychiatry Services	
a. Inpatient settings	**Data collected at:**
Health of the Nation Outcome Scales for Children & Adolescents Principal Diagnosis	14 days following admission, or discharge if occurs sooner. *Note: Collection requirements for ongoing inpatients to be resolved*.
b. Community settings	**Data collected at:**
Age Health of the Nation Outcome Scales for Children & Adolescents Chidrens Global Assessment of Functioning ICD-10 Factors Influencing Health Status	4 weeks following registration, or discharge from care if occurs sooner. If Episode continues beyond 3 months: • reassess at 3 months; and • repeat at 3 monthly intervals thereafter; and • repeat at discharge from care.

- **Relationship of episode costs to long term costs.** The construction of episode definitions for the MH-CASC classification was largely dictated by the 91 day study time frame. Further work is required to understand the relationship between the short term episode costs used in the MH-CASC classification and the long term care costs for individual patients. As a start, the care patterns of the MH-CASC patient cohort in the 12 months prior to and following the 12 month study period should be reviewed. Research of this type would require linkage of MH-CASC data with service utilisation data collections maintained at the site or State/Territory level.

- **Developing approaches for high cost outlier patients.** . Trimming of high cost patients occurred post-class finding with an effect of reducing average costs for each of the classes. Trimmed cases ranged from 3.2% of Adult Ongoing Inpatient Episodes to 7.2% of Adult Community Episodes. While trimming is an accepted procedure to achieve more reliable estimates of average costs, value is likely to be gained from a specific study of high cost patients. Special arrangements would be required for dealing with 'outliers' should the MH-CASC classification be implemented in a funding model. Further work is required to unravel the distinguishing features of exceptional cost patients and explore the relationship between exceptional episode costs and longer term costs.

- **Using the classification for cost benchmarking.** Three issues should be considered in using costs reported in the MH-CASC study to establish costing benchmarks: (1) adjustments would need to be made to reflect the exclusion of non-core costs such as pharmacy, which are estimated to account for 5-8% of total costs; (2) adjustments would need to be made for the fact that labour costs were standardised; and (3) agreement would need to be reached about how best to trim the data to reflect average costs.

- **Using the classification for 'good practice costing'.** The MH-CASC classification is based on the costs of 'average practice' as it existed in late 1996. Concerns have been raised about using this as a base to fund future services, as it may not be consistent with 'appropriate practice'. To test the validity of this concern, consideration should be given to using the MH-CASC classification to establish cost estimates for each of the classes based on 'good practice' clinical protocols.

- **Next steps for development of 'bundled care' concepts and other approaches to support service substitution.** The short timeframe of the study, along with the diverse types of multi-episode sequences, limited the Project's initial ambition to develop a classification that would provide a financial incentive for substitution of inpatient admission by community care. Further work may point to greater opportunities for bundling care. For example, a pilot study could be conducted, in which collection of patient attribute data and number of treatment days could be collected. Alternatively, jurisdictions with comprehensive databases could examine the service utilisation pattern of those in the MH-CASC dataset to determine twelve month profiles.

- **Use of Age, Legal Status and Focus of Care.** Three of the variables used to differentiate patient classes are subject to debate:

  Age: The Adult Inpatient (Ongoing and Complete) and Child/Adolescent episode types use Age as a top-level splitting variable. Age is also used as a splitting variable in AN-DRGs. There is concern that this is a relatively arbitrary split, and the person's need for care (and associated reimbursement) should be linked more directly to clinical factors. The alternative view is that broad Age groupings do make clinical sense (e.g., the care needs of a younger person with schizophrenia or mood disorder are different from those of an older person). An important aspect of the ongoing clinical review of the MH-CASC classification is to confirm whether there is broad support for the use of Age as a classification variable.

Legal Status: Legal Status is a key classification variable in all Adult episode types. It is also included in the fourth Version of the AN-DRG classification. There is concern that the use of Legal Status for funding may create an incentive for people to be classified as involuntary to receive higher reimbursement. The contrary view is that the administrative requirements of mental health legislation are such that clinicians are unlikely to take such action, and their professional ethic is to use Legal Status only if it is clearly necessary. The preferred option would be to find the mix of clinical factors that underlie involuntary Legal Status. Further work is needed to 'unbundle' the clinical attributes associated with involuntary mental health care.

Focus of Care: Focus of Care was excluded as a classification variable in all episode types except Adult Community Episodes due to concern about the measure's 'hybrid' status (in that it combined elements of the independent variable set with elements of the dependent variable set), a belief that it may be easily 'gamed' if applied in a funding context, and concerns that its psychometric properties were unknown. As with Legal Status, the preference would be to find clinical attributes that correlate with it. Further work is needed to refine and test the variable, or to determine the clinical factors that underlie it.

- **Refinement of the patient measurement instruments.** The majority of the measures used in the MH-CASC classification are captured by rating instruments developed for other purposes. These need to be subject to ongoing refinement based on experience in their use.
- **Children and adolescents in ongoing inpatient care.** In the MH-CASC Project, no attempt was made to classify people with ongoing episodes in child/adolescent specialist mental health services, due to their small numbers. However, it is recognised that such a group exists and has a genuine need for such ongoing care. Consultation with experts is required to determine the most appropriate way to fund this group.
- **Approaches for patient care activities outside the scope of the classification.** All four non-patient attributable activities (services to unregistered clients; teaching, training and research; consultation-liaison services; and community development) would fall outside the boundaries of any funding system that allocated resources solely on the basis of casemix output. Separate funding options need to be developed for these 'products'.

Suggestions for funding model design

Although the aim of the Project was to develop a classification system for mental health, the research work has a number of pointers for future funding model design:

1. There remains considerable scope for substitution between acute inpatient and community care, and a high risk of distorted incentives if only one service type is funded using casemix. If acute specialised mental health services are to be funded on an activity-basis (whether through AN-DRGs or the MH-CASC classification), then the MH-CASC classification model should also be used to fund community mental health services.

2. Design of any activity-based funding system for the community should be based on the number of services a person receives in a time period, not the cost per occasion of service. Defined periods of care should be the basis for funding community programs.

3. The study has identified those clinical factors that predict hospitalisation, which may be useful for utilisation review.

4. Funding of an 'intended same day admitted' patient class or episode type should be avoided.

5. Per diem funding should be used to fund non-acute inpatient services, and not completed episodes of care.

6. The early days of 'acute' inpatient stays do cost more than later days, but not enough to justify a step-down funding system.

7. The data collected during the MH-CASC study do not support funding models which make reimbursement contingent on changes in outcomes as measured by current instruments.

8. If casemix funding is introduced to specialised mental health services, then there are other services or 'product lines' that need to be funded apart from casemix, specifically: brief assessments; consultation-liaison; teaching, training and research; and community development.

Strengthening the signal

The major challenge for the mental health community is to strengthen the signal so that there is a more normative pattern of service that differentiates the types of patients using specialised mental health services.

Casemix tools could greatly assist this work to proceed, because they provide a system to describe patients in a way that makes sense clinically, and which has meaning in terms of resource utilisation. It is not possible to disentangle the role of provider factors from patient factors without some standard system to compare patients. Similarly, a patient classification system is the starting point for development of clinical protocols.

The MH-CASC classification provides a basis for further development of normative patterns of care based on the attributes of people with mental disorders using specialised mental health services. There are a number of initiatives that could be contemplated:

- Use of the classification for management information, benchmarking, outcome and quality review is likely to focus services more directly on the patterns of care being provided to different types of patients. Implementing routine collection of the MH-CASC patient dataset, and collation and publication of the data by a national benchmarking unit, could be considered.
- The professional colleges, in collaboration with State and Territory mental health units, could be funded to develop clinical protocols or pathways. The service utilisation patterns for the MH-CASC patient classes are a valuable resource in identifying the type, level, and cost of service over the three-month period of the study. The colleges could compare this with what is regarded as appropriate practice. The MH-CASC database is structured to allow future analyses of these patterns.

- Some sites could be selected for pilot collection of the patient attribute data for grouping into the MH-CASC classes and modeling of their use for funding purposes. Sites that participated in the study would have the relevant training and expertise for this. Such a pilot should look at more long-term service utilisation patterns, and changes in clinical ratings over time, to enable further development of the bundling option.

Classification development, refinement and implementation are iterative processes. The above list is clearly not exhaustive, and other possibilities will emerge as the mental health industry gains experience in this area. The MH-CASC classification offers a potential base for many future developments in the mental health sector.

SECTION 1

Background

Chapter

1

Introduction

Over the past 10 years, casemix classifications have become an integral component of Australia's health care system through major research and development programs sponsored by the Commonwealth Department of Health and Family Services. Initially, mental health services were excluded from those programs. This was based on the industry's concerns about the lack of appropriate classification tools, the 'non-acute' and 'chronic' nature of its patient population and its community-based orientation.

The isolation of mental health services from casemix developments has had the undesirable effects that the services have failed to influence and benefit from the major developments in health policy and funding of the past 10 years. The Mental Health Classification and Service Costs (MH-CASC) Project was commissioned in mid-July 1995 by the Department of Health and Family Services to develop a classification system which provides the basis for a rational funding model for mental health services. Funding was provided under the National Mental Health Strategy and the Casemix Development Program

The current organisation of Australia's public and private mental health services is such that they are mostly funded regardless of the type of patients using the services. Public sector specialised mental health services are funded either using 'inputs', such as number of staff, or on an historical basis. Under such a system, services receive the same amount of funding regardless of the number or type of patients receiving care. Private mental health services are funded per bed day or occasion of service, with the incentive to increase the number of bed days or services provided, but not necessarily to link these to the different types or needs of patients.

Neither public nor private mental health services have financial incentives for substitution of community-based care for inpatient care. If a service succeeds in reducing hospitalisation, this tends to be a saving to the funding body, rather than available for redistribution within the specialised mental health service. Similarly, existing funding approaches do not create financial incentives for efficiency, improvements in service quality, or consumer outcomes.

Under the Medicare Agreements between the Commonwealth, States and Territories, effective from July 1993 to June 1998, Australian Health Ministers agreed to move towards the establishment of a nationally consistent casemix-based management and information system, which could serve as the basis for alternative funding arrangements. Such funding schemes are believed to:

- be inherently fairer than historical funding because they pay health services on the basis of their activities, measured in terms of the number of patients treated and the severity of their conditions;
- have superior incentives for productivity; and
- reinforce best practice (e.g., reduce excessive hospital stays)

Achieving this potential is contingent on the tools available for classifying and setting prices for services. In acute inpatient settings, the Australian National Diagnosis Related Groups (AN-DRGs) have been used as the classification system of choice. This classifies patients primarily on diagnosis and procedures. Concern has been expressed by the mental health sector that a classification system based primarily on diagnosis does not explain adequately the variation between mental health consumers in their needs for care.

The literature identifies a number of alternative mental health classification systems. Many are unsuitable because they perform poorly in terms of predicting resource use, or because they have an unwieldy number of classes.

Others are not regarded as being able to be readily applied in Australia, they are limited to specific service settings (primarily acute or long-stay inpatient settings), with few community-based and/or cross-setting instruments. It is considered that the introduction of casemix payments for hospital care in isolation from community care may act as a disincentive to achieving the kinds of services promoted under the National Mental Health Strategy. The nature of many psychiatric disorders means that they require treatment in a variety of settings (e.g., acute, community, long-stay residential) throughout their course. A broad case-based funding approach is advocated for mental health services that take account of the need for integration of care. The MH-CASC Project was designed specifically to test the hypothesis that adding other patient attributes to diagnosis, such as severity and level of functioning, would enable mental health consumers to be better differentiated.

Project aim

The aim of the MH-CASC Project was to develop the first version of a national casemix classification, with associated cost weights, for specialist mental health services that:

- is consistent with the National Mental Health Strategy;
- can be used to classify mental health patients in the various treatment settings;
- includes an appropriate number of casemix classes, each of which is iso-resource and clinically meaningful; and
- was developed through a nationally coordinated research Project incorporating both the public and private sectors and a representative sample of study sites.

The desired output of the study was a proposed patient classification system, with associated cost weights of each patient class for the following service types:

- acute inpatient
- non-acute inpatient
- community-based services.

The study aimed to further analyse costs across-settings and over time, to facilitate more ‘bundled’ funding approaches - such as the relative cost of treatment over three months for one patient class compared with another, or the number of hospital days over a twelve month period for different patient classes.

The objectives of the Project are summarised in Table 1.

Table 1: Objectives of the MH-CASC Project

- To develop the first version of a national casemix classification for Australian specialised mental health services
- To develop cost weights for this classification system which can be used for funding

Key questions

To achieve these objectives, the Project was required to address three key questions. These are summarised below.

Table 2: Key questions addressed by the Project

1. Is there a relationship between patient attributes, or need, and service costs?	• Do higher need patients cost more? • How do we classify patient need? • Is there a normative clinical pattern in Australia's specialised mental health services?
2. Is the pattern sufficiently strong to use it for funding?	• Is it consistent with casemix statistical standards? • Is there clinical logic in the statistical pattern?
3. Can the classification advance the National Mental Health Strategy?	• Can the classification be used to reward continuity of care in the community, by: – Reducing the separation of inpatient and community services? and – Facilitating the movement of patients between hospital and the community? • Would its use support integration and mainstreaming? • Does it give priority to high need groups? • Can it be used to promote a focus on consumer outcomes?

Scope

The study covered public specialised mental health services and specialised private hospital acute units. Private psychiatric practice were excluded from the costing aspect of the Project, but Medicare Benefits Schedule (MBS) data were sought on the use of private psychiatrists by study participants. Out of scope were mental health services provided by general hospitals without specialised psychiatric units and by general practitioners.

Structure of this report

The remainder of this report describes the development of the classification.

It is divided into the following sections:

Section Two: Study methodology for collecting service use and patient attribute data.

Section Three: Approach to costing.

Section Four: Overview of the dataset (summary of the data collected).

Section Five: Preparatory analysis (e.g., definition of episodes for classification).

Section Six: Classification development (presents the MH-CASC classification, and reviews performance of AN-DRGs and clinically hypothesised groups).

Section Seven: Review of the classification model (assesses the potential of the model and considers its use in advancing the objectives of the National Mental Health Strategy).

This report has been designed as a stand-alone document, but further details about some Chapters can be found in several supporting documents which have been prepared during the course of the Project: MH-*CASC Progress Report - Initial Consumer Groupings*, October 1995[1]; *MH-CASC Proposed Study Methodology for Stage Two*, June 1996[2]; and *MH-CASC Study Manual*, August 1996[3]. These documents are referred to in the text as appropriate.

A supplementary 'technical' volume of resource materials has been produced as a separate publication to accompany this report. Readers should consult the *Volume 2* for materials relating to:

- the study procedure, including data collection forms, information pamphlets, privacy protocols and so forth;
- aspects of the research design, including selection of patient measures and site sampling approach;
- detailed descriptive statistics on the analysis cohorts; and
- supplementary analyses of the MH-CASC data set.

Chapter

2

Generating Hypotheses on Predictors of Resource Use

The initial stage of the MH-CASC Project involved generating hypotheses about which patient attributes would be likely to predict resource use by consumers of mental health services. This involved three key elements:

- A review of the international literature was conducted to identify potential patient attributes that should be tested in the development of the classification.
- A series of Clinical Panels were convened, at which clinicians representing a mix of sub-specialties and disciplines were asked to identify patient attributes that they thought would be likely to predict resource use and to generate patient classes based on these characteristics.
- A preliminary validation study was then conducted on the groupings covering 'schizophrenia and related disorders' and 'mood disorders', to 'test drive' the initial patient groups with practising clinicians and to undertake early analysis of differential resource use by the groups.

The results of each of three elements involved in hypothesis generation are briefly summarised below. Greater detail is provided in a previous Project report.[1]

Literature review

Over 300 papers examining predictors of resource use in mental health were reviewed. The majority of this literature directly assessed the impact of various patient characteristics on resource utilisation, and the remainder included studies from which indirect inferences could be made, including patterns of care literature and treatment guidelines.

The majority of studies considered resource use in an acute inpatient setting or resource use over time, although some dealt with other non-acute inpatient settings and community-based services.

The literature review was confined to examining predictors of resource use that could be described as patient characteristics, and excluded service-based predictors (such as hospital type). This was thought to be consistent with mainstream casemix approaches, where patient attributes are the independent variable, and type of service used is the dependent variable.

It should be noted that a limited number of mental health classification systems were identified in the literature review. None was regarded as able to be readily applied in Australia because they either

- were limited to specific service settings (most were specific to acute or long-stay settings, none included community-based settings); or
- were poor predictors of resource use or provided too little information for such a judgement to be made; or
- had an excessive number of classes; or
- were based on a classification of outcomes rather than attributes, which determine patterns of care and resource use.

Seven key attributes were identified in the literature, each of which is discussed briefly below.

Diagnosis

In the acute psychiatric inpatient setting, diagnosis is not regarded as an adequate predictor of resource use by itself. For adults, diagnosis alone explains between 2-19% of the variance in length of stay[4,5,6,7,8,9,10,11,12,13,14,15] depending on the trimming criteria used. For adults, the diagnoses associated with longer lengths of stay and high readmission rates are schizophrenia and major affective disorders. [9,16,17,18,19,20,21,22] For children, diagnosis only explains 3% of the variance in length of stay, with those with personality disorders, associated affective disorders, psychoses, organic and developmental disorders, and aggressive conduct disorders tending to stay longer than those with other diagnoses.[23,24,25,26]

The literature suggests that combining diagnosis with other patient characteristics increases its ability to predict length of stay in the acute inpatient setting.[27] For example, a Psychiatric Patient Classification System developed for the United States Veterans' Administration found that combining diagnostic groupings with other patient attributes (e.g., severity, medical complications) achieved a four to five times better explanation of variance in length of stay than Diagnosis Related Groups (DRGs).[28]

The evidence of the impact of diagnosis on resource use outside of the acute inpatient setting is sparse, but there is some suggestion that diagnosis may have some predictive power. Specifically, those making medication visits and brief visits to outpatient services have been shown to be likely to have been diagnosed with a psychotic disorder[29], and this group (along with those with a borderline personality disorder) have also been found to be the heaviest and longest-term users of both inpatient and outpatient services over time.[30,31,32,33,34]

Severity of symptoms

Although it is not unequivocal, the body of evidence suggests that severity of symptoms has an influence on mental health resource use. Studies that have directly examined the link have found severity to explain up to 24% of the variance in acute inpatient stays.[35,36] The patterns of care literature indicates that severity is associated with greater use of all services, and particularly of higher inpatient use and more intensive day and community treatment.[37,38,39,40,41,42]

Clinicians themselves rate severity as the greatest predictor of resource use[5], and this is evident in nursing classification instruments adopting severity as a factor which is predictive of high nursing dependency[43], and treatment guidelines pointing to specific differences in treatment depending on whether a person's symptoms are mild, moderate or severe.[44,45,46]

Although severity would appear to be a likely candidate for inclusion in a classification aimed at predicting resource use in mental health, care should be taken because of the variety of meanings that different people attach to the term. Severity has been variously used to refer to: the type of acute symptoms; the number and intensity of acute symptoms; the persistence of acute symptoms, or their responsiveness to treatment; the type and level of 'negative' symptoms, such as flattened affect; the impact of symptoms on personal functioning; or even a range of attributes, such as level of functioning, history of hospitalisation and so forth.[12,43,47,48,49] Caution needs to be exercised to ensure that there is no overlap between severity and other attributes.

Risk of harm to self or others

In the acute inpatient setting, studies which have directly examined the relationship between risk of harm to self or others and resource use have consistently shown suicidality to be predictive of greater lengths of stay. The evidence regarding danger to others is more equivocal in this setting. [50,51]

In the long-stay inpatient setting, danger to others has been shown to be associated with higher levels of resource use, as reflected in Fries et al.'s long-stay inpatient classification which initially splits on aggressive or self-destructive behaviours.[49]

For people with severe and borderline personality disorders, those who consume the greatest quantity of resources across all services tend to be at risk of harm to themselves.[34]

Risk of harm to self or others has been viewed as a significant predictor of resource use by clinicians, with nursing dependency scales prioritising dangerousness as a significant factor[43], and treatment guidelines giving strong and consistent emphasis to danger to self or others as a consideration of where to treat the patient, and the degree of supervision needed.[44]

A recent review of research in the United States' public mental health system concluded that 'disruptive behaviour' appears to be the major determinant of costs, and outweighs the influence of demographic and clinical factors which have been the main focus of previous research work. Disruptive behaviour is defined as " any behaviour that causes harm or discomfort to the individual engaging in the behaviour, to another person or to the environment".[52]

Level of functioning and social support

The concept of functioning has various dimensions, including social, physical, occupational and economic functioning. It should be considered in conjunction with social support, since the extent to which services need to respond to problems in functioning is partly contingent upon the level of social support available to a person (e.g., a person with poor social functioning may have a strong social support network which compensates for personal limitations).

Various studies have found that patients with extended hospital stays, or those with a high number of bed days over a time period, tend to function at a lower level than patients staying for shorter periods (both in the acute and non-acute inpatient setting)[10,16] and this has been reflected in several psychiatric patient classification systems[28]. Likewise, studies have shown that patients with poor social functioning and impaired ability to perform activities of daily living incur higher costs in the community than their higher functioning counterparts.[47,53,54]

Similarly, a number of studies have shown shorter lengths of stay in acute and non-acute inpatient setting to be associated with high levels of social support, as measured by expressed desires of the family regarding discharge, availability of accommodation and related issues.[51,55,56,57,58] Family situation has been shown to be particularly important in predicting length of stay for children and adolescents.[59]

Clinical opinion concurs with these findings[60], and again this is reflected in nursing dependency scales (which include self management and social skills as discriminating variables in determining nursing resource needs)[43] and treatment guidelines (which consistently factor social support into treatment choices).[44,46]

Co-morbidity

The literature points to three types of co-morbidity that may influence patterns of care or resource use: psychiatric co-morbidity, substance abuse, and physical co-morbidity.

However, it is often relatively non-specific on what combinations of co-morbidities are likely to influence patterns of resource use. For example, Ashcraft et al.'s psychiatric classification system developed for acute inpatient services found the number of medical complications to differentiate resource use, but included both physical co-morbidities and substance abuse in this concept.[28] Likewise, a major United States study of 170,000 Medicare and Blue Cross/Blue Shield admissions found that psychiatric or physical co-morbidity explained about 7% of the variance in length of stay, but again did not differentiate between the two.[61]

There are studies, however, which isolate one of the three types of co-morbidities. In particular, the relationship between substance abuse as a co-morbidity and resource use both within and across services, has been examined. For example, an American study of patients in a community support program found that treatment of patients with concurrent substance abuse and schizophrenia is significantly more costly than that of patients with no history of substance abuse.[62]

Treatment guidelines make extensive reference to substance abuse as a factor which will add complexity and difficulty to the treatment of a patient with a psychiatric disorder, citing implications for co-operation with treatment, feasibility of using some drug therapies and other treatment issues.[44]

It should be noted that in testing its potential relevance as an attribute in the classification, presence of co-morbidities should be defined in such a way as to not run the risk of overlapping with other patient attributes, such as level of functioning.

Socio-demographic characteristics

Many studies have analysed the socio-demographic factors that can predict resource use among mental health care consumers. However, much of the evidence is derived from epidemiological studies, rather than studies that specifically examine the different interventions needed by patients with particular attributes. To be used in a classification system, there needs to be a direct or indirect link between the specific attribute and the pattern of care to be provided.

In addition, some of the characteristics that have been identified as predictive of resource use would be difficult to defend in the design of a reimbursement system (e.g., socio-economic status, and marital status). They are included here, however, to provide a complete picture from the literature, and should be tested in the classification.

Age

Studies on the relationship between age and service utilisation point to a complex picture. There would appear to be a tendency for community or outpatient care to decrease as a function of age, and inpatient care to increase.[22] The nature of resource use in each setting also varies with age. The United States literature suggests that, in the community, younger patients are more likely to use psychotherapy[63] and to be more frequent users of private case management agencies[64], while older patients are more likely to make medication visits or brief visits[29]. In the inpatient setting, elderly patients have higher admission and readmission rates, and longer stays, than younger patients do.

Gender

The evidence on the impact of gender on service use is equivocal, with some studies showing women as higher users of services[65], and others finding that men are more likely to be over represented in this group.[30] Again, this may reflect different patterns of care. Women have been shown to be more likely to make use of primary prevention and early intervention services, while men have been found to be more likely to use 'after care' facilities.[66]

Socio-economic status

Low socio-economic status has been shown to be predictive of high service utilisation, both within and across services.[30,35,67]

Marital status

Of all socio-demographic variables, marital status has probably been most consistently shown to be associated with level of resource use. Being unmarried and without dependants has been shown to be correlated with longer hospital stays, higher readmission rates, higher costs in community residential settings, and difficulty in engaging in treatment.[4,9,18,22,30,35,48,66,68,69,70,71,72,73]

Ethnicity

Overseas studies have found ethnicity to be correlated with resource use in the acute inpatient setting, with higher readmission rates associated with particular ethnic minorities[67]. Care should be taken in interpreting these findings, however, since they may arise from unique social circumstances in the country of the study.

Stage of illness

There is evidence that resource use will differ with stage of illness. In particular, long-term chronic patients have been shown to require more and longer hospitalisations compared with their more recent onset counterparts[18,21,55], although there is also a recognition that initial episodes may require additional resource inputs[44].

Clinical panels

As discussed in the *MH-CASC Progress Report - Initial Consumer Groupings,*[1] the Clinical Reference Group resolved that the best way to sample available knowledge from experienced practitioners was through a clinical panel process. Five clinical panels were convened, organised around diagnostic clusters, with each panel meeting for between four and six hours. Diagnostic clusters were chosen as a starting point partly because the major mental health classification systems are based on diagnosis and also because areas of clinical expertise and patterns of care could be readily identified. In addition, separate, supplementary panels were convened to survey the views of consumers and carers.

Each panel was asked to identify the key patient attributes that differentiate patients within each diagnostic category on the basis of the type of treatment required and/or resources used.

Panel members were then asked to refine the attribute list. They were asked to ensure that each attribute was measurable and was not redundant (in the sense that it measured the same underlying concept as another attribute). They were also asked to consider interaction among attributes, and ensure that attributes were included which did not in them predict resource inputs but were important in combination with other attributes.

Finally, panel members were asked to identify the major classes of patients within the diagnostic category, in terms of their relative resource requirements and their key attributes identified above.

The clinical panels identified a total of 50 initial consumer classes, distributed across nine ‘diagnostic super classes’, which were used as working hypotheses for classification development. The super classes, and the attributes considered important within each are summarised in Table 3. Further detail of how these attributes were grouped and operationalised can be found in Appendix B-3 of Volume 2 of this publication.

Table 3: Attributes likely to predict resource use by diagnostic super class, as identified by clinical panels

Diagnostic super class	Attributes identified as potential predictors of resource use
Schizophrenia, paranoia and acute psychotic disorders	• recency of onset (less than two years; two years or more) • receipt of psychiatric treatment within six months of onset • substance abuse • risk of harm to self or others • co-operation with treatment • level of functioning
Mood disorders	• diagnosis (manic disorder or bipolar affective disorder with manic phase; major depression) • melancholia • psychotic symptoms • risk of harm to self or others • history of poor treatment response • personality disorder
Anxiety disorders	• depression • psychiatric co-morbidity of depression or personality disorder • substance abuse • severe avoidance symptoms • requires detoxification treatment due to secondary substance dependency

Diagnostic super class	Attributes identified as potential predictors of resource use
Anxiety disorders (cont)	• major depressive illness • suicidal
Eating disorders	• diagnosis (anorexia nervosa; bulimia and other eating disorders) • stage of illness (acute; chronic) • adequacy of social support • identifiable precipitating event • first episode of the disorder • suicidal • psychiatric co-morbidity • physical co-morbidity
Obsessive compulsive disorders	• psychiatric co-morbidity • poor insight • poor motivation • receiving detoxification services • obsessive slowness • history of poor treatment response
Personality disorders	• Axis 1 psychiatric conditions, particularly psychoses or major affective disorder • substance abuse • chronic medical conditions • intellectual disability • antisocial behaviour (forensic involvement) • major social disruption • risk of harm to self or others • multiple agencies involved in the care of the person • presence of psychotic symptoms
Stress and adjustment disorders	• brief episode • psychiatric co-morbidity • intellectual disability • substance abuse • risk of harm to self or others • existence of a recurring stressor
Child and adolescent mental disorders	• psychotic disorder • first presentation • risk of harm to self or others • juvenile correctional system involvement • major family dysfunction
Organic disorders	• risk of harm to self or others • high levels of social disruption • grossly inappropriate behaviour • persistent wanderings • significant physical illness • mental disorder co-morbidity, particularly depression, intellectual disability, substance abuse • family/social complications • accommodation problems • level of dependency

Correspondence between literature review and clinical panels

Examination of Table 3 reveals a high correspondence between the attributes identified by the literature as likely to be of significance in predicting resource use and those identified and grouped into patient classes by the clinical panels.

Validation study

A preliminary validation study was undertaken on the initial patient classes generated by the clinical panels under the diagnostic clusters of ‘schizophrenia and related disorders’ and ‘mood disorders’ (eight and seven classes, respectively). These cover about two thirds of patients treated by Victoria’s public mental health services, where the validation study was conducted. The aim of the validation study was to ‘test drive’ the initial patient classes with practising clinicians and to undertake early analysis of differential resource use by the classes. Summary details of the study are provided below. Further details can be found in the Project Teams earlier paper *MH-CASC Progress Report - Initial Consumer Groupings*.[1]

Method

Four public mental health services were approached to participate in the validation study. Three of these provided both hospital and community mental health services, and one included only community services. A total of 1,360 patients with a diagnosis of ‘schizophrenia and related disorders’ or ‘mood disorders’ had been treated at these agencies over the three months from 1 April 1995 to 30 June 1995, and 125 key workers had been involved with these patients. These key workers were asked to rate each of their patients within the above diagnostic categories on three ratings tasks.

Task 1

Key workers were asked to rate each of their patients within the above diagnostic scope over the previous three months on an instrument adapted from an early version of the Health of the Nation Outcomes Scale (HoNOS).[74] This modified instrument comprised 18 items, as follows, and was considered to cover all of the patient attributes that distinguished between the classes for ‘Schizophrenia and related disorders’ and ‘Mood disorders’:

1. problems resulting from aggression
2. suicidal thoughts, non-accidental self-injury
3. health or social problems associated with alcohol or drug misuse
4. problems involving memory, orientation or understanding
5. problems associated with physical illness or disability
6. depressed mood disturbance: general
7. depressed mood disturbance: melancholic features
8. loss of pleasure in all, or almost all activities; loss of reactivity to usually pleasurable stimuli
9. elevated mood disturbance
10. problems associated with hallucinations or delusions
11. ‘negative symptoms’
12. other mental and behavioural problems
13. problems making supportive social relationships
14. social environment: housing and locality
15. social environment: employment, recreation, finance

16. overall severity of functional disability
17. onset of symptoms
18. problems with compliance

For items 1-15, and item 18, ratings ranged from 0 (no problem during period rated) to 4 (severe problem during period rated). Item 16 was rated on a scale from 0 (no problems) to 100 (severe disability), and item 17 was rated on a scale from 0 (first experience of symptoms within three months) to 4 (symptom onset more than 5 years ago).

Task 2

Key workers were asked to assign each patient to one of the classes under the appropriate diagnostic cluster.

They were then asked to rate how well the class described the key attributes of characteristics that influenced the patient's management over the three-month period. This rating was made on a scale of 0-4 (with 0 indicating a 'very poor fit' and 4 indicating a 'very good fit').

They were also asked to describe their experience in assigning a rating, on a scale of 0-4 (with 0 indicating 'very easy' and 4 indicating 'very difficult'). In addition, they were given the opportunity to describe their experience for each patient, by checking any of the following statements: *"He/she meets the descriptions of more than one sub-class"; "He/she doesn't really meet the description of any sub-class";* and *"I am not sufficiently familiar with the person's clinical history to be confident about these ratings".*

Task 3

Finally, key workers were asked to rate the resource requirements of each patient on a scale of 0-4 (with 0 indicating 'very low resource requirements' and 4 indicating 'very high resource requirements').

Results

861 non-duplicated patients were included in the study (63% of potential cases, and 7.4% of all patients within the diagnostic scope of the validation study treated in Victoria during the period in question). 85 key workers (63% of those employed at the four services) rated these patients.

There was a reasonable distribution of cases across the initial patient classes, with the smallest class ('Manic episode without complications') containing 17 cases. This suggested that most classes were of sufficiently large cell size for further study.

On 'goodness of fit', all of the classes except 'Other depression/mood disorders' achieved above the mid-point on the 0 (poor) to 4 (good) scale, with an average of 2.7 for 'Schizophrenia and related disorders' diagnostic cluster and 2.3 for 'Mood disorders'.

On 'ease of fit', most classes scored better than the midpoint on the 0 (easy) to 4 (hard) scale. The average ranking's for 'Schizophrenia and related disorders' and 'Mood disorders' were 1.6 and 2.0, respectively.

Key workers were consistent in their assignments across the tasks, on average assigning those with low functioning scores on the adapted HoNOS instrument to the class that reflected that level of functioning. They consistently distinguished between 'level of functioning' and ‘complications’, which was a key splitting distinction in the classification proposed by the clinical panels.

In terms of reported resource use, there was a reasonable differentiation between the initial patient classes. Most importantly, the relativities between the groups were clinically sensible (i.e., no complications and high functioning being associated with low resource use, and complications and low functioning being associated with high resource use). In the ‘Schizophrenia and related disorders’ diagnostic cluster, the resource use scores ranged from 1.2 (‘Schizophrenia without complications and high functioning’) to 3.1 (‘Schizophrenia with complications and low functioning’). Likewise, in the ‘Mood disorders’ diagnostic cluster, the highest resource use score was for ‘Major depression with melancholia and with complications’, and scores below 1.8 were associated with classes with no complications. These patterns of resource use were subsequently supported in a more empirical analysis which used data on service contacts, routinely collected via the Victorian Psychiatric Records Information Systems Manager (PRISM).

Discussion

The preliminary validation study indicated that:

- there was a reasonable distribution of cases across the initial patient classes (consistent with a requirement for adequate numbers in each class in the classification);
- there was reasonable differentiation of resource use between classes (consistent with the requirement that classes be resource homogenous);
- and that the initial classes were workable, and acceptable to the clinical community as a hypothesis to be tested (consistent with the requirement that classes be clinically meaningful).

SECTION 2

Study design and methodology

Chapter
3

Overview of Study Design

This Chapter provides an overview of the study design. Essentially it describes the 'what', 'when' and 'who' of the study. It begins by describing the major 'blocks' of data that formed the basis for the analysis. It then defines the notion of 'episode of care', and describes the data collection cycle within this context. Finally, it describes the study cohort.

Data to be collected

The study examined the influence of certain patient characteristics on resource use. To do this, the study collected data on patient characteristics, the services they used and their associated costs for all patients treated over a three month period (1 September - 30 November 1996) by a sample of 22 public sector and private hospital specialised mental health services. Further detail on the sample is provided in Chapter 6.

Four core 'data blocks' were collected for use in the development of the classification system. These included:

- patient attribute data, covering key clinical and socio-demographic characteristics hypothesised as being likely to influence resource use;
- staff activity data, particularly identifying time and services which could be attributed to individual patients;
- extracts from hospital morbidity data; and
- financial data from the services' charts of accounts, to allow staff time directed to patients, associated goods and services, on-costs and overheads to be identified, then aggregated to derive the total costs for each episode of care.

In addition, data on patients' use of private psychiatrists during the three month study period (as identified by Health Insurance Commission statistics) was collected to supplement staff activity data provided by private hospitals included in the study. This was necessary to accurately determine the costs of services provided by psychiatrists for each patient class at these sites, where such services were delivered by private practitioners.

The definition of an episode of care

For the purposes of data collection, the definition of an episode of care needed to be simple and reliable so that clinicians could readily understand what was expected of them when an episode began or ended.

Several options were considered with the resolution that the episode of care would be tied to treatment setting for the data collection stage of the Project. Movement to a new treatment setting was defined as a new episode of care, and triggered a new cycle of data collection.

However, sufficient data were collected to allow exploration during the analysis stage of a more clinically meaningful classification of mental health episodes. Specifically, the concept of 'phase' was considered to be important, and was incorporated into an operational definition of 'focus of care' which took into account the needs of the patient, but placed more emphasis on what was being done about them (i.e., the goal of care). This, along with other patient attributes, was assessed each two weeks of the episode. Similarly, programs were identified via cost centre codes associated with recording of staff activity, enabling differentiation below the setting level (e.g., separating community into acute and maintenance episodes of care).

With this potential for a more detailed definition in the analysis stage, the study defined 'episode of care' by treatment setting only in the data collection period. Three types of treatment settings were identified (see Table 4).

- Acute inpatient units
- Non-acute inpatient units
- Community services

An episode of care began when the patient entered a treatment setting and finished when treatment was completed in that setting or he/she moved to another setting.

Within this framework, a patient could only be in one episode at any one time, but may have had more than one episode of care during the study period (e.g., an admission to an inpatient setting followed by discharge to care in the community).

The data collection cycle

A full set of patient attribute data was collected for each episode of care for each patient included in the study. Staff activity data were collected in parallel during the episode. Specific data recording forms were designed for each element of data collection.

Patient attribute data

The schedule for data collection was designed with the following aspects of mental health care in mind:

- That episodes would be of variable duration, with some very brief (e.g., same-day admissions) and others extending throughout the entire three-month study period.
- The schedule for collecting clinical ratings of the severity of the patient's condition needed to standardise the period across which the ratings were to be made.
- That single ratings of patients made only once during an episode may not describe adequately the characteristics of patients whose clinical condition undergoes significant clinical change. Given the often chronic and cyclic nature of many mental disorders, clinical ratings repeated at intervals throughout the episode were considered desirable.

Table 4: Definitions of episode of care types

ACUTE INPATIENT

Referred to an admission to an acute inpatient service which involved one or more overnight stays. Acute inpatient services were deemed to be those which have as their principal purpose the provision of specialist psychiatric care for people who present with acute episodes of mental illness and may be:

- focused on assisting people who have had no prior contact or previous psychiatric history, or individuals with a continuing psychiatric disorder for whom there has been an exacerbation of symptoms; and
- targeted at the general population, or be specialist in nature, targeted at specific clinical populations. The latter group include psychogeriatric, child & adolescent, and forensic psychiatry services.

NON ACUTE INPATIENT

Referred to an admission to a non-acute inpatient service which involves one or more overnight stays. Non acute inpatient services were defined as those typically referred to as 'Rehabilitation' or 'Extended Care' units. Their primary focus is reduction of functional impairments that limit independence, and/or provision of care over an indefinite period for people who are unable to function independently without extensive care and support. This episode type included admissions to community-based residential services staffed on a 24-hour basis by mental health trained staff.

COMMUNITY

Referred to all forms of care provided to patients who were not currently admitted patients within an acute or non- acute unit. This included, but was not confined to services provided by:

- Outpatient clinics, whether provided from a hospital or community mental health centre
- Child and adolescent outpatient teams
- Crisis assessment and treatment services
- Mobile assertive case management services
- Social and living skills programs including day programs, Living Skills Centres
- Day Hospitals
- Psychogeriatric assessment teams
- Rural outreach teams

Notes:

1. *For the purposes of data collection, same-day patients were recorded as undergoing a community episode. Hospital morbidity systems were subsequently used to enable them to be separately analysed as inpatient episodes, as per the current National Health Data Dictionary (see Chapter 11 for further discussion of same day stays).*
2. *It was recognised that differentiation between acute and non acute inpatient programs would be difficult in some centres that provide multiple programs, so negotiation was undertaken with sites to ensure that standard program/ward definitions were applied (see Appendix B-6, Volume 2). Clarification was also made to exempt short term internal ward transfers from triggering an episode change.*
3. *Within inpatient settings, it was considered desirable to differentiate between "normal" units and designated intensive treatment units (e.g. high dependency or locked sections of wards). This was done by recording resource use against identifiable cost centre codes or program types on staff activity forms. For example, where there was a designated "intensive care" section within an inpatient unit, patients treated within the section were identified on staff activity sheets completed by staff on a daily basis. Potentially, this enabled differentiation of the costs of days in an acute inpatient stay which were spent in more intensive care. Similarly, cost structures were used, where available, to identify rehabilitation and extended care wards in long stay facilities.*

To take these factors into account, three critical points were defined in the data collection cycle for each episode of care.

- **Episode registration:** socio-demographic data and information about the episode were collected at the beginning of a given episode of care
- **Each 14 days of the episode:** clinical ratings were collected each two weeks after the commencement of the episode
- **End of episode:** final clinical ratings were collected when the episode of care was completed, along a small number of additional socio-demographic items

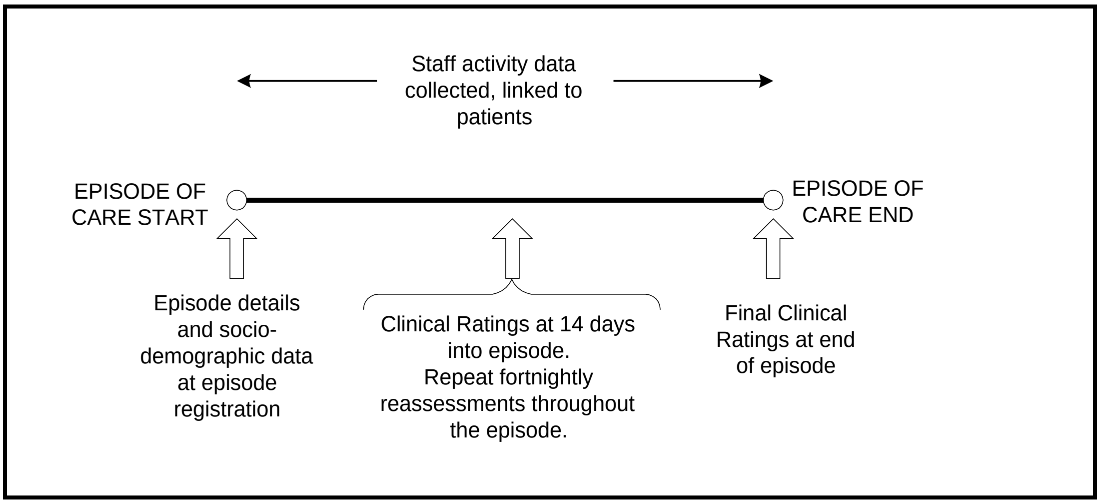
Staff activity data

Staff activity data were collected by each clinician on a daily basis.

The data collection cycle

Figure 1 illustrates the complete data collection cycle, including both the patient attribute data and the staff activity data.

Figure 1: Schematic representation of the data collection cycle



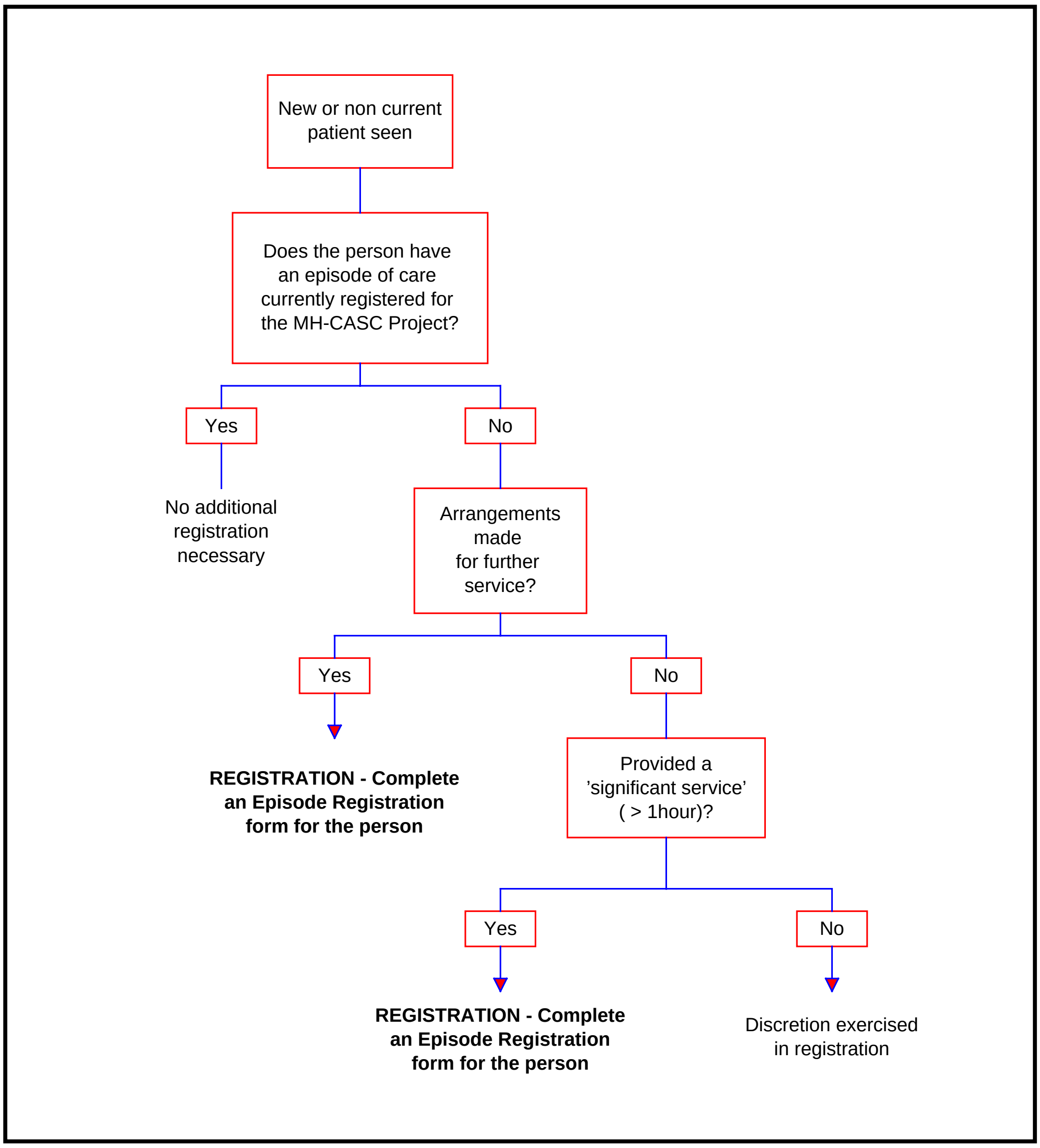
The study cohort

All patients who received a significant face-to-face service (defined as one hour or more) during the study period were registered to the study.

Thus, patients who received brief one-off assessment and/or referral services (with no intent of further services being provided by the agency) were excluded from the classification component of the study, as were patients who received only telephone contact or indirect services (e.g., court report or interagency liaison). The costs of providing these services was collected and separately identified (to permit estimation of the overall costs of services provided), but no patient attribute data was collected on these patients. It was thought that the treating clinician would be unlikely to gain sufficient clinical information to complete the patient attribute forms, and the cost of data collection would have been out of proportion to the cost of providing the service.

The logic used by staff in deciding whether to register a person to the study is show in Figure 2.

Figure 2: Logic used in deciding whether to register a new patient in the MH-CASC study

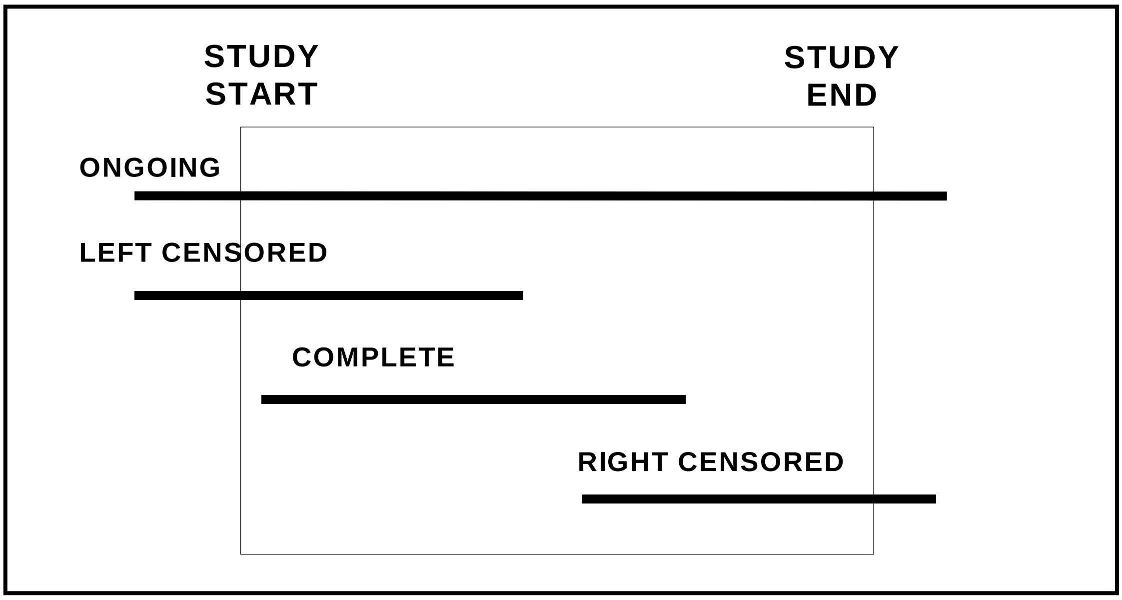


A given patient in the cohort may have had a number of episodes of care during the study period. However, their initial registration to the study would have occurred via one of three main 'recruitment pathways':

- Inpatients who were occupying a psychiatric bed at the commencement of the study were first registered on 1 September
- Inpatients who were admitted after 1 September were first registered on the date of their first admission
- Registration for community patients occurred when they first received a direct and face-to-face community care service after 1 September, subject to the guideline shown in Figure 2.

In terms of the pattern of service use throughout the study period, the study cohort contained four subsets, as shown in Figure 3 below

Figure 3: Cohort subsets entering and leaving during the study period



The subsets were defined in the following manner:

Ongoing:	those who were receiving care prior to study commencement and were still receiving care at study end.
Left censored:	those who were receiving care prior to study commencement but who completed care before study end.
Complete:	those who started and completed an episode between study commencement and study end.
Right censored:	those who began an episode of care after study commencement and were still in receipt of care at the study end.

Chapter

4

Patient Attribute Measures

The patient attribute dataset comprised 'core attributes' that were collected on all patients in the study. In addition, a number of special items were collected for patients treated by Child and Adolescent mental health services included in the study, Psychogeriatric patients and patients with 'chronic' organic disorders. These items were identified either in the research literature or by the expert panels as being relevant to the particular patient groups but not sufficiently relevant to all patients to justify comprehensive collection in the study.

While a number of data items required by the study existed in the routine mental health information systems operating at the study sites, the majority required special collection.

Overview of patient data items

Four types of core patient measures were collected:

1. Identifiers
Different types of identifiers were collected on the patient attribute forms to provide the capacity for a given patient to be tracked across different settings.

2. Socio-demographic and environmental variables
A range of socio-demographic and environmental variables was collected at the point of episode registration. Some of these (e.g., age) were identified by the Clinical Panels and the research literature as being likely to impact upon resource utilisation, while others were included primarily to enable statements to be made about the representativeness of the sample in the context of population indicators.

3. Clinical details
These variables provided information on diagnosis, severity, and level of functioning and treatment history. All items included in this group were selected on the basis that they were hypothesised to influence resource utilisation.

4. Psychiatric service details
Additional items were collected to provide details about the episode, or the service context in which the episode occurred.

Table 5 summarises the core patient measures in each of these categories. The key clinical details are described below, and details of the remaining patient measures are provided in Part C of Volume 2 of this publication.

Table 5: Overview of core patient dataset

IDENTIFIERS	SOCIO-DEMOGRAPHIC	CLINICAL DETAILS		SERVICE DETAILS
		TREATMENT & ILLNESS HISTORY	CURRENT EPISODE	
• Local UR number • Service/facility code • Staff Code Name (of Key worker) • Ward/Team Code	• Date of birth • Sex • Country of birth • Aboriginality • Postcode • Interpreter required • Marital status • Number of dependent children <5 years • Pension status • Usual accommodation *Plus for Child and Adolescent services only* • Living with • Guardianship • Family Court involvement • Juvenile Justice involvement • Family income	• Psychiatric service history • Time since first psychiatric treatment	• Principal psychiatric diagnosis • Additional psychiatric diagnoses • Other diagnoses • Ratings of clinical severity • Level of functioning • Focus of care • Legal status *Plus for Child and Adolescent services only* • Factors influencing health status	• Episode type • Admission date (Inpatient Episodes) • First contact date (Community Episodes) • Episode end date • Reason for Episode end

Core clinical measures

Psychiatric diagnosis

Diagnosis was a central element in the overall dataset: the Clinical Reference Group argued its importance as a tool for initially organising patients into clinically meaningful classes. Consideration of a range of issues surrounding the collection of diagnosis (see Appendix B-4, Volume 2) led to the following approach being taken.

For each episode, a Principal Psychiatric Diagnosis and up to three Additional Psychiatric Diagnoses were recorded. A tailor-made coding system based on ICD-10 clinical terms was used which required clinicians to code diagnosis from an abbreviated set of clinical terms. These summarised the 812 unique mental health disorder codes in the full ICD-10 to 16 major categories, and 61 individual codes.

The summary categories were designed to provide a relatively simple task for clinical staff, acknowledging that professional coders were not available to most community-based mental health services. Additionally, only a limited number of diagnostic categories were needed to test the hypotheses generated by the Clinical Panels consulted during Stage One of the Project. Appendix B-5 of Volume 2 provides details on the specific ICD-10 codes included within each of the 61 summary codes.

In addition to the coded diagnoses collected via the MH-CASC patient attribute forms, ICD-9-CM data was extracted from hospital morbidity systems for all admitted patients.

Severity and level of functioning

Specific clinical rating instruments were used by clinicians to measure 'severity' and 'level of functioning' of patients during each episode of care. Rather than develop new instruments, the Project sought to use available clinical measurement scales, and classification instruments, with established satisfactory psychometric properties. However, no single measurement instrument was available 'off the shelf' that was both comprehensive in its coverage of the relevant variables and practical to apply in a casemix context.

The instruments selected for use in the MH-CASC study were chosen as the best of those available to meet the following criteria:

- they placed minimal demand upon raters and were easy to use;
- collectively, they provided comprehensive coverage of the relevant clinical dimensions;
- their reliability had been demonstrated in previously published studies; and
- they are valuable clinical instruments in their own right, sensitive to clinical change, and therefore potentially useful for use as outcome instruments.

The specific instruments used to measure severity and level of functioning are listed in Table 6 and summarised in this section. More detail on each can be found in Part C of Volume 2.

Table 6: Clinical rating instruments for measuring severity and level of functioning

Used by	Clinical ratings of severity	Level of functioning
All services except specialist Child and Adolescent Psychiatry services	Health of the Nation Outcome Scales (HoNOS)	Life Skills Profile (LSP-16) (abbreviated version)
	Plus for patients 65 years or more and those with chronic organic brain syndromes:	*Plus for patients 65 years or more and those with chronic organic brain syndromes:*
	Resident Classification Instrument (RCI) Behaviour Scale	Resource Utilisation Group Activities of Daily Living Scale (RUG-ADL)
Specialist Child and Adolescent Psychiatry services	Health of the Nation Outcome Scales for Children and Adolescents (HoNOSCA)	Children's' Global Assessment Scale (CGAS)

The Health of the Nation Outcome Scales

For adults, severity was primarily assessed using the Health of the Nation Outcome Scales (HoNOS), an instrument developed in the United Kingdom as a tool for use by clinicians in their routine clinical work to measure consumer outcomes. The final version was released for use in 1996 and made available to the MH-CASC Project by the development team.[74,75.]

An earlier version of the instrument used in the validation study of Stage One of the Project described in Chapter 2. The HoNOS was extensively trialed in the United Kingdom over the last three years and has been piloted in Australian mental health services. In a review of a large number of available clinical scales, Andrews and colleagues of the University of New

South Wales identified it as one of the most suitable instruments available internationally for measuring patient outcome.[76] For the current study, the strengths of the HoNOS were its comprehensive coverage of clinical domains identified as likely predictors of resource use its general utility by all categories of mental health staff, and its brevity.

The HoNOS consists of 12 scales designed to measure the severity of a mental health problem on a five-point scale with attached descriptors (⓿ No problem; ❶ Minor problem; ❷ Mild problem ❸ moderately severe problem ❹ Severe to very severe problem). The scales are summarised in Table 7.

Table 7: The twelve HoNOS scales

Scale 1:	Overactive, aggressive, disruptive or agitated behaviour
Scale 2:	Suicidal thoughts or behaviour
Scale 3:	Problem-drinking or drug-taking
Scale 4:	Cognitive problems involving memory, orientation, understanding
Scale 5:	Physical illness or disability
Scale 6:	Hallucinations and delusions
Scale 7:	Depressed mood
Scale 8:	Other mental and behavioural problems
Scale 9:	Supportive social relationships
Scale 10:	Activities of Daily Living (ADL): overall disability
Scale 11:	Accommodation
Scale 12:	Occupational and recreational activities

Abbreviated Life Skills Profile (LSP-16)

The Life Skills Profile (LSP) was used as the specialised 'functioning assessment' instrument for adult patients. Developed in Sydney[77], the LSP has been used in various studies in Australia and overseas.

Although the HoNOS includes two items on level of functioning, the LSP was selected for three reasons:

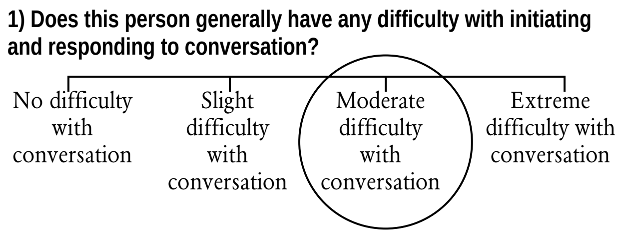
- It is a specific instrument designed to measure a range of aspects of the 'psychosocial functioning' concept, an attribute strongly supported both by clinicians and research studies to be predictive of resource use;
- It includes several items that measure core attributes more directly than the HoNOS (e.g., risk to others, cooperation with treatment); and
- Its scales focus more directly on observable behaviours, and were considered to offer potentially a more robust measure.

In its original form, the LSP comprises 39 items. For the purposes of the study, the instrument was shortened to 16 items with the assistance of the original designers, to reduce the rating burden on clinicians when used in conjunction with the HoNOS. Selection of the 16 items was based on the following criteria:

- that items did not duplicate patient attribute data captured by the HoNOS, unless the LSP item was deemed to be clearly superior on face validity grounds;
- that items measured attributes deemed to be important in the Stage One work; and
- that the psychometric strengths of the overall scale and its component subscales were retained - for each scale the top four items of each sub-scale were demonstrated to have between 85 and 90 per cent concordance with the full sub-scale.

The final 16 items were selected which cover four broad domains: withdrawal; anti-social behaviour; self-care; and compliance. These domains were based on revised the LSP subscales developed by Trauer et al.[78]

Clinicians were asked to consider the patient's general functioning over the past three months, and specifically requested not to assess functioning during crises or when the patient was ill or becoming ill. The potential responses to each of the 16 items were given on a four-point scale, and clinicians were instructed to circle the correct response (as below), or to leave a blank if insufficient information was available to them to make a judgement.



The Resource Utilisation Groups - Activities of Daily Living (RUG-ADL)

Clinical consultations during Stage One suggested the following additional factors beyond those affecting general psychiatry patients were significant influences on resource utilisation for geriatric patients:

- the patient's level of physical functioning, particularly where assistance was required with the basic activities of daily living; and
- the patient's degree of 'behavioural disturbance' in specific areas which were not adequately covered by the HoNOS (social disruption, wandering, grossly inappropriate behaviour).

Similar factors were also identified as relevant to patients affected by chronic organic syndromes, such as the dementias affecting people less than 65 years of age, or individuals with acquired brain damage.

Although the LSP provided some data on activities of daily living for all patients, it was considered necessary to use a purpose specific measure for those over 65 and/or with chronic organic brain syndrome. The RUG-ADL was used for this purpose. This instrument, developed by Fries et al. for the measurement of nursing dependency in skilled nursing facilities in the USA[79], explains 30% of variance in nursing costs in that setting. It measures ability with respect to what are called “late loss” activities - those activities that are likely to be lost last in life (eating, bed mobility, transferring and toileting). “Early loss” activities (such as dressing and grooming) are included in the LSP.

To complete the RUG-ADL, clinicians were asked to select the response which best described the patient during the period rated (i.e., over the previous two weeks), rating what the patient did, not what he/she was capable of, with regard to four domains:

- Bed Mobility (❶ Independent or Supervision Only; ❸ Limited Physical Assistance; ❹ Other than 2-person Physical Assistance; ❺ 2-person Physical Assistance);
- Toileting (❶ Independent or Supervision Only; ❸ Limited Physical Assistance; ❹ Other than 2-person Physical Assistance; ❺ 2-person Physical Assistance);
- Transfer (❶ Independent or Supervision Only; ❸ Limited Physical Assistance; ❹ Other than 2-person Physical Assistance; ❺ 2-person Physical Assistance); and
- Eating (❶ Independent or Supervision Only; ❷ Limited Assistance; ❸ Extensive Assistance/Total Dependence/Tube Fed).

Resident Classification Instrument Behaviour Scale

The Behaviour Scale of the Resident Classification Instrument (RCI) was used as the second additional measure of severity for patients aged over 65 and/or those with chronic organic brain syndrome. The RCI has been applied widely as a patient dependency measure in Australian nursing homes, and until recently, was used to determine the level of Commonwealth nursing home subsidies.[80] The Behaviour Scale comprises three items from the total scale, and specifically covers the types of behaviours identified by the Clinical Panels as important in determining resource use by these patients.

Clinicians were asked to rate the frequency with which attention/intervention was required for:

- Physical aggression (❶ Minimal/none; ❷ Most days; ❸ 2-3 times; ❹ 4 or more times);
- Verbal Disruption (❶ Minimal/none; ❷ 1-3 times daily; ❸ 4-6 times daily; ❹ More than 6 times daily); and
- Behaviour (❶ Minimal/none; ❷ 1-3 times daily; ❸ 4-6 times daily; ❹ More than 6 times daily).

The Health of the Nation Outcome Scales for Children and Adolescents

Special clinical rating instruments needed to be used in the study that were sensitive to the factors identified during Stage One as affecting the type and level of care provided to children and adolescents. These attributes are not well measured by the HoNOS and LSP-16, which were developed with general adult populations.

As with all instruments used in the study, these needed to be relatively brief and simple to use with demonstrated reliability. Many specialist clinical scales have been developed for use within the child and adolescent mental health field. However, most require extensive training or considerable time to administer. No single rating instrument has been developed that met the Project criteria as well as capturing the full range of variables proposed for measurement.

Responding to a similar need, the United Kingdom Department of Health funded the Department of Child and Adolescent Psychiatry at the University of Manchester to develop of a brief rating instrument, modelled on the HoNOS, for application by child and adolescent mental health services.[81] The trial version of the scales developed in 1995 - titled the HoNOSCA (Health of the Nation Outcome Scales for Children and Adolescents) - was provided to the Project Team for evaluation and possible use. Although only at an early stage in its evolution, the instrument was considered to have satisfactory face validity in terms of its coverage of the relevant clinical domains, as well as performing reasonably in the preliminary UK trials.

The HoNOSCA therefore formed the core of the special measures collected by specialist child and adolescent mental health services participating in the study.

The draft version of this instrument received by the Project Team contained 13 subscales that required ratings of the child or adolescent, along with two additional scales concerned with problems for the child, parent or carer caused through lack of information about diagnosis and services. The version used in the MH-CASC Project modified this version in two ways.

First, the two items concerned with lack of information were removed, as these were not considered to be direct measures of the child or adolescent's mental health. Second, an additional item was introduced measuring the quality of the child or adolescent's accommodation, taken direct from the adult HoNOS (Scale 11). This was decided following consultation with clinicians who thought that the absence of any measure of accommodation quality was a significant omission in the current United Kingdom version. From a resources perspective, clinicians proposed that deterioration in a child and adolescent's accommodation (e.g., homelessness in youth) often triggered higher needs for care and recommended that a measure of this be included in the dataset.

Table 8: The fourteen HoNOSCA scales (amended for MH-CASC Project)

Scale 1	Problems with disruptive, antisocial or aggressive behaviour
Scale 2	Problems with overactivity and attention deficit
Scale 3	Non-accidental self injury
Scale 4	Problems with alcohol, substance/solvent misuse
Scale 5	Problems with scholastic or language skills
Scale 6	Physical illness or disability problems
Scale 7	Problems associated with hallucinations and delusions
Scale 8	Problems with non-organic somatic symptoms
Scale 9	Problems with emotional and related symptoms
Scale 10	Problems with peer relationships
Scale 11	Problems with self care and independence
Scale 12	Problems with family life and relationships
Scale 13	Poor school attendance
Scale 14	Problems with accommodation arrangements

The fourteen scales of the amended HoNOSCA for use in the study are summarised in Table 8. It used the same response format as the HoNOS, with each item scored on a five-point scale with attached descriptors: ⓿ No problem; ❶ Minor problem; ❷ Mild problem; ❸ Moderately severe problem; ❹ Severe to very severe problem.

The Children's Global Assessment Scale

The CGAS was used as the key measure of level of functioning for patients seen by specialist child and adolescent mental health services. The instrument was developed by Schaffer and colleagues at the Department of Psychiatry, Columbia University to provide a global measure of severity of disturbance in children and adolescents.[82] Similar to the HoNOSCA, it is designed to reflect the lowest level of functioning for a child or adolescent during a specified period.

Clinicians were required to assign a score from 1-100, with 1 representing the most functionally impaired child, and 100 the healthiest. The CGAS contains detailed behaviourally oriented descriptions at each anchor point that depict behaviours and life situations applicable to children and adolescents. These were made available to clinicians in the study and are reproduced in Appendix C-8 of Volume 2.

Other measures

Focus of care

'Focus of care' operationalised the concept of 'phase' which has strong clinical meaning in the mental health field, with patients moving between stable and more acute episodes with corresponding changes in resource demands. The focus of treatment changes along with such changes in the phase of illness. The measure was developed to identify 'markers' or time points within episodes at which significant changes may have occurred in the patient's clinical status and treatment goals. Through this approach, the Project Team aimed to explore whether it was possible to develop an alternative episode of care classification that could be applied across treatment settings.

Clinicians were asked to identify which of four types of care focus best described the care provided to a patient over the immediately preceding period. The four 'focus' categories - acute, functional gain, intensive extended and maintenance - were developed in consultation with clinicians, and were distinguished on the basis of the key clinical attributes of the patient, and the primary goal of care. Previous work had not been conducted in this area to guide the measurement strategy, or to suggest the likely number of focus of care changes within different episode types.

The ratings required judgments about the patient's primary need for care and the treatment objective. The four types of focus, and their definitions, were as follows:

Acute:	Short-term reduction in severity of symptoms and/or personal distress associated with recent onset or exacerbation of psychiatric disorder
Functional gain:	Improve personal, social or occupational functioning or promote psychosocial adaptation in a patient with impairment arising from a psychiatric disorder

Intensive extended:	Prevent or minimise further deterioration and reduce risk of harm in a patient who has a stable pattern of severe symptoms/frequent relapses/severe inability to function independently, and is judged to require care over an indefinite period
Maintenance:	Maintain level of functioning, minimise deterioration or prevent relapse where the patient has stabilised and functions relatively independently.

Legal status

This single item indicated whether the patient was treated on an involuntary or compulsory basis (in the inpatient or community setting) under the relevant State/Territory mental health legislation at any point during the episode. Legal status was included because the literature review and the Clinical Panels suggested that it was likely to be a significant predictor of resource use. Clinicians used the following codes: ❶ Involuntary for all or part of the period rated; ❷ Voluntary for all of period rated.

Factors Influencing Health Status and Contact with Health Services (Child & Adolescent Services Only)

This set of items was included only on the Child and Adolescent Services *Final Clinical Ratings Form*. The purpose of the items is to identify the degree to which the child or adolescent had 'complicating psychosocial factors' that required additional clinical input during the episode.

Clinicians advised the Project Team that children or adolescents seen by specialist mental health services may present in the context of a range of circumstances which influence the person's health status but are not in themselves a current illness or injury. For example, the child may be severely affected by a history of sexual abuse but does not have a formal psychiatric diagnosis. Child and adolescent specialists indicated that these factors need to be identified in the study to adequately describe the patient sample and because they are likely to be correlated with increased treatment costs.

Some aspects of the amended HoNOSCA - particularly Scale 12 (Problems with family life and relationships) and Scale 14 (Problems in accommodation) - directly tap the degree to which external complicating factors are present. Similarly, several of the special child and adolescent services socio-demographic items address environmental factors (e.g., Living With, Guardianship, Family Court Involvement, Juvenile Justice Indicator, Family Income). However, these do not provide comprehensive coverage of the full range of issues indicated to be prevalent in cases presenting to child and adolescent mental health services.

The International Classification of Diseases (ICD) includes a coding system for *'select factors influencing health status and contact with health services'* which covers the range of issues raised in the clinical consultations. These can be recorded as supplementary to a principal psychiatric condition. Seven categories of the ICD codes were chosen for inclusion in the study on the basis of advice from clinicians about the most frequently occurring factors.

The data collection forms

The data collection cycle and its relationship to the concept of episode of care was described in the previous Chapter. In summary, there were three critical points defined for each episode of care at which specific patient attribute data were collected. Each of these data collection points was associated with a specific data collection form, as indicated below:

Episode registration:	*Episode Registration Form*
Each 14 days of the episode:	*Repeat Clinical Ratings Form*
End of episode:	*Final Clinical Ratings Form*

The same *Episode Registration Form* was used for all patients. Two versions of each of the *Repeat Clinical Ratings Form* and the *Final Clinical Rating Form* were developed: one for use in adult services, and one for use in child and adolescent services. Examples of all patient attribute forms are presented in Part D of Volume 2 of this publication.

The rating period for a *Repeat Clinical Ratings Form* covered the previous 14 days, which meant that the first *Repeat Clinical Ratings Form* in a given episode always covered the first 14 days of the episode and provided a measure of the clinical status of the patient at entry to the care episode. Subsequent forms resulted in the remainder of the episode being covered at 14-day intervals. Some adjustment of this schedule was allowed for patients who were seen less frequently (e.g., outpatients seen on a monthly basis). For these patients, the second and subsequent clinical ratings were administered the next time the patient was seen after the clinical rating was due.

The rating period for the *Final Clinical Ratings Form* covered the period since the most recent clinical rating had been made, and therefore covered a period varying from 1 day to 14 days.

Various combinations of these forms could occur, depending on the nature and duration of the episode.

In the case of episodes lasting more than 14 days, an *Episode Registration Form* would be submitted, then one or more *Repeat Clinical Ratings Forms* would be completed, and the episode would be closed with a *Final Clinical Ratings Form*.

When episodes were shorter than 14 days, clinicians would complete only an *Episode Registration Form* and a *Final Clinical Ratings Form*, skipping the *Repeat Clinical Ratings Form*. This was made possible by the fact that the *Final Clinical Ratings Form* contained all of the information contained on the *Repeat Clinical Ratings Form*, plus some additional information.

Participating sites indicated that the cycle of repeat clinical ratings would be complex to manage where there were multiple staff or services based at several locations involved in a patient's care. Customised software was developed by the Project Team and made available to local Site Coordinators to assist in this process (see Chapter 6).

In the community, there were some episodes of care for which it was considered unreasonable to request clinicians to provide clinical ratings. Specifically, these were episodes where a brief assessment or referral service had occurred, and no further arrangements were made for treatment at the given agency. In these cases, only an *Episode Registration Form* was completed, with an indication that no further services had been arranged (see 'Arrangements for further service', below).

Table 9 shows the items collected on each of the data collection forms.

Table 9: Information collected on patient attribute data forms

Episode Registration Form (GREEN)	Repeat Clinical Ratings Form (YELLOW)		Final Clinical Ratings Form (RED)
	First assessment	Subsequent assessments	
Identifiers			
• Local URNO • Service/facility code • Ward/team code • Staff code	• Local URNO • Service/facility code • Ward/team code • Staff code	• Local URNO • Service/facility code • Ward/team code • Staff code	• Local URNO • Service/facility code • Ward/team code • Staff code
Psychiatric service details			
• Episode type • Admission date • First contact date[a] • Arrangements for further service[a] • Previous registration[a] • New patient[a] • Last seen[a]			• Episode end date • Reason for episode end
Socio-demographic and environmental variables			
• Sex • Date of birth • Country of birth • Aboriginality • Postcode • Interpreter required • Marital status • Number of dependent children under 5yrs • Pension status • Usual accommodation			*Specialist child/adolescent mental health services* • Living with • Guardianship • Family court involvement • Juvenile justice indicator • Family income
Clinical details			
	All services • Provisional psychiatric diagnosis • Focus of care • Legal status *Adult mental health services* • HoNOS • LSP-16 • Behaviour Scale of RCI[b] • RUG-ADL[b] *Child/adolescent mental health services* • HoNOSCA • CGAS	*All services* • Focus of care • Legal status *Adult mental health services* • HoNOS • Behaviour Scale of RCI[b] • RUG-ADL[b] *Child/adolescent mental health services* • HoNOSCA • CGAS	*All services* • Psychiatric service history • Time since first psychiatric treatment • Principal psychiatric diagnosis • Additional psychiatric diagnoses • Other diagnoses • Legal status *Adult mental health services* • HoNOS • LSP-16 • Behaviour Scale of RCI[b] • RUG-ADL[b] *Child/adolescent mental health services* • HoNOSCA • CGAS • Factors influencing health status (FIHS)

Notes
a. Community episodes only
b. For patients aged 65 years or more and/or with chronic organic brain syndrome only

Clinicians' Reference Guides that provided full glossaries of instruments and definitions of individual items, as appropriate, accompanied the patient attribute forms.

Responsibility for completion of ratings

Only one member of the clinical staff was required to complete the ratings for each episode.

A key consideration in selecting rating instruments for the study was that they should be suitable for use by all health professional members of the clinical team. The type of information generally did not require special investigation as it is normally obtained in the course of mental health care. However, as knowledge of the patient was required to make the ratings, sites were instructed that for each episode, the staff member who was most familiar with the patient be identified to complete the forms.

In general, this was the patient's case manager in community settings. In inpatient settings, sites were advised that the appropriate staff included the consultant psychiatrist or registrar responsible for the patient's care, or the primary clinical nurse allocated to the patient, or at other times, an allied health professional member of the treatment team. Decisions about the choice of staff member were made on an individual basis taking into account local factors such as staff member availability and workload issues.

Finally, sites were advised that, in general, it was desirable that the same clinical staff member complete all ratings on the patient throughout the data collection cycle.

Chapter

5

Service Utilisation Data

The major resource input for consumers of mental health services is staff time. This was therefore the focus of the service utilisation data collection, with staff activity data being collected on a daily basis. As indicated earlier, this was subsequently supplemented by additional data on private psychiatrist use from the Health Insurance Commission for patients treated in private hospital sites.

Data on use of pharmacy (drugs), pathology, imaging and electroconvulsive therapy (ECT) were not collected at the patient level, for two reasons. Firstly, these costs were expected to account for only a very small proportion of the overall costs of providing care, and this was subsequently confirmed (e.g., drug costs accounted for only 2.1% of total costs).

Secondly, collection of these data at the individual patient level would have proved logistically difficult, and placed an unacceptable additional burden on staff alongside what also was being expected of them. Pharmacy costs for the overall service were collected, but not assigned to individual patients.

Staff activity data

Information about staff activity was collected for two purposes: to attach service costs to particular patient groups across all treatment settings; and to provide a basis for describing patterns of care. In previous casemix studies where the focus has been on the inpatient setting, only the former purpose has been considered. This Chapter describes who was required to provide staff activity data, the types of activities that were recorded, and the method by which the data were collected.

Who was required to provide staff activity data?

All staff involved in the direct care of patients were asked to participate in the activity data collection. These included nursing staff, medical staff and allied health professionals (including, but not limited to psychologists, social workers, occupational therapists, speech pathologists and physiotherapists) and other personal care staff who provided services to patients in both inpatient and community settings.

What types of activities were recorded?

Staff activities were conceptualised as belonging to one of the following three broad categories:

1. **Patient attributable activities:** Activities for which the time and associated costs could be attributed to a specific patient. Four activity categories of this type were recorded:

- Individual patient care
- Group based care
- Visit to patient
- Services on behalf of the patient

2. **Non-patient attributable activities:** Activities which could not be attributed to patients registered in the MH-CASC study, but which related to important functions of a mental health service that should be costed separately. Four activities in this category were identified:

- Teaching, training and research
- Services to unregistered patients
- Consultation-liaison services
- Community development

3. **'General Clinical Time':** The time (and associated costs) of these activities could not be linked to one or more specific patients, but because the activity was an integral part of the clinical service delivery, costs were apportioned across all individuals accommodated in or attending a specific mental health setting. 'General Clinical Time' was not recorded separately in the study but was derived by subtracting the total time spent on all eight of the activities listed above from the total time spent on duty.[a]

Definitions for each of the eight activity categories are provided in Table 10.

How staff time data were collected

The over-riding principle in the collection of staff activity data was that the information should be able to be provided with minimal disruption to clinicians. The preferred approach was to use, or adapt, existing data collections systems and forms to capture the necessary information, rather than requesting that clinicians duplicate information provision. The minimum requirement was that the amount of staff time spent on individual was recorded comprehensively - without it the relative cost of each patient, and ultimately the different patient types, could not be calculated.

However, this was possible in a small number of community-based sites, and one inpatient site, where basic systems were already in place that collected staff activity data comprehensively, and contained items which could be mapped to the MH-CASC categories.

[a] Note: Total time on duty was defined as the total time spent working during the shift, not total paid hours.

Table 10: Staff activity categories recorded on MH-CASC Activity Form

1	**Individual Patient Care (Ward/Centre-based)** Includes all services delivered to patients on a 1:1 basis, e.g. conversation, phone contact, assessment, individual patient supervision, counselling, bathing, feeding or escorting. The service is being provided directly and exclusively to the patient.
2	**Group-based Care** These activities include all services provided to a group of patients, e.g. centre or ward-based patient group discussions, other structured or unstructured activities, occupational therapy in activity centre, shopping excursions and other outings. This includes all Day Programs.
3	**Visit to Patient** Refers to all services in which the patient is seen on a 1:1 basis in their own environment, e.g. home visit by a crisis team, assessment of patient in homeless persons' shelter, visit to aged patient in nursing home or visit to child at school. Travel time associated with the visit should be included.
4	**Services on Behalf of a Patient** Refers to services which are related to an individual patient, but which are not provided directly to the patient, e.g. sessions with patient's family or carers, consultations between clinical staff regarding the patient or liaison with another agency, making case or nursing notes, court appearances, Mental Health Tribunal preparations. Travel time should be included.
5	**Consultation Liaison Psychiatry Services** Refers to services provided to another health service provider in relation to a patient of that provider. The characteristic of consultation-liaison services is to provide specialist mental health advice on diagnosis and/or management issues in relation to the patient. The patient may or may not been seen by the mental health worker. Travel time should be included.
6	**Services to Unregistered / Non-Current Patients** Refers to direct or indirect services to persons who are not currently under care of the agency where (1) the contact is brief (< 1hr), and (2) no further appointment is made. In general, no medical file is raised or clinical entry made to a previous medical file. Travel time should be included. *Note: Services to patients who are covered under Consultation-Liaison Services should not be included here.*
7	**Teaching, Training and Research** **Teaching and Training:** All time associated with attending recognised award courses, training and supervision of students and the conduct of lectures and seminars (including interdepartmental and interagency work). Time associated with preparation of formal lectures should be included. **Research:** All activities undertaken by staff in relation to a discretely funded formal research projects, where the activity can be clearly distinguished from the provision of day-to-day clinical care. All meeting and travelling time associated with teaching, training and research should be included.
8	**Community Development** Refers to activities which aim to promote community action and knowledge about mental health issues, including provision of information/assistance to other agencies in relation to mental health services and program development; and general community education and health promotion activities, such as Mental Health Week. Travel time should be included.

Note: All the residual time (i.e., total time on duty minus time recorded for above categories) was classified as General Time.

For sites that did not have an existing data collection procedure, a specific MH-CASC *Staff Activity Form* was developed for use during the three-month study period to capture all the required data. A copy of the form is provided in Part 2 of Volume 2. Again, every effort was made to minimise the burden on clinicians. The form was designed to be flexible, enabling staff to complete it in one of two ways: at the end of the shift, or activity by activity. Staff were not required to record details of every activity undertaken during the shift. For example, time spent in meetings, or on administrative duties, did not need to be included: rather it was derived as part of 'General Clinical Time'.

All forms required the time spent on patient attributable activities to be recorded against the specific patient, but the patient was always de-identified prior to the form being sent to the Project Team. Some sites recorded patient attributable time against UR numbers only. Sites that recorded patient attributable time against patient names stripped the names from the forms prior to their dispatch.

Similarly, staff were only identified on *Staff Activity Forms* by a Staff Code, and not by name.

Frequency with which staff activity data was reported

Clinicians were required to submit at least one form for each shift, recording each of their activities according to each of the activity categories in Table 10.

Health Insurance Commission data

Data on patients' use of private psychiatrists during the three month study period (as identified by Health Insurance Commission statistics) was collected to supplement staff activity data provided by private hospitals included in the study. This was necessary to accurately determine the costs of services provided by psychiatrists for each patient class at these sites, where such services where delivered by private practitioners.

To access this information, participating sites were required to provide a list of the patients in the study cohort directly to the Health Insurance Commission (HIC), along with the unique MH-CASC ID. This information was downloaded from the Episode Registration and Tracking Tool (ERaTT) (see Chapter 6). The HIC then returned to the Project Team data on the use by those patients of private psychiatrists during the three-month study period, with the name removed.

This approach to linking MH-CASC and HIC data was approved by the Departmental Ethics Committee of the Commonwealth Department of Health and Family Services, and advice received from the Office of the Privacy Commissioner.

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Chapter

6

Site Selection and Preparation

Site selection

Two key criteria were used in selecting the study sample.

First, the sample needed to include sufficient observations across the mental health disorder spectrum to develop the classification. Using clinical and statistical criteria, it was estimated that the study would need to sample between 1,400 and 2,800 acute inpatient episodes, 1,800 non-acute inpatient episodes and between 1,900 and 4,100 community episodes. Appendix B-1 of Volume 2 provide details on the approach used in developing these estimates.

Second, it was considered desirable to select sites that reflected Australian specialised mental health practice and which met the following criteria:

- services should be integrated or clustered to enable tracking of patients across time and setting;
- services should incorporate a range of service types, particularly acute inpatient, non-acute inpatient and community services;
- services should be representative of the Australian mental health system, reflecting public and private coverage, representation from all States and Territories and metropolitan and regional areas, and a balance of service types (e.g., co-located and stand-alone inpatient units);
- services should have a level of resources which is adequate to provide a reasonable service, as measured in comparison with national averages; and
- services should be recognised as engaging in "best practice".

Using data provided by the Department of Health & Family Services drawn from the National Survey of Mental Health Services (1995-96), a potential sample of public sites was selected that both met the above criteria as well as providing sufficient observations to develop a classification system. Final selection of public sites was following consultation with the directors of state mental health services.

Similarly, selection of potential private sites was based on consultation with the Australian Private Hospitals Association. Executives and senior clinicians at all potential sites were then approached and invited to participate. The final sample included 22 sites, as shown in Table 11.

Table 11: Sites included in the MH-CASC study

NEW SOUTH WALES

Central Sydney Area Mental Health Services

- Royal Prince Alfred Hospital Mental Health Services
- Rozelle Hospital
- Rivendell Child and Adolescent Mental Health Services
- Concord Hospital
- Central Sydney Area Community Mental Health Service

VICTORIA

Barwon Psychiatric Services, Geelong Base Hospital

- Acute inpatient unit
- Consultation-liaison service
- Day Treatment Centre
- Community Mental Health Teams, four locations
- Child and Adolescent Team
- Community Rehabilitation Facility

Mornington Peninsula Psychiatric Services

- Acute inpatient adult psychiatry services
- Acute inpatient aged psychiatry services
- Crisis Assessment and Treatment Team
- Mobile Support and Treatment Team
- Aged Psychiatry Community Team
- Community Care Unit

Dandenong Psychiatric Services

- Adult Community Treatment Team
- Mobile Assessment and Support Team
- Mobile Intensive Treatment Team
- Psychogeriatric Assessment Team
- Inpatient Acute Unit
- Adult Day Program
- Psychogeriatric Day Program
- Community Care Unit

Early Psychosis Prevention and Intervention Centre

- Inpatient Service
- Outpatient services
- Early Psychosis Assessment and Community Treatment Team

QUEENSLAND

Logan-Beaudesert Mental Health Services

- Logan Hospital acute inpatient unit and outpatients
- Woodridge Clinic
- Mobile Intensive Treatment Team
- Beenleigh Community Mental Health Service
- Logan Child and Youth Service
- Mobile Intensive Treatment Team and Extended Hours Services
- Consultation-liaison Service

Gold Coast Hospital

- Gold Coast Hospital acute inpatient unit
- Mobile Intensive Treatment Team
- Rehabilitation Service
- Southport Community Psychiatry Clinic
- Miami Clinic

West Moreton Integrated Mental Health Services

- Adult acute inpatient unit (at Wolston Park Hospital)
- Aged care inpatient unit (at Wolston Park Hospital)
- Mobile Intensive Treatment Team
- Assessment and Acute Care Team (based at Goodna and Ipswich Centres)
- Rehabilitation Team (based at Goodna and Ipswich Centres)
- Accommodation Team (based at Goodna and Ipswich Centres)

Wolston Park Hospital

- All inpatient units, including Acute Unit, Rehabilitation Unit, Secure Unit, Psychogeriatric Unit, Adolescent Unit

WESTERN AUSTRALIA

Bentley Health Service and associated services

- Mill Street Centre – acute psychiatric inpatient units, including adolescent unit
- Mill Street Centre – community teams
- Bentley Psychogeriatric Lodge and Day Hospital
- Jarrah Road Day Centre
- Patricia Street Drop In Centre
- East Victoria Park Child and Adolescent Clinic
- Armadale Clinic
-

Fremantle Psychiatric Services

- Fremantle Hospital acute psychiatric units (general psychiatry and psychogeriatric units)
- Fremantle Hospital community mental health teams
- Moss Street Lodge
- Milpara Centre
- Rockingham-Kwinana community mental health services
- Peel District community mental health services

SOUTH AUSTRALIA

Women's and Children's Hospital/Northern Child and Adolescent Mental Health Services (Northern CAMHS)

- Women's and Children's Hospital (Boylan Ward)
- Academic Department of Psychiatry, Women's and Children's Hospital
- Eastern Region,
- Western Region., Northern CAMHS
- Northern Region, Northern CAMHS
- Adolescent Day Services, Northern CAMHS
- Helen Mayo House, Glenside Hospital

Northern Area Mental Health Service

- Lyell McEwin Hospital acute inpatient unit (Ward 1G)
- Northern Community Team
- Northern Rehabilitation Team
- North Eastern Community Team
- Accommodation Support Team

Eastern Area Mental Health Service, including

- Royal Adelaide Hospital - acute ward (Ward C3) and Consultation-liaison Team
- Cleland House acute inpatient unit, Glenside Hospital
- Emergency Team, Cleland House
- East Adelaide Continuing Care Team
- Adelaide City Continuing Care Team
- Rehabilitation Team

Glenside Hospital

- All inpatient units covering acute, intensive care, extended care and Statewide Services, except Cleland House Unit (included in Eastern Area as per above) and Helen Mayo House (included in Northern CAMHS) and Services to the Elderly program

Services to the Elderly, Hillcrest Hospital

- All Hillcrest Hospital inpatient units except James Nash House Forensic Psychiatry Unit

TASMANIA

Mental Health Services, Southern Metropolitan Region

- Royal Derwent Hospital
- Clare House (Child and Adolescent Service)
- Royal Hobart Hospital acute unit (ward 5A)

NORTHERN TERRITORY

Darwin Urban District Mental Health Services

- Royal Darwin Hospital psychiatric unit (acute and forensic wards)
- Community Psychiatric Services, Northern Team, Tamarind Centre
- Community Psychiatric Services, Southern Team, Tamarind Centre
- Child and Adolescent Family Services, Tamarind Centre
- Forensic Team, Tamarind Centre

PRIVATE HOSPITALS

St John of God, Burwood, New South Wales

- Specialised Post Natal Depression Unit
- Acute Assessment Admission Unit
- General Psychiatric Unit
- Drug and Alcohol Unit
- Specialised day patient services

St John of God, Richmond, New South Wales

- General acute psychiatry
- Rehabilitation Program
- Drug and Alcohol Program
- Specialised Post Traumatic Stress Disorder Program
- Inpatient and Day Hospital Service

New Farm Clinic, Queensland

- Elderly Assessment Unit
- Eating Disorders Unit
- Mood Disorders Unit

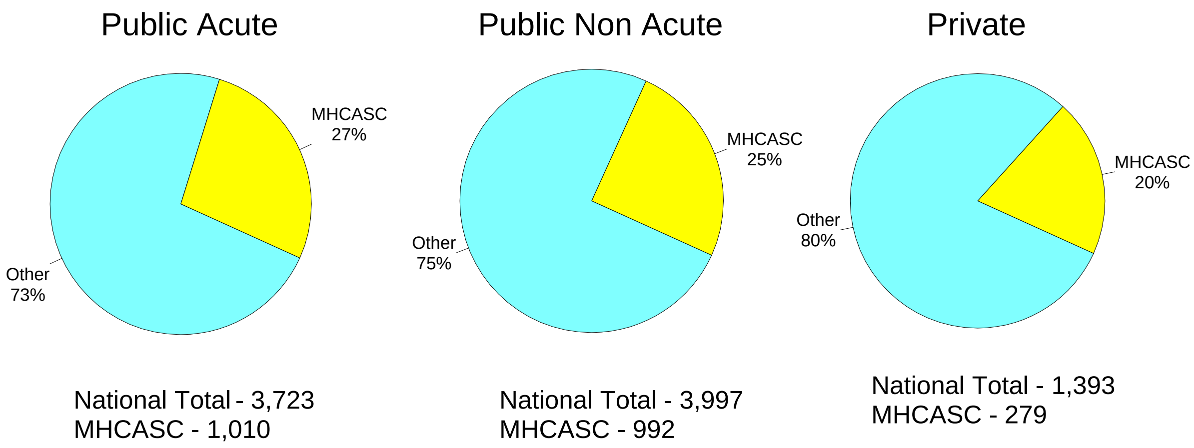
Albert Road Clinic, Victoria

- Psychogeriatric Assessment Unit
- Adolescent Unit
- Parent Infant Unit
- Intensive Care Unit
- Acute Adult Unit

Coverage and representativeness of site sample

Figure 4 shows the coverage of Australian specialised psychiatric inpatient beds. The sites in the study comprised 27% of all public acute beds in Australia, 25% of all public non-acute beds, and 20% of all private beds.

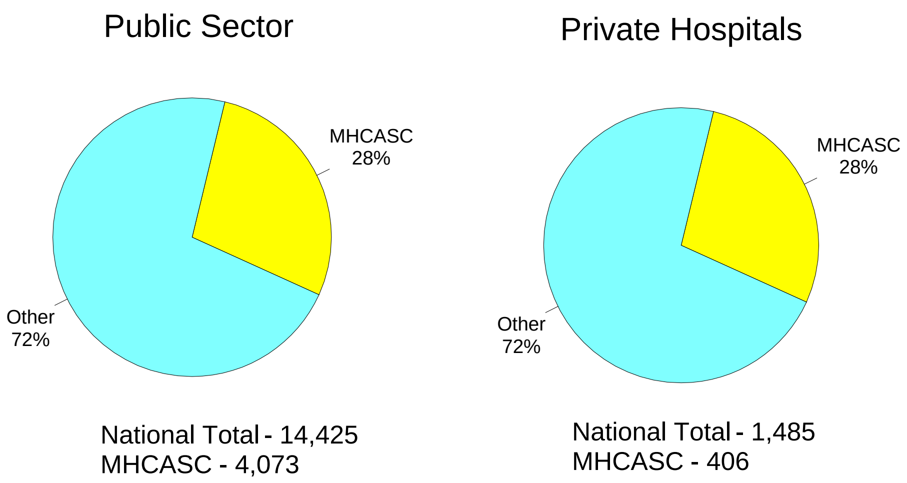
Figure 4: Study sample coverage of specialised psychiatric inpatient beds



Note: National bed numbers based on 1996 National Mental Health Report[83] Non-acute beds includes 24 hour staffed residential units

Figure 5 describes the sample's coverage of the mental health workforce. During the three-month study period, the MH-CASC Project captured the activities of 28% of the total mental health workforce in each of the public and private sectors, and 26% of the total private mental health workforce.

Figure 5: Study sample coverage of mental health workforce



Note: National workforce estimates based on 1996 National Mental Health Report.[83]

Table 12 shows the representativeness of the final sample, in terms of expenditure. On a national basis, one quarter of Australia's mental health services participated in the study, including one quarter of all private sites. Victoria and New South Wales were under-represented, and South Australia, Tasmania and the Northern Territory were over-represented.

Table 12: Project coverage of mental health spending

Site	% total site spending	% national mental health spending	% sector covered by study
NSW	18	29	16
NT	3	1	88
QLD	19	15	32
SA	20	8	62
TAS	8	3	70
VIC	11	27	10
WA	12	10	31
Private hospitals	9	9	26
All sites			25

Estimates of State/Territory expenditure based on 1995-96 National Survey of Mental Health Services.
Estimates of site spending based on expenditure reported to MH-CASC Study for period Sept-Nov 1996.

Site support

Given the magnitude of the data collection task, the Project Team recognised the real risk of poor quality data, and put considerable effort into supporting sites. Site co-ordinators were appointed to all sites to co-ordinate the local effort, and the Project Team provided training and on-going liaison.

Site co-ordinators

Additional Commonwealth funding was made available for the appointment of Site Co-ordinators to all sites one month prior to the data collection period, and for the duration of the study and the period immediately following data collection.

They comprised clinicians, medical records personnel and administrative staff, and were selected for their knowledge of all aspects of the site, seniority and respect within the site, organisational abilities, communication skills and commitment to the Project.

At the beginning of month prior to data collection, all Site Co-ordinators attended a two-day workshop. They were given an overview of the Project's rationale and design, were introduced to the complexities of the data collection cycle, and were provided with the opportunity to familiarise themselves with the specific data collection instruments. With their unique knowledge of their own sites, Site Co-ordinators were able to consider how the data collection process would work in practice, and to provide input into fine tuning the data collection plan.

After the workshop, Site Co-ordinators put in place local systems for collecting, reconciling and dispatching forms, and organised training for clinicians.

For the three-month data collection period, Site Co-ordinators were responsible for overseeing data collection at each site. This involved registering and monitoring episodes of care to ensure that all episodes were registered and clinical ratings forms completed appropriately, ensuring that *Staff Activity Forms* were correctly completed on a daily basis by each staff member, answering questions and motivating staff.

Site Co-ordinators remained active in the month following the data collection period, chasing up forms that had not been completed and assisting with checking the integrity of the data.

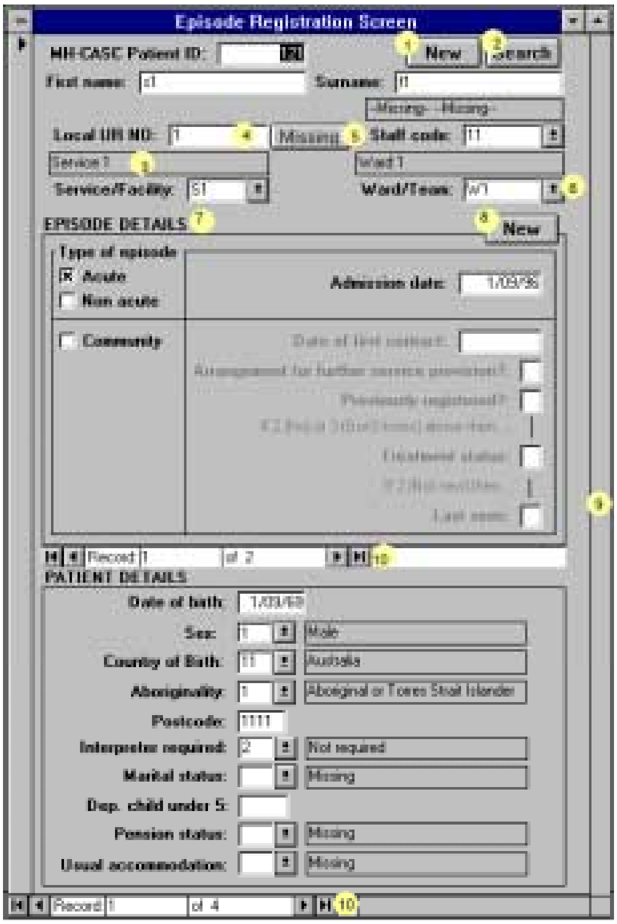
Site Co-ordinators were invaluable. Without their dedication to the task, the study would not have been possible.

Data management at sites

The data management function provided by Site Co-ordinators was one of the key supports provided to sites. The requirement that clinicians complete data collection forms imposed a significant burden, which would not have been tolerated if they were also required to monitor when an individual patient's next *Repeat Clinical Ratings Form* was due.

Managing the data collection cycle for patient attribute data was very complex: it involved monitoring each patient who had been registered to the study; ensuring that the appropriate *Repeat Clinical Ratings Forms* were completed each two weeks of a given episode; ensuring that a *Final Clinical Ratings Form* was completed when the episode closed; ensuring that no patient had concurrent episodes open at the same time (e.g., in the community and in the inpatient setting); and making sure that if an individual patient underwent more than one consecutive episode of care during the study they were identified as the same person by a unique MH-CASC ID.

Figure 6: Example of ERaTT software – the registration screen



Consequently, special Project Software was developed by the Project Team to act as the database management tool. This product, known as the Episode Registration and Tracking Tool (ERaTT) was designed by Strategic Data Pty Ltd to register and monitor episodes and to assist Site Co-ordinators in scheduling clinical ratings (Figure 6). On a weekly basis, Site Co-ordinators generated lists of patients who were due for repeat clinical ratings, and distributed them at the ward or staff level. Site Co-ordinators were also able to generate reports to inform them about concurrent episodes. ERaTT also automatically generated a MH-CASC ID for an individual patient, and any number of episodes could be associated with this unique identifier.

Site co-ordinators were also responsible for managing the staff activity data at sites, although, by comparison to the patient attribute data, this was a more straightforward task. Clinicians knew that they were required to submit at least one *Staff Activity Form* for each shift, and Site Co-ordinators generally used rosters for the purpose of reconciling forms.

Training sessions

The Project Team ran a total of 97 training sessions during the month prior to the start of the study. Approximately 1,650 direct care clinical staff attended one or more of these sessions. These training sessions enabled clinicians to familiarise themselves with the rationale behind the Project, its methodology, and the specific data collection instruments.

In addition, Site Co-ordinators conducted numerous training sessions themselves, as well as many informal briefings.

Chapter
7

Ethics and Privacy

Several steps were taken by the Project Team, the Commonwealth Department of Health and Family Services and participating sites to ensure that the study met national privacy and ethics guidelines. There were two key considerations surrounding ethics and privacy issues. Firstly, it was necessary to define arrangements that guaranteed the protection of private and confidential information:

- about mental health consumers who were the subject of the study;
- about staff who provided data on their activities; and
- about the mental health service organisations who participated in the study and contributed financial and service delivery information.

Secondly, the research nature of the Project demanded that it comply with standards established by the National Health and Medical Research Council for human research.

This Chapter outlines the mechanisms put in place for privacy protection, and the processes undertaken to gain ethics approval for the study to proceed.

Protection of consumer privacy

Arrangements to safeguard consumer privacy were outlined in the form of a Privacy Protocol prepared jointly by the Commonwealth and the Project Team. This was designed to ensure that the Project complied with the standards for the collection, storage and use of personal information set down in the Information Privacy Principles created under the *Privacy Act (Commonwealth) 1988.*

The Protocol was reviewed by the office of the Privacy Commissioner within Human Rights Australia that commented that " *the Project designers have obviously paid considerable attention to protecting the privacy of the research subjects and have addressed issues in a thoughtful and detailed way.*" The Protocol was also considered and approved by the Ethics Committee of the Commonwealth Department of Health and Family Services. A full copy of the document *Privacy Protocol for the Use of Personal Information in the Mental Health Classification and Service Costs Project*, August 1996, can be found in Part A of Volume 2 of this publication.

The Privacy Protocol stipulated arrangements for five elements aimed at protecting consumer privacy: the de-identification of data; the flow of data between parties; the provision of information about the Project to consumers; the need for specific data protection agreements with individual sites; and the requirement for privacy protection to be contractually binding upon the Project team.

De-identification of data

The essence of the arrangements to safeguard personal information obtained during the study was that data left sites in a form whereby patients could not be identified by name. In this way, the privacy implications of the data collection processes were no different for participating patients than those that would have normally occurred in the course of their general attendance at the service.

The specific arrangement was that, at each site, the Site Co-ordinator was responsible for ensuring that all data collected were sent to the Project Team with patient personal identifiers (name and address) removed. To enable records to be attributed to a single (unidentified) individual, each patient was assigned a unique, automatically generated MH-CASC ID by the Site Co-ordinator. The MH-CASC ID was linked via a master list to the one (or more) local unit record numbers (URNOs) used by the site to identify that patient. Data in respect of that patient was forwarded to the Project Team for analysis using the URNO that could then matched with MH-CASC ID as the chief identifier.

Data flow

The Project collected routine data through two media: soft copies of existing automated systems (i.e., information downloaded to tape or disk) or via manual data-capture instruments (i.e., the forms described in Chapter 4 and Chapter 5 which were designed and customised for the Project).

Study sites were provided with software developed by the Project Team (see Chapter 6) which 'registered' patients at the time they entered the study and assigned them the above mentioned unique MH-CASC ID. This information was used to identify those patients deemed to be within scope for the study period. The information contained in the registration database was forwarded to the Project Team. Prior to this occurring, the Site Co-ordinator at each site removed patient names.

One site entered data locally and forwarded it to the study in encrypted form. The data were then uploaded to the main study database.

At the end of the study, sites were given back their own data. While the MH-CASC Project Team held national data during the data analysis stage, the Commonwealth became the custodian of the national data at the completion of the Project.

Consumer information pamphlet

Consumers were fully informed about the study through two information pamphlets which were distributed to all sites. Copies of the pamphlets are provided in Appendix A-3 of Volume 2.

The first pamphlet was designed as an easy-to-understand overview of the study and was made available to all consumers by Site Co-ordinators. The second pamphlet was available on request from Site Co-ordinators, and was designed to give more details about the Project.

Specifically, the two pamphlets described:

- the purpose of the Project

- the type of information to be collected, its purpose, and how it was to be used
- who would have access to the information and in what form
- how the information could be accessed by the person to whom it related.

This approach to informing consumers was chosen because all information was de-identified prior to it being sent to the Project Team and information collection did not require any direct input from consumers themselves. Advice from the Office of the Privacy Commissioner confirmed that the adopted approach was consistent with national privacy principles.

Data protection agreements

The Privacy Protocol stipulated that the Project Team develop data protection agreements with individual sites requiring all participants to be aware of and comply with the privacy protection governing the Project. These agreements took the form of Memoranda of Understanding, an example of which is presented in Appendix A-1 of Volume 2.

Contractual obligations

To further strengthen the privacy protection arrangements, a variation was made to the original contract between Shane Solomon and Associates and the Commonwealth. This was designed to ensure compliance with the protocol and imposed upon the Project Team many of the legal obligations that a Commonwealth agency is subject to under the information Privacy Principles as contained in the *Privacy Act (Commonwealth) 1988.*

Protection of staff and agency confidentiality

The Project Team guaranteed that no information regarding an individual staff member obtained from the MH-CASC *Staff Activity Forms* would be returned to management, or any other party. In making this undertaking, the Team guaranteed that Project data could not be used by local management to monitor an individual staff member's performance. Management representatives of all participating organisations endorsed this approach. For additional protection, sites were invited to use study-specific staff codes, rather than names or other identifying information.

Similarly, the Project Team assured all participating organisations that it would maintain confidentiality of data. As such, no data have been presented in a way that would breach this undertaking. Where specific organisation results are reported, it is done in such a way as to not identify the organisation concerned.

To strengthen these undertakings, these guarantees were specifically included in the data protection agreements with individual sites, described above.

Ethics Committee approvals

The Project methodology was approved on 12 August 1996 by the Commonwealth Department of Health and Family Services Ethics Committee, a national body convened specifically to examine Commonwealth and Commonwealth-funded activities.

Additionally, the Ethics Committee of the University of Wollongong approved the Project earlier in 1996.

At the individual site level, each site was given the option of submitting the Project for local ethics approval. Fourteen sites opted to do so and received approval from their respective Ethics Committees to proceed with the study.

SECTION 3

Approach to costing

Chapter

8

Costing Methodology

The objective of the costing process was to distribute costs to two categories of 'products':

- Patient care products – costs were allocated to individual patients according to a range of statistics and subsequently aggregated to form episode costs. Cost per episode of care became the dependent variable used in development of the MH-CASC classification.
- Non-patient care products – costs were also distributed to the four 'non-patient attributable' activities reported by staff (i.e., Teaching, Training and Research; Consultation-Liaison; Unregistered Patients; and Community Development). Total costs assigned to these four activities became separate 'final products'.

The methodology used to distribute costs to patient and non-patient care products relied largely on the clinical staff time and service use data discussed in Chapters 4 and 5. Wherever possible, the approach taken in the study aimed to reflect current national standards employed in costing health services, or methods established in previous costing studies. However, much of the methodology required new approaches as previous health costing work has been based mainly in inpatient settings, and offered few precedents to guide the distribution of shared cost pools between inpatient and community care.

This chapter outlines the approach used, and how the staff activity, service use data, and cost data were processed to produce final costing products.

Unit of counting for patient care products

The basic output, or unit of counting, of the costing methodology was the 'patient care day'. For patients treated in an inpatient or residential settings, this represented the cost for each day of stay (occupied bed day cost). For patients treated in community or outpatient settings, the day cost represented the total costs associated with all occasions of service received by the patient on the particular day.

The intention was to allow scope for these patient care days to be 'rolled up' into final service use products more appropriate for classification development, such as:

- cost per inpatient separation; or
- cost per bed day for days 1-14 of a non-acute inpatient stay; or
- cost per acute community episode of care.

Core and non-core costs

The total costs reported by the study sites were split into core and non-core costs, with only the former being used to develop the casemix classes. Table 13 summarises the separation of core and non-core costs. The rationale for identifying cost items as non-core primarily concerned either the impracticality of collecting reliable data, or the immateriality of the item in the overall classification. Reasons for exclusion of each item are summarised in Table 14.

Table 13: Core and non-core costs

Core Costs	Non-Core Costs
• Direct care staff - Salary & Wages, salary on costs for Medical, Nursing, Allied, Other • Private Psychiatrists (MBS) - for private inpatients • Administrative infrastructure * • Overheads, Good and Services	• Drug Costs • Pathology & Imaging • Satellite/Regional/ External • ECT - non salary related • Capital • Depreciation

* Includes general hospital corporate costs for co-located psychiatric inpatient units

Table 14: Rationale for exclusion of non-core costs

Non-Core Costs	Rationale for exclusion
• Drug Costs • Pathology & Imaging	• Systems were not available at most sites to attach costs reliably to individual patients; special manual collections not considered practical given demands of activity data collection. • Variable practice in whether costs were met by the site e.g., pharmacy costs for inpatient episodes within private hospitals not met by the site; community patient pharmacy costs not uniformly met by public sector sites. *Note re Drug costs: Only costs of consumables excluded. Salary and wage-related expenditure for Pharmacy departments distributed as overheads.*
• Regional management costs	• Systems not available for reliable estimation. • Not considered material in overall impact on classification.
• ECT – non salary related	• Systems not available at most sites to reliably estimate non-salary costs (theatre time, anaesthetics) associated with ECT administration. • Considered only being marginal in impact. *Note re ECT: Staff time associated with ECT treatments included in core costs.*
• Capital Depreciation	• Public sector costs not met in most States and Territories.

Overview of costing methodology

The costing methodology had six steps.

Step 1: Adjustments were made to expenditure recorded by the study sites.

Step 2: Sites' basic cost centre structures were defined.

Step 3: Sites' cost centre structures were refined to match activity data.

Step 4: Overhead costs were distributed to patient care cost centres.

Step 5: Staff salary and wages related expenditure was distributed to patient care and non-patient care events.

Step 6: Overheads were distributed to patient care and non-patient care events.

Each of these is described in more detail below.

Step 1: Adjustments made to sites' recorded expenditure

As the study covered a three-month period, most services needed to adjust their recorded expenditure to ensure that the costs matched activity. There were two broad types of adjustments.

First, sites' chart of accounts were supplemented by expenditure incurred for services provided to patients in the study cohort, but paid through some other source. Examples included:

- external services provided by another agency, for example, payroll services; and
- superannuation and workers compensation costs funded directly by State or Territory Governments.

Second, for sites with cash based accounting, an accrual adjustment was made to align the three-month expenditure with activity.

Step 2: Defining sites' basic cost centre structures

Subsequent to adjustments, general ledger costs were distributed to the cost centre structure used by the site.

Initially, cost centres were identified as being either overhead or patient care cost centres.

> **A patient care cost centre** *was defined as including costs of delivery of care directly to patients, for example: wards, outpatient clinics, day programs, specialist teams, etc.*
>
> **An overhead cost centre** *was defined as including costs which were incurred indirectly in delivering services to other cost centres, and typically included cleaning, administration, catering, fuel, light, power, organisational liabilities such as superannuation, etc.*

Cost centres varied in their specificity and correspondence to service delivery programs. For the purposes of the study, it was desirable for patient care cost centres to map as closely as possible to identifiable programs delivered by the site, although this preference was not met in all cases. The only mandatory requirement imposed by the Project was for a clear separation of ward-based units (i.e., those in which an overnight stay was possible) to be uniquely identified in the cost centre structure.

Each patient care cost centre was further sub-divided into the four clinical service delivery staff classes, defined by the labour classification of the service provider (i.e., Medical; Nursing; Allied Health; and Other). These represented the standard cost components to be reported. Staff time within each pool was aggregated over the three-month study period to smooth out fluctuations unrelated to patient factors.

Step 3: Refining sites' cost centre structures to match activity data

Adjustments were made to correct misalignments between time reported by staff and salary and wage-related costs at the cost centre level. This step in the costing approach was necessary for the majority of the twenty-two study sites.

To determine the extent of misalignment between reported time and salary and wage-related costs, average hourly rates were computed for the four labour classes within each of the patient care cost centres for all sites. Where significant variations were identified between cost centres for a particular site, a 90% tolerance limit was used to distinguish those cost centres deemed to require adjustment.

Misalignments between reported time and salary and wage-related costs were found to be caused by two main factors.

Cost centre structures did not adequately reflect staff activity patterns

This typically arose when the allocation by site finance personnel of salary and wages to cost centres was based on inaccurate assumptions about how and where staff spent their working days. For example, all salary related costs for medical personnel at a particular site were reported under the inpatient unit cost centre, but on *Staff Activity Forms*, 35% of medical time was reported under cost centres for community-based services. This was the most common factor that necessitated cost centre adjustments.

Where this occurred, salary and wage related expenditure was redistributed between cost centres in proportion to time reported by each labour class on the *Staff Activity Forms*. The impact of this step varied according to the degree of misalignment. For some sites, extensive reassignment of costs between cost centres was required.

Under-reporting of time by staff

In a small number of cases, salary and wage-related costs failed to reconcile with activity data due to under-reporting of activities by staff within a particular labour class or local program. Where this was significant, the estimated value of the unreported time was transferred to a 'dummy' cost centre and subsequently distributed on the same basis as overheads or general time (described below).

Step 4: Overhead and infrastructure costs distributed to patient care cost centres

The next step was to distribute the overhead and infrastructure costs to patient care cost centres. This was necessary to gain a true cost of a patient care episode, and involved assigning a share of overhead/infrastructure costs such as cleaning, finance, administration, fuel light and power, to the patient care cost centres.

Table 15 provides a summary of expenditure items included in the overhead and infrastructure category.

Table 15: Items included in overhead and infrastructure costs

- Administration
- Cleaning & Domestic Services
- Utilities
- Engineering & Maintenance
- Catering
- Corporate Services
- Goods and Services
- Medical and Surgical Supplies
- Clerical Staff salaries and wages
- Telecommunications, Computing & IT
- Finance, Payroll and Human Resources
- Porters & Orderlies
- Medical Records
- Transport – Staff and Patient related

Costs in overhead/infrastructure cost centres were allocated to patient care cost centres based upon organisation specific allocation statistics. Overhead and infrastructure costs remained aggregated at the cost centre level, and were not split into labour-class specific pools.

Ideally, the best allocation statistic would have been derived from the true costs of services provided by one cost centre to another. However, the true costs were often difficult to measure. For example, the costs of cleaning services could have best been allocated by accessing the cleaning services roster and identifying the total time spent by each cleaner in each area corresponding to a cost centre. However, this was impractical because the necessary data were not routinely collected nor readily available. Thus, another statistic was used which was more readily accessible, such as the number of square metres of floor space per cost centre. Allocation of cleaning service costs to the respective cost centres was then based on their proportion square meterage.

If a site already had acceptable 'rules' for allocating overheads/infrastructure, or existing clinical costing systems, these were used. If these were not available, a hierarchy of alternative allocation statistics was used, developed by the Department of Health & Family Services from the National Costing Study.[84] Using these, three alternative allocation statistics were identified for each cost centre, so that for sites which were unable to provide data corresponding to the preferred allocation statistic, two alternate or 'fall back' statistics were offered. The list of statistics used for the allocation of overheads/infrastructure is provided in Appendix B-8 of Volume 2.

The Project Team worked with each organisation during site visits to develop the approach to be used. Organisations were also given the opportunity to review the overall cost allocation processes and make any necessary amendments. The Commonwealth's Casemix Education Series Volume 4 provides a more detailed description of the processes used in this stage of the study.[85]

Step 5: Distribution of staff salary and wages related expenditure to patient care and non-patient care events

This step in the costing process involved the allocation of salary and wage related costs for the four classes of clinical service delivery staff to individual patient events and non-patient care products. Table 16 provides details of costs included in the salary and wage related category.

Table 16: Salary and wage-related costs for clinical service staff

- Salary & Wage payments
- Termination Payments (excluding exceptional payments e.g., VDPs, TSR's)
- Long Service Leave provision
- Sick Leave payments
- Annual Leave Provisions
- Higher duties payments
- Superannuation
- Payroll Tax (where applicable)
- Workers Compensation - payments and premiums
- State and Territory loadings (e.g., Remote location allowances)
- Payroll Tax

Distribution of salary and wage-related expenditure was driven by a series of allocation statistics based directly on the staff activity patterns reported by the four labour classes within each final patient care cost centre.

For each labour class, total time reported over the three-month study period was first split into three 'pools': Patient Attributable Time; Non-patient Attributable Time; and General Time. The allocation of time, and associated costs, from each of these pools followed different principles as outlined below.

Patient attributable time (P)

Patient attributable time (P) comprised the sum of all time reported on patient care events (Individual Patient Care, Group-based care, Visit to Patient, Services on Behalf of a Patient).

A component of total salary and wage-related costs for each staff class was allocated to a 'patient attributable cost pool', in proportion to total time reported on these activities. This pool was then allocated to patient care events in proportion to patient attributable time reported for a given event.

Non-patient attributable time (N)

Non-patient attributable time (N) was defined as the sum of all time reported on the four non-patient attributable activities (Teaching, Training and Research, Consultation-Liaison, Services to Unregistered Patients, Community Development).

A share of the total salary and wage-related costs for each staff class was allocated to a 'non-patient attributable cost pool', in proportion to total time reported on these activities. Distribution of this pool to the non-patient care products was in proportion to total time reported over the study period for each of the four activities.

General time (G)

General time (G) represented the sum of the residual total time worked that was not accounted for by P or N. As discussed later in this report (see Chapter 10), General Time was a significant factor at all sites, accounting for 47% of total staff time. It was evident, therefore, that the method used in the allocation of General Time to the costing products would have a material impact on final costs.

The approach taken was based on four key considerations:

- First, General Time comprised a mix of clinical and administrative activities, the costs of which needed to be spread across patients and non-patient products.
- Second, significant cross servicing occurred between inpatient and community-based cost centres, requiring new cost distribution processes to be developed.
- Third, the distribution of General Time (and associated costs) to patients should balance two principles:
  - the allocation of General Time should bear a direct relationship to the amount of resources used, so that those patients using more resources receive a greater share of General Time; but
  - the allocation statistic should not overly amplify differences between patients as would occur, for example, if General Time was allocated in direct proportion to Patient Attributable time.
- Fourth, the allocation of General Time to non-patient products should exclude two of the four activities – Teaching, Training and Research and Community Development. The rationale for this was that clinicians were specifically instructed to include preparation time for these activities, which therefore already included a General Time component. Consequently, General Time should only be distributed to the remaining two activities – Unregistered Patients and Consultation-Liaison.

To begin the allocation process, General Time was calculated for each labour class within each cost centre and split into two initial pools – a share to be attributed to individual patients and a share to be distributed to non-patient products. Creation of these 'G pools' was based on the ratio of time reported by the particular staff class for patient and non-patient activities, with Teaching, Training and Research and Community Development excluded from the equation. Thus, the shares of the G pool set aside for patients and non-patient products were calculated by the following formulae.

$$\text{G share to patients} = G \times \frac{[\text{Sum P}]}{[\text{Sum P}] + [\text{Sum N}]}$$

$$\text{G share to non-patient products} = G \times \frac{[\text{Sum N}]}{[\text{Sum P}] + [\text{Sum N}]}$$

where Sum P = [Total Time on P activities] and
Sum N =[Total Time on Unregistered Patients] + [Total Time on Consultation-Liaison]

Allocation of G time to patient attributable activities

Allocation of the G time pool set aside for patients followed separate rules developed for inpatients and community patients.

For inpatients, occupied bed days was identified as the most appropriate statistic for distributing G time costs. However, prior to the allocation, a distinction was made between those inpatients who were actually resident in a ward on a particular day (referred to as 'home ward' patients) and those who were provided services by the given ward, but were resident in another ('non-home ward' patients). This was based on the observation that staff reporting under a particular inpatient cost centre frequently provided services to inpatients from other wards, for example, in the form of group activity programs, medical assessments and so forth.

In operational terms, certain cost centres were identified at the outset of the study as wards in which an overnight inpatient stay was possible. On a given day, a particular inpatient's 'home ward' was identified as the one from which the majority of care (i.e., P time) was received.

It was not considered reasonable for 'non-home ward' inpatients to compete for G time on the basis of bed days, since this would have resulted in double counting (i.e., 'non-home ward' patients accessing considerable amounts of G time from the ward they visited and the ward they slept in).

Community patients, who also accessed programs and services from inpatient wards on a daily basis, compounded the problem. It was not considered feasible to resort to a common denominator by, for example, equating a certain number of non-inpatient occasions of service to a bed day. Other studies have developed this sort of conversion currency, but these were considered outdated and not mental health specific.[86]

As a consequence, three separate G pools were created, each with different allocation statistics:

- General time – 'home ward' patients
- General time – 'non-home ward' patients
- General time – community patients.

The relative amounts of G assigned to each component were calculated in proportion to patient attributable time reported by the particular staff class. For example, if 20% of the patient attributable time reported by nurses in Cost Centre 1 was directed to 'home ward' inpatients, then 20% of the Nursing G time pool within Cost Centre 1 was assigned for allocation to those patients.

For 'home ward' inpatients, the approach taken in other inpatient costing studies was followed. G time was allocated in proportion to total bed days, with leave days excluded. Leave days were defined as those on which an admitted patient received no P time from the 'home ward' cost centre. The creation of 'home ward' G pools applied only to the ward-based cost centres identified at the beginning of the study.

For the G pools created for 'non-home ward' inpatients and community patients, five options were evaluated against the principles described earlier in this section – that is, the distribution of G time should be related to the amount of resources used; but the allocation approach should not exaggerate differences between patients.

Option 1	Distribute G in direct proportion to patient attributable time. This was rejected as it would overly amplify differences between patients.
Option 2	Distribute G in proportion to number of days 'on the books' (i.e., number of days registered as a patient of the service). This was considered to be unrealistic, given the substantial differences across patients in terms of non-contact days (i.e., days with no P time). In the community, for example, a considerable proportion of patients were seen only once a month, but remained registered with the service for the duration of the study. This option would have unrealistically dampened these differences between patients.
Option 3	Distribute G in proportion to the number of contact days. By this option, a patient would have received a share of G time on any day on which an occasion of service occurred, regardless of the duration of contact, or the staff class of the service provider(s). Again, this option was rejected on the grounds that it would unrealistically dampen differences between patients.
Option 4	Distribute G in proportion to the number of provider contact days. By this option, a 'provider contact day' would be counted for each day on which an occasion of service was provided to the patient by a unique staff member, with an upper limit of one contact per staff member per patient per day. For example, four 'provider contact days' would be counted for a patient if four different service providers recorded a contact on a given date. This option was considered preferable to Option 3, but was still thought to dampen the differences between patients by equating short contacts with those of longer duration, thereby failing to take account of individual care time.
Option 5	Distribute G in proportion to the number of 'provider contact days' weighted for total duration of the contacts. This was the preferred option, since it achieved a compromise that allowed G time to reflect the amount of individual care time provided, without exaggerating differences between patients.

Once Option 5 was selected, appropriate weights were developed. In the absence of any precedent to guide the approach, the distribution of patient attributable time per 'provider contact day' was reviewed. To do this, all occasions of service recorded by each unique staff provider for each unique patient were summed on a daily basis and the distributions plotted, to allow comparison between the four labour classes and between sites.

Significant site and labour class differences were found in the distribution of total time per 'provider contact day', pointing to the need for labour class and site-specific weights. For example, patient contacts recorded by staff based in inpatient settings were typically briefer, and more frequent, than those recorded by staff based in community settings.

For each staff class within each site, 'provider contact days' were divided into 'tertiles' (three groups), based on the total contact time accounted for by each group. The bottom tertile, defined as 'low duration' contact days, were those which accounted for the first third of time, 'medium duration' contact days for the second third, and 'high duration' for the final third.

Weights of 1, 2 and 3 were assigned to these tertiles, respectively. Each 'provider contact day' received by a patient was assigned a weight based on its duration and the sum of the weights was used as the basis for allocation of the G pool.

To illustrate the process of assigning tertile weights, an example is provided in Table 17 below. Tertile weights are specific for 'patient type' for each labour class at each site where 'patient type' is either community or 'non-home ward' inpatient. If a Medical staff member at Site A saw a community patient, one or more times on a particular day, and the total time recorded for that day was 30 minutes, this 'provider contact day' would be assigned a weight of 1. Alternatively, if that staff member was a Nurse, the 'provider contact day' would be assigned a weight of 2.

Table 17: Example of tertile assignment

Site	Labour Class	Patient Type	Weight	Low	High
A	Medical	Community	1	1	45
A	Medical	Community	2	46	60
A	Medical	Community	3	61	1439
A	Nursing	Community	1	1	25
A	Nursing	Community	2	26	60
A	Nursing	Community	3	61	1439

For both community and 'non-home ward' inpatients, the allocation of the various G pools was staff class-specific. In other words, a patient who had only had contact with a doctor on a given day would only access a share of G time from the Medical staff pool. By contrast, 'home ward' inpatients who had contact with any ward-based staff member on a given day would gain a 'one bed day share' in each of the staff class-specific G pools within the 'home ward' cost centre.

Allocation of G time to non-patient attributable activities

The total G pool allocated to non-patient care activities was allocated to two activities – Services to Unregistered Patients and Consultation-Liaison - in proportion to total time reported on these activities over the three month study period. As indicated earlier, Teaching, Training and Research and Community Development were excluded from the distribution of G time to non-patient care events.

To summarise the approach used in distribution of salary and wages related expenditure to patient care and non-patient care events:

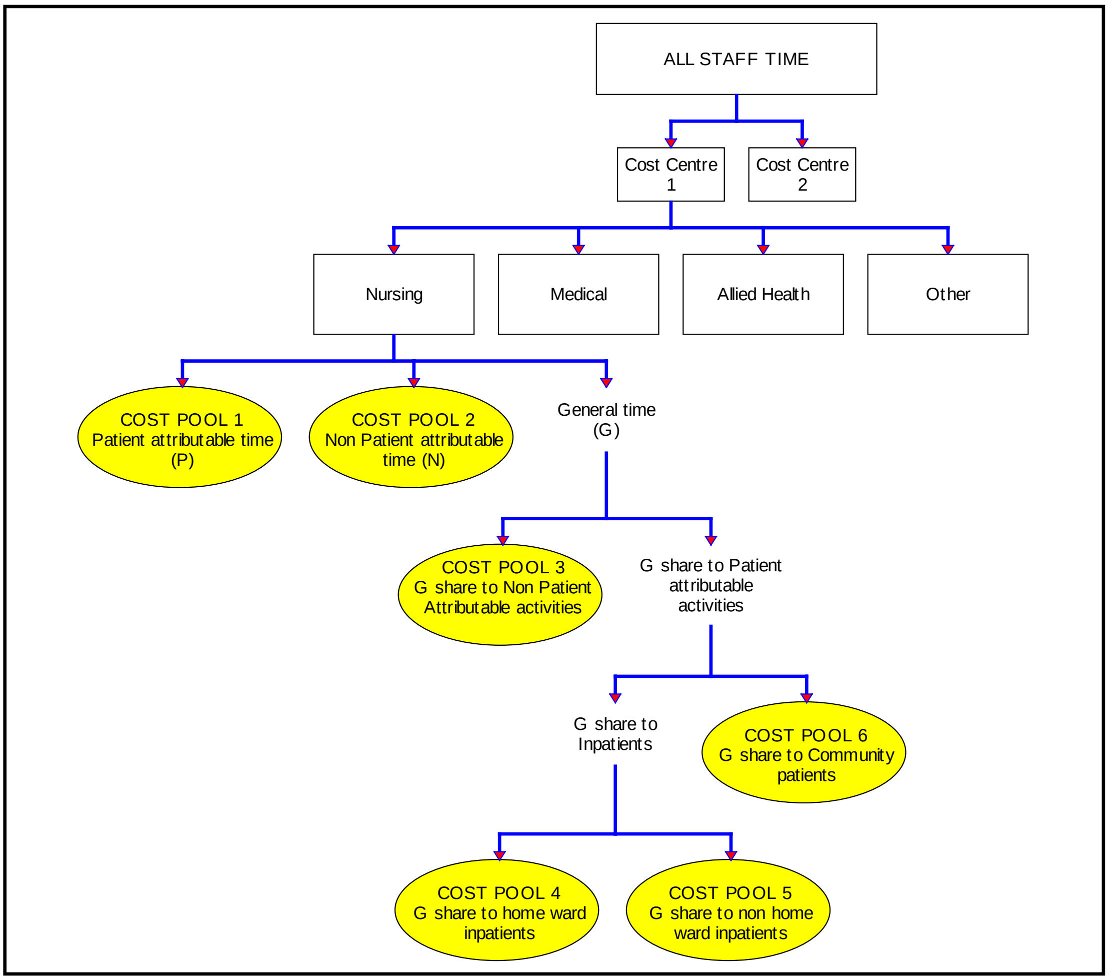
- expenditure for Medical, Nursing, Allied Health and Other direct care staff within each cost centre was first split into six separate cost pools based on the activity patterns reported by the relevant staff group; and
- these pools were then distributed to patient and non-patient care products, using a set of allocation statistics appropriate to each pool.

Table 18 summarises the various allocation statistics used to distribute the pools to patient care and non-patient care events; Figure 7 displays the overall flow of salary and wage expenditure to the six cost pools.

Table 18: Allocation statistics used to distribute the six salary and wage-related 'cost pools' to patient attributable and non-patient attributable events

Cost Pool	Allocation basis
1. Patient Attributable	Allocated to individual patient attributable events in proportion to time reported per patient care event
2. Non-patient Attributable	Allocated to the four non-patient attributable products (Teaching, Training & Research, Unregistered Patients, Consultation-Liaison, Community Development) in proportion to total time reported over the study period.
3. General Time – Share to Non-patient Attributable Activities	Allocated to only two of the four non-patient attributable products (Unregistered Patients and Consultation-Liaison) in proportion to total time reported on each activity category over the study period.
4. General Time – Share to 'home ward' Inpatients	Allocated in proportion to total bed days, with leave days excluded. Leave Days defined as days on which an admitted patient receives no P time from any staff group within the 'home ward' cost centre. *Note: Creation of 'home ward' G pools applied only to ward-based cost centres.*
5. General Time – Share to Non Home Inpatients	Allocated to individual patient attributable events in proportion to 'provider contact days', weighted for duration. All 'provider contact days' assigned a weight based on total contact time, where 'Short duration' = 1, 'Medium duration' = 2, 'Long duration' = 3.
6. General Time – Share to Community Patients	As per (5)

Figure 7: Splits of staff time into six 'cost pools'



Step 6: Distribution of overhead and infrastructure costs to patient care and non-patient care events

As is discussed in Chapter 10, overheads and infrastructure costs accounted for 36% of total expenditure by the study sites. Therefore, it was clear at the outset of the costing process that, like General Time, the method used for allocating overhead and infrastructure expenditure to the costing products would have a significant impact on final costs.

Similar issues faced in the distribution of General Time needed to be resolved for overheads and infrastructure costs, particularly the requirement to distribute expenditure across patient care events occurring in both inpatient and community settings. As a consequence, an alternative approach was needed to that used in previous costing studies, where overheads are allocated on a bed day basis.

Initial consideration was given to separating overhead and infrastructure costs into those that were exclusively associated with either inpatient or community care from those which were 'mixed', or which supported service delivery in all settings. Apart from one exception (see below), this was rejected following a review of the expenditure components, as it was clear that the vast majority were of the 'mixed' type.

Similarly, the option of first splitting overhead and infrastructure costs into labour class specific pools was considered. While a small number of sites provided cost data in this format, the approach was not pursued for two reasons. Firstly, the majority of sites had no systems in place to accurately allocate overhead/infrastructure shares to labour classes. And secondly, splitting overheads/infrastructure to labour allocation was considered desirable from a reporting point of view but would have minimal impact upon final costs. Consequently, the overheads and infrastructure remained aggregated at a cost centre level, and were not split into labour class specific pools.

Within each final patient care cost centre, overhead and infrastructure cost items were initially split into two sub-pools, patient attributable and non-patient attributable, in proportion to time reported in each activity category by staff within the cost centre.

The patient attributable share of overheads/infrastructure was then further split into three pools, in proportion to total time reported by cost centre staff:

- Overheads and infrastructure costs – 'home ward' patients
- Overheads and infrastructure costs – 'non-home ward' patients
- Overheads and infrastructure costs – community patients.

For each cost centre, a total of four cost pools were therefore created, to be subsequently allocated to patient attributable events and non-patient attributable products.

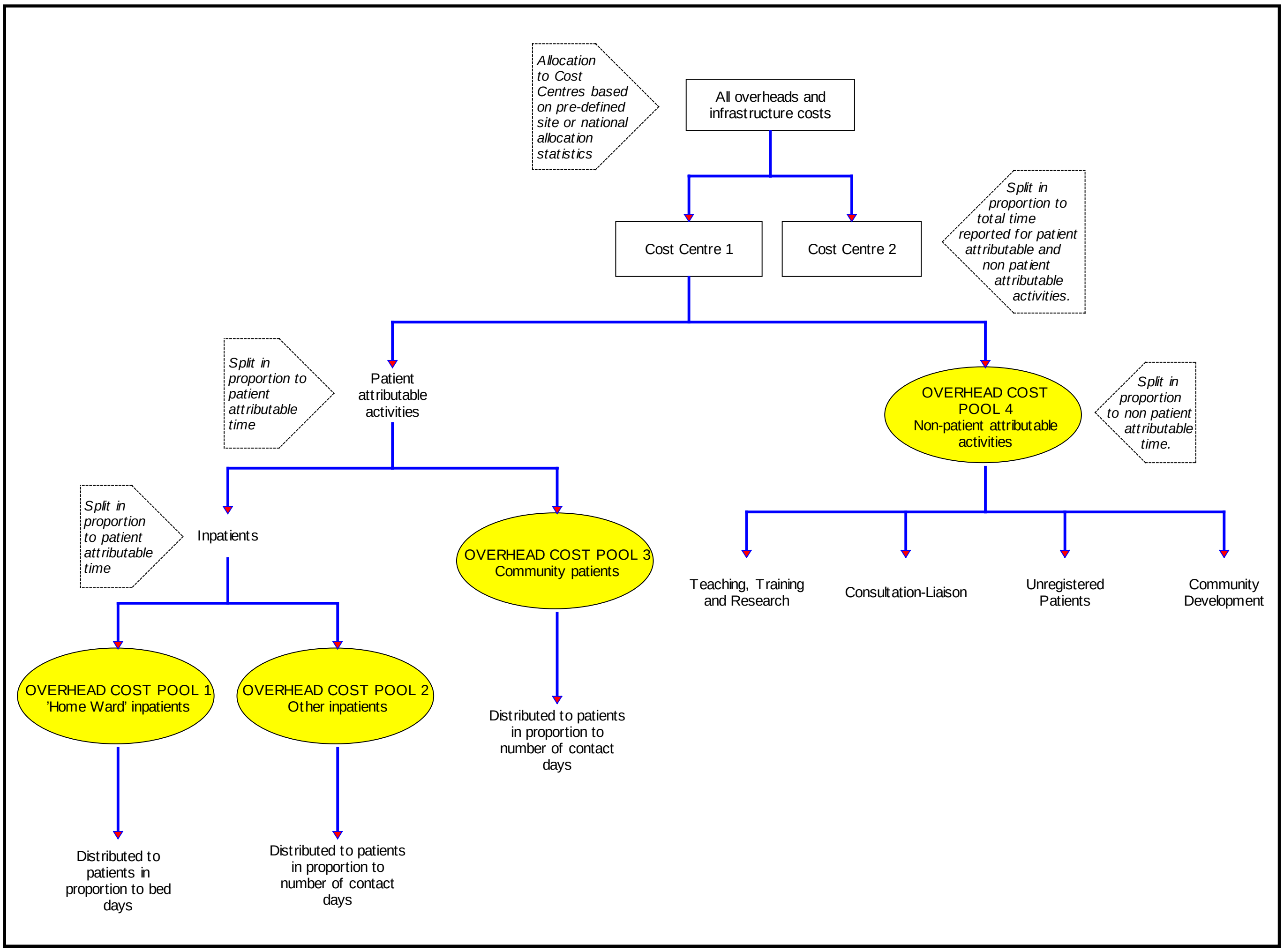
Allocation of the patient attributable cost pools to patient care events followed a similar logic to that used for General Time, with some simplifications.

- For 'home ward' patients, overheads were allocated on the basis of bed days.
- For 'non-home ward' and community patients, the allocation was based on one share per day where a contact had occurred with a cost centre, regardless of the number or duration of contacts. This was based on the idea that overheads are mainly fixed costs, so a patient who has more contacts or more time per day does not use more corporate services etc than their lower contact or shorter time counterparts.

Distribution of the non-patient attributable overhead/infrastructure pool to the non-patient care products was in proportion to total time reported over the study period for each of the four activities.

Figure 8 summarises the approach taken in the distribution of overheads and infrastructure costs.

Figure 8: Distribution of overhead and infrastructure costs to patient and non-patient attributable events



Food services and laundry costs were the one exception to the approach described above. Where these were reported separately against ward-cost centres, cost were allocated exclusively to 'home ward' inpatients in proportion to occupied bed days, on the rationale that only those resident on a given ward used such services.

The costing tool

The costing process required the use of a tool that could allocate overhead and infrastructure costs to the patient care cost centres using the methods described above. The latest existing public domain software package released by the NSW Health Department (COSMOS) was used to achieve the first phase of costing.[87]

Once overheads were allocated, the more complex process of costing the individual patient day or encounter had to be undertaken. In essence this required a tool which could cost at the individual patient level, that is, clinical cost – rather than cost at an aggregate or class level.

The revised version of COSMOS was unable to support the level of clinical costing required by the Project, largely due to the file sizes and the constraints COSMOS had in terms of the interdependence with spreadsheet packages such as LOTUS© and Microsoft Excel©.

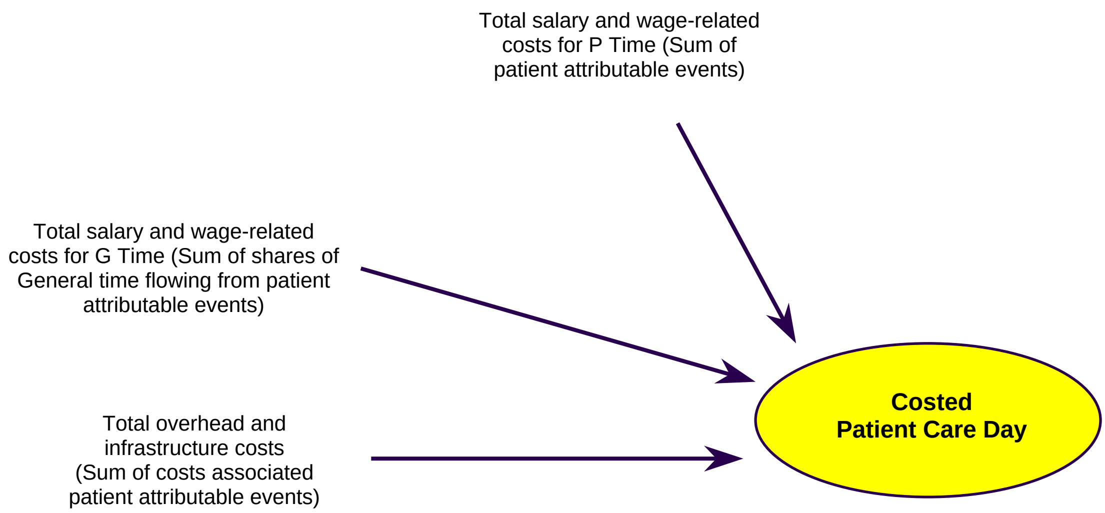
As a consequence, the Project Team developed an interface that enabled individual costs per patient per day or encounter to be derived. The interface took the study database, (constructed in Microsoft Access© format) and uploaded it into the COSMOS engine. Costing, using the absorption process described in the Casemix Education Series[85] was undertaken via the COSMOS engine, the results downloaded into an Access database using the interface product.

The application derived by the Project Team has significant implications for future National Costing Studies, particularly in the area of service weight development, where clinical costing systems are a particular requirement. Additionally, for those health care agencies that considered that, due to financial restrictions, cost modelling was their only method of deriving costs and financial performance indicators, this position can now be reconsidered.

The costed 'patient care day'

The outcome of the costing process provided an aggregate cost for each patient care day, defined as a day on which a patient had one or more contacts with one or more staff members. Each patient care day represented the total of all costs assigned to individual patient care events, summed at the date level, as shown in simplified form in Figure 9.

Figure 9: Cost components of the 'patient care day'



Approximately 320,000 patient care days were costed in the study. As indicated earlier, these formed the building blocks for subsequent episode costing.

Two examples of this are shown in the following figures.

Figure 10: Costed patient care days for a patient with multiple episodes

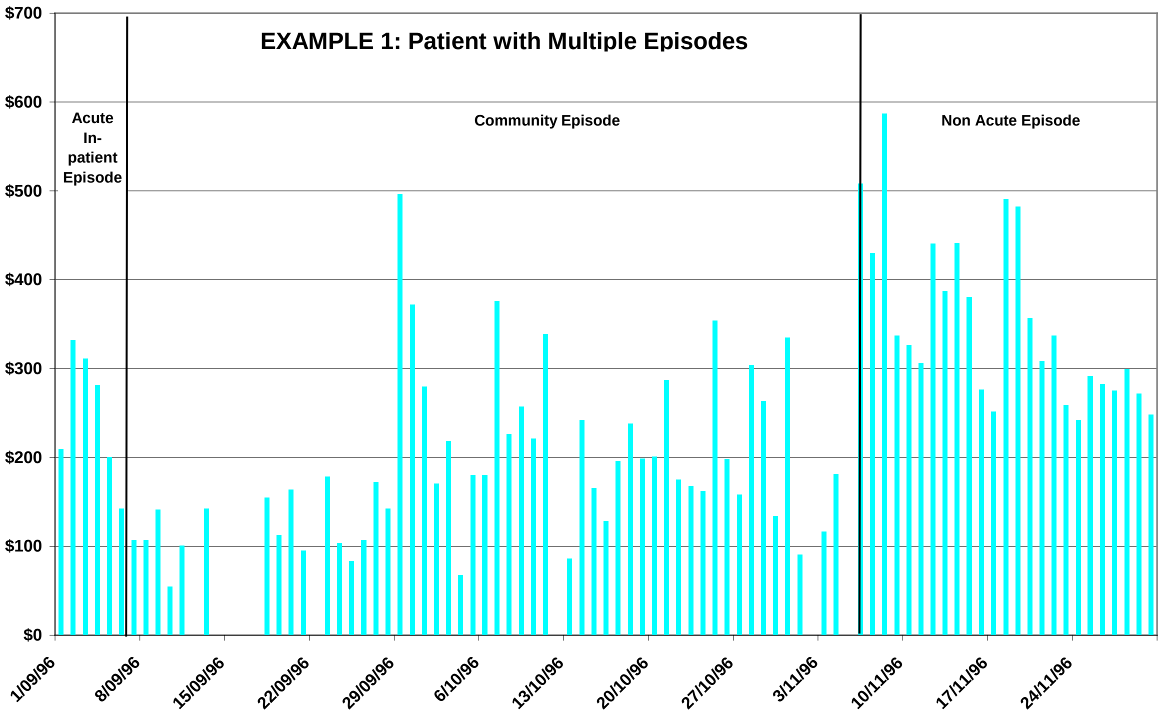


Figure 11: Costed patient care days for a patient seen in fortnightly outpatient care

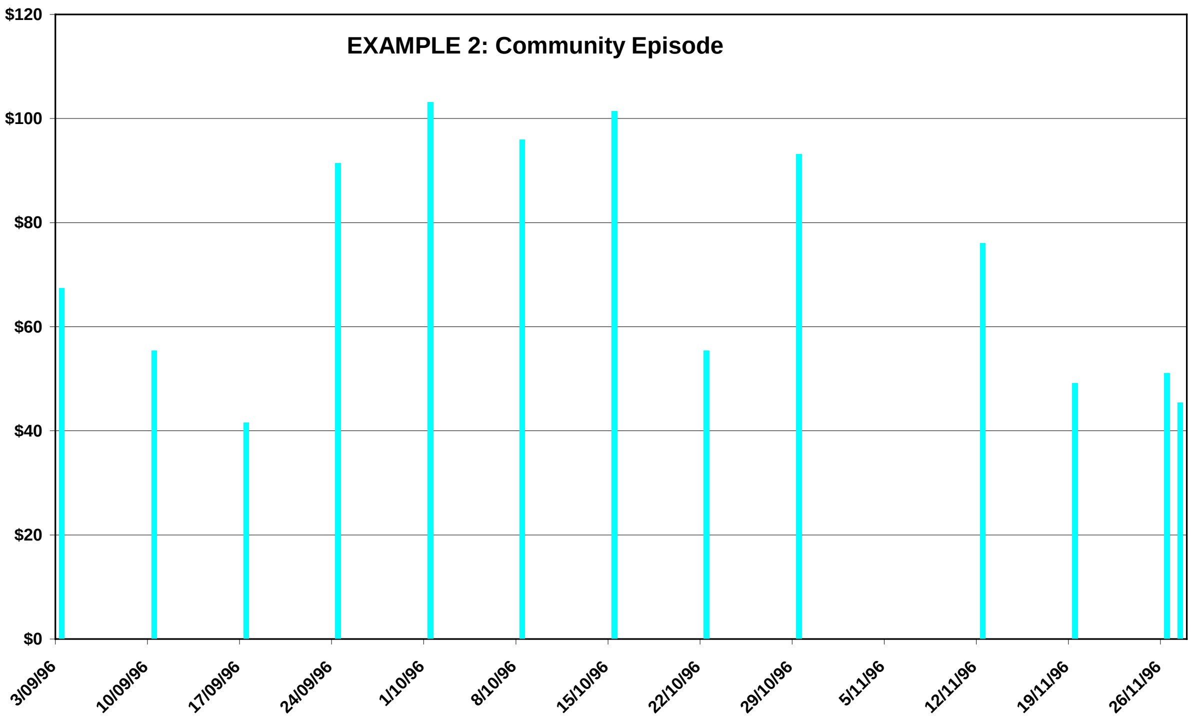


Figure 10 presents the cost utilisation pattern of a patient who had been admitted to an acute inpatient unit prior to the study commencement, was discharged shortly thereafter into a period of community care which was completed approximately 8 weeks later by admission to a non-acute inpatient unit. The case example provides a succinct illustration of two features of the costing process. It highlights:

- the need to distribute costs, for any particular patient, across multiple episodes that may occur in different treatment settings; and
- that costs were only assigned on days on which a patient attributable event was recorded for the patient, thereby creating 'zero cost' days within both community episodes and inpatient episodes (leave days).

Figure 11 presents a different pattern of care, summarising details of costs associated with a patient who attended weekly outpatient appointments in all weeks of the study except one. This example also illustrates that costs were only assigned for days on which care was provided, as well as showing that, despite the regularity of the care pattern, cost per day of care may vary. This was largely driven by the amount of P time recorded for each particular day.

Both cases also illustrate 'incomplete episodes', whereby the study three-month sampling frame censored episodes at either their beginning, their end or both. Discussion of how this was dealt with in the analysis is presented in Chapter 11.

SECTION 4

Overview of dataset

Chapter 9

Database Development and Quality

Building the MH-CASC analysis dataset required creation of 'episode records' that linked information from several sources - staff activity, episode registration, clinical ratings, site expenditure records and data collected externally to the Project. This task was made more complex by the fact that a number of sites made modifications to data collection forms, to cater for local variations and requirements. Four of the 22 sites used existing systems to provide data electronically for all or part of their services while seven other sites required customised routine data collection forms, developed for the purposes of the MH-CASC Project.

As a preliminary step to linking the data sources into episode units, extensive data quality and validation checks were conducted, to establish confidence that the dataset was suitable for analysis.

Figure 12 presents an overview of the 'building blocks' used to create episode records and the checks applied to each. This Chapter summarises the main procedures used in ensuring that each component met data quality standards.[a]

Staff activity data validation

Approximately 160,000 daily activity records were submitted to the Project by participating staff. A series of data integrity 'tests' and edits were applied to ensure quality of the information and correct errors where they could be identified.

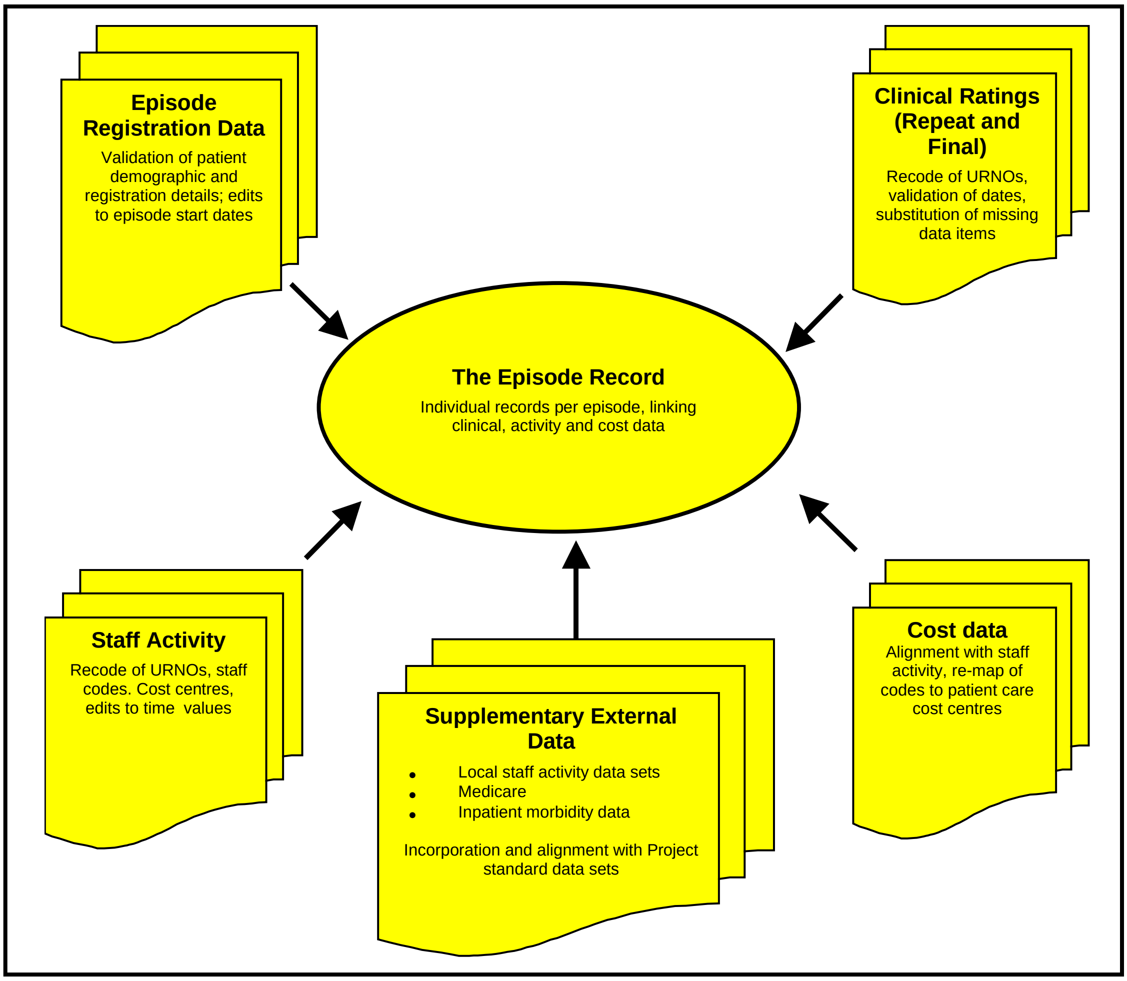
Re-mapping of patient Unit Record (UR) numbers recorded by staff

With the exception of public sites in Victoria (which has a statewide UR numbering system), it was possible for an individual patient to be legitimately allocated more than one UR number. Indeed, some sites had up to five UR numbering systems. This created significant problems for the study, reducing the ability to attribute staff activity to individual patients and track service use over time and across-settings.

In addition, UR numbers were frequently recorded incorrectly, resulting in staff activity being unable to be tied to a bona fide MH-CASC patient, or being attributed to the wrong patient. As well as this, there were instances where considerable activity was recorded against an 'unregistered' UR number, often by several staff. This usually indicated that the particular patient had 'slipped the net' of registration.

[a] Details on edits made to cost data are not included here. See Chapter 8 for details.

Figure 12: Summary of edits to episode record 'building blocks'



At the close of the data collection period, members of the Project Team worked with Site Co-ordinators in matching and re-mapping of UR numbers to ensure that they were associated with the correct MH-CASC ID. In some cases errors were simple to detect and rectify, such as where non-alphanumeric characters (e.g., dashes or slashes) or leading zeros had been omitted. In other cases, more complex cues were involved, such as which staff members provided care to the patient, and in what setting. Incorrect UR numbers were replaced by the correct ones, and, where necessary, patients were registered on ERaTT.

Over 16,000 unmatched UR numbers appearing on *Staff Activity Forms* were mapped to registered patients during this phase. As a result, 97% of patient-attributable time recorded by staff could be linked to patients registered with the study.

Re-mapping of staff codes and cost centres

It was necessary to ensure that all staff time could be associated with a payroll identifier to enable that time to be converted to costs, and that the correct cost centre was associated with those costs. As with patient UR numbers, there were inaccuracies in the recording of staff codes. Again, the Project Team and Site Co-ordinators undertook an extensive effort to ensure that each staff code uniquely identified an individual staff member and that all codes appearing on the activity records could be traced to staff registered on ERaTT. Similar edits were made to ensure staff codes were correctly assigned to cost centres.

Editing time values

Activity data were examined for exceptional time values. 'Exceptional' was defined in the context of the overall sample, and the task was to confirm the validity of such values. In other words, it was not automatically assumed that atypical time values were incorrect, but additional evidence was sought to support their validity. Where they appeared to be invalid, a series of corrections was applied, as described below.

Individual events

The activity data were edited to correct extreme times for individual events. At the lower end, negative time values were interpreted as data entry errors, and converted to positive values. Events with a value of 1 minute were left intact, since, although they may have indicated 1-hour events incorrectly recorded by clinical staff, edits were considered unjustifiable. These brief staff patient interactions accounted for 2.8% of total patient attributable activities recorded in the study.

At the upper end, the 'credibility threshold' for any specific individual event was set at 702 minutes, since this was equivalent to the longest standard shift worked at any of the sites. Values above this were trimmed to 702 minutes.

For group-based care activities, this edit procedure was modified to take account of the number of patients in the group. If the number of people in the group was 1, the event was reclassified as individual care and treated as above. If the number of people in the group was 2 or more, and the sum of group time exceeded 702 minutes, the figure was divided by the number of people in the group, on the assumption that the total group time had been recorded against each of them. If the sum of group time still exceeded 702 minutes, total group time was trimmed to 702 minutes and re-apportioned across all members of the group.

While the checks were extensive and detailed, less than 1% of the 2 million patient attributable events recorded by staff were amended by the process

Sum of all events

Once individual events had been edited, the sum of all events reported by a given staff member on a given day was checked to ensure it did not exceed the maximum possible shift length. For the majority of staff, this involved only one form, but some staff submitted multiple forms on a given day (usually because they worked in more than one ward/cost centre combination). These 'multiple form day' records accounted for approximately 20% of total activity returns. For these, events were summed across the daily set of records.

A conservative upper limit for total activity time was set at 24 hours (1,439 minutes), reflecting the maximum possible time available per day. This was necessary as Site Coordinators validated staff (primarily on-call medical officers) submitting returns with 24-hour shift times reported. Where the total activity time exceeded the 24-hour limit, it was trimmed to 1,439 minutes. Individual 'staff days' were scaled proportionally to adjust their sum to 1,439 minutes.

Again, these edits resulted in changes to a very small (less than 100) number of activity records.

Shift times

Finally, edits were made to extreme or invalid shift times that were associated with either single or multiple forms. Multiple forms were particularly prone to invalid shift times, since staff commonly inserted the total shift time on the top of each form, rather than apportioning it across ward, cost centre combinations.

At data entry, a default of 480 minutes was used for records where shift time was not recorded. The maximum value for any single record was set at 1,439 minutes.

In the case of multiple forms where the summed shift time exceeded this limit, an attempt was made to identify what the actual shift time had been. The first step was to examine any form with a non-480 minute shift time, on the assumption that if a non-default value had been entered on one form, this might reflect the true shift time. So, for example, if a staff member had submitted three forms on the same date, and two had 480 minutes as the shift time and the remaining form indicated had 240 minutes, the latter form was examined. If the shift time recorded on this form (240 mins) was greater than the sum of events reported on all forms, then 240 minute was taken as total shift time for the day and apportioned across all forms. If this was not the case, a hypothetical shift time of 480 minutes was put to the same test. If this also failed the test, the sum of all events was taken as the shift time, and again this figure was apportioned across the daily form set.

Approximately 20% of the original pool of activity records was rationalised in this manner.

With single forms, the issue was shift times that were exceptionally low. In these cases, the explanation considered to be most credible was that the clinician had indicated shift time in hours, rather than minutes, or that the final zero had been left off the number. Where shift time was less than 144 minutes, and less than total activity time, the figure was multiplied by a factor of either 60 or 10, and evaluated against the sum of all events as described in Table 19 below.

Again, this scrutiny resulted in only a minimal number of changes, with less than 100 forms being amended.

Edits to patient registration details

Key demographic details on each patient – date of birth, sex, Aboriginal/Torres Strait Islander status and country of birth – were provided to the study through the *Episode Registration Form*, completed at the commencement of each episode. These were reviewed for all patients at the conclusion of the study period to identify records with missing data or anomalous combinations. Anomalies included, for example:

- patients aged less than 60 years treated by specialist geriatric psychiatry teams or inpatient units;
- conversely, patients more than 21 years treated by specialist child/adolescent team; or
- patients recorded as Aboriginal/Torres Strait Islander status but born in a country other than Australia; and
- very old or very young persons registered to the study, defined as people falling outside the age range 2 to 95 years.

While any of these combinations are possible, they were referred to sites for verification and/or correction, along with records with missing details. Where necessary, additional steps were taken to complete missing items. For example, if date of birth could not be found, but was available from morbidity data, it was copied across.

Table 19: Summary of edits to staff activity data

PROBLEM	SOLUTION	RATIONALE
Single event has negative value	Convert to positive	Assume data entry error
Single event has value of 1 minute	No edits performed	Cannot assume error
Single event (not group-based care) has value of >702 minutes	Trim to 702 minutes	702 minutes is longest standard shift time at any site in study
Single event (group-based care) has value of >702 minutes	If number in group is 1, treat as individual care event and trim to 702 minutes	Assume that event was incorrectly classified as group based care
	If number in group is >1, divide value of each event by number in group. If this still exceeds 702, trim accordingly, and re-apportion across all members of the group	Assume clinician has recorded total group time against each member of the group
Sum of all events exceeds 1439 minutes	Trim to 1439 minutes, and scale individual events proportionally	1439 minutes is maximum time in a day
Shift time is 1-9 minutes	Multiply by 60	Assume staff member recorded hours, not minutes
Shift time is 10-24 minutes	If shift time ≥ sum of all events, no adjustment applied	Assumes staff member intended to report a 'short shift' to record a brief activity event.
	If shift time < sum of all events, multiply by 10 if this produces shift time ≥ sum of all events. If not, multiply by 60	Assumes problem is omission of trailing zero at data entry
Shift time is 25-144 minutes	If shift time ≥ sum of all events, no adjustment applied	Assumes staff member intended to report a 'short shift' to record a brief activity event.
	If shift time < sum of all events, multiply by 10 if this produces shift time ≥ sum of all events. If not, amend shift time to sum of all events	Assumes problem is omission of trailing zero at data entry
Shift time is >144 minutes	If shift time ≥ sum of all events, no adjustment applied	Valid pattern, no reason to amend
	If shift time < sum of all events, amend to equal sum of all events	Only increases shift time by the minimum amount required to produce shift time equal to sum of all events

Validation of episode details

Details about episodes were obtained from two sources – the *Episode Registration Form* which recorded episode type and start date, and *Clinical Ratings Forms* collected at fortnightly intervals throughout, and at the closure of each episode. Validation of episode details involved both reviewing the integrity of individual items on these forms as well as ensuring that in combination, they formed a coherent picture.

Re-mapping of patient UR numbers in clinical ratings data

It was necessary to ensure that UR numbers on *Clinical Ratings Forms* corresponded to those registered on ERaTT. As with the re-mapping of UR numbers from the staff activity data, this required the Project Team and Site Co-ordinators to work together in correcting unmatched UR numbers.

Aligning episode components

The data collection cycle required that each episode be associated with a core set of data elements. First, episode type and personal details was required at registration. Second, a *Final Clinical Ratings Form* should have been completed on the close date, and, depending on the length of the episode, one or more *Repeat Clinical Ratings Forms* should have been completed at regular two-weekly intervals during the course of the episode. Third, each episode should have been represented by a series of days on which activity data was recorded. Finally, valid start and close dates, recorded on ERaTT from the *Episode Registration Form* should have bound these events and *Final Clinical Ratings Form*.

There were instances, however, where these activity and clinical ratings events did not occur in logical sequences. This caused anomalies in the database, where, for example, a patient might appear simultaneously in hospital and in the community, or be registered twice for the same episode. Considerable time and effort was spent on reconciling anomalous episodes, which relied largely on careful inspection of activity data. A series of edits was implemented to align the episode components, each of which is described below.

It should be noted that the bulk of episode realignment occurred with community episodes. Alterations to the dates of inpatient episodes were done conservatively, since there was a potential to create new dates that conflicted with hospital morbidity data extracted from the local site systems.

Insert Episode Registration Form

Activity data was sometimes recorded for patient (with or without clinical ratings), without an episode having been registered. To rectify this, a 'dummy' *Episode Registration Form* was inserted with start and close dates corresponding to the earliest and latest dates on which activity was recorded, respectively. In the inpatient setting, additional cues as to the start and end dates were taken from morbidity data where it was available. Episode type was defined by source setting of the activity data.

Move Episode Registration Form

On occasions, activity occurred prior to an episode being registered. If it was apparent that staff provided this care from a setting that matched the episode type, the start date on the *Episode Registration Form* was amended to correspond with the first date on which activity was recorded. The majority of these changes occurred to community episodes.

Fix close date

Close dates were inserted or altered as necessary, to correspond with the latest date on which activity was recorded. As with the insertion of *Episode Registration Forms*, this occurred with reference to morbidity data where it was available and in conjunction with site representatives. The majority of close date fixes occurred at a single site, where episode completion dates had not been entered on ERaTT. As 95% of episodes at this site were for patients in ongoing non-acute inpatient care, correction was a straightforward process of substituting the study end date for the missing date.

Insert Final Clinical Ratings Form

Where episodes had no *Final Clinical Ratings Form*, a 'dummy' blank form was inserted on the last date on which activity was recorded. This provided a basis for subsequent copying of details from the most recent valid clinical rating, performed during the analysis stage.

Move Final Clinical Ratings Form

Where the date of a *Final Clinical Ratings Form* did not correspond with the last date of recorded activity, or with the episode close date, it was moved accordingly. As with the moving of the *Episode Registration Form*, this action was primarily implemented for community episodes.

Delete Episode Registration Form

In cases where an episode had been registered, but no activity was associated with the episode, the *Episode Registration Form* was removed from the database.

Delete Final Clinical Ratings Form

Likewise, on occasions where a *Final Clinical Ratings Form* had been completed which was not associated with an episode with activity data, the form was deleted.

Dealing with exceptional episodes

In addition to ensuring that all episodes conformed to logical sequences, consideration was given to episodes with an exceptional amount of time reported by staff, or treatment days, relative to other episodes of a similar type. As with the daily staff activity data, it was not automatically assumed that exceptional episodes were invalid, but supporting evidence was sought. In particular, the following were considered:

- exceptionally long acute inpatient episodes (greater than 35 days)
- exceptionally short non-acute inpatient episodes (less than 14 days)
- community episodes with more than 9 consecutive days of contact, or with exceptionally high average daily time (more than 100 minutes per day)

These episodes were inspected manually, to determine the dates on which care had been provided and the setting from which the care had been provided. On some occasions, it was apparent that incorrect dates had been entered, and these were rectified. In other cases, the dates appeared to be correct, but staff delivered the majority of care from a setting that did not match the episode type, and the episode type was changed accordingly. In the remaining cases, where the dates appeared correct, and the source of activity data corresponded to the episode type, the episode was left unedited.

Adjusting inpatient episode dates for leave days

Accurate data on start and end dates for leave periods was not available across all sites but, based on the Project Team's experience, was known to be a significant source of inconsistency in estimation of length of stay within inpatient psychiatric units. Adjustments were therefore necessary to identify leave periods and to exclude these from length of stay calculations in accordance with national definitions[88].

An operational definition of leave was used for all inpatient records which deemed a leave day to be any inpatient day on which no time had been attributed by 'home ward' staff to the patient. Given that an average of nine staff spent, collectively, a total of 72 hours (3 shifts per day, 3 staff per shift, 8 hour shifts) on a typical ward per day, it was considered reasonable to assume the patient was absent from the ward if he/she did not appear in any event recorded by any of the rostered staff.

As with other edits applied to the episode data, a conservative approach was taken. For multi-ward inpatient services, if a patient did not appear on activity forms submitted by staff working in his/her 'home ward' but did appear in forms submitted by staff in other wards, then a ward transfer rather than a leave day was deemed to have taken place.

Using this approach, 5% of total inpatient days were deemed to be leave days. This is consistent with Project Team's experience of estimates of leave derived from service systems that maintain accurate, electronic leave record systems.

Once leave periods were flagged, consideration was given to adjusting inpatient episode dates to account for leave periods. The aim here was to identify inpatient episodes that concluded with an extended leave period. This was necessary because leave periods are often used in mental health settings as a way to determine a patient's readiness for full discharge. Typically, where leave immediately precedes discharge, the last leave day rather than the last day in hospital is recorded as the discharge date.

Again, this involved manual inspection of the electronic episode data. Where leave was identified at the end of an episode, and the activity data indicated that the patient had been discharged (with or without community care), episodes were trimmed to the date on which care was last provided from the inpatient setting. A variant of this occurred when the patient was transferred from an acute to a non-acute setting or vice versa. If necessary, the first episode was closed and a new one opened.

Where leave periods were found nested within an inpatient episode and bound by actual periods in hospital, no adjustment was made to the episode close date. As discussed in Chapter 8, this had no implications for costs assigned to inpatient episodes as overhead and 'general time' costs were not allocated for leave days.

Linking contiguous episodes into a single episode

A small proportion of patients was identified as having multiple episodes of the same type, separated by brief periods. Typical combinations included:

- discharge from an inpatient unit followed by readmission several days later, with or without staff activity being recorded against the patient in the intervening period;
- closure of a community episode closely followed by registration of a new episode, again, with or without activity recorded in the intervening period.

Initial review of these episodes was undertaken to ensure that the pattern of care apparent from the data accurately reflected the sequence of treatment events. The key concern here was that errors in recording episode start and episode end dates, as well as inconsistencies between sites in the use of discharge and re-admission for weekend leave, would artificially segment a single episode into multiple, brief episodes.

A review of a sample of representative cases and consultation with site representatives revealed that leave and recording errors were the primary factors underlying these episodes. The approach taken was therefore to join consecutive same-type episodes separated by a gap of three days or less into a single episode, based on the typical length of a weekend leave period.

Less than 3% of total episode records were affected by this edit procedure, with greatest impact on acute inpatient episodes (see Table 20).

Table 20: Impact of merging contiguous same-type episodes

Episode Type	Number of Episodes Prior to Merging	Number of Episodes Post Merging	Per cent of total records affected
Inpatient episodes			
Acute	5,856	5,449	7.0%
Non-acute	1,086	1,055	2.9%
Community episodes	14,147	14,049	0.7%
Total	21,089	20,553	2.5%

Refining the clinical dataset

The 91-day study period provided the potential for up to seven clinical ratings to be submitted for a given episode. In general, clinical ratings forms were well completed, with little missing data.

However, there were clinical ratings forms on which particular variables were incomplete. In particular, clinicians were given the option of ticking a 'no change' box in lieu of completing the HoNOS or HoNOSCA, under circumstances where the patient had been rated on the relevant instrument in the last 14 days within the given episode, and there had been no clinical change which would be reflected on any of the individual items. This created a significant number of legitimately 'missing' HoNOS and HoNOSCA ratings on both the *Repeat Clinical Ratings Forms* and the *Final Clinical Ratings Form*.

In addition, completion of key items on the *Final Clinical Ratings Form*, particularly principal psychiatric diagnosis and the Life Skills Profile, was not always optimal. Both were collected at the end of the episode on the advice of clinicians who thought that they should 'summarise' the episode. However, a provisional psychiatric diagnosis and a preliminary Life Skills Profile were completed at the beginning of the episode, on the first *Repeat Clinical Ratings Form*, in anticipation of the possibility that some patients may become 'lost to care' or the data were not provided at the end of the episode for some other reason. During training, clinicians were advised that this was the case.

Where data were missing, they were extrapolated from previous relevant ratings. For example, if the third *Repeat Clinical Ratings Form* for a given episode had no HoNOS, the individual HoNOS scores were deemed to be the same as those on the second *Repeat Clinical Ratings Form.*

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Chapter

10

Overview of the Dataset: Staff, Patients, Episodes and Costs

This chapter presents an overview of the MH-CASC dataset, and sets the context for the data analysis described in the subsequent chapters. Summary views are presented of each of the four major components of the study data – the patients, their episodes of care, the staff providing that care and the costs reported by participating sites.

The patient cohort

To date, little information has been available about the consumers of Australia's mental health services. The MH-CASC Project, being based on a 25% sample of specialised public and private mental health services, has provided the most comprehensive dataset yet collected about people receiving specialised mental health care in Australia.

In total, the study sites treated 18,002 patients over the three month study period. Males and females were represented in roughly equal numbers, with a male female ratio of 53:47. The patient sample covered all age groups, although adults in the age range 20-50 comprise 54% of the sample (Figure 13). Males outnumbered females by a factor of 50% within the group of child and adolescent patients (age 0-19 years), but the reverse was true for patients aged over 65 years.

The majority of patients (80%) were born in Australia, with Europeans being the next largest subgroup (Table 21). Of those born in Australia, 324 (2%) were of Aboriginal or Torres Strait Islander descent. An interpreter was required for 591 patients, or 3% of the total sample.

Twenty two per cent of the patient sample were currently married (or de facto), but the majority (over half) had never been married (Table 22). The majority of the sample (71%) had no dependent children, and for 64%, their main source of income was government income support, primarily some form of pension. Most commonly, this was a disability pension (Table 23).

For the majority of patients (82%), their usual accommodation constituted private housing. The remainder had a variety of accommodation arrangements, shown in Table 24.

Figure 13: Age and sex distribution of the MH-CASC patient sample

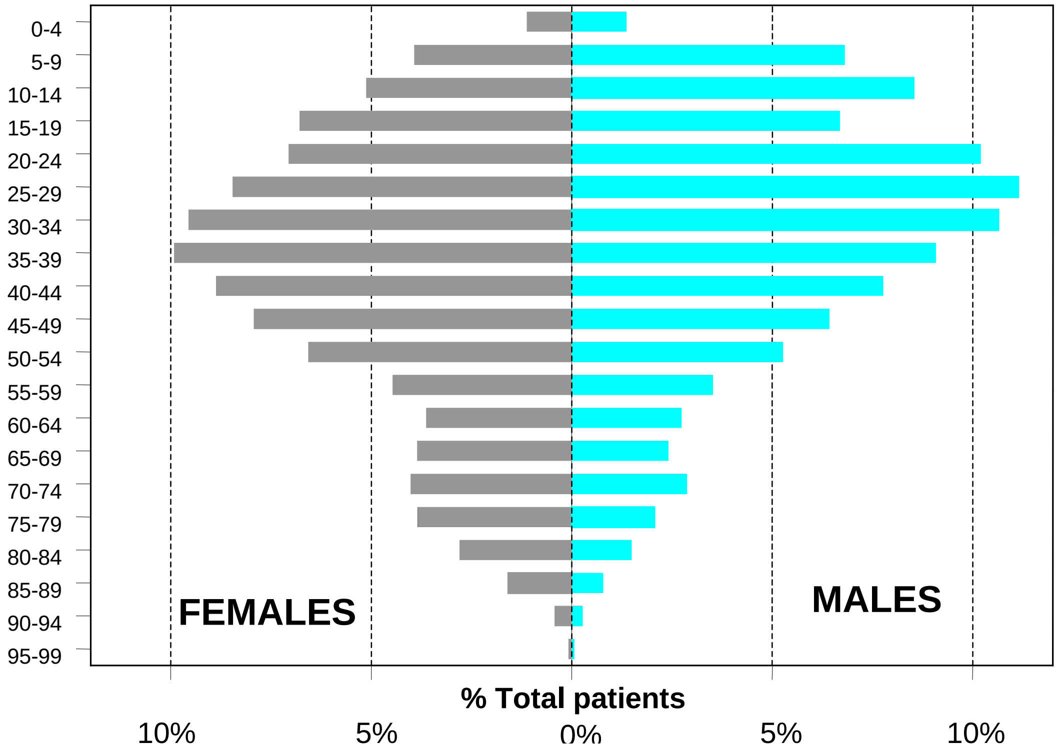


Table 21: Country of birth of the MH-CASC patient sample

	Number of Patients	Valid Percent
Australia	13,983	79.5%
Europe	2,349	13.4%
Sth East Asia	356	2.0%
Oceania – Antarctica	287	1.6%
Middle East – North Africa	193	1.1%
Sth Asia	132	0.8%
Nth East Asia	82	0.5%
South America	80	0.5%
Africa	79	0.4%
North America	42	0.2%
Total Valid	17,583	100.0%
Missing	419	
Total	18,002	

Table 22: Marital status of the MH-CASC patient sample

	Number of Patients	Valid Percent
Never	9,630	55.9%
Married	3,867	22.4%
Divorced	1,666	9.7%
Widowed	1,129	6.6%
Separated	941	5.5%
Total Valid	17,233	100.0%
Missing	769	
Total	18,002	

Table 23: Pension status of the MH-CASC patient sample

	Number of Patients	Valid Percent
None	5,702	35.6%
Disability Support	5,023	31.4%
Aged	1,789	11.2%
Unemployment	1,484	9.3%
Sickness Benefit	1,032	6.4%
Other	759	4.7%
Repatriation	232	1.4%
Total valid	16,021	100.0%
Missing	1,981	
Total	18,002	

Table 24: Usual accommodation of the MH-CASC patient sample

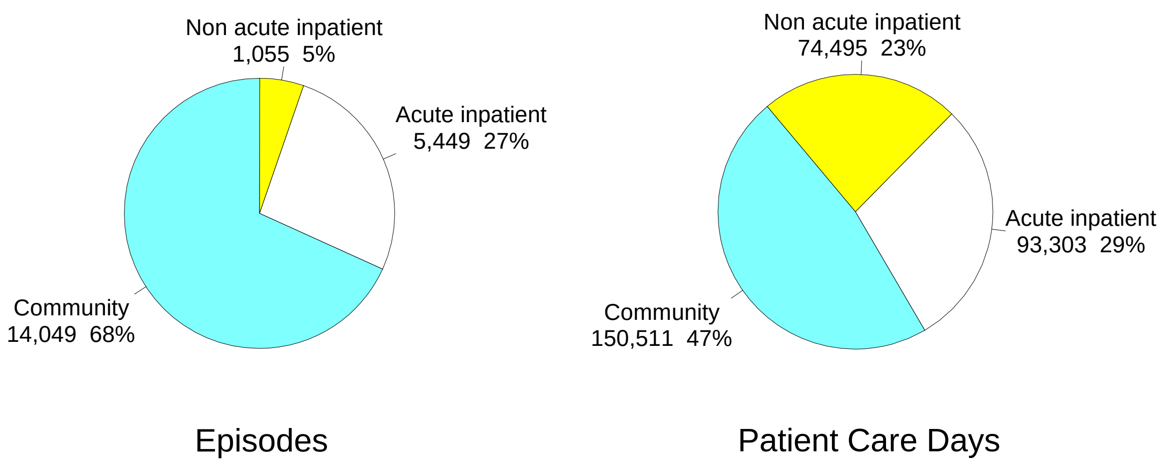
	Number of Patients	Valid Percent
Private	13,876	82.4%
Nursing home	903	5.4%
Residential Support	625	3.7%
Boarding House	436	2.6%
Hostel	335	2.0%
Special Accommodation House	295	1.8%
None	194	1.2%
Caravan	125	0.7%
Homeless Shelter	41	0.2%
Total Valid	16,830	100.0%
Missing/Unknown	1,172	
Total	18,002	

Episode overview

Episode types

In total, the 18,002 patients underwent 20,553 episodes of care, receiving a total of 318,309 patient care days – or days on which a service to the patient was recorded. As discussed in Chapter 8, these formed the building blocks for episodes. The distribution of episodes and patient care days across the episode types is summarised in Figure 14.

Figure 14: Number of episodes and patient care days by episode type



The vast majority of patients (90%) had one episode only, and a further 7% and 2% had two and three, respectively. The greatest number of episodes for any individual patient was eight. The implications of this low level of multiple episodes for the analysis are discussed in Chapter 11.

Episode type by program class and sector

Table 25 shows the breakdown of episode type by program class (adult and specialist child/adolescent). Community episodes were the most common across both program classes, accounting for 92% of all episodes in the specialist child/adolescent setting and 64% of episodes recorded by general adult services. Acute inpatient episodes were the next most frequent episode type in both settings, occurring almost seven times more frequently than non-acute inpatient episodes in the specialist child/adolescent setting, and five times more frequently than non-acute episodes in general adult services.

Table 25: Episode type by program class

	Acute	Non-Acute	Community	Total
Specialised Adult Mental Health Services	5,233	1,023	11,080	17,336
Specialised Child/Adolescent Mental Health Services	216	32	2,969	3,217
Total	5,449	1,055	14,049	20,553

Table 26 shows the relative contribution of the public and private sites to the profile of episodes. The majority of episodes at the private sites were acute inpatient episodes.

Table 26: Episode type by public/private sector

	Acute	Non-Acute	Community	Total
Public	4,363	1,055	13,673	19,091
Private	1,086		376	1,462
Total	5,449	1,055	14,049	20,553

Episode type by treatment history

Most patients in the study had significant histories of psychiatric treatment. Patients for whom psychiatric treatment commenced more than two years prior to the current episode accounted for forty three per cent of total episodes. In 61% of episodes, the patient had at least one prior admission to a psychiatric inpatient unit. Only 14% of episodes were provided to patients who were reported to have no prior history of psychiatric care. Figure 15 and Figure 16 provide the summary details.

Figure 15: Episode Type by Time Since First Treatment

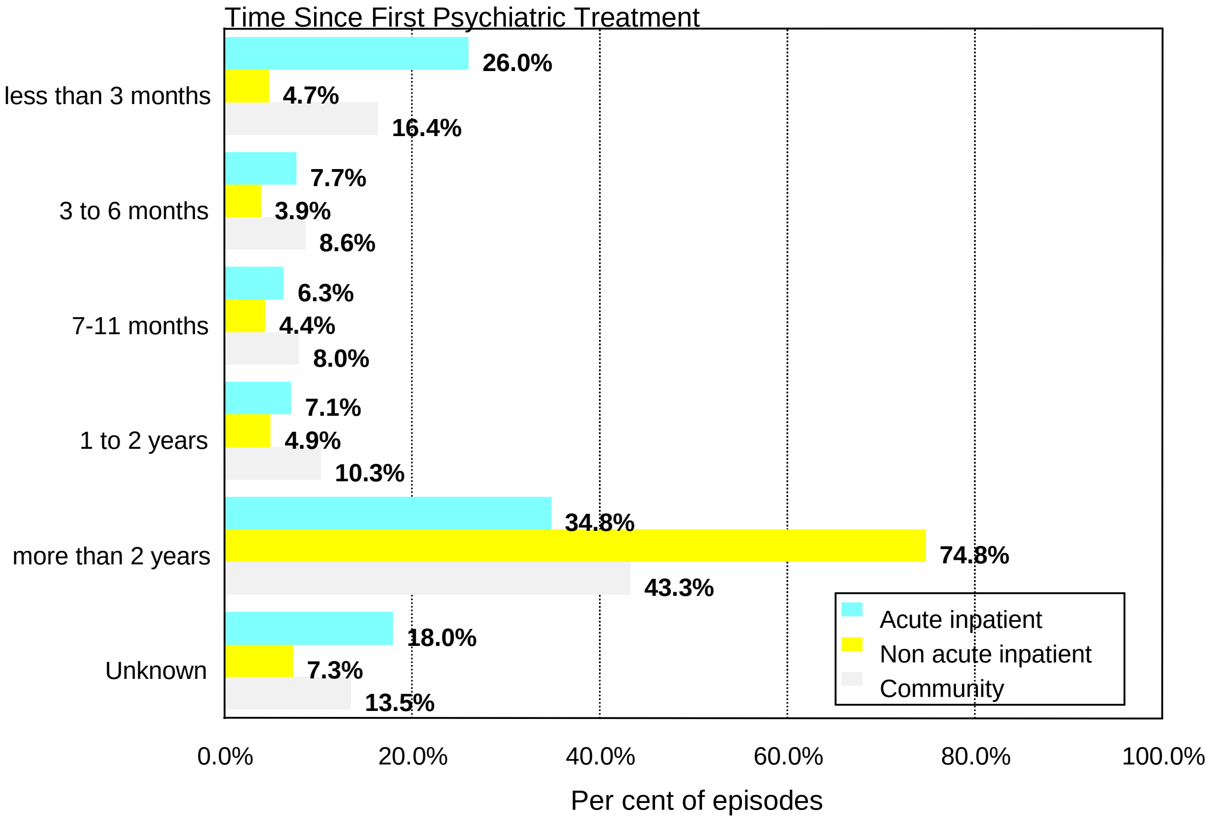
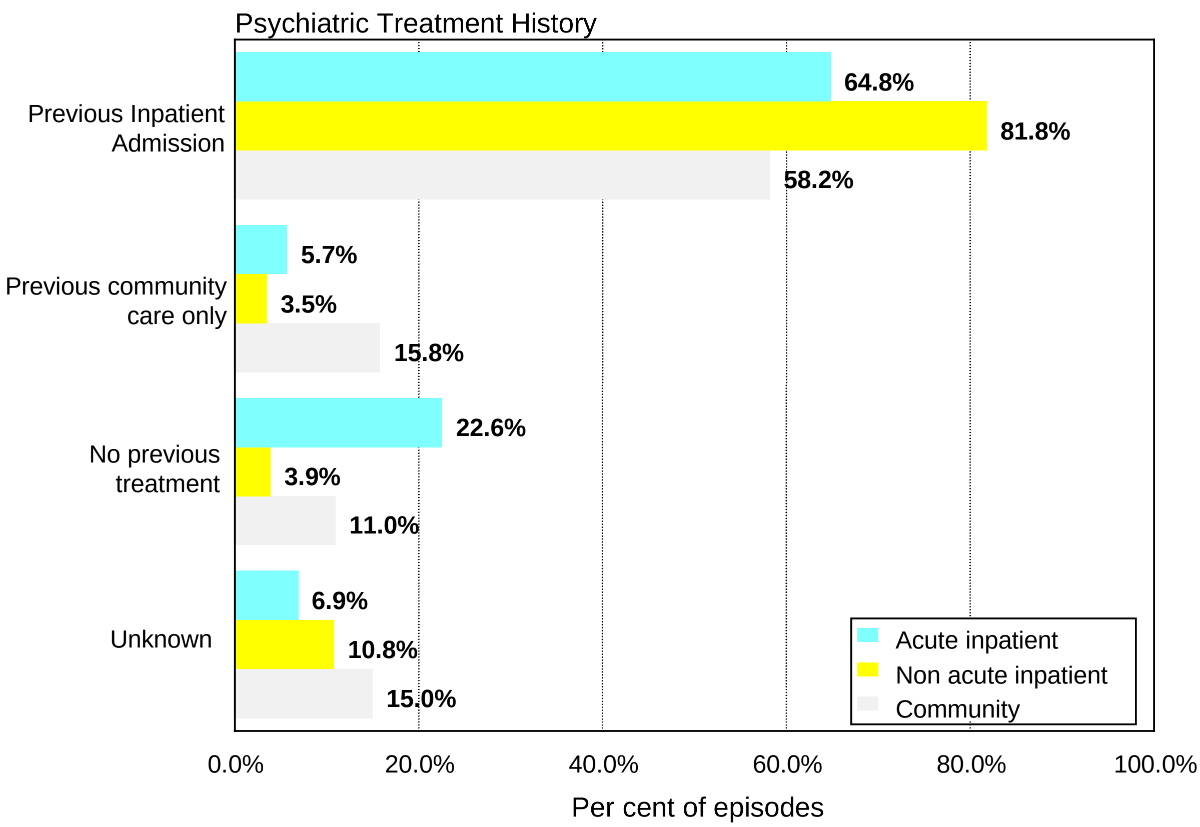


Figure 16: Episode Type by Psychiatric Treatment History



The extent and type of prior psychiatric treatment varied between the episode types. Patients admitted to non-acute inpatient units had the most extensive psychiatric histories, with 75% having commenced treatment more than two years prior to the study. Eighty two per cent of this group had at least one prior admission to a psychiatric inpatient.

For patients recorded under community episodes, 58% had experienced an admission to psychiatric inpatient unit, while 43% had treatment histories extending back at least two years.

Patients admitted to acute inpatient units were recorded as having the most recent psychiatric treatment histories. Twenty six per cent of acute inpatients first commenced treatment less than three months earlier compared with 18% for the overall patient sample. Twenty three per cent had received no treatment prior to the current inpatient admission. Notwithstanding these comparisons, the sample of acute inpatient episodes primarily comprised patients with significant prior treatment, sixty five per cent having had at least one previous admission, while 35% commenced psychiatric care at least two years earlier.

Episode type by diagnosis

The most common diagnosis across all episode types was schizophrenia and related psychotic disorders, followed by mood disorders. As expected, there was an interaction between diagnosis and episode type, with particular diagnoses occurring more frequently in particular settings. For example, some conditions, such as anxiety disorders were infrequently treated in an inpatient setting. Table 27 provides details on the distribution of diagnosis by episode type.

Overall, the desired sample size was reached (see Appendix B-1, Volume *2)*. In the acute inpatient setting, the total number of episodes was more than double that required by the sampling strategy (1,400-2,800). Only eating disorders and disorders of childhood and adolescence were under-represented.

In the non-acute inpatient setting, the overall numbers were slightly less than aimed for (1,055 compared with 1,800). In particular, organic, mood and personality disorders were under-represented.

In the community setting, the total number of episodes (14,049) was more than triple that which had been planned (1,900-4,100). Only eating disorders were under-represented in this setting.

Table 27: Episode type by diagnosis

MH-CASC Diagnostic Category	Acute	Non-Acute	Community	Total
Schizophrenia, Paranoia and Acute Psychotic Disorders	1,750	581	4,971	7,302
Mood Disorders	1,811	95	2,846	4,752
Stress and Adjustment Disorders	406	11	1,120	1,537
Disorders of Childhood and Adolescence	59	9	1,344	1412
Organic Disorders	239	238	604	1,081
Personality Disorders	331	35	438	804
Anxiety Disorders	124	5	608	737
Substance Abuse	363	14	226	603
Disorders of Psychological Development	3	3	242	248
Behavioural Syndromes Associated with Physiological Disturbances and Physical Factors	47	4	175	226
Mental Retardation	20	29	124	173
Obsessive Compulsive Disorders	21	2	145	168
Eating Disorders	64	5	54	123
Somatoform Disorders	10		43	53
Sexual Disorders	3	3	28	34
No Principal Diagnosis	198	21	1,081	1,300
Total	5,449	1,055	14,049	20,553

Staff overview

Staff labour category

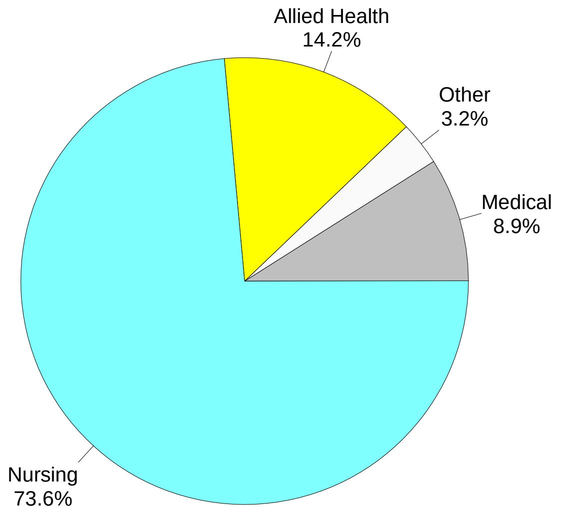
In total, approximately 4,500 clinical staff participated in the study[a]. Collectively, these staff reported 1.3 million hours of activity, spread across 158,000 days worked during the study period.

Figure 17 gives a breakdown of staff by labour class, showing nurses as the largest group, representing approximately three quarters of the overall workforce. This figure is consistent with the mental health workforce profile reported in the 1996 *National Mental Health Report.* [83]

Staff based in settings primarily dedicated to providing community-based care accounted for approximately 25% of time reported to the study.

[a] Note: Analyses of staff numbers and activity patterns are based on activity forms submitted to the Project, and therefore exclude private psychiatrists at the four private hospital sites. However, cost data presented later in this chapter incorporates the costs associated with attendances by private Consultant Psychiatrists at these sites.

Figure 17: Staff participating in study by labour classification

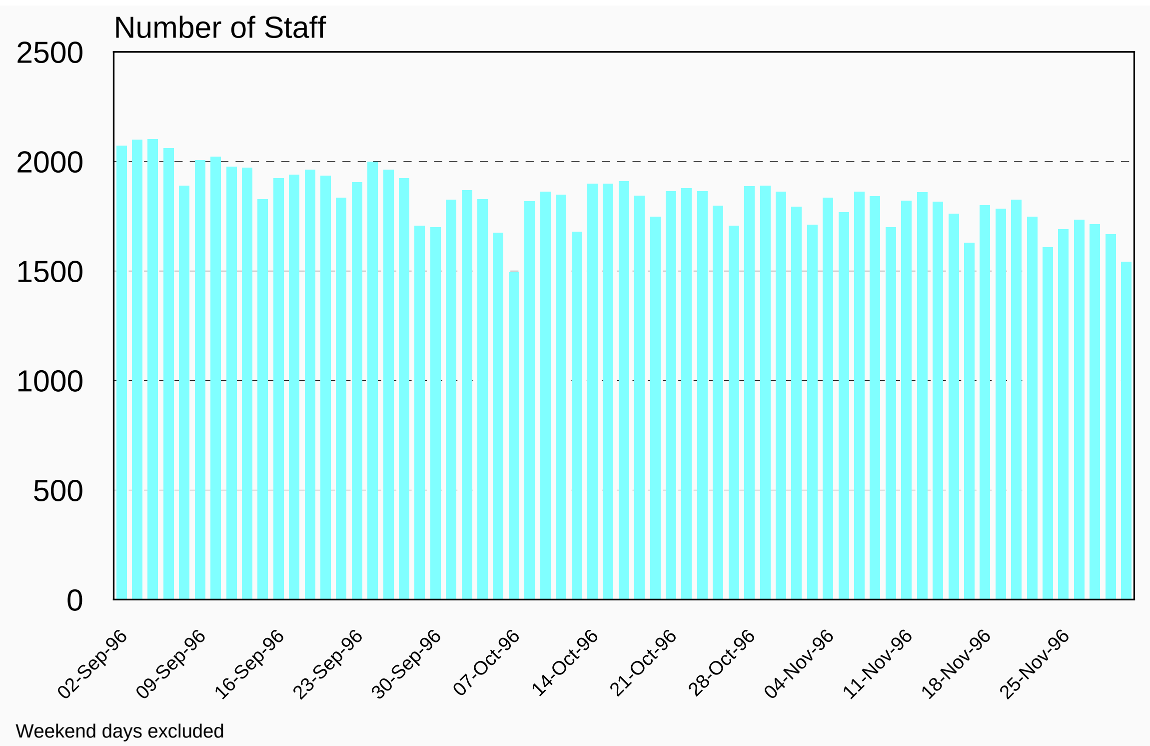


Compliance with activity reporting

Compliance with the task of recording staff activity was reported by all site coordinators to be high, based on their local systems for reconciliation of activity forms. Where systematic non-compliance occurred, it was reported to be isolated to a small number of instances involving particular personnel or teams.

Figure 18 shows the trend in total staff reporting for each weekday of the study period. A slight reduction is evident after the first two weeks in the number of staff completing activity forms and another slight drop in the final two weeks. Eighty five per cent of those who were completing forms at the beginning of the study were still doing so at the end. This picture was consistent across the four staff classes.

Figure 18: Number of staff reporting activities over the study period



Precise measures of actual vs. expected number of staff were not maintained at the national level. Such measures would have required data collections systems at each site that met three conditions – activity and payroll data linking, classification of staff in terms of the expected mix of 'clinical' (recordable) and 'non clinical' (non recordable) time and distinction within the payroll of 'non productive' paid periods arising from leave. These requirements were considered too onerous for sites given the extent of other data demands imposed by the Project.

Eight of the 22 sites however maintained routine payroll systems that met these conditions and provided a basis to draw national conclusions. Results are summarised in Table 28. They suggest that the Project captured 87% of activities potentially recordable by clinical staff. Comparative data of this type are not available from previous Australian casemix studies but, based on the sample below, staff compliance is regarded as within acceptable limits.

Table 28: Comparison of actual vs expected time reported by clinical staff [a]

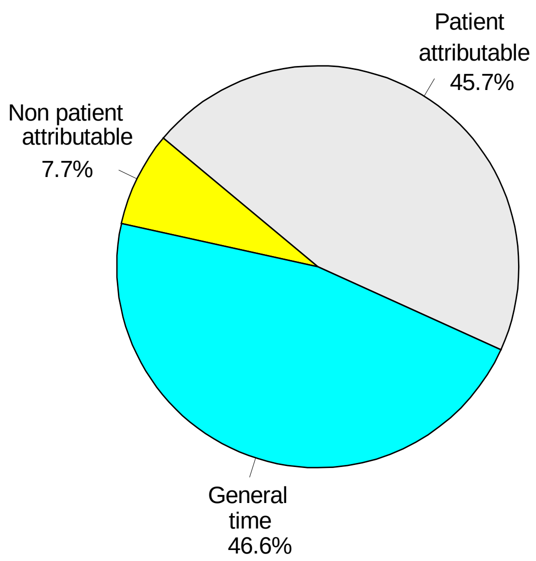
	Actual 'Paid Productive Hours' for direct care staff	Actual hours reported on MH-CASC Activity Forms by direct care Staff	Estimated compliance
Site A	230,988	200,710	87%
Site B	30,495	26,635	87%
Site C	25,259	23,233	92%
Site D	29,262	29,274	100%
Site E	50,034	42,504	85%
Site E	55,669	47,731	86%
Site F	61,821	49,363	80%
Site G	29,457	22,715	77%
Average of Sites			87%

Distribution of staff time

Figure 19 shows the distribution of staff time between the activity categories recorded by the study. Across all sites, general time was a major factor, accounting for 47% of total time reported. It should be noted that general time incorporates a range of clinical (e.g., ward rounds, rosters) and non-clinical activities (e.g., administration). General time should not be interpreted as unrelated to patient care, but rather that the time cannot be specifically attributed to an individual patient or any of the four non-patient attributable activities recorded by the Project.

[a] Note: Code numbers in this figure have been randomly allocated to prevent site identification. Similar techniques to maintain anonymity of the study sites have been applied to all relevant tables and figures presented in this report.

Figure 19: Distribution of staff time between activity categories



Patterns of activity varied by both labour category and work location. For example, non-patient attributable activities accounted for a significantly greater proportion of time for medical and allied health staff than for nurses (Table 29). Similarly, staff employed in community-based locations spent a larger share of time on non-patient attributable duties than staff employed in hospital settings (Table 30).

Table 29: Distribution of staff time between activity categories by labour category

	Nursing	Medical	Allied	Other	All Staff
Patient attributable activities	47%	37%	44%	50%	46%
Non-Patient attributable activities	5%	20%	14%	9%	8%
General Time	48%	43%	43%	41%	47%

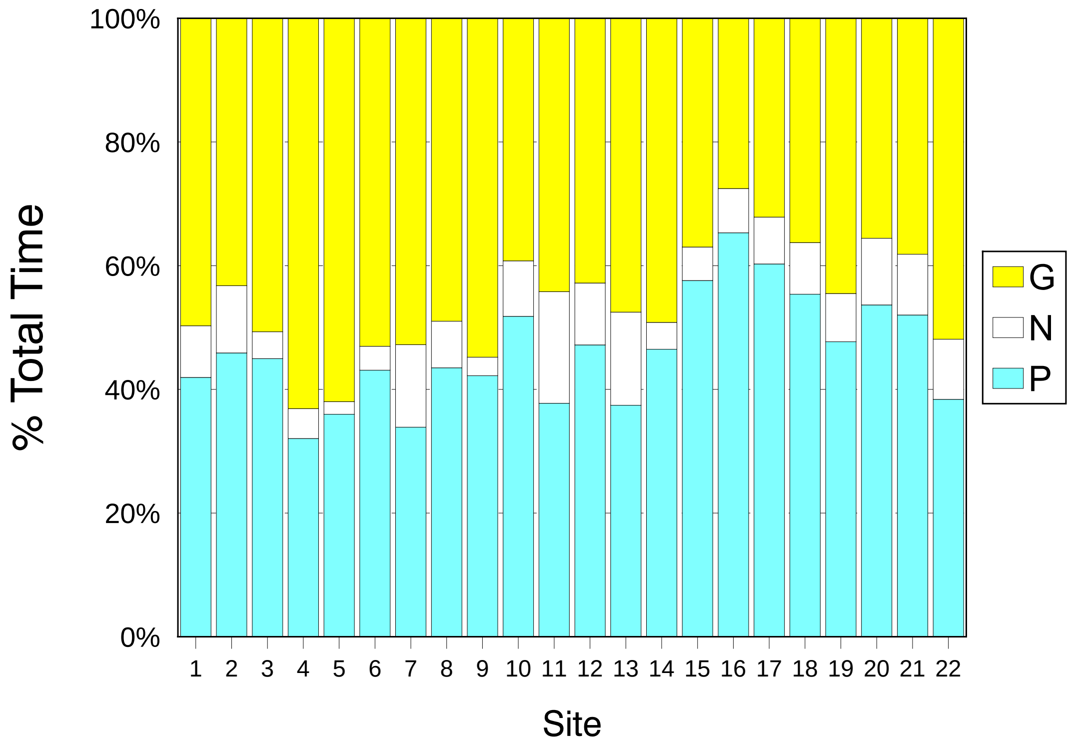
Table 30: Distribution of staff time between activity categories by work location

	Hospital staff	Community staff
Patient attributable activities	47%	43%
Non-Patient attributable activities	5%	14%
General Time	47%	43%

Variation between sites in their overall staff activity profiles was also considerable (Figure 20). For example, general time ranged from 28% to 63% of total reported time, while the range of non-patient attributable activities extended from 2% at the lowest site to 18% at the highest site. While these variations may be partly a function of site differences in staffing profiles and service mix, the scale of the variation suggests significant differences in clinical practice.

Figure 20: Site differences in distribution of staff time

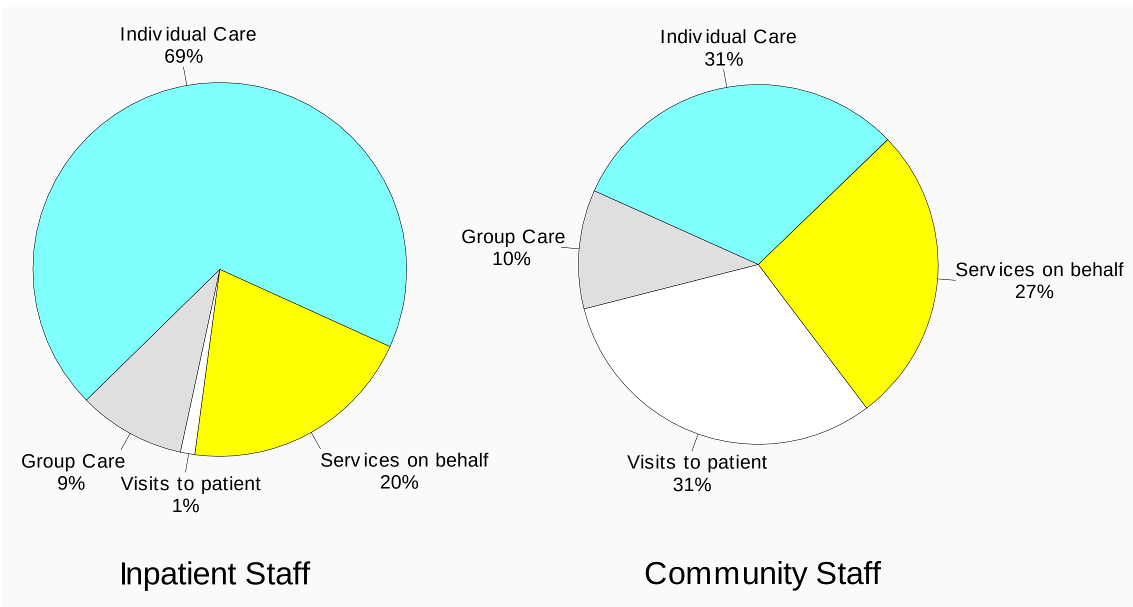
P = Patient attributable time; N = Non-patient attributable time, G = General time



Patient attributable activities

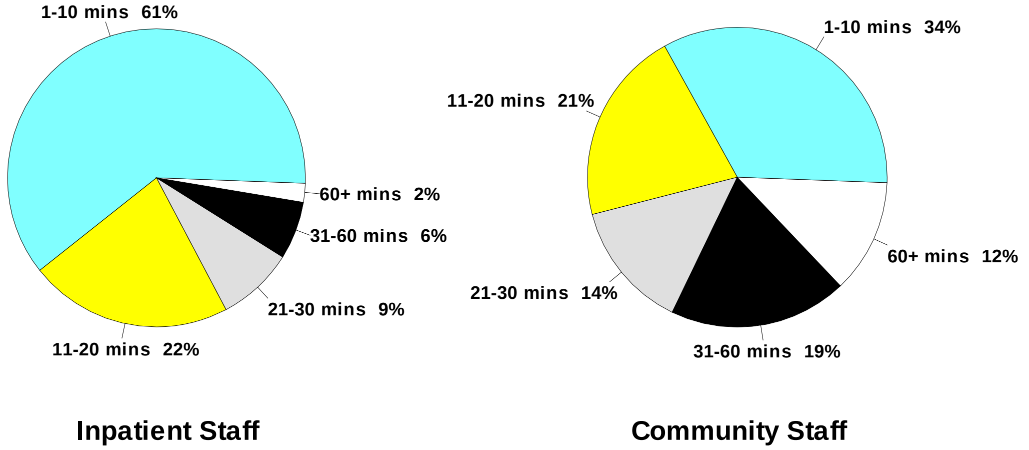
Consistent with findings in other casemix studies, about half (46%) of all clinical staff time was attributable to identifiable patients. Of this time, 60% was spent on individual patient care, 10% on group based care, 9% on visits to patients, and 22% on services on behalf of patients. However, the pattern differed significantly depending on the service setting in which staff were employed. (Figure 21).

Figure 21: Distribution of patient attributable time



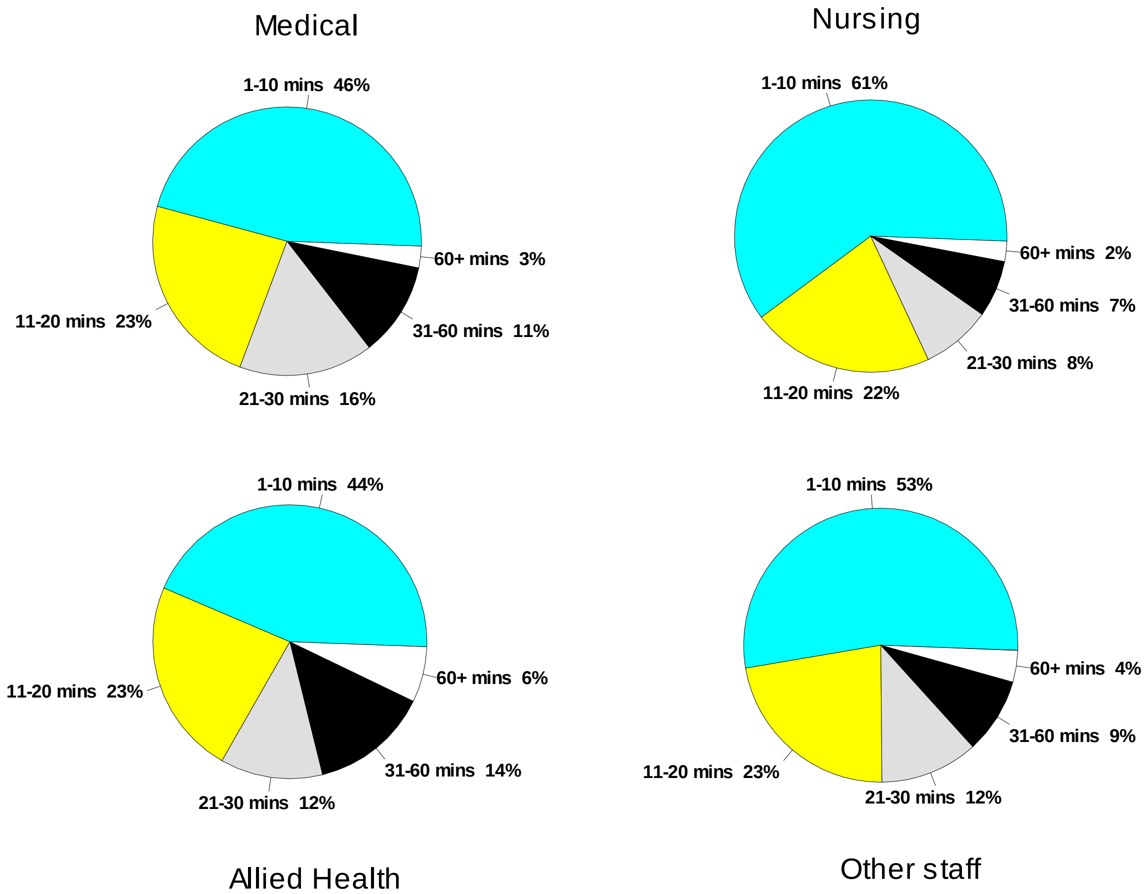
A total of 2 million patient attributable 'treatment events' were recorded by clinical staff. Nationally, events lasting 10 minutes or less represented 58% of all patient attributable activities recorded by staff. Community staff recorded a higher proportion of longer duration events than inpatient staff (Figure 22).

Figure 22: Time recorded for patient attributable events – Comparisonof community-based and inpatient-based staff



Differences between service providers in time patterns of patient attributable event are also evident when the four labour classes are compared (Figure 23). A significantly higher proportion of brief patient contacts was reported by nursing staff than by allied health and medical service providers.

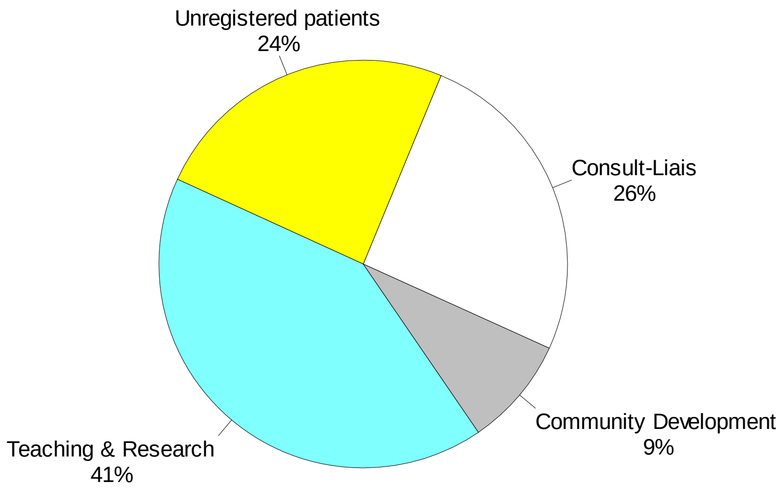
Figure 23: Time recorded for patient attributable events – Comparisonof staff classes



Non-patient attributable activities

Of the 8% percent of staff time reported for non-patient attributable activities (Figure 24) teaching, training and research accounted for the largest share (41%).

Figure 24: Distribution of non-patient attributable activities



Cost data

Total expenditure by sites during the three-month study period was $82.2 million.[a] On an annualised basis, this represents approximately 30% of total spending by the States and Territories on specialised mental health services.[83]

Distribution of costs between patient care and non-patient products

Ninety one per cent of expenditure reported by sites was available for distribution across the activities recorded during the data collection period, with the remainder allocated to 'out of scope' services, or activities beyond the Project data collection boundaries. The majority of 'in scope' expenditure – $65.8 million or 88% - was directed to patient care, with the balance distributed across the four 'non-patient attributable' activities.

The distribution of total site expenditure is summarised in Figure 25, showing the final allocations to patient attributable, non-attributable and 'out of scope' activities. Overall, 86% of 'in scope' expenditure was distributed to the 18,002 patients who comprised the study cohort.

[a] This includes $0.65 million of Medicare Benefits Schedule expenditure for services provided to patients admitted to the four private psychiatric hospital sites during the study period. Unless otherwise indicated, all data presented in this section incorporates these costs.

Figure 25: Distribution of total site expenditure to patient attributable, non-patient attributable and 'out of scope' activities

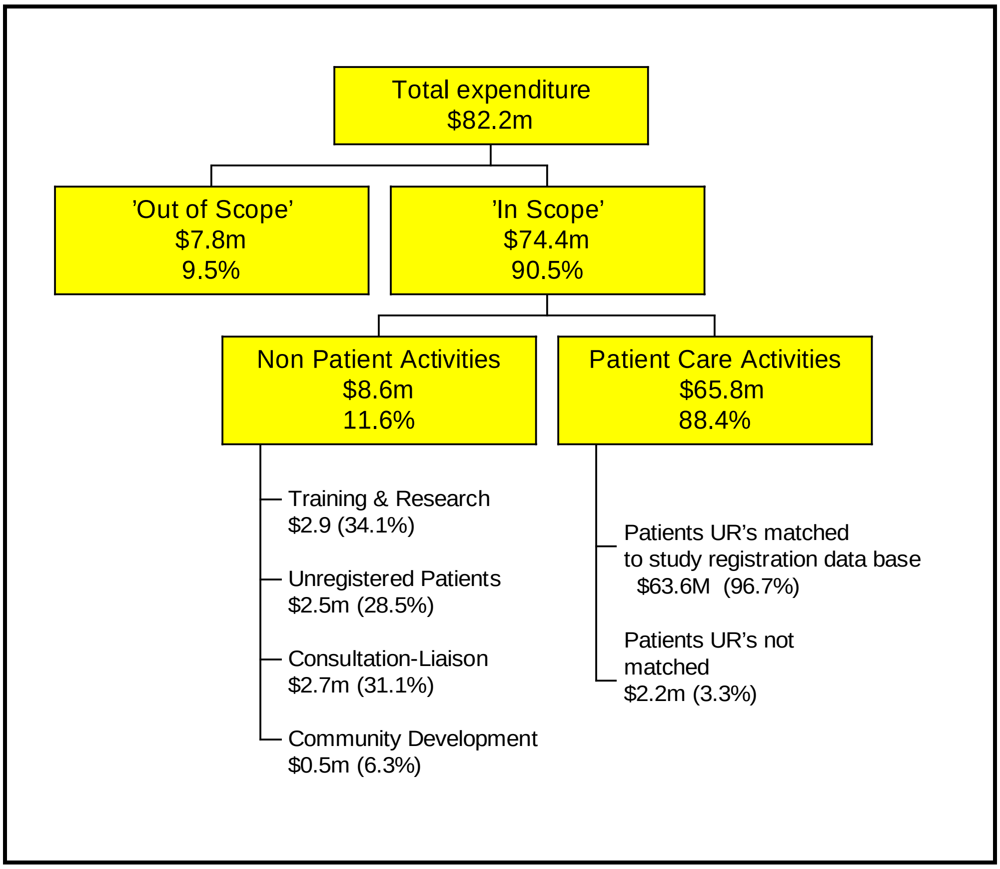
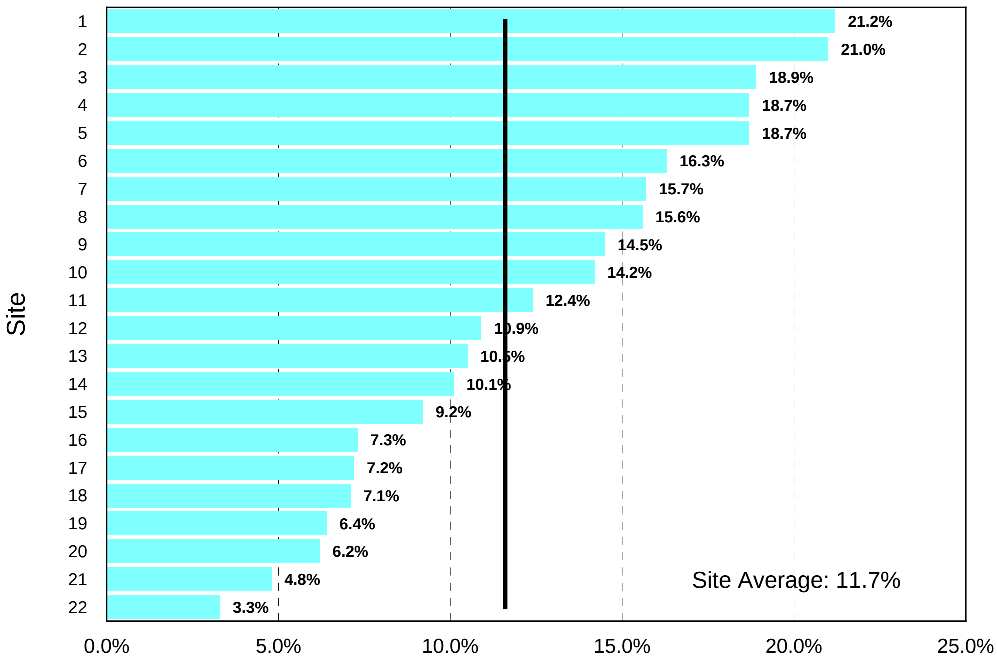


Figure 26: Variation between sites in proportion of expenditure directed to non-patient attributable activities



Note: Excludes MBS expenditure

An important 'by product' of the study design was its measurement of the extent to which Australia's mental health services are involved in activities other than traditional clinical service delivery to patients formally under care. Such measures have not been available previously.

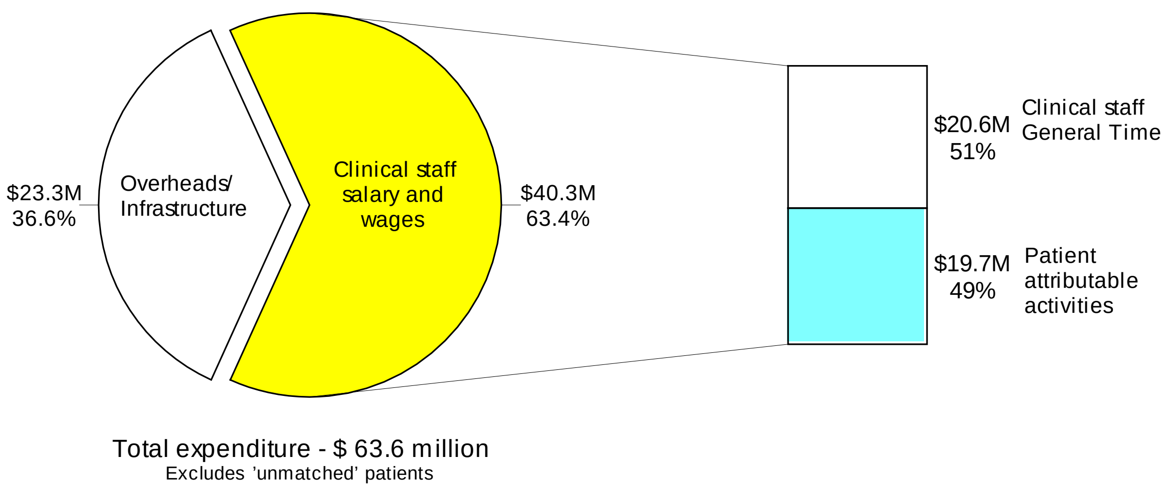
Figure 25 highlights the cost significance of the four non-patient attributable activities specifically recorded by the study – teaching, training and research, consultation-liaison, assessment and referral (unregistered patients) and community development. Together, these activities accounted for 11.6% of total 'in scope' expenditure. However, as shown in Figure 26, sites differed significantly in the proportion of overall expenditure directed to these activities.

All four non-patient care 'products' costed in the study would fall outside the boundaries of any funding system that allocated resources solely on the basis of patient throughput. Issues relating to funding options for these 'products' require separate review but are not considered further in this report.

Patient care cost components

Salaries and related costs for clinical staff accounted for approximately two thirds of the total amount spent on patient care activities. Within this amount, the share of clinical staff costs allocated to patients on the basis of patient attributable time and general time were roughly equal - 31% and 32% respectively of total patient care costs. Overhead and administrative infrastructure expenditure made up the remaining 37% of patient costs (Figure 27).

Figure 27: Components of patient care costs



Significant variation between sites was evident in the relative contribution of the overhead and infrastructure component of patient care costs, ranging from a low of 22% to 52% for the highest site. Figure 28 presents a comparison of the study sites on this index.

Nursing salary and wage related costs comprised 70% of expenditure on clinical staff providers, while medical staff accounted for 17%, the second highest cost group. However, as shown in Figure 28, sites differed considerably in the mix of clinical staffing, particularly in proportion of expenditure for medical and allied health service providers.

Figure 28: Variation between sites in overhead and infrastructure components as a proportion of total patient care costs

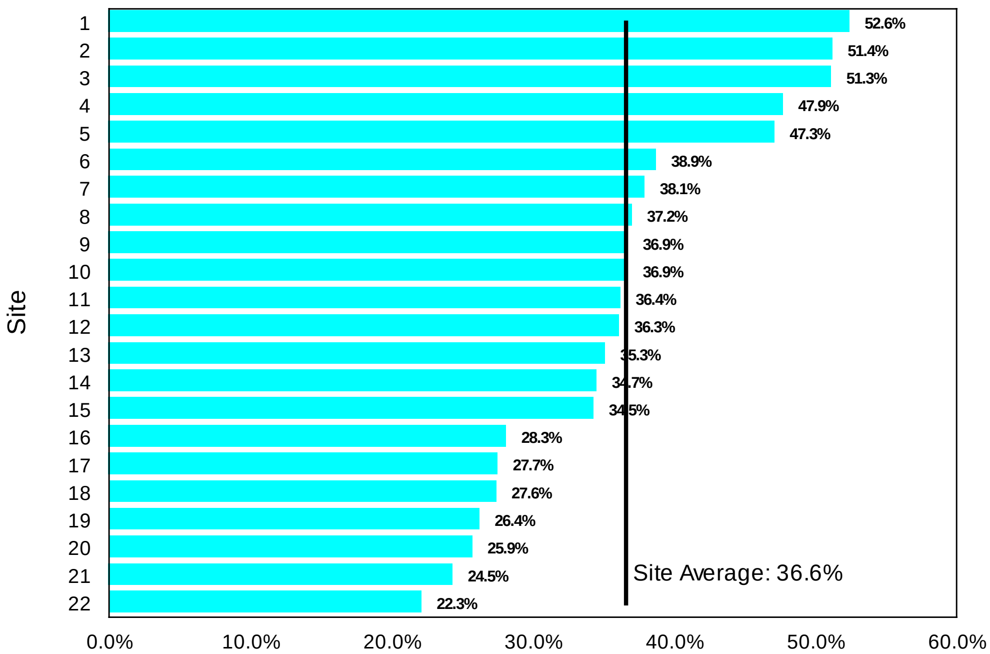


Table 31: Variation between sites in staffing mix components of patient care costs

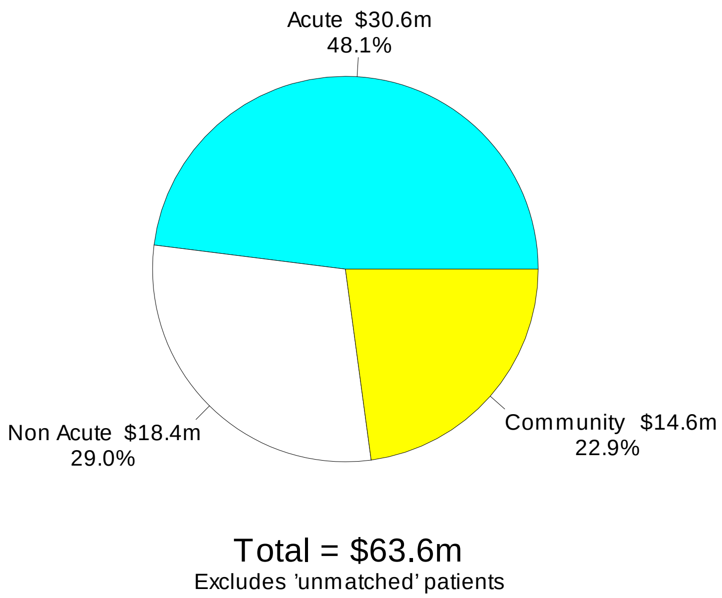
Site	Staff Labour Class			
	Nursing	Medical	Allied Health	Other
1	86%	9%	4%	1%
2	83%	10%	6%	1%
3	80%	9%	8%	3%
4	80%	13%	7%	1%
5	77%	15%	8%	0%
6	69%	19%	9%	3%
7	69%	12%	15%	3%
8	68%	23%	5%	4%
9	67%	27%	6%	0%
10	66%	17%	14%	4%
11	66%	19%	15%	0%
12	65%	15%	10%	10%
13	65%	16%	18%	1%
14	63%	21%	14%	2%
15	62%	21%	10%	7%
16	62%	26%	10%	2%
17	60%	32%	7%	1%
18	59%	13%	20%	7%
19	57%	18%	15%	9%
20	57%	24%	14%	6%
21	48%	16%	35%	0%
22	47%	32%	20%	0%
Total	70%	17%	11%	2%

Distribution of cost across treatment settings

The 1996 *National Mental Health Report* estimated that 42% of mental health expenditure is spent in community-based settings. Based on a patient level costing approach (as opposed to the macro service costing approach of the National Report), the study found a lesser figure, with only 23% of patient care costs directed to non-inpatients. Two thirds of inpatient care costs were spent on admitted patients in acute units (Figure 29).

It is recognised that the differing estimates may reflect different costing methodologies and the relatively high representation of stand-alone inpatient services in the MH-CASC study sample.

Figure 29: Distribution of patient care costs between acute inpatient, non-acute inpatient and community episodes



Patient care costs within the three treatment settings differed both in the relative share of costs accounted for by overheads/infrastructure, and in clinical staffing 'ingredients'.

- In inpatient settings, overhead and infrastructure costs accounted for a relatively greater share of total patient care costs than in community settings (38% compared with 32%) (Table 32). Comparing the two inpatient settings, the overheads and infrastructure cost component of non-acute care was more significant than in acute units (40% compared with 36%).
- Within inpatient settings, overhead and infrastructure costs represented 38% of total patient care costs compared with 32% in community settings.

Table 32: Relative contributions of clinical staff costs and overhead/infrastructure to patient care costs within each treatment setting

	Acute inpatient	Non-Acute inpatient	Community	Total
Clinical staff salary and wage related	64%	60%	68%	63%
Overhead and infrastructure	36%	40%	32%	37%

- Nursing services accounted for 75% of clinical provider costs in acute inpatient units and 82% in non-acute care, reflecting their central role in provision of 24 hour care. Expenditure on services provided by allied health and, and to a lesser extent, medical staff is more prominent in the community than within inpatient settings (Table 33)

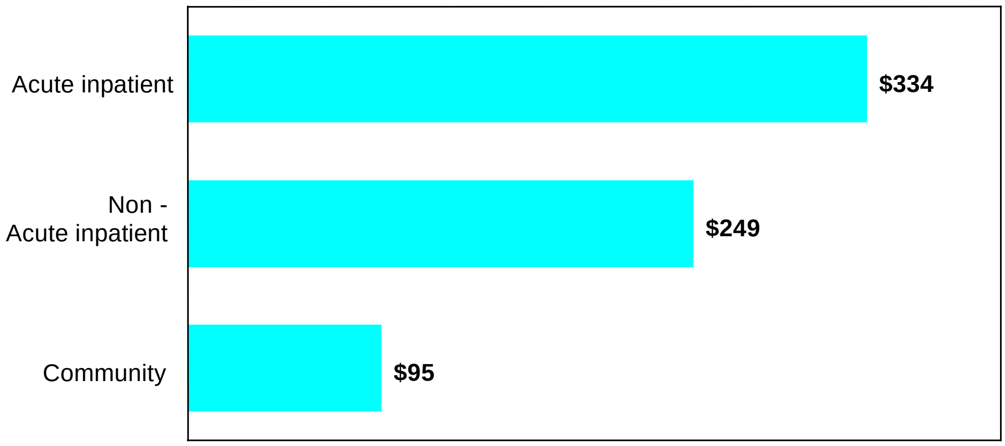
Table 33: Relative contributions of the four clinical staff groups to patient care costs within each treatment setting

	Acute inpatient	Non-acute inpatient	Community	Total
Nursing	75%	82%	44%	70%
Medical	18%	10%	22%	17%
Allied Health	6%	7%	28%	11%
Other	1%	1%	5%	2%

Comparative unit costs

Cost per day of patient care varied significantly between setting types, as shown in Figure 30. Compared with a community care, a patient care day in a non-acute inpatient setting cost twice as much, and an acute inpatient bed day cost over three times as much.

Figure 30: Average cost per patient care day by episode type



As would be expected from the differences between sites in the structure and level of costs, significant variation was found in the patient care day costs. These are summarised in the figures below.

Figure 31: Average bed day costs – acute inpatient units

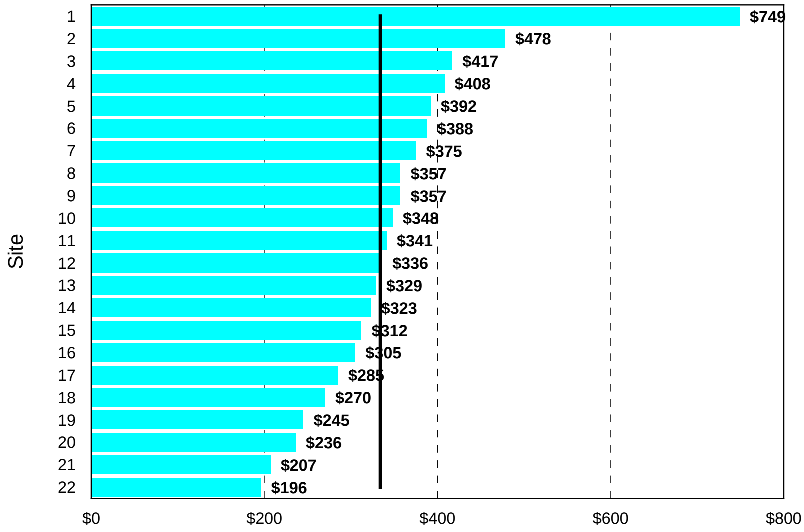
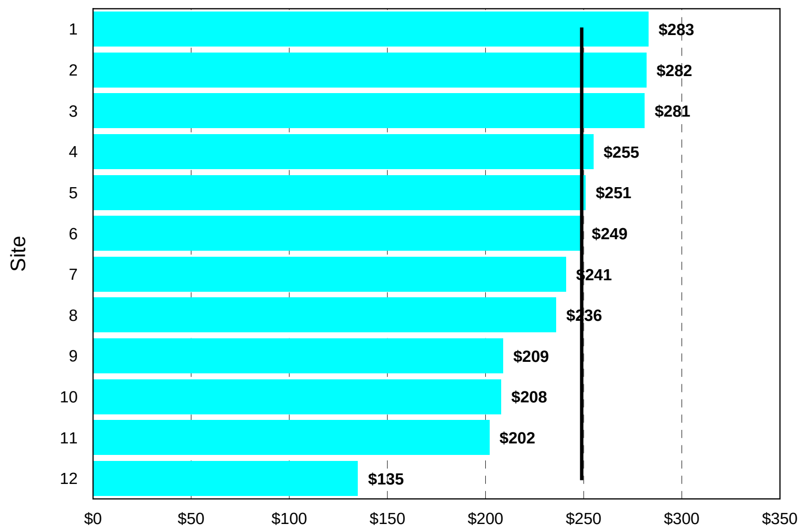
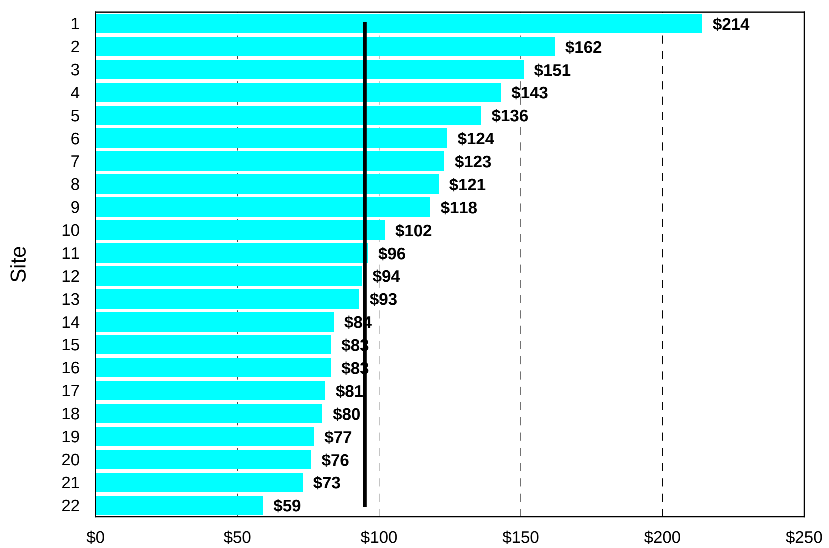


Figure 32: Average bed day costs – non-acute inpatient units



Note: 10 of the 22 sites did not provide non-acute inpatient units

Figure 33: Average patient care costs per treatment day – community



Relationship between costs and patient attributable time

The complexity of the costing process, combined with the significant structural variation between sites in costs, created potential for a range of non-patient factors to distort the final costs allocated to episodes. As indicated in Chapter 8, the objective of the costing methodology was to ensure that episode costs reflected the relativities between patients in the level of clinical care provided to the individual patient (i.e., patient attributable time), but not to exaggerate these in the allocation of 'shared' cost pools (overheads/infrastructure and general time)

Table 34 summarises the correlations between patient attributable time and the major components of episode costs. As intended, for all three episode types, total episode cost correlate strongly with patient attributable time, with this relationship being more significant in community episodes. Thus, the goal of 'more clinical care means higher cost' was fully achieved through the costing logic developed by the Project Team. Overhead/infrastructure and general time costs also correlate significantly with patient attributable time, but the relationship is less direct. Within inpatient episodes, the link between patient attributable time and these shared cost pools is weaker than for community episodes, a highly plausible outcome given the higher level of 'fixed' costs in inpatient settings.

Overall, the cost data were considered by the Project Team to be sufficiently robust to be used as the dependent variable in a class finding analysis. The steps involved in building the dependent variable for the classification development are discussed in the following chapter.

Table 34: Correlations between patient attributable (P) time and components of costs

Episode setting	**Cost element**			
	Clinical staff salary & wages		Overheads/ Infrastructure	Total Episode Cost
	General Time allocation	Patient attributable time allocation		
Total P Time - Acute inpatient episodes	0.71	0.93	0.66	0.85
Total P Time - Non-Acute inpatient	0.40	0.98	0.42	0.76
Total P Time - Community episodes	0.76	0.95	0.75	0.90

SECTION 5

Preparatory Analysis

The material presented in the following Section deals with the analytical, conceptual, and statistical work required on the study dataset in preparation for the classification analysis.

- Chapter 11 describes how episodes were defined for the classification development work, and the unit of counting for these.
- Chapter 12 summarises other preparatory work on the dataset, including how multiple clinical ratings were handled, identification of additional criteria for exclusion of episodes from the analysis cohorts, and refinements made to the costing data prior to class finding.
- Chapter 13 provides descriptive data on the analysis cohorts in terms of their sociodemographic, clinical and cost characteristics, and explores whether there is in fact variance to explain.

Chapter

11

Defining Episode Types for Classification Development

Casemix classification systems are tied to specific treatment or care events, usually referred to as 'episodes of care'. In contrast to most classification systems which only deal with one episode type or 'funding product', the MH-CASC Project had the difficult task of covering numerous potential episode types, because its scope crossed the traditional inpatient/community and acute/non-acute boundaries.

Additionally, as the Project objective was to find a classification that would work within each of the major service settings, and also across them, defining and differentiating episodes was the core analytical task to be resolved before class finding could begin.

This chapter reviews the issues to be resolved in defining episodes within the MH-CASC dataset and outlines the approach taken in the development of the classification.

Separating data collection from analysis needs

As discussed in Chapter 3, a distinction was made between the data collection and analysis requirements of the project. From the data collection perspective, the episode of care definition needed to be simple and reliable so that clinicians understood what was expected of them when an episode began or ended. Consequently, during data collection, the concept of episodes was tied to the setting in which treatment occurred, with three types of settings being defined - acute inpatient, non-acute inpatient, and community. Changes in treatment setting were used to identify the beginning and the end of an episode.

The aim was to create markers for collection of clinical data as patients moved between settings, not to pre-judge how episodes would be defined for classification purposes. The wider point is that data were collected in such a way to allow episodes to be re-defined at the analysis stage of the project.

Elements of an episode definition

The key question is 'what patient attributes explain variation in *resource use*?' However, before statistical tools can be applied to address that question, three elements of an episode definition need to be resolved.

First, any definition of episodes should identify whether different episode types will be distinguished, to ensure that 'like is compared with like'. For example, it is not generally considered appropriate to compare community treatment to inpatient treatment, or short-term surgical cases with long term nursing home care, because these are believed to represent fundamentally different health care product types.

Casemix classification development in Australia is built on recognition of this and has led to a range of systems that split the health system on the basis of the different product types. For example, the AN-DRG system was designed for the classification of acute inpatient episodes, while the Developmental Ambulatory Classification System (DACS) attempted to describe and classify the non-inpatient products of hospitals.[89]

Second, once the different episode types have been identified, the boundaries of each episode type need to be defined so that the start and the end points are clearly demarcated. While this is relatively straightforward for discrete treatment events such as brief inpatient admissions, it is considerably more complex in those parts of the health system which provide ongoing care to patients over the longer term, or which attempt to coordinate care across multiple treatment settings. Inevitably, some arbitrary cut-points are required to segment continuous long-term periods of care into manageable units.

Third, having identified episode start and end points, the units of counting to measure resource use within the boundaries need to be defined. These units represent the actual dependent variable used to describe cost variation between patients and provide the base for the classification. For example, in the case of patient treated in the community for an 8 week period, should the dependent variable be the average cost per patient-provider encounter, or average cost per month of care, or total cost per completed episode of care, and so on?

The dependent variable can be understood as the most basic product for payment. A range of measures is evident in the various activity-based funding systems currently used in Australia, as summarised in Table 35.

Table 35: Examples of product types in activity funding

Payment Product	Example of Use in Funding
Completed inpatient episode	AN-DRGs
Per day of care	Nursing Home and Hostel Funding
Per day of care, adjusted for the stage in an inpatient stay	Private Hospital Reimbursements by Health Insurance Funds
Per occasion of service	Commonwealth Medical Benefits Schedule
	Victorian Ambulatory Care System

Work completed elsewhere offered little guidance on how each of the three aspects of the episode definition would be resolved in the MH-CASC class finding analysis. For example, available National Health Data Dictionary (NHDD)[88] definitions proved difficult to operationalise and make relevant to the mental health field. The NHDD defines an episode of care as a 'phase of treatment', pointing to four episode types (acute care, rehabilitation care, palliative care and non-acute care). Each of these episode types incorporates some notion of clinical intent and treatment within a designated unit. An episode of rehabilitation care, for example, was defined as occurring when a person with a disability is participating in a multi-disciplinary program aimed at improvement in functional capacity.

The NHDD definitions were not considered suitable for MH-CASC because:

- they were designed only for admitted patients;
- the boundaries between the end of one episode type and the beginning of another are not clearly defined; and
- while the concept of 'phase of treatment' is used to differentiate episode types, it is not defined.

Rather than drawing on precedents created by previous studies, resolution of how episodes would be defined and counted for analysis purposes was approached by reviewing the patterns evident in the available study data in the context of four 'threshold' issues.

1. the extent to which the data allowed cross-setting episodes to be defined;
2. the relative balance of completed and incomplete episodes, and in particular, the proportion of episodes that straddled the study sampling frame;
3. the identification of same day inpatient episodes; and
4. the extent to which inpatient episodes could be separated into acute and non-acute on the basis of treatment setting.

Threshold issues in defining MH-CASC episode counting rules

The following section reviews the study data from the perspective of each of these issues, and identifies the implications for episode definitions used for class finding purposes.

Dataset potential for defining cross-setting episodes

From the outset, the Project aimed to develop a classification that recognised the reality of differences between inpatient and community settings, as well as explore whether an alternative cross-setting classification could be developed which 'bundled' the inpatient and community care received by patients.

The study design was based on the view that *a priori* decisions could not be made about how to bundle care across settings. Instead, a range of options was planned to be trialed using the MH-CASC dataset. In particular, the data item 'focus of care' was collected specifically to allow exploration during the analysis stage of a more clinically meaningful classification of mental health episodes. As indicated in Chapter 4, judgements made by clinicians about focus of care incorporated the notion of 'phase', a concept with strong clinical meaning in the mental health field. Consultation with clinicians indicated they believed 'phase of care' to be integral to the definition of mental health episodes, as it brings together two key concepts – that patients' needs change over time as they move between stages of a mental illness, and the focus of treatment (and associated resource use) changes accordingly. Clinicians also argued phase is not dependent on treatment setting. For example, treatment of patients in an acute phase occurs regularly in both inpatient and ambulatory settings.

'Focus of care' therefore provided the potential 'bridge' to link the inpatient and community care received by individual patients into a single episode concept. Within this model, changes in the focus of care would define the start and the end points of episodes. If changes in the focus of care were found to be associated with changes in costs for a patient and changes in clinical attributes, then it was considered possible to find a new way of defining episodes of care without being restricted by treatment setting boundaries.

This analysis plan was premised on an expectation that there would be a sufficient patients with cross-setting episodes, that is, patients who were treated in more than one setting over the three month study period. This was not the case.

Table 36 presents the profile of episodes for all patients in the study sample. It shows that only 10.4% of patients had multiple episodes, accounting for 26.4% of expenditure.

The multiple episodes are dispersed across a complex range of service patterns, which makes the cohorts available for similar episode patterns very small. For example, if a new episode was to be defined as the acute inpatient stay plus the community treatment for a period after discharge, then only potentially 2.6% of patients would be available from the study cohort for possible casemix classification, accounting for 5.4% of expenditure.

Table 36: Mix of episode types – Per cent of patients and expenditure by episode combinations

Note: A = acute inpatient C = community N = non-acute inpatient

Episode combination	% Total patients	$m	% expenditure
A single only	17.6%	17.99	29.6%
N single only	5.0%	17.17	28.3%
C single only	67.0%	9.54	15.7%
A multiple only	1.8%	3.28	5.4%
N multiple only	0.1%	0.17	0.3%
C multiple only	0.5%	0.14	0.2%
AC	2.6%	3.27	5.4%
CA	2.0%	2.70	4.4%
CAC	1.5%	1.96	3.2%
Other AC combinations	1.1%	2.41	4.0%
NC combinations	0.4%	0.62	1.0%
AN combinations	0.4%	1.33	2.2%
ANC combinations	0.1%	0.19	0.3%
TOTAL	100.0%	60.77	100.0%

The low level of patients with multiple episodes was an unexpected result, but may be explained by various factors:

- The three-month sampling frame was probably insufficient to observe multiple episodes of care. An extended period of (e.g., one-year) could be expected to produce a significantly higher number of observations of patients moving between inpatient and community treatment settings.
- The study may not have recorded the community services received for a proportion of acute inpatient episodes:
  - the private hospital episodes in the study (n=1,086; see Table 26) are likely to have pre- and post- inpatient care in the community from a private psychiatrist or GP, and this has not been recorded in the data base;
  - although most public acute inpatient units in the study were attached to integrated specialised mental health services with affiliated community services, a proportion of acute episodes occurred in separate psychiatric hospitals servicing a wider catchment. These episodes (n=1,193) may have received community care in another unit outside the study sample.
- Gaps in the service system or inadequate clinical practice may also explain the low number of multiple episodes observed during the study period. To explore this hypothesis, the records of those patients who received one or more acute inpatient episodes were examined. This group represented 27% of total patients (n=4,785), who received 5,449 acute inpatient episodes. It is reasonable to expect that this group would have also received some level of community care over the three-month period of the study. The exception to this principle would be patients treated in those study sites which were unable to collect comprehensive information on community care. These included private acute psychiatric units, where mainly private psychiatrists or general practitioners provided community care, and units in stand alone psychiatric hospitals that provided supra-regional services. Together, these services accounted for 2,279 episodes provided to 2,199 patients. When these are excluded, it is reasonable to expect that the balance of patients who received acute inpatient treatment (n=2,506) would also have received some community care, either prior to or following the inpatient episode. In fact, the study found only 1,298 such patients, about half the number that would be expected as appropriate service patterns.

In the absence of sufficient observations of multiple episodes, only limited options were available to explore bundling across settings. Class finding therefore was primarily concentrated on within-setting episodes. The specific approach taken to defining 'Bundled Episodes' is described later in this chapter.

An additional consequence of the low number of multiple episodes was that the study data restricted the opportunity to explore the potential of the Focus of Care concept to define cross-setting episodes. However, as no previous work has been conducted in this area, the preliminary analyses conducted by the Project Team are summarised in Appendix J-1 of Volume 2.

Method of handling complete and incomplete episodes

Distinguishing episodes where full costs are available from those with only partial costs was a key issue in resolving how to define the dependent variable. In the AN-DRG classification, this is dealt with simply, by the exclusion of incomplete inpatient admissions from the classification development. However, in developing a classification for the mental health industry, with its mix of short and long term cases, such an approach was not considered appropriate.

Table 37 and Table 38 indicate the significance of incomplete episodes in the MH-CASC dataset. Episodes that had both the start date and the end date occurring within the three month study period were classified as 'completed' and represent only 29% of total episodes in the study database.

Incomplete episodes were of three types. Left censored episodes were those that started before the study began, but ended during the course of the study. Right censored episodes started during the study period, but had not finished at the closure of the data collection period. Finally, episodes that began prior to the start of the study but were not completed at study end were classified as ongoing.

Episodes in community and non-acute inpatient settings were typically ongoing (45% and 61% respectively), while acute inpatient episodes were mostly completed (67%).

Table 37: Completed and incomplete episodes by treatment setting for MH-CASC sample

Episode Setting	Complete	Left censored	Right censored	Ongoing	Unknown	TOTAL
Acute inpatient	3,645	866	879	58	1	5,449
Non-acute inpatient	113	147	151	642	2	1,055
Community	2,156	1,814	3,111	6,288	680	14,049
TOTAL	5,914	2,827	4,141	6,988	683	20,553

Table 38: Percentage of total patient care costs accounted for by complete and incomplete episodes

Episode Setting	Completed	Incomplete	TOTAL
Inpatient episodes	27.1%	50.0%	77.1%
Community episodes	1.9%	21.1%	22.9%
TOTAL	28.9%	71.1%	100.0%

From the cost perspective, completed episodes accounted for 35% of total inpatient costs and only 9% of the costs of community-based care. Across all episode types, incomplete episodes accounted for 71% of total patient care costs reported by the study sites.

The implication for analysis is that a classification based only on completed episodes is not feasible for community and non-acute settings but would be appropriate for acute inpatient settings. The high proportion of incomplete episodes in community and non-acute inpatient settings needs to be accommodated, rather than excluded, by the definition of the dependent variable.

‘Intended same day’ episode types

The ‘intended same day’ classification has considerable ambiguity in specialised mental health services, highlighting a lack of consensus about how to define the boundary between inpatient and community care. The analysis issue to resolve was whether to include same day episodes with inpatient episodes involving an overnight stay, or whether to include them with community episodes.

Site coordinators reported that day programs were treated as outpatient attendances in most cases, but at some sites, attendance at hospital-based day programs was recorded as intended same day admissions in inpatient morbidity statistics. A mixture of activities was provided in these programs, but were described as generally comparable to those offered in day programs provided in community-based mental health centres.

For the data collection cycle, such same day admissions were recorded as parts of a community episode of care, to avoid the excessive clinical ratings that would have been associated with a daily admission-discharge cycle. Data were subsequently extracted from hospital morbidity systems and matched to the MH-CASC database to identify those episodes recorded as ‘community’ during data collection but which were classified as ‘intended same day inpatient’ by the hospital (see Chapter 14 for details). This allowed the option of including those episodes in either (or both) the acute inpatient and community analysis cohorts.

A total of 2,039 episodes classified as community type in the MH-CASC collection were found to be coded as ‘intended same day’ inpatients in the site hospital morbidity data. Table 39 compares average daily patient attributable time for this group of episodes with all acute inpatient and community episodes recorded in the MH-CASC data set. Although average patient attributable time for ‘intended same day’ patients is higher than average daily time for patients seen in the community, it is substantially less than average patient time recorded for overnight acute inpatients.

Table 39: Average patient attributable time recorded per day for acute inpatient, community and same day patients

Treatment Setting	Average P Time (mins)
Acute inpatient	163
‘Intended same day’ *	72
Community	59

* Note: ‘Intended same day’ refers to episodes coded as community in the MH-CASC collection but recorded as intended same day inpatients in local hospital morbidity data.

Given the closer similarity between ‘intended same day’ and community patients, coupled with the variation in coding practice, it was decided to continue to treat all same day admissions recorded as community episodes during data collection as part of a community episode during the analysis stage. This approach was regarded as more consistent with broader concerns expressed by the clinicians advising the Project Team that there would be a perverse incentive to over-emphasise centre-based day program treatment if they are classified and funded as inpatient admissions.

Thus, ‘intended same day’ episodes were excluded from the acute inpatient cohort in the development of the MH-CASC classification. However, to allow comparison with AN-DRGs, they were flagged and incorporated in this part of the analysis (see Chapter 14).

Differentiating acute and non-acute inpatient episodes

The distinction made between acute and non-acute inpatient settings during data collection left open the option of maintaining a split between inpatient setting types during the class finding analysis. The issue is one of whether there is a sufficiently clear demarcation between the two settings in terms of length of stay to justify patients being partitioned into acute and non-acute branches of a classification tree solely on the basis of the type of inpatient setting in which they are treated.

Advice provided to the team by its Clinical Reference Group suggested that the delineation of functions for acute and non-acute settings is variable across Australia and is reducing as the number of long term beds declines. As reported in the most recent *National Mental Health Report*, the number of non-acute psychiatric beds reduced by 35% (1,522 beds) between June 1993 and June 1996, primarily as a result of reductions in the size of stand alone hospitals.[83] Clinicians advised that, as long-term beds reduce in number, acute units are required to take an increasing role in managing patients who need ongoing inpatient care. It was further reported that in several areas, where there is very limited access to long-stay facilities, a substantial proportion of available acute inpatient days are consumed in caring for ongoing inpatients.

Data presented earlier suggested that a classification based on completed episodes might be appropriate for acute settings but not for non-acute settings. However, if it is in fact true that many acute units also provide a long term care function, then a classification based only on complete episode costs would either disadvantage those units with higher numbers of long stay patients or, more seriously, may create disincentives for not admitting such patients. To avoid this, a complex system for defining outliers, or patients to be excluded from the classification, would be required.

From a classification design perspective, a better approach is one where classes are based more directly on differences between patients, rather than settings.

Review of the length of stay data confirmed some degree of overlap between acute and non-acute settings, demonstrated by the presence of long-stay patients in acute units and short-stay patients in non-acute units.

For example, over the 91 day study period, the longest-staying 5% of episodes in acute units remained in hospital for 54 days or more, compared with a mean of 18 days for all acute episodes. In the class finding analysis, these patients would be better compared with the non-acute group when determining relative episode costs.

Similarly, the bottom 10% of episodes had short stays more characteristic of episodes in acute inpatient units, remaining in hospital 19 days or less during the study period, compared with the non-acute average of 73 days.

Table 40 summarises the distribution of days in hospital during the study period for acute and non-acute units.

A similar picture is obtained from the cost data. The top 5% of acute inpatient episodes had costs of $14,143 or higher, compared with the bottom 5% of episodes in non-acute inpatient units whose costs were $13,099 or less.

Based on the overlap, it was resolved that the classification analysis should separate inpatient episodes into those that were completed in the study period and those that were incomplete, rather than on the basis of treatment setting. Thus, two types of inpatient episodes were defined for class finding purposes:

- Completed inpatient episodes - includes all episodes that started and ended during the study period.
- Incomplete inpatient episodes – includes all episodes that started and/or ended outside the study period.

Within this approach, those patients in non-acute inpatient units who began and completed their episodes within the course of the study were therefore included in 'completed inpatient episodes' (113 episodes out of a total sample of 1,055).

Table 40: Distribution of number of inpatient days observed during the 91-day study period for acute inpatient and non-acute inpatient episodes

	Number of Inpatient Days	
	Acute inpatient units	Non-acute inpatient units
Percentiles		
5	2	10
10	3	19
20	4	40
25	5	59
30	6	78
40	9	91
50	12	91
60	16	91
70	21	91
75	24	91
80	29	91
90	41	91
95	54	91
Total episodes	5,449	1,055
Minimum	1	1
Maximum	91	91
Mean	18.0	73.0
Std. Deviation	17.8	29.5

Note: 'Number of Inpatient Days' refers to the number of occupied bed days observed during the 91 day study period, not episode length of stay. For example, the number of inpatient days for a patient admitted to hospital on day 40 of the study and who remained in hospital at the study end would be calculated as 51.

Episode types used for class finding analysis

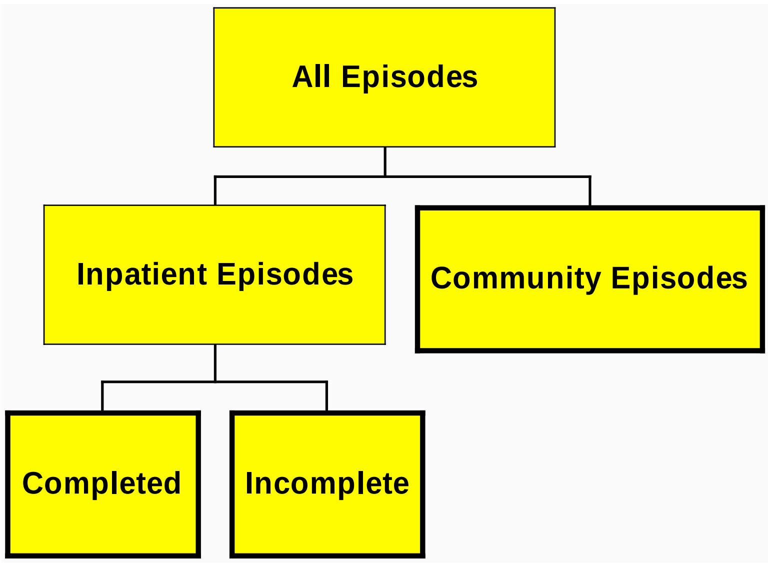
Based on the preceding analysis of issues, the Project Team resolved to develop the classification on the following basis:

- Class finding analysis would primarily focus on developing a setting-specific classification. Supplementary analysis of a classification for 'Bundled Episodes' would be conducted on a limited, exploratory basis.
- The setting specific classification would distinguish three types of episodes – community, completed inpatient and incomplete inpatient (Figure 34).

In developing the MH-CASC classification, services to adults were differentiated from children and adolescents. In most jurisdictions these services are organised separately, and different patient characteristics were collected for those in adult services compared with those in child and adolescent. A separate classification was therefore developed for child and adolescent services. They are brought together only in the analysis of the AN-DRG performance to be consistent with approach used in the AN-DRG development (see Chapter 14).

Development of the child and adolescent classification followed the same structure as shown in Figure 34, with the exception of incomplete episodes where the number of observations was insufficient to sustain a classification (see below).

Figure 34: Revised setting-specific episode types for MH-CASC analysis



The remainder of the chapter further defines these episode types and the 'units of counting' used within each.

Completed inpatient episodes

A total of 3,758 completed inpatient episodes were recorded by study sites (see Table 41), drawn mainly drawn from psychiatric units located in general hospitals, a sample weighting selected to reflect National Mental Health Strategy directions (see Figure 35).

Figure 35: Distribution of completed inpatient episodes between public colocated, public stand alone and private psychiatric hospital units

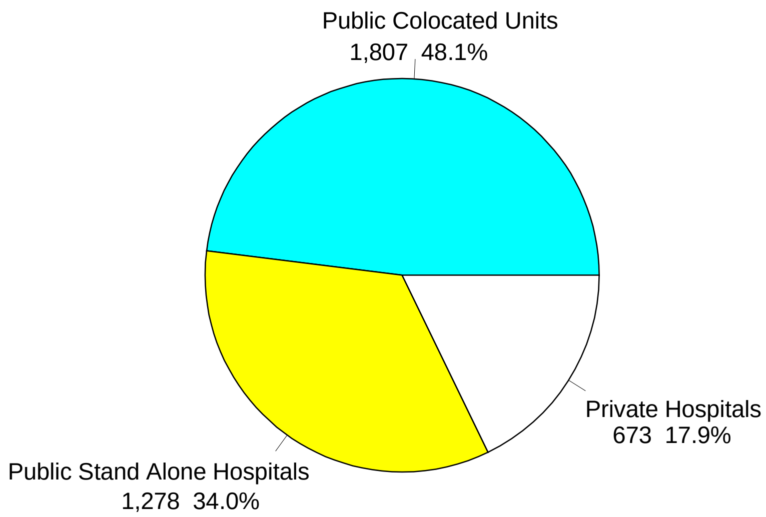


Table 41 provides the distribution of episodes across public and private sector sites, and between adult and child and adolescent services. It shows that 82% of completed inpatient episodes were provided by public sector services, and 96% were within adult services.

Table 41: Distribution of completed inpatient episodes by public-private sector and inpatient program type

Inpatient Program Type	Public Sector	Private Sector	Total
Adult Mental Health Services	2,960	653	3,613
Child and Adolescent Mental Health Services	125	20	145
Total	3,085	673	3,758

Length of stay and *per diem* cost distributions are shown in Figure 36 and Figure 37, respectively. Typically, completed inpatient episodes were brief with an average length of stay of 14.1 days and an average daily cost of $343. The top 10% of episodes on length of stay had stays of 32 days or more: on *per diem* costs, the top 10% of episodes cost $520 per day.

However, variation in length of stay is double that of cost per day (coefficients of variation of 0.88 and 0.40 respectively, see Table 42), suggesting that differences between patients in length of stay are the main driver of variation in total episode costs.

The cost per day is higher in the early days of treatment, as illustrated in Figure 38. While the earlier days are more expensive, the variation is not as significant as the variation in length of stay.

Figure 36: Completed Inpatient Episodes - Distribution of length of stay

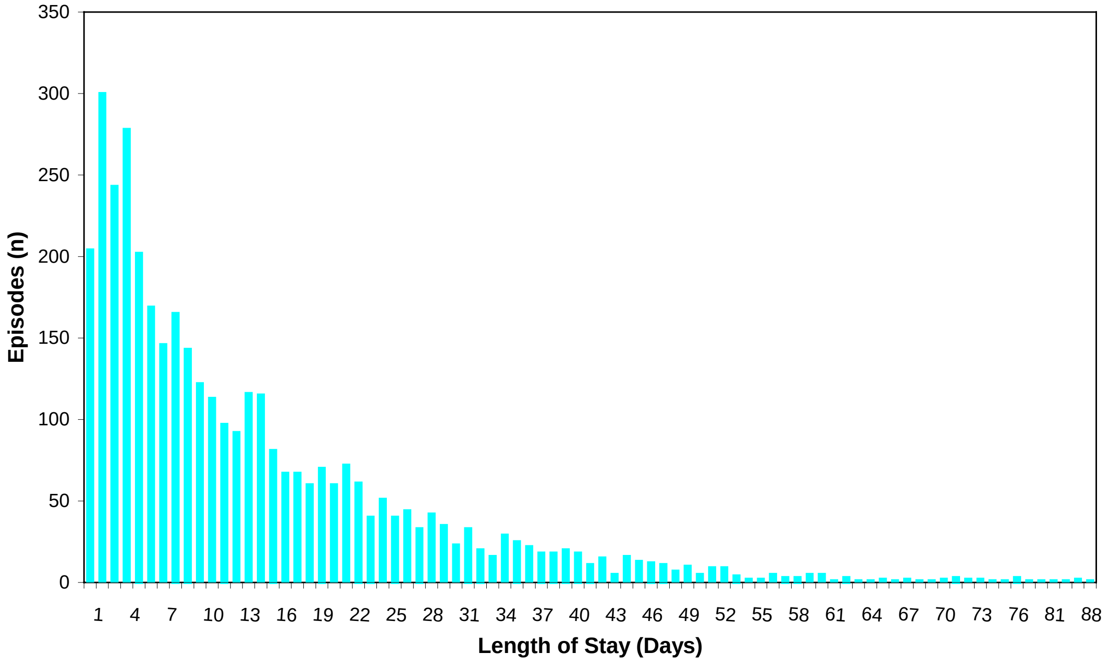


Figure 37: Completed Inpatient Episodes – Distribution of cost per day

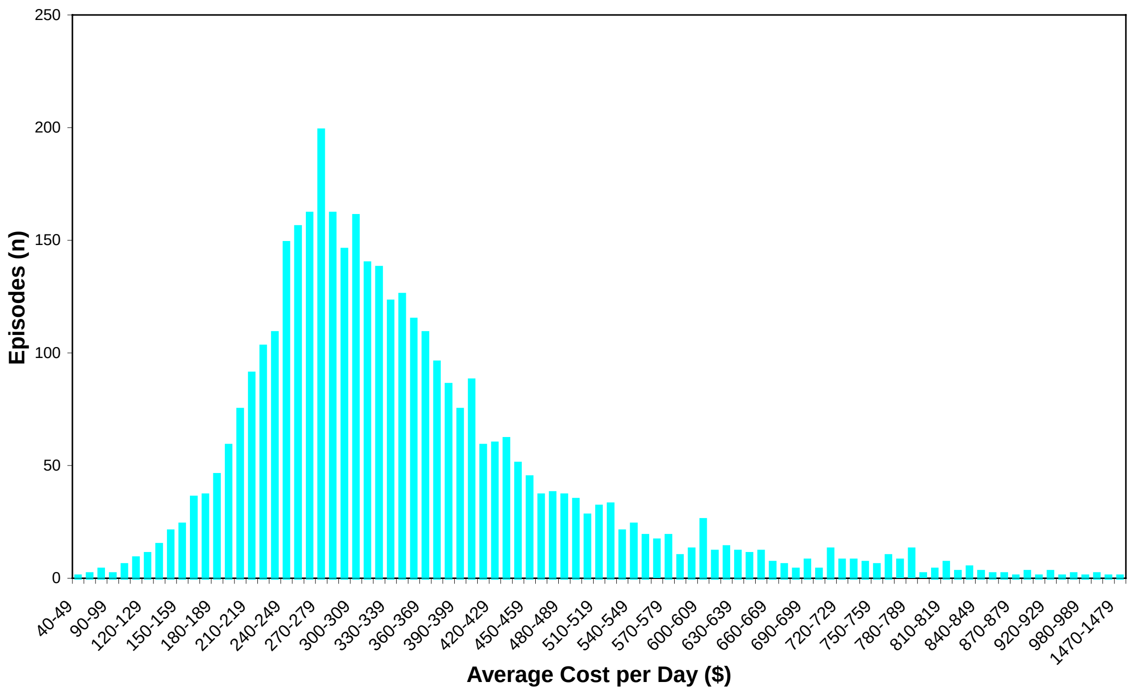
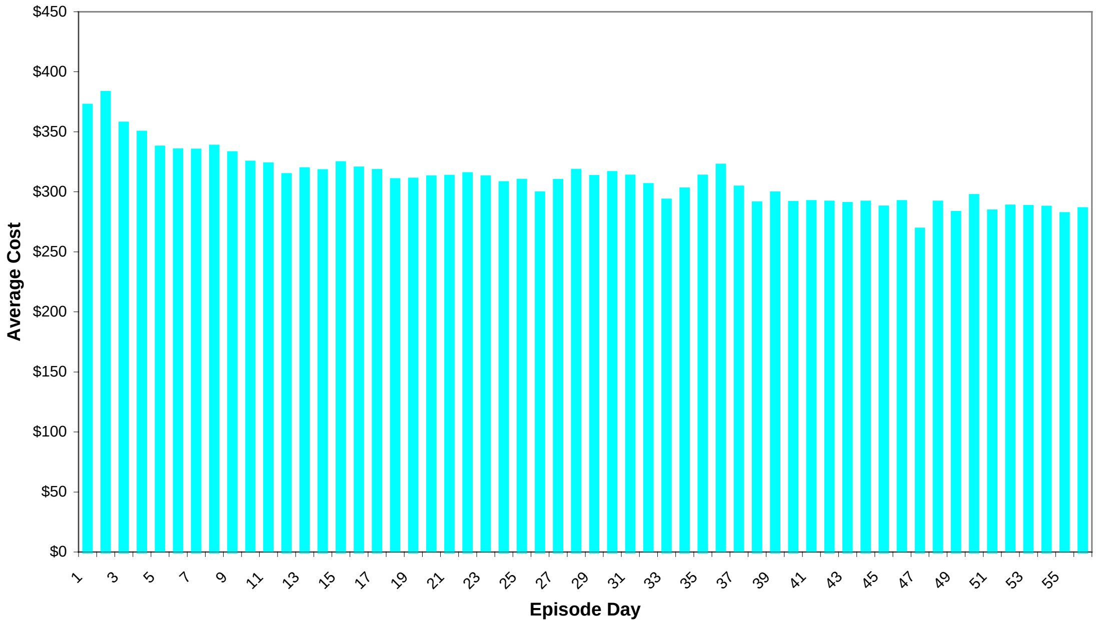


Table 42: Completed Inpatient Episodes – Comparison of variation in length of stay and per day costs

	Length of Stay	Cost per day
Mean	14.1	$343
Standard Deviation	13.4	$139
Coefficient of Variation	0.88	0.40

Figure 38: Completed Inpatient Episodes – Per daycosts by day of care



Note: First 8 weeks only

Total episode costs was selected as the dependent variable because:

- most variability is in the length of stay, and so a classification based on completed episodes is most likely to lead to more normative practices and costs;
- cost per day of treatment (e.g., days 1-3, days 4-10, etc.) are not sufficiently different to justify different 'product lines' within an acute inpatient stay;
- stays are sufficiently short to fit within the normal cycle of funding; and
- the approach is consistent with mainstream casemix classification for acute inpatient services (i.e., AN-DRGs).

Incomplete inpatient episodes

In total, 42% of inpatient episodes were incomplete, with 66% of these occurring in acute inpatient units (see Table 37). The distribution of incomplete episodes by 'edge' status and inpatient program type is shown in Table 43.

Table 43: Distribution of incomplete inpatient episodes by inpatient program type

Episode Setting	Left censored	Right censored	Ongoing	Unknown	Total
Adult Mental Health Services	972	975	694	3	2,644
Child and Adolescent Mental Health Services	41	55	6		102
Total Episodes	1,013	1030	700	3	2,746

The MH-CASC incomplete inpatient episodes sample is broadly of two types:

- Short stay admissions that either commenced or ended outside of the study boundaries. Using the terminology defined earlier in this chapter, episodes of this type represent the majority of 'left censored' and 'right censored' episodes.
- Medium to long-stay episodes which extended across the majority of all of the study period. These 'ongoing' episodes comprise 25% of incomplete episodes.

Figure 39 summarises the distribution of days in hospital during the study period for incomplete episodes and non-acute units and shows a very different pattern to completed episodes. This is reflected in the distribution curve, with the concentration at study end.

Variability in cost per day is also low (Table 44, Figure 40) and consistent with the CV noted for completed inpatient episodes (CV less than 0.50).

Figure 39: Incomplete Inpatient Episodes - Distribution of days in hospital during the study period

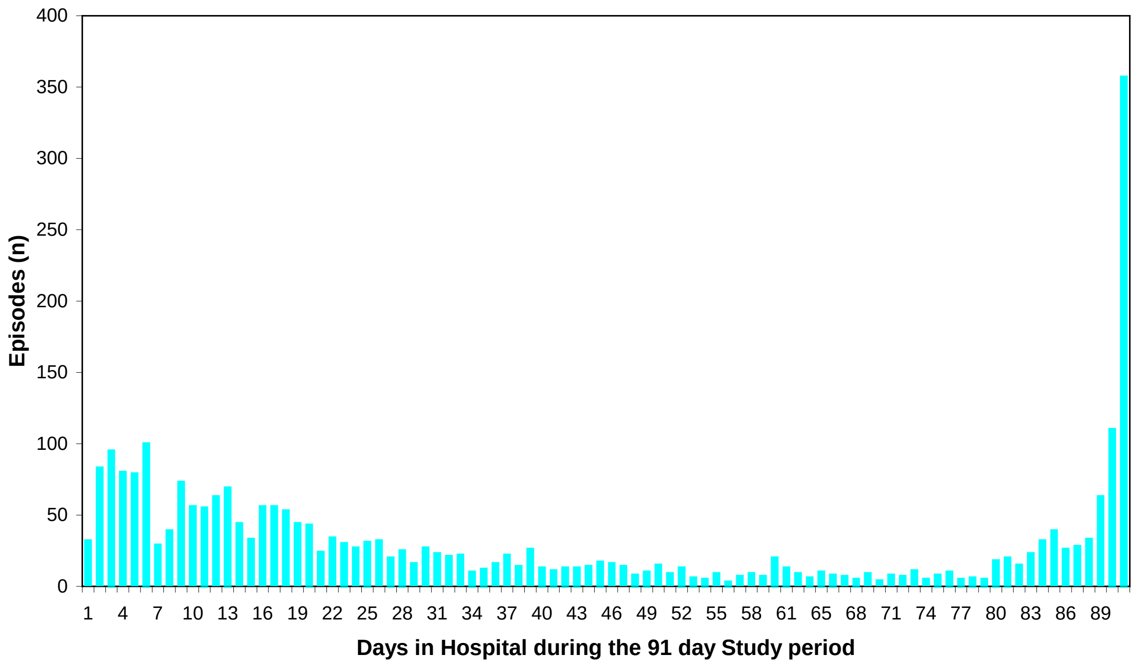
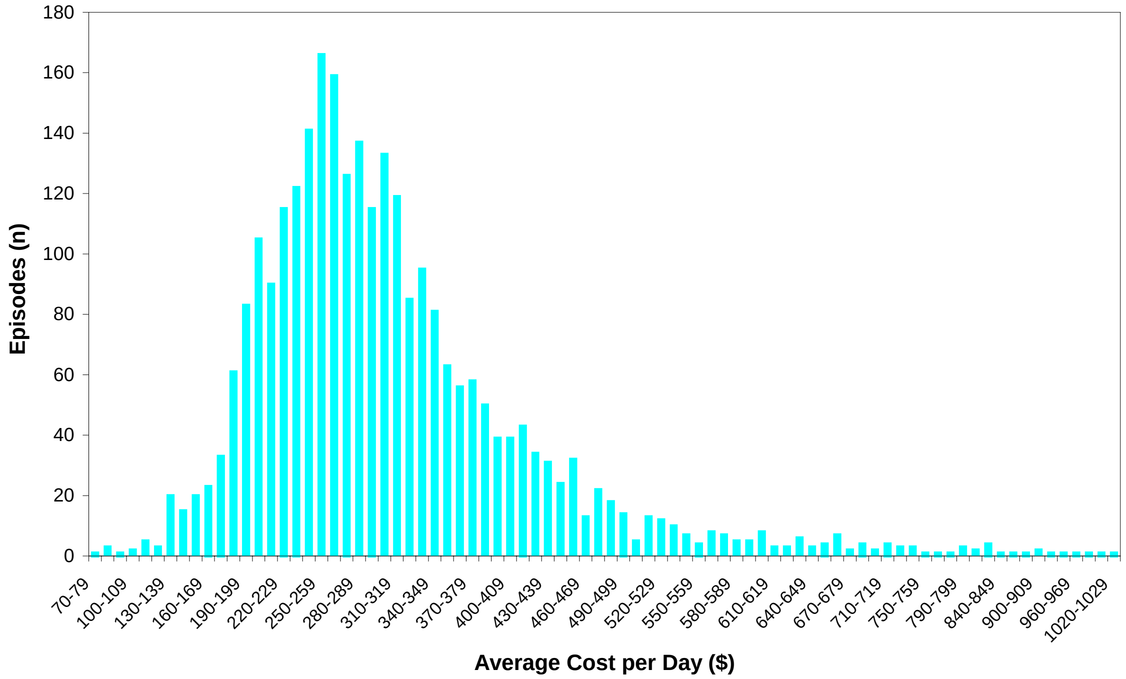


Table 44: Incomplete Inpatient Episodes - Comparison of variation in length of stay and per day costs

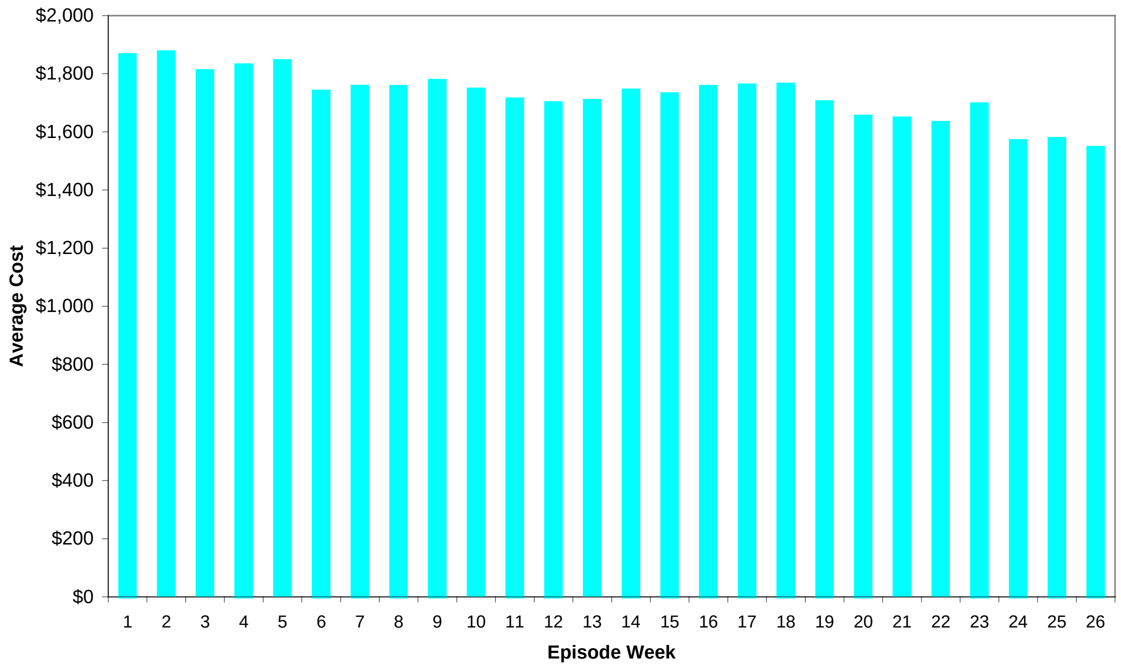
	Days in Hospital	Cost per day
Mean	41.0	$304
Standard Deviation	33.9	$112
Coefficient of Variation	0.83	0.37

Figure 40: Incomplete Inpatient Episodes - Distribution of cost per day



Based on the study data, treatment costs appear to vary with stage of care, with slightly higher costs in the early weeks, and gradually declining over the first six months. (Figure 41).

Figure 41: Incomplete Inpatient Episodes - Distribution of costs per treatment week over first 6 months



Note: Week of care derived from original admission date which, for left censored and ongoing inpatients, occurred prior to study commencement

In deciding on the dependent variable for incomplete inpatient episodes, a 'common ground' unit of counting was needed that incorporated both the ongoing episodes and a reasonable proportion of the left censored and right censored episodes that comprise the overall sample.

The Project Team considered the approach used in other non-acute funding classifications would be appropriate, where the dependent variable is the average daily cost calculated over a fixed period of time. Casemix reimbursements in a number of long-stay inpatient settings use this concept, and are based on the number of days a person spends in the treatment setting, weighted by an average *per diem* rate. Reimbursement is typically calculated as follows:

daily rate (casemix adjusted) multiplied by the number of days in care

For class finding purposes, any multiple of patient days could be used for classification development, while retaining as many patients as possible in the cohort analysis. The critical issue is one of balancing the need for a minimum reasonable period of observation upon which to draw conclusions about average daily costs with the need to retain sufficient cases for analysis. The Project Team considered, for example, that it would not be credible to compare average costs for a patient admitted in the final days of the study with those calculated for a patient who remained in hospital for the full three months of the study. At the other extreme, setting the minimum observation period at 91 days would include ongoing episodes but exclude left and right censored episodes that collectively make up 75% of the sample.

An eight-week period was finally selected as the 'reasonable observation period' because:

- it provided sufficient days of care for the opportunity to incorporate high/low cost days of care for these long-stay patients; and
- it allowed retention of 81% of the potential inpatient episodes in non-acute units in the analysis cohort;
- although the approach excluded 77% of left and right censored episodes, this was considered appropriate as the majority of these were in acute units and were considerably shorter than the 56 day cut off.

Using an 8-week cut-off produced a potential analysis cohort of 974 episodes from the total incomplete sample of 2,746 episodes. Included in this group were 21 child/adolescent episodes that met the criterion, an insufficient number to sustain a classification. These were therefore excluded, with the implication that only one inpatient episode type was defined for child and adolescent cases (completed inpatient episodes).

Thus, a pool of 953 incomplete inpatient episodes was created for analysis, all sharing the characteristic of having a minimum of 8 weeks continuous inpatient care. Ninety seven per cent of these (n=929) were provided by public sector sites, 86% of which were in stand alone psychiatric hospitals.

Due to the long-stay quality of these inpatient admissions, this analysis cohort is referred to hereafter in this document as **'ongoing episodes'**.

For analysis purposes, the episode was defined as the total care provided over an 8-week period and the dependent variable was calculated as the total 8-week cost. For the patients who had more than 8 weeks of treatment in an incomplete episode, their total costs were calculated, and scaled back proportionately to 8 weeks.

Community episodes

Like non-acute inpatient stays, a classification based on completed episodes of community care is not regarded as feasible, given that only 15% of episodes were completed, and the largest group was ongoing patients (45%).

Table 45: Community Episodes - Number of episodes and percentage of costs by 'edge' status

'Edge' Status	Number of Episodes	% Total Episodes	% Community Expenditure
Completed	2,156	15%	8.5%
Incomplete			91.5%
Left censored	1,814	13%	
Right censored	3,111	22%	
Ongoing	6,288	45%	
Unknown	680	5%	
Total	14,049	100%	100.0%

Note: Unknown included with Incomplete in expenditure data

These features of the MH-CASC dataset reflect the chronic nature of many mental disorders, and the custom by mental health services to keep patients 'on the books' for long periods, often for maintenance care. For example, 21% of the community cohort received 3 treatment days of care or less over the 3-month period.

It also highlights the lack of protocols to guide practitioners in discharge and regular review of cases under ongoing community care.

The episode definition task must reflect this clinical reality, and so incorporate both the completed and incomplete groups of patients. To achieve this a dependent variable is required that can be used as a 'unit of counting' for all community care episodes.

In creating an episode definition, the Project Team looked ahead to the possible ways in which such a classification might be applied in a funding context. We were mindful of concerns expressed by clinicians that, if organisations were paid on the basis of completed community episodes, then the incentive would be either to discharge/readmit, or constantly close and re-open the episode so that an episode payment could be collected.

In the absence of a completed episode, the Project Team considered three options for defining the dependent variable in an activity-based funding system for community mental health services:

1. Funding for each occasion of service or patient contact (e.g., Commonwealth Medical Benefits Schedule); or
2. Funding for each day on which treatment is provided, regardless of how many occasions of service are involved (e.g., reimbursement per treatment day); or
3. Funding for a period of time when the person is under the care of a service provider (e.g., reimbursement per day in community care). This model is equivalent to the episode definition used for incomplete episodes

In mental health, community care is varied, ranging from multi-disciplinary centre based services (e.g., day program), intensive treatment (e.g., crisis intervention team, mobile intensive treatment), or one-to-one (e.g., maintenance medication visits with a psychiatrist).

An occasion of service system would require a classification of each of the service types, and overlaying this onto a patient classification, creating a complex system with minimal benefits.

Occasion of service funding systems have the incentive to increase the number of patient contacts, because a reimbursement is received for each service. Given the many 'low intensity' ongoing patients in mental health services, the likely impact of such an approach would be to expand the services for these patients, perhaps at the expense of those who need high intensity of treatment to continue living in the community.

The Project Team concluded that a classification based on occasions of service was not the preferred way to quantify variation between patients because of its complexity, the relatively low level of variability in costs per occasion of service and its potential to create distorted incentives when translated to a funding environment.

To explore the second option of funding for each day on which treatment occurred, preliminary analysis showed that variability between patients in their use of community mental health resources is more related to the number of days on which a person receives treatment, rather than the cost per treatment day. For example:

- CVs for number of treatment days were approximately double those for cost per treatment day (Table 46); and
- the number of community treatment days explains 79% of the variation in community episode costs, compared with 25% for cost per day.

Table 46: Community Episodes - Comparison of variation in treatment day costs and number of treatment days

	Cost per Treatment Day	Number of Treatment Days
Mean	$98.74	9.0
Standard Deviation	$57.21	10.1
Coefficient of Variation	0.58	1.12

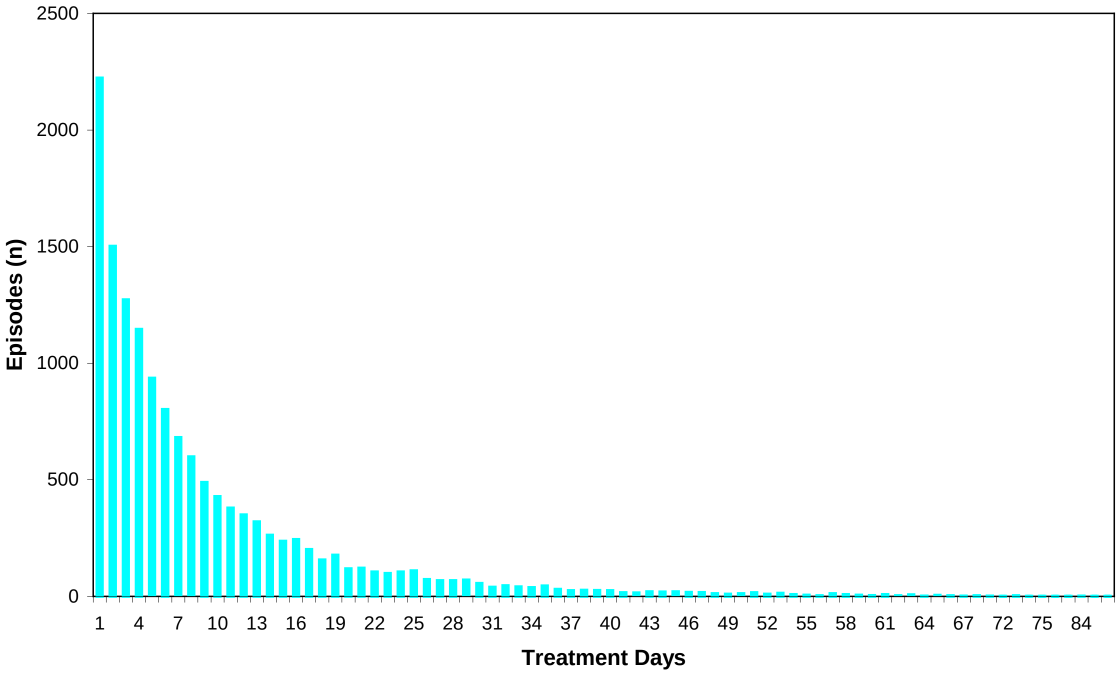
Figure 42 and Figure 43 provide the frequency distributions of community treatment days and cost per treatment day for all episodes recorded in the study.

The Project Team concluded that a classification based on cost per treatment day has all the weaknesses of the occasion of service approach. Neither of these approaches deals adequately with the ongoing and chronic nature of the mental illnesses experienced by most people treated in the community, and the reality that the key variable differentiating patients is the intensity of treatment required over a given time period,

The preferred approach is the third option – a classification based on care over a given period while the person is a client of the community mental health service.

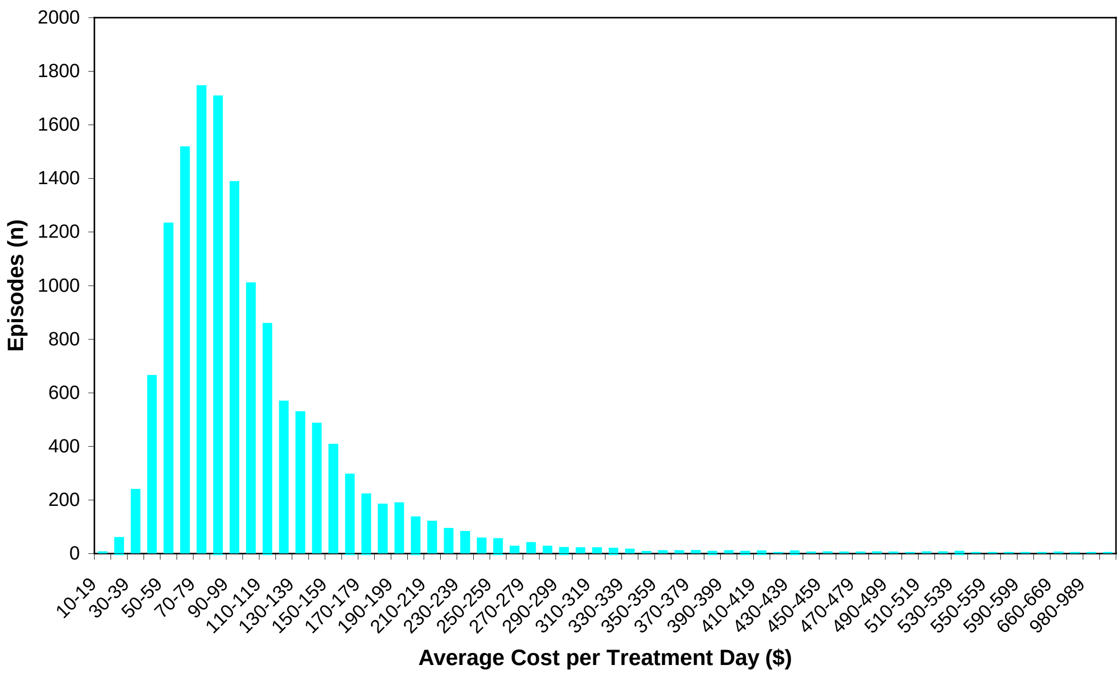
As the model is a new one for community services classification, it requires some illustration. Three examples are offered for this purpose.

Figure 42: Community Episodes – Distribution of treatment days



Note: Treatment days refers to the number of days within the episode on which a service was provided to the patient.

Figure 43: Community Episodes – Distribution of costs per treatment day



Note: Cost per treatment day is calculated as the total costs of the community episode care divided by number of treatment days.

- **Example 1:** Patient 1 was under the continuing care of a community mental health service and was seen on 3 of the 91 study days, at a cost per treatment day of $30, $40, and $20. The patient therefore had 91 days in care at a total cost of $90. Thus, under the 'period of care' approach, the average cost was $1 per day. This could be scaled up or down depending on the funding period, for example, $56 per 8 weeks of care.
- **Example 2:** Patient 2 was also an ongoing patient, but had more intensive needs. The patient remained under care of the area mental health services for the full 91-day study period and spent the first 21 of those days in an acute inpatient unit. The community team saw the patient on 20 of the remaining 70 days following discharge, with a total cost of $1,400. Thus, the average cost per day of community care for this 70 day care period was $20 ($1,400 divided by 70 days). Scaled up to a different timeframe, the cost would be, for example, $1,120 per 8 weeks of community care.
- **Example 3:** Patient 3 was a new patient to the mental health services, and was seen for the first time on Day 10 of the study. Treatment for this patient comprised 6 outpatient consultations over a 20-day period, at a total cost of $400. At the completion of the sixth visit, the patient was discharged from care (episode closed) and did not return for the remainder of the study period. Thus, the average cost per day of community care for this 20 day care period was $20 ($400 divided by 20 days). However, when considering a longer period (e.g., the cost over an 8-week period), it is not appropriate to scale this episode because it in fact started and finished within the period. Thus, the 8-week period cost for this patient is $400 – the same as the 20-day cost. This example demonstrates that for completed episodes, a different logic is needed from that used for incomplete episodes.

The concept of a classification based on a period of care for community episodes represents an innovative and relatively simple way of 'counting' community episodes of care:

- total cost of services provided over a given time period is first calculated, and can be adjusted to any funding period (e.g., per day, per month, per year);
- when translated to a payment model the approach allows differential funding for those with the need for more frequent visits, without the potential to create incentives for excessive 'call in' visits that characterise occasion of service payment systems; and
- the definition of community episodes as 'periods of care' recognises the chronic nature of the mental illnesses experienced by most people under the care of specialised mental health services and their needs for ongoing community support.

The approach is most like a capitation model, and on its own would create the risk of 'skimming' low cost patients. However, as indicated, when used in conjunction with a casemix classification, reimbursement will vary according to the characteristics of the patient type.

Using the period of care concept to define episodes for classification purposes requires resolution of which patients have had sufficient days of observation to remain in the analysis cohort. As with incomplete inpatient episodes, a significant proportion (35%) of community episodes were right censored or left censored, which would be excluded from analysis if a the criterion of a full 90 days of care was required.

Table 47 presents the distribution of episode length for all community episodes, where episode length is defined as the number of days the patient was registered as under community care. It shows that 77% of the 11,893 incomplete community episodes were of 4 weeks or more duration. The cohort available for analysis would reduce significantly if an 8-week requirement was set, with only 66% of incomplete community episodes retained in the sample.

The acceptable period of time for a incomplete community episodes to be included in the analysis cohort was resolved to be 30 days for the following reasons:

- sufficient days are included to observe variations in patients' service costs and patterns, from which reasonable conclusion can be drawn about their 'typical costs' over time; and
- 85% of community episodes (11,904 of 14,049 total) are included in the analysis cohort for classification development, providing a respectable sampling of the range of patients' service patterns.

Under this approach, incomplete community episodes which had less than 30 days observation were excluded from the classification development. However, all completed episodes were retained, regardless of the duration, on the rationale that because costs across the 'whole' episode had been recorded, there was a reasonable basis to generalise about 8-week period cost.

Table 47: Community Episodes - Number of days under care

	Completed Community Episodes		Incomplete Community Episodes		Total
Episode Length/ Elapsed Days	Number of Episodes	Cumulative Per cent	Number of Episodes	Cumulative Per cent	
0-6	633	29.4%	716	6.0%	1,349
7-13	233	40.2%	409	9.5%	642
14-20	267	52.6%	498	13.6%	765
21-27	145	59.3%	391	16.9%	536
28-34	192	68.2%	541	21.5%	733
35-41	114	73.5%	428	25.1%	542
42-48	130	79.5%	528	29.5%	658
49-55	82	83.3%	483	33.6%	565
56-62	104	88.1%	629	38.9%	733
63-69	73	91.5%	711	44.8%	784
70-76	79	95.2%	973	53.0%	1,052
77-83	39	97.0%	1,345	64.3%	1,384
84-91	65	100.0%	4,241	100.0%	4,306
Grand Total	2,156		11,893		14,049

Having defined the 'rules' for cohort inclusion, the remaining issue concerned the length of the 'period of care' to which costs would be scaled for the classification analysis (e.g., 1 month, 3 months, 12 months etc.). For consistency reasons, an 8-week period of care was selected as this facilitated comparison with the episode concept used to classify Ongoing Inpatient Episodes.

Thus, for analysis purposes, the episode was defined as the total care provided over an 8-week period and the dependent variable was calculated as the total 8-week cost.

- For patients who had more than 8 weeks of treatment (completed or incomplete episode), total costs were calculated, and scaled down to 8 weeks.
- For incomplete episodes with a duration between 30 and 56 days, total episode costs were scaled up to their 8-week equivalent.
- For completed episodes less than 56 days, no scaling was applied – the episode cost was also regarded as the 8-week period cost.

'Bundled Episodes'

As discussed earlier, the study dataset limited the extent to which episodes could be bundled across settings. However, rather than dismiss the opportunity to explore possible cross-setting classifications, the Project Team conducted initial analyses that could provide a foundation for future work. As a demonstration only of what might be developed in the future, the analysis was restricted to adult episodes.

The approach aimed to explore whether a classification could be developed that explained the total costs received by all patients over the study period, regardless of the setting in which they were treated. In this approach, the episode is defined as a period of care, similar to the definitions used for community and Ongoing Inpatient Episodes, but where costs of all treatment received in all settings is pooled.

This form of 'episode' allows for the prospect of a capitated casemix model of funding, where a service provider would be funded for providing comprehensive care to particular patient classes over a defined time period. Funding would not be linked to whether patients were treated in inpatient or community settings. The aim of this approach is create real funding incentives to substitute community for acute mental health services, consistent with the National Mental Health Strategy.

The method used examined the 'total period cost' of all patients who received:

- community care only; or
- inpatient care only; or
- any combination of community and completed inpatient episodes.

The cohort excluded those inpatients, who because of the study design, no information was available on their community service use. This included:

- patients treated by private psychiatric inpatient units; and
- patients treated by non-integrated public acute inpatient units.

In both cases, community care is mostly the responsibility of another service not included in the study data.

The unit of counting for this type of episode of care is cost per period. To be included in this cohort it was considered essential that a patient had sufficient opportunity to receive a range of care options. For example, inclusion of a patient who entered the study in the last week of the data collection would not enable a reasonable comparison with patients who had been in the study for the full 3 month period, with their opportunity for inpatient admission and community care.

Examination of the database found that a 4-week period in the study was sufficient to retain 76% of the potential patient sample and was considered a reasonable time frame to draw conclusions about 8 week costs. All those with less than 4 weeks in the study were excluded from this cohort for analysis. Those who received more than 4 weeks of care had their total costs estimated for their period in the study (e.g., 3 months), and scaled up or down proportionately to the 8 week period. This allowed for reasonable comparisons.

Dependent variable overview

Table 48 brings together the previous discussion and summarises the main 'rules' for defining cohorts and episode costs for each of the episode types.

Table 48: Inclusion criteria and episode cost calculations for the episode types

Episode Type And Dependent Variable	Inclusion Rule	Calculation of Episode Cost	Notes
Completed Inpatient Episodes (Adult and Child/ Adolescent cohorts)			
Total Episode Costs	All inpatient episodes starting and ending in the study period, regardless of acute/non-acute classification of inpatient unit.	Episode Cost = Total Cost for the inpatient stay, regardless of length	
Ongoing Inpatient Episodes (Adult cohort only)			
8 week period cost	All incomplete inpatient episodes (left censored, right censored, ongoing) ≥ 56 days during the study period, regardless of acute/non-acute classification of inpatient unit.	For episodes > 56 days, total episode costs summed and scaled down to 56 days	Episodes < 56 days costed and excluded from analysis.
Community Episodes (Adult and Child/ Adolescent cohorts)			
8 week period cost	*Completed episodes:* All episodes included, regardless of episode length.	*Completed episodes*: For episodes ≤ 56 elapsed days, total costs for the episode = 8 week cost. For episodes > 56 elapsed days, total episode costs summed and scaled down to 8 weeks	
	Incomplete episodes (left censored, right censored, ongoing): Episodes ≥ 30 'elapsed days', where elapsed days is defined as the number of days between episode registration and episode end.	*Incomplete episodes:* For episodes < 56 elapsed days, total episode costs summed and scaled up to 8 weeks. For episodes > 56 days, total episode costs summed and scaled down to 8 weeks.	Episodes < 30 days costed and excluded from analysis.
'Bundled Episodes' (Adult cohort only)			
8 week period cost	All patients with 30 or more 'elapsed days', where elapsed days is defined as the number of days between date of first contact in the study period and study end.	For patients with < 56 elapsed days, total costs summed over all episodes and scaled up to 8 weeks. For episodes > 56 days, total costs summed over all episodes and scaled down to 8 weeks.	Patients with <30 days costed and excluded from analysis

Chapter

12

Preparation of Analysis Datasets

Once episode types and units of counting were defined, three issues needed to be resolved prior to finalising analysis datasets to be used for class finding. The issues to be resolved were:

- how multiple clinical ratings would be handled in the selection of independent variables;
- whether adjustments were necessary to the cost data to reduce the influence of site factors; and
- whether all episodes that met the cohort criteria described in the previous Chapter were appropriate for inclusion or particular episodes warranted exclusion.

This Chapter describes the approach to each of these issues.

Selecting the independent variables from the clinical rating cycle

Unlike classification studies based on a single set of clinical observations recorded at a fixed point (e.g., Principal Diagnosis as determined at discharge), the MH-CASC dataset included multiple clinical variables collected at repeated intervals during the course of an episode. A key pre-analysis issue to resolve was which rating, or mix of ratings, should be used as independent variables for class finding.

For some variables, an *a priori* decision had been made with regard to when the variable should be measured. For example, the majority of socio-demographic variables were considered to be relatively stable, and were therefore collected only once at the start of the episode on the *Episode Registration Form*. Likewise, clinical measures such as principal psychiatric diagnosis and the Life Skills Profile were considered to be summary measures which reflected the patient's status over the whole episode, and were therefore collected at the end of the episode on the *Final Clinical Ratings Form*.

Other clinical measures, however, were collected on multiple occasions throughout an episode each time a clinician completed a *Repeat Clinical Ratings Form*. For adults, these included the HoNOS, the RUG-ADL and RCI (for patients over 65 and/or with a diagnosis of chronic organic brain syndrome) and Legal Status. For children, multiple ratings were collected on the clinical and level of functioning scales (HoNOSCA, CGAS) and variables related the patient's social circumstances (Living With, Guardianship, Family Court Involvement, Juvenile Justice Indicator and Family Income)

For the multiply rated items, the preference identified by the Project's Clinical Reference Group at the outset of the study was to build the classification from the rating that 'best described the clinical picture'. Options considered included the first or final rating, the most severe rating or an average of all ratings made across the episode. Beyond these, the possibility was considered of developing a classification model that incorporated multi-point ratings. For example, patient classes might be based on the degree of clinical change expected over the period, or the stability/volatility of the clinical picture.

However, decisions about these issues made in advance of the study were considered to be inappropriate – for example, debate over whether to use the first or the last clinical rating would be unproductive if it transpired that the majority of episodes only had one rating.

Number of ratings per episode

Approximately 60,000 clinical ratings were submitted on the MH-CASC patient sample, or an average of three ratings per episode. However, frequency of ratings varied by episode type, reflecting differences in episode duration.

For completed inpatient episodes, 68% of cases had only one clinical rating (the final rating) reflecting the average length of stay for these cases of 14.1 days. By contrast, 99% of incomplete inpatient episodes and 72% of community episodes had more than one clinical rating. This finding applied to both the adult and child/adolescent cohorts.

Table 49 summarises the distribution of ratings across the episode types.

Table 49: Distribution of number of clinical ratings by episode type

Number of Clinical Ratings	Episode Type			
	Completed Inpatient	Ongoing Inpatient	Community	All Episodes
1	67.8%	0.6%	28.5%	35.8%
2	19.6%	0.4%	15.8%	15.8%
3	7.8%	1.7%	13.2%	11.3%
4	3.3%	5.0%	12.0%	9.6%
5	0.7%	13.9%	11.3%	9.1%
6	0.5%	20.8%	12.7%	10.4%
7+	0.3%	57.6%	6.6%	8.1%
	100%	100%	100%	100%

Clinical ratings for Community and Ongoing Inpatient Episodes

In considering which rating to take, Community and Ongoing Inpatient Episodes were considered first, because of their greater potential for multiple ratings.

Table 49 points to the disadvantages that would follow for each of the episode types if the classification model relied upon multiple clinical ratings. For the ongoing inpatient group, less than 1% of cases would be excluded from the analysis but a greater proportion (29%) for community episodes. However, these disadvantages may be acceptable if significant change in ratings over time were observed, as this may in fact be the key to understanding differences between patients in treatment costs.

Review of the summary data for patients with multiple ratings in fact pointed to very little change over time. Selected views of the data are described below to demonstrate this feature of the MH-CASC dataset.

Adult Episodes

Figure 44 compares the mean HoNOS scores for the first and last ratings for Ongoing Inpatient Episodes, based on all cases with at least two ratings. Figure 45 makes the same comparison for community episodes.[a]

Figure 44: Mean HoNOS scores at first rating and last rating – Adult Ongoing Inpatient Episodes

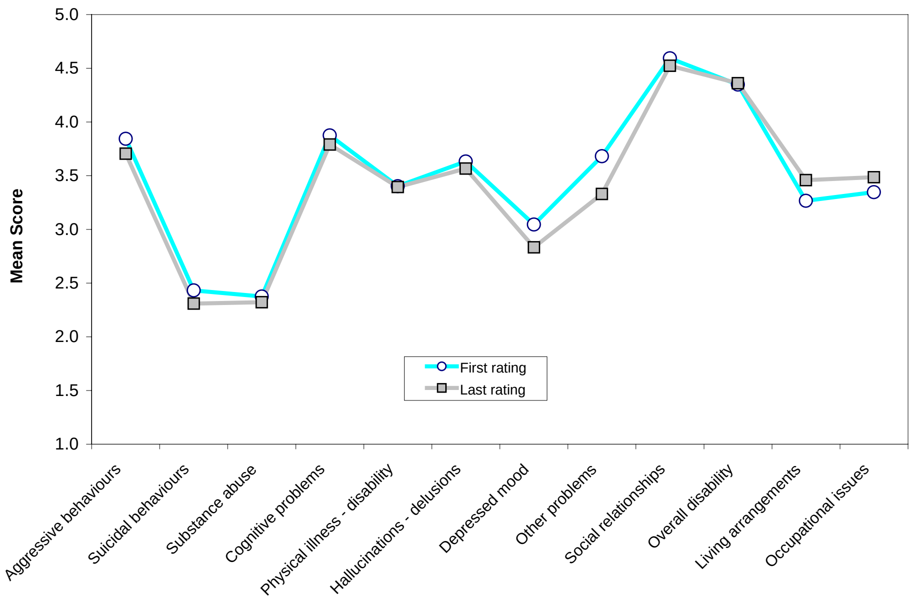
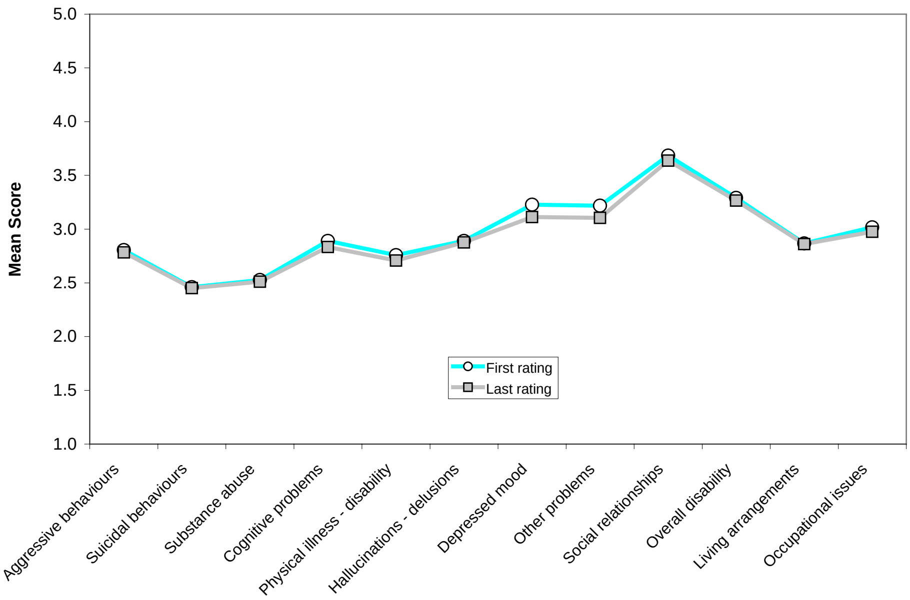


Figure 45: Mean HoNOS scores at first rating and last rating – Adult Community Episodes



[a] Note: For the purposes of analysis, all original HoNOS scores have been transformed by adding 1 to remove the zero anchor point. Scores of 9 ("Not known or Not Applicable") have been scored as 1.

The figures reveal that the average HoNOS score on a given item varied little as a function of rating number, within the two episode types. Given the minimal fluctuation in mean scores for individual HoNOS items across ratings, it was considered appropriate to use the first HoNOS rating from each episode for the classification analysis as this would retain all cases in the analysis cohort.

Similar results were found for the RUG-ADL and RCI scales, indicating that use of the first rating for these measures would also be appropriate.

For legal status, the remaining 'multiple adult variable', analysis indicated that there were three major combinations – always involuntary, never involuntary and sometimes involuntary. Table 50 gives the breakdown of the combinations by episode type.

Table 50: Legal status combinations by episode type

Episode Type	Legal Status Combinations			
	Always involuntary	Never involuntary	Sometimes involuntary	total
Completed Inpatient	42%	52%	6%	100%
Incomplete Inpatient	38%	46%	16%	100%
Community episodes	10%	81%	9%	100%
Total	21%	69%	9%	100%

Although the most common legal status for all episode types was 'never involuntary', there were proportionally far more such cases in the community than in the two inpatient episode types.

In practice, clinicians reported legal status to be a highly volatile item that fluctuates both with clinical status, social factors and decisions by external review bodies. Complex sequences of legal status occur, dictated to some extent by the relevant State or Territory legislation. The key distinction was argued to be between patients who had been made involuntary at some stage in the episode and those who had not, as this is what most influences clinician behaviour.

The current definition of mental health legal status in the National Health Data Dictionary[88] takes this approach, defining the item in binary terms (ever involuntary-never involuntary). It is similarly defined in the revised AN-DRG Version 4 classification.

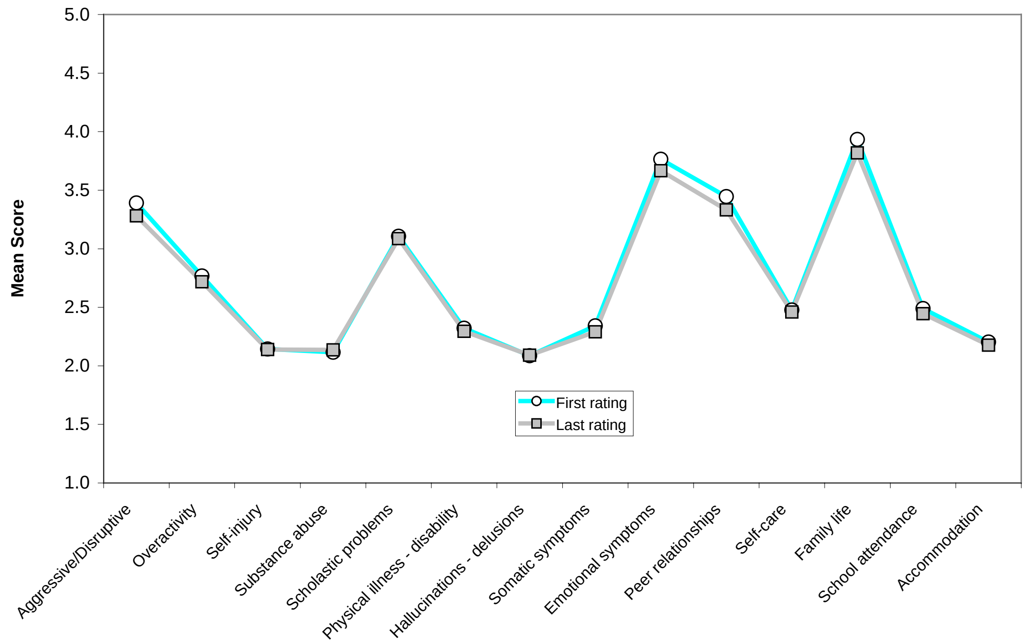
For these reasons, this approach was adopted as the method for defining legal status for patients with multiple ratings. For all episode types, one or more ratings indicating involuntary legal status assigned this status to the overall episode.

Child and Adolescent Episodes

Details of multiple ratings for Child/Adolescent Community Episodes are provided below. As discussed in the previous chapter, a classification for child/adolescent Ongoing Inpatient Episodes was not pursued due to insufficient numbers for analysis.

Figure 46 compares mean scores on the first and last rating for community episodes for which two or more ratings were made.

Figure 46: Mean HoNOSCA scores at first rating and last rating – Child/Adolescent Community Episodes[a]



Like their adult counterparts, there was little variation across ratings. Given this picture, it was considered appropriate to adopt the same approach as that for the adult HoNOS, and to take the first HoNOSCA rated in a any given episode for the class-finding analysis.

Similar results were found for the CGAS measure. Taking all community episodes for which there were at least two ratings, the mean CGAS score for the first and last ratings was 58.2 and 62.9, respectively. These scores placed the average level of functioning across community episodes at the upper end of *"variable functioning with sporadic difficulties"*, or the lower end of *"some difficulty in a single area, but generally functioning pretty well"*.

Given this evidence of minimal change across ratings, it was considered appropriate to use the first CGAS score in the class-finding analysis.

For the variable 'Living With', although details about the child's living arrangements were collected every two weeks of a given episode, it was uncommon for their circumstances to change across episodes. Children were most commonly recorded as living with two natural parents, followed by mother alone. Ninety seven per cent of episodes had only one arrangement indicated.

Likewise, 'Guardianship Arrangements" seldom changed during an episode. Again, 97% of episodes had only one guardianship arrangement indicated, despite this information being collected every two weeks of the episode.

Under these circumstances, it was considered appropriate to use the first 'Living With' and 'Guardianship Arrangements' ratings from each episode in the classification analysis.

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[a] Note: For the purposes of analysis, all original HoNOSCA scores have been transformed by adding 1 to remove the zero anchor point. Scores of 9 ("Not known or Not Applicable") have been scored as 1.

'Family Court Involvement', the 'Juvenile Justice Indicator' and 'Family Income' were the remaining measures to settle for the child/adolescent cohorts.

In 89% of all episodes, no family court involvement was indicated on any rating. In 8%, it was indicated on all ratings, and in the remainder it was sometimes indicated. Given this breakdown, it was considered appropriate to recode multiple indications of family court involvement to a single episode indicator (no family court involvement across the episode vs. at least one instance of family court involvement). Using this breakdown, family court involvement was indicated at least once in 18% of community episodes.

In 96% of all episodes, there was no involvement with the juvenile justice system. In 3%, juvenile justice system involvement was indicated on all ratings completed during the episode. In 1%, juvenile justice system involvement was indicated on some ratings and not on others. Similar logic was used for determining the best way to deal with multiple juvenile justice indicators within episodes as that used to dichotomise family court involvement. A single indicator was used to summarise the episode (no juvenile justice system involvement across the episodes vs. at least one instance of juvenile justice system involvement).

For Family Income, in 59% of all episodes, the family's main source of income was at no time stated to be a pension or other government benefit. In 37% of episodes, the family's main source of income was always stated as a pension or other government benefit. In the remainder, it varied depending on which rating was considered.

Again, family income was converted into a single measure for any given episode: never received a pension or other government benefit during the episode; received a pension or other government benefit at least once during the episode.

Using this breakdown, a pension or other government benefit was indicated in 52% of community episodes.

Clinical ratings for completed inpatient episodes

In the case of completed inpatient episodes, the question of which HoNOS (or HoNOSCA) rating to take was less of an issue because of the high proportion of episodes (68%) with only one rating. In the remaining 32%, the same rules were used as for Ongoing Inpatient Episodes and community episodes – that is, the first rating was used.

Clinical ratings for 'Bundled Episodes'

By definition, 'Bundled Episodes' could potentially include more than one setting-specific episode, since 'Bundled Episodes' included all of the care provided to a given patient during the study period. This meant that they could not only have multiple ratings, but could have more than one *Final Clinical Ratings Form* completed. For example, a 'Bundled Episode' might involve a 21 day community episode for which a *Repeat Clinical Ratings Form* was completed on Day 14, and a *Final Clinical Ratings Form* was completed on Day 21, followed by a 19 day completed inpatient episode for which a *Repeat Clinical Ratings Form* was completed on Day 14, and a *Final Clinical Ratings Form* was subsequently filled out on Day 19.

The first rating of the first setting-based episode in any 'Bundled Episode' (i.e., the first rating for the study period for the given patient) was taken for all but three clinical measures:

- for Principal Diagnosis and the LSP, the final rating of the first setting-based episode in any 'Bundled Episode' was used;
- Legal Status was reduced to a dichotomous variable (ever involuntary during the study period; never involuntary during the study period).

Table 51 summarises which rating was selected for each clinical measure in both the setting-based episode and 'Bundled Episodes' analyses.

Table 51: Source of rating for each clinical measure included in analyses

	Setting-based episodes	'Bundled Episodes'
Adult		
• HoNOS	First rating for episode	First rating for study period
• RUG-ADL	First rating for episode	First rating for study period
• RCI	First rating for episode	First rating for study period
• LSP-16	Final rating for episode	Final rating of first setting-based episode for study period
• Legal Status Indicator	Ever involuntary vs never involuntary across episode	Ever involuntary vs never involuntary across study period
• Diagnosis	Final rating for episode	Final rating of first setting-based episode for study period
Child/Adolescent		No 'bundled episode' analysis performed.
• HoNOSCA	First rating for episode	
• CGAS	First rating for episode	
• Living With	First rating for episode	
• Guardianship	First rating for episode	
• Family Court Involvement	No family court involvement vs at least one instance of family court involvement across episode	
• Juvenile Justice Indicator	No juvenile justice system involvement vs at least one instance of juvenile justice system involvement across episode	
• Family income	Never received a pension vs received a pension across episode	
• Diagnosis	First rating for episode	

Standardising costs to reduce site variation

The Project objective, to develop a casemix classification, is dependent on finding which of the various patient variables are best able to explain cost differences between patients. However, between-patient cost variation can also be affected by other factors. The most notable of these are factors under the control of providers.

A wide range of factors, including differences in efficiency, differences in labour and other 'input costs' and differences in clinical practice may cause provider-driven variation in costs. These factors diminish the extent to which patient factors can be identified as influencing costs: the stronger the 'non-patient noise', the harder it is to find the 'patient signal'.

An initial task in the analysis, therefore, was to estimate how much of the reported variation in costs was attributable to differences between providers and how much was attributable to differences between patients. Depending on the significance of provider as an explanatory variable, it was considered desirable to control for these factors and maximise the potential of finding a patient-based classification.

Using 'site' as the provider variable, initial exploration of the MH-CASC dataset confirmed that provider factors were significant in contributing to cost variation, although this varied by episode type. Table 52 summarises the reduction in variance accounted for by the site variable for each of the setting-specific episode types.

Table 52: Proportion of variation in episode costs accounted for by Site

Episode Type	% Variance Reduction
Adult Completed Inpatient	6.9%
Adult Ongoing Inpatient	25.1%
Adult Community	2.3%
Child/Adolescent Completed Inpatient	3.6%
Child/Adolescent Community	20.9%

A range of options was considered to standardise the cost data and reduce the site influence. Few precedents were available to guide this aspect of the analysis, as most Australian classification research has been based on actual costs, unadjusted for site factors. The Victorian Palliative Care Study, however, is an exception and described an approach to reduce site factors that were identified as significant drivers of cost variation.[90] The method employed by the study involved standardising mean episode costs within like facilities, where the mean for a particular facility was converted to the mean cost for all similar facilities. Episode costs for that facility were then adjusted by the appropriate scaling factor. Three 'peer groups' (hospitals, hospices and community care) were used to set the scaling benchmarks.

This approach is justifiable if it can be assumed that all facilities within each of the 'peer groups' treat a similar mix of patients. However, this is not the case in MH-CASC, where sites were selected explicitly to ensure particular types of patients were included in the sample. The key problem in the method is that it can mask genuine differences in casemix between facilities. For example, cost differences between private units and public intensive care units may reflect genuine differences in the mix of patients being treated. Such differences would be masked if the costs per bed day in both sectors were standardised to be the same.

Any adjustment to reduce site differences in unit costs needs to consider the range of factors that may underlie cost differences between sites. These include:

- sites may differ in their relative efficiency; or
- sites may differ in their input costs (e.g., salaries and wages); or
- sites might differ in their clinical practices; and
- sites may differ in the kinds of patients treated (i.e., the casemix)

The optimal statistical solution is one that selectively removes site differences caused by differences in non-patient factors such as efficiency and input costs (e.g., differences in the cost of purchasing similar professional services) but retains the variation that may be casemix related (e.g., higher cleaning and domestic overheads because patients have greater physical dependency). Where variation is caused by clinical practice differences, no amount of statistical manipulation will be effective.

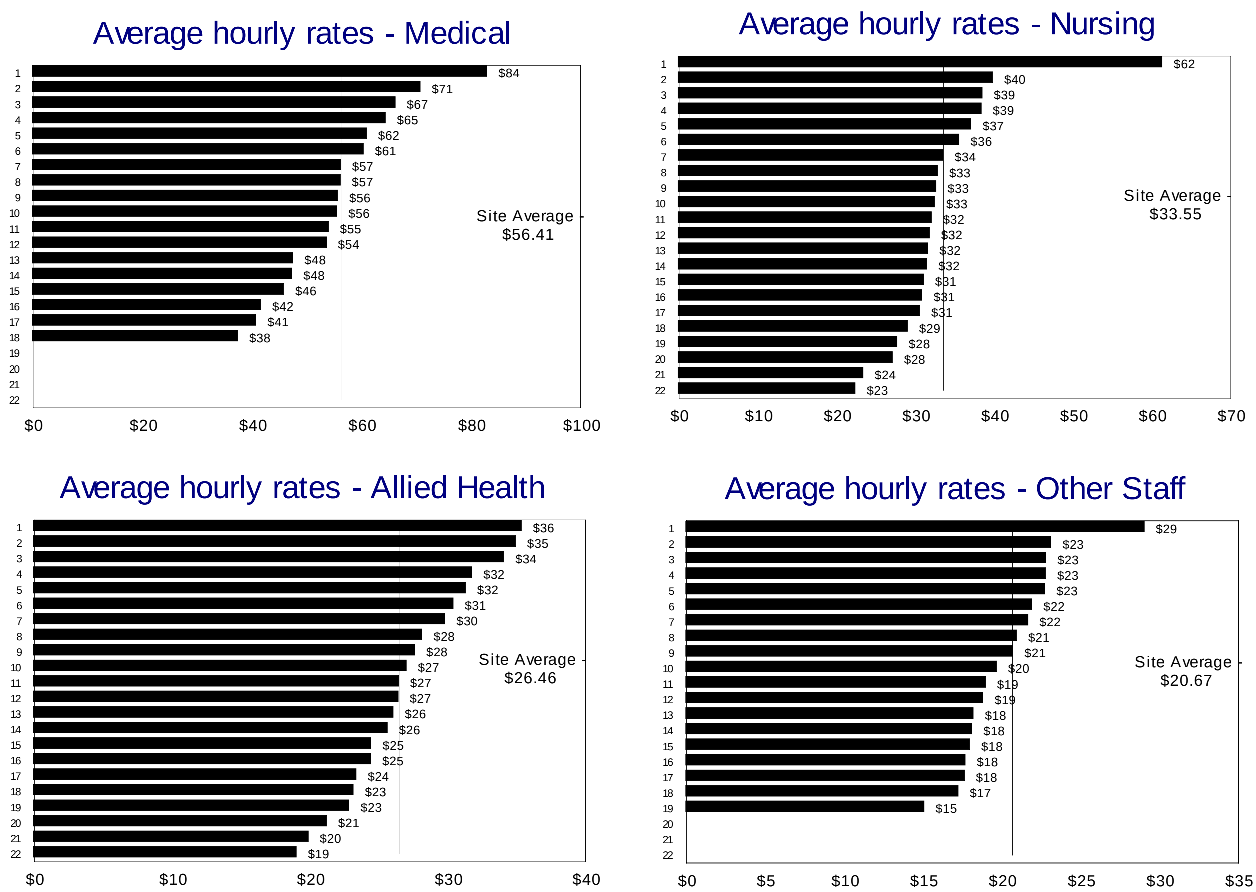
Three options were considered.

First, to develop the classification using the actual costs reported by each study site (i.e., no standardisation applied). This was rejected because the significance of site as a variable to explain variation in the MH-CASC data was considered to be highly unlikely to be related only to casemix differences.

Second, a refined facility-type standardisation was considered. This would use the method developed in the Victorian Palliative Care Project, but the definition of a facility would be refined to include different standardised costs for, say, psychiatric hospitals, general public hospitals, private hospitals and community mental health services. Such an approach would require the study team to make assumptions about the mix of patients treated in each study site – for example; "the costs at these 6 sites can be standardised because they all treat similar patients". This approach was also rejected because of the circularity inherent to the method – the study wants to control for variation between providers to understand the differences between patients; but the method used to control for variation between providers is based on a set of assumptions about differences between patients.

The third option considered was to adjust for structural differences in the cost of labour, the main 'input cost'. Review of the cost data pointed to significant variation between sites in hourly rates for the same labour class. Figure 47 summarises the data.

Figure 47: Variation between sites in labour class costs



Note: Site codes have been randomly allocated across all graphs to prevent site identification; Medical Staff costs are not reported for the four private hospital sites; Other Staff site costs reported only for the 19 sites that employed staff in these categories.

Although labour rate differences may also be casemix related, (e.g., more senior staff employed to treat more difficult patients), the extent of the variation was considered to be primarily linked to non-patient factors such as differences in industrial awards, levels of reporting and the extent to which casual and agency workers were used to supplement employed staff.

For these reasons, the third option was used as the method to reduce site variation.

In this method, average hourly rates were identified for each of the four labour classes (Nursing, Medical, Allied Health and Other staff) and used to standardise the labour cost data at all sites.

In preparing the data file, both standardised and non-standardised costs were built into the costs file to allow subsequent re-analysis. In effect, this required a conversion factor to be applied to all 1.6 million events recorded by staff and costed as part of the original costing process. For example, a patient seen by a nurse for 30 minutes within a site where nursing rates were $40 per hour would be costed initially at $20. An additional field 'standardised cost' was then added to the event, which multiplied the unadjusted cost, by the conversion factor appropriate to that site, calculated as follows:

Standardised cost	= (Non standardised cost) x	(Average Nursing hourly rate, all sites) / (Average Nursing hourly rate for the site)
	= $20 x (40/33.5)	
	= $16.75	

Standardising for differences in labour cost provided only a limited correction of site factors. However, no further steps were taken as the study team considered these required unwarranted assumptions that risked masking real casemix differences between the sites.

Final cohort selection

Selection of final analysis cohorts from the total episode sample occurred at three levels. First, preliminary culling of episodes occurred as part of the database development procedures described in Chapter 9. For example, episodes registered but which had no associated staff time were removed records from the database. Second, the criteria used to define episode types and the dependent variables for each (Chapter 11) removed episodes from the analysis that did not have a sufficient observation time frame.

The final step involved a more qualitative review of the data to filter out cases considered inappropriate for inclusion. Reasons for exclusion were mainly of two types.

- The episode was registered within a particular service with low or unusual staff compliance, resulting in an exceptionally large amount of general time being allocated to particular episodes. A small proportion of inpatient and community episodes were excluded from analysis on these grounds.

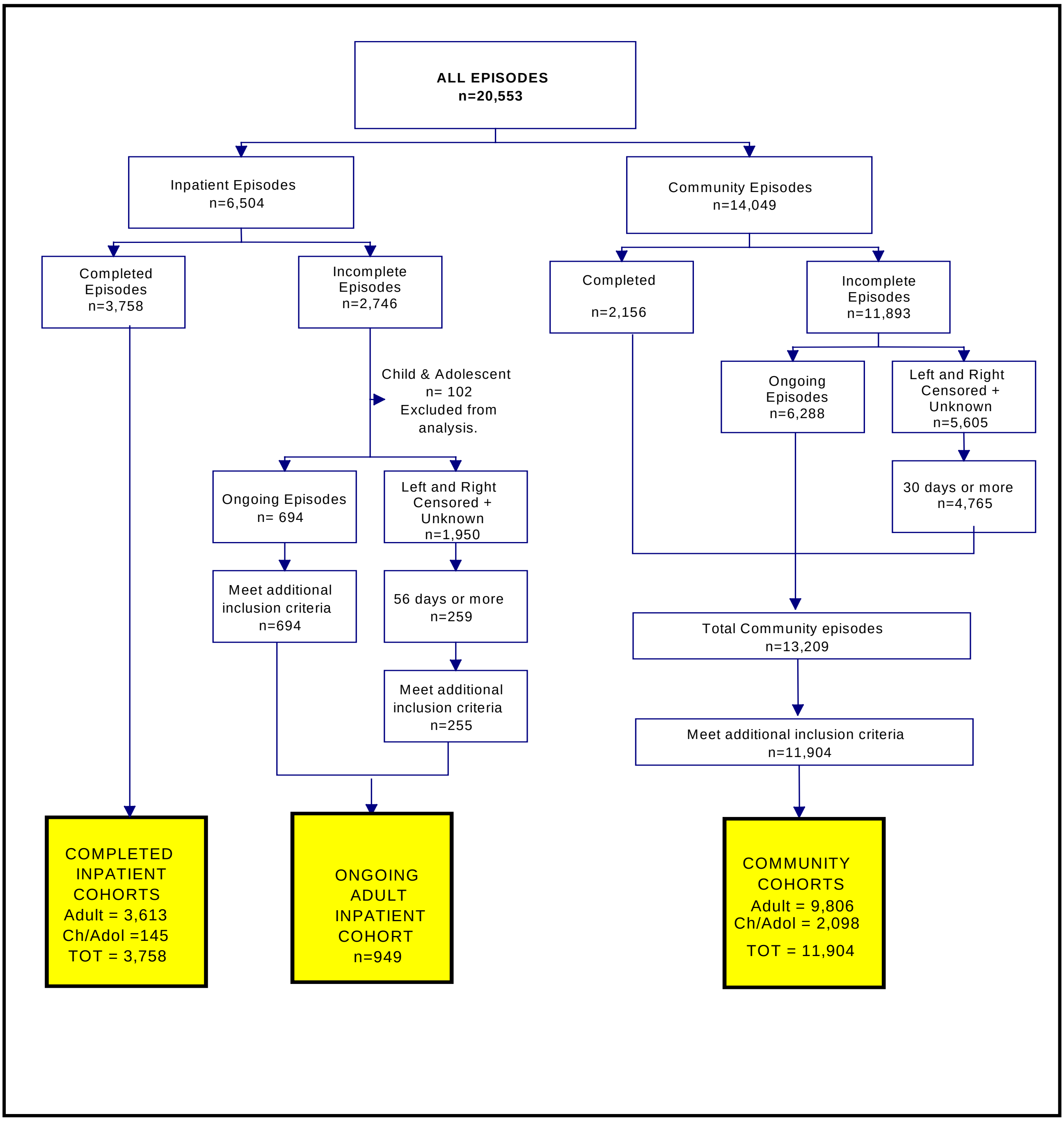
- For community episodes, the episode was registered with a service where the Project was unable to collect comprehensive data on community service use. This mainly applied to community episodes registered at private hospital sites and public stand-alone psychiatric hospitals that registered community episodes.

Table 53 summarises the additional exclusion criteria used in selecting the final analysis cohorts for each episode type. The combined effects of the three levels for selecting the analysis cohort reduced the total episode sample by 19% for setting-based episodes and 44% for the cross-setting sample. Figure 48 summarises the movement from the total episode sample to the setting based analysis cohorts

Table 53: Additional exclusion criteria used in selection of final analysis cohorts

Episode Type	Additional Exclusion Criteria	Rationale
Completed Inpatient Episodes	Episodes registered at inpatient services with high level of non-reported staff activity.	Applied only to a small number of services. Necessary because costing would be very inaccurate.
Ongoing Inpatient Episodes	Episodes registered at inpatient services with high level of non-reported staff activity.	Applied only to a small number of services. Necessary because costing would be very inaccurate
Community Episodes	Community episodes registered by sites where comprehensive service use data not available.	Necessary because core costs not available. Exclusions included community episodes registered by most private sites and public stand-alone hospitals.
	Episodes deemed to terminate prematurely, where Reason for Episode End coded as either 'Lost to Care' or 'Further Contact Deferred (Waiting List)'	Recommended by clinicians to ensure community classification based on cases where care was actually delivered. Mainly affected child/adolescent services, which often provide assessment followed by referral to waiting list to manage demand.
	Episodes where Principal Diagnosis coded as Mental Retardation (adult only)	Applied to a small number of cases registered at particular sites. Anomalies identified in clinical ratings and costings for these cases.
Adult 'Bundled Episodes'	Patients registered at inpatient services with high level of non-reported staff activity.	Applied only to a small number of services. Necessary because costing would be very inaccurate.
	Patients with community episodes (with or without an inpatient episode) registered at sites where comprehensive community service use data not available.	Necessary because core costs not available. Exclusions included community episodes registered by most private sites and public stand-alone hospitals.
	Patients with episodes in non-acute inpatient units	The 'Bundled Episodes' concept was designed to explore the potential for a casemix capitation approach in a 'typical' integrated area mental health service, exclusive of specialist tertiary services. Inclusion of patients with episodes in non-acute inpatient units, the majority of whom were in ongoing care throughout the study period, grossly skewed the 8 week cost distribution and 'masked' the signal of interest.

Figure 48: Moving from the total episode sample to MH-CASC analysis cohorts



Chapter

13

Descriptive Profiles of the Analysis Cohorts

This chapter presents an overview of the patients in the six 'analysis cohorts' which comprise the data set used for developing the MH-CASC classification.

As described in the previous two Chapters, the six cohorts are spread over four episode types:[a]

- Completed Inpatient Episodes include an adult and a child/adolescent cohort.
- Ongoing Inpatient Episodes includes an adult cohort only
- Community Episodes include both an adult and a child/adolescent cohort.
- 'Bundled Episodes' comprises an adult cohort only

There are two purposes in presenting descriptive profiles of the cohorts in this chapter.

First, an understanding of the characteristics of episode types, and the differences between them, gives a basis for evaluating the clinical relevance of a classification model. Casemix classification systems are highly reductionist tools, simplifying the complexity and uniqueness of individual patients to an abstract set of 'classes', based on a limited set of clinical variables as well as similarity in treatment costs. This chapter provides the more complete picture of the patients being 'classified', describing their range of clinical characteristics and varied patterns of service use.

Second, it is essential to establish the extent of variation that actually exists within each of the episode types. Casemix presupposes that patients are different in their treatment costs, and that these can be linked to differences in clinical characteristics. The success of a classification system is therefore limited by the extent to which variation is present because:

- there must be variability in the cost of patients, otherwise there is marginal gain in promoting standardised 'product' costing; and
- there must be variability in the attributes of patients to justify funding of patient types at different levels in proportion to their level of resource use.

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[a] As the data presented in this chapter, and for the remainder of the report, are based on the analysis cohorts, the various totals differ from the total episode counts for the setting-specific definitions used to describe the overall dataset in Chapters 10 and 11.

The data presented on cost differences between patients draw on the cost per day data (derived mostly from recording of the time staff spent with identifiable patients), and the number of days of treatment received.

Data on clinical variation between patients rely on the clinical measurement tools - HoNOS, LSP-16, RCI, RUG-ADL, HoNOSCA, and CGAS. Of course, the extent of differences in patient characteristics on these measures is also a test of the utility of the measurement tools themselves.

Variation in costs

Table 54 provides summary statistics on overall resource use for each of the six patient cohorts. It shows a limited range in the variation within each cohort on all measures of resource use.

Of the resource use indicators shown in Table 54, total episode cost is the measure preferred in casemix classification studies to describe cost variation, and is also used in the current report. It is significant that, for the setting-specific episode types (completed inpatient, ongoing inpatient, community) there is a restricted variation between patients in episode cost, as indicated by the coefficients of variation (CVs). Most variation occurs in community episodes, but even in this cohort the distribution of costs is limited (CV=1.22 for adults, CV = 1.24 for children and adolescents).

Typical CVs for the 23 Major Diagnostic Categories (MDCs) in AN-DRG 3 are shown in Table 55 for comparison purposes. Across the total sample of public hospital discharges (1994-95 year), overall variation in the untrimmed AN-DRG data set (CV=3.3) is approximately three times that of the MH-CASC sample. Even at the individual MDC level, the lowest CV (CV=1.2 for MDC 14 Pregnancy, Childbirth and Puerperium) is greater than the largest CV of the three MH-CASC inpatient cohorts (CV=1.01 for Adult Completed Inpatient Episodes).

Two conclusions can be drawn from this comparative cost variation data:

- there is substantially less variance in the MH-CASC dataset than is found in the 'mainstream' AN-DRG dataset; and
- given this, the application of classification tools to the MH-CASC dataset can only achieve, at best, a modest reduction in variance simply because there is less variance to explain.

The implications of this aspect of the data for the interpretation of findings and initiatives occurring under the National Mental Health Strategy targeted at improving quality of care, are taken up later in this report.

The Adult 'Bundled Episode' cohort is an exception, showing a reasonable degree of between-patient variation (CV=1.90). However, the variation in Total 8 week costs is strongly influenced by whether people were admitted to inpatient facilities, where costs per day of treatment are significantly higher than in the community. As discussed later in this report, explanation of the variation in this cohort is probably more directly addressed through determining what patient attributes predict hospitalisation.

Table 54: Summary resource use statistics on the six analysis cohorts

	Adult Cohorts				Child & Adolescent Cohorts	
	Completed Inpatient Episodes	Ongoing Inpatient Episodes (8 week period)	Community Episodes (8 week period)	'Bundled Episodes' (8 week period)	Completed Inpatient Episodes	Community Episodes (8 week period)
Number of Episodes	3,613	949	9,806	8,067	145	2,098
Episode Cost						
Mean	$4,562	$14,201	$694	$1,670	$6,639	$490
Inter-quartile range	$1,351-$6,468	$11,414-$16,218	$208-$843	$239-$1417	$2,232-$10,240	$161-$559
SD	$4,615	$ 4,590	$844	$3,173	$5,954	$609.54
CV	1.01	0.32	1.22	1.90	0.90	1.24
Length of Stay/ Treatment Days (a)						
Mean	14.0	54.1	7.6	16.5	18.1	4.8
Inter-quartile range	4.0-20.0	52.9-56.0	2.5-10.2	4.3-21.5	5.0-25.5	1.9-6.1
SD	13.3	3.6	7.4	17.3	16.4	4.6
CV	0.95	0.07	0.97	1.05	0.91	0.95
Cost per Treatment Day (b)						
Mean	$336	$263	$96	$88	$414	$97
Inter-quartile range	$257-$389	$209-$299	$64-$114	$50-$105	$288-$512	$72-$112
SD	$118	$84	$55	$67	$138	$40
CV	0.35	0.32	0.57	0.76	0.33	0.4
Total Episode Time (hrs) (c)						
Mean	38.2	118.2	7.4	32.5	52.1	5.1
Inter-quartile range	8.9-47.2	74.5-142.1	1.8-8.9	2.9-24.5	14.4-70.4	1.7-6.2
SD	51.1	81.5	10.0	63.4	58.0	5.6
CV	1.34	0.69	1.35	1.95	1.11	1.11
Time per Treatment Day (hrs) (d)						
Mean	2.7	2.2	0.9	1.2	3.1	1.0
Inter-quartile range	1.5-3.4	1.4-2.6	0.6-1.1	0.6-1.4	1.8-3.8	0.8-1.3
SD	1.8	1.5	0.6	1.1	1.7	0.5
CV	0.67	0.69	0.66	0.92	0.54	0.47

(a) Length of Stay for Completed Inpatient Episodes refers to the number of days between admission and discharge, as per the definition contained in the National Health Data Dictionary.[88] For Ongoing Inpatient Episodes, Length of Stay refers to the number of days the patient was in hospital during the 8-week period and therefore excludes leave periods. Treatment Days is relevant only for Community Episodes and 'Bundled Episodes' and indicates the number of days on which the patient received one or more services during the 8 week period.

(b) Cost per Treatment Day is calculated by dividing Total Episode Cost by either Length of Stay (for inpatient episodes) or Treatment Days (for Community Episodes and 'Bundled Episodes').

(c) Total Episode Time refers to the total patient attributable time recorded for the patient during the episode.

(d) Time per Treatment Day is calculated by dividing Total Episode Time by either Length of Stay (for inpatient episodes) or Treatment Days (for Community Episodes and 'Bundled Episodes').

Table 55: AN-DRG 3 – Percentage of separations and CVs by MDC for public acute hospitals, 1994-95

MDC	Description	% Separations	CV of length of stay
1	Nervous System	5.1%	4.1
2	Eye Diseases & Disorders	1.9%	4.4
3	Ear, Nose, Mouth & Throat	4.8%	2.1
4	Respiratory System	6.5%	2.7
5	Circulatory System	8.5%	2.0
6	Digestive System	11.4%	2.0
7	Hepatobiliary System & Pancreas	2.0%	1.4
8	Musculoskeletal System & Connective Tissue	8.1%	1.9
9	Skin, Subcutaneous Tissue & Breast	4.1%	2.1
10	Endocrine, Nutritional & Metabolic	1.2%	1.7
11	Kidney & Urinary Tract	10.9%	2.3
12	Male Reproductive System	1.6%	2.9
13	Female Reproductive System	4.6%	1.6
14	Pregnancy, Childbirth & Puerperium	9.9%	1.2
15	Newborns & Other Neonates	2.3%	1.9
16	Blood, Blood Form Organs, Immunological	1.4%	1.8
17	Neoplastic Disorders	4.3%	2.5
18	Infectious & Parasitic Diseases	1.5%	2.0
19	Mental Diseases & Disorders	2.3%	2.2
20	Alcohol/Drug Use & Disorders	0.6%	4.2
21	Injury, Poison & Toxic Effect Drugs	2.8%	2.4
22	Burns	0.2%	1.8
23	Factors Influencing Health Status	3.3%	8.9
ED	Edit DRG (Across all MDCs)	0.5%	2.2
PR	Pre-MDC (Tracheostomy Procs, Transplants, ECMO)	0.2%	1.3
	Total	100.0%	3.3

Source: Australian Casemix Report on Hospital Activity, 1994-95 [91]

Comparing all measures of resource utilisation presented in Table 54, Total Episode Time, Length of Stay/Treatment Days and Total Episode Cost show greater between-patient variation than either of the two *per diem* measures (Cost per Day and Time per Treatment Day). This feature of the data confirms the observation made earlier in Chapter 11 - that differences between patients in daily treatment costs are less significant than the number of days on which services are received. The one exception to this rule is in Ongoing Inpatient episodes, where variation in Length of Stay/Treatment Days has been virtually eliminated as an artefact of using a standard 8-week period to define the episode. For this group, differences between patients in Cost per Day are the major driver in variation in Total Episode Costs.

Table 56 summarises the correlations between Total Episode Cost and the alternative measures of between-patient variation for all cohorts.

Table 56: Correlation between total episode cost and other measures of resource use

	Adult Cohorts				Child & Adolescent Cohorts	
	Completed Inpatient Episodes	Ongoing Inpatient Episodes	Community Episodes	'Bundled Episodes'	Completed Inpatient Episodes	Community Episodes
Length of Stay/ Treatment Days	0.91	0.15	0.86	0.59	0.89	0.92
Total Episode Time	0.87	0.78	0.92	0.66	0.86	0.91
Cost per Day	0.20	0.98	0.22	0.79	-0.04	0.35

Variation in clinical attributes

Table 57 and Table 58 provide summary data comparing the analysis cohorts on the main instruments used in the study to measure clinical severity and level of functioning. Overall, they point to limited variation within each of the cohorts on the total, summary scores. Differences between the cohorts, however, are more evident than within-cohort variation.

The summary scores can mask within-cohort differences as shown in the figures presented later in this chapter. Nonetheless, the limited variation in the summary scores emphasises the need for multiple measures to capture casemix variations.

Table 57: HoNOS and HoNOSCA total scores by episode type

Episode Type	Mean Total Score	SD	CV
Adults (HoNOS)			
Completed Inpatient Episodes	21.3	6.4	0.30
Ongoing Inpatient Episodes	24.9	6.4	0.26
Community Episodes	20.1	6.2	0.31
Child and adolescent (HoNOSCA)			
Completed Inpatient Episodes	28.3	7.7	0.27
Community Episodes	24.4	6.2	0.26

Table 58: Measures of level of functioning by episode type

Episode Type	Mean Total Score	SD	CV
LSP 13 (Adults)			
Completed Inpatient Episodes	25.1	7.4	0.30
Ongoing Inpatient Episodes	34.3	8.7	0.25
Community Episodes	26.4	9.1	0.34
RUG-ADL (Adults ≥ 65years)			
Completed Inpatient Episodes	5.7	3.5	0.62
Ongoing Inpatient Episodes	8.1	5.2	0.64
Community Episodes	5.7	3.5	0.61
CGAS (Child/adolescent)			
Completed Inpatient Episodes	58.5	16.5	0.28
Community Episodes	63.2	15.6	0.25

Notes to above tables:

1. HoNOS data: For the purposes of analysis, all original HoNOS scores have been transformed by adding 1 to remove the zero anchor point. Scores of 9 ("Not known or Not Applicable") have been scored as 1. For consistency with the approach used in the class finding analysis, total score represents the sum of scores on scales 1 to 10 (scales 11-12 excluded) and has a minimum value of 10 and a maximum of 50. See Chapter 16 for rationale.
2. HoNOSCA data: Scores have been transformed as per the HoNOS data. HoNOSCA Total refers to sum of all 14 items.
3. LSP data: For consistency with the approach used in the class finding analysis, total LSP score represents the sum of 13 of the 16 items on the abbreviated LSP. Scores on the 3 Compliance items have been excluded. See Chapter 16 for rationale.

The HoNOS and LSP scales, in particular, highlight differences between adult patients in the three treatment settings which are amplified in the figure below.

Figure 49: HoNOS scores for Community, Completed Inpatient, and Ongoing Inpatient Episodes (Adult)

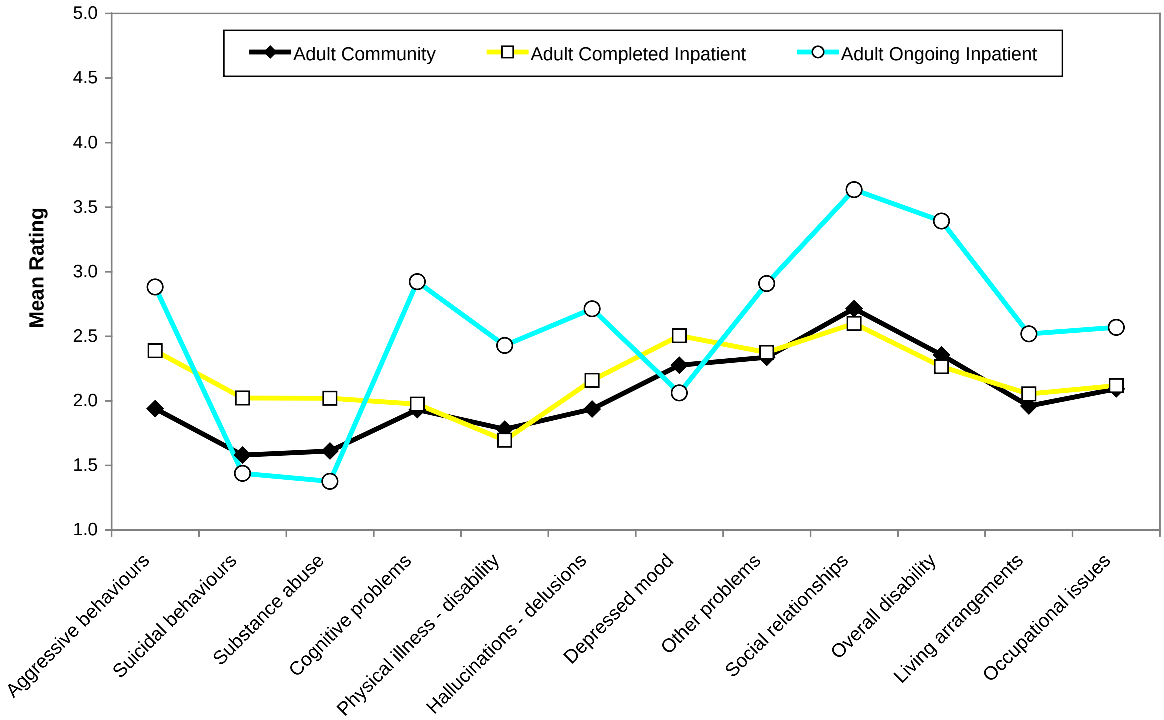


Figure 50: Life Skills Profile scores for Community, Completed Inpatient, and Ongoing Inpatient Episodes (Adult)

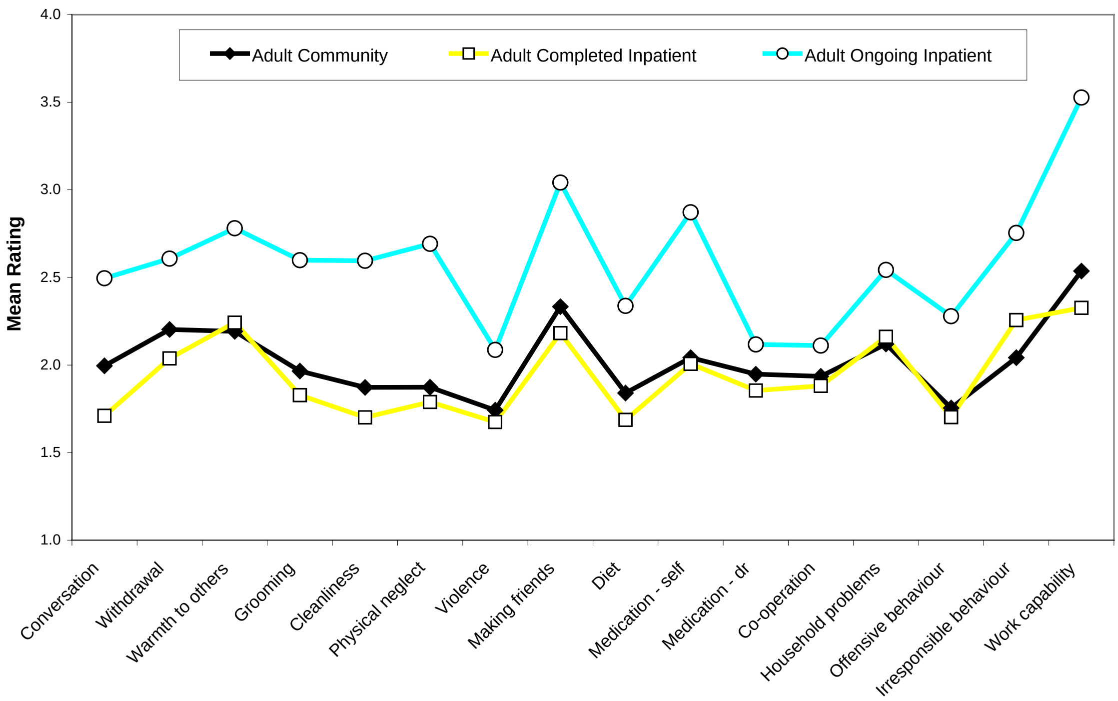


Figure 49 shows that patients in Ongoing Inpatient Episodes have higher average scores than those in Community and Completed Inpatient episodes on all but the following three HoNOS scales: Suicidal behaviours, Substance Abuse, Depressed mood.

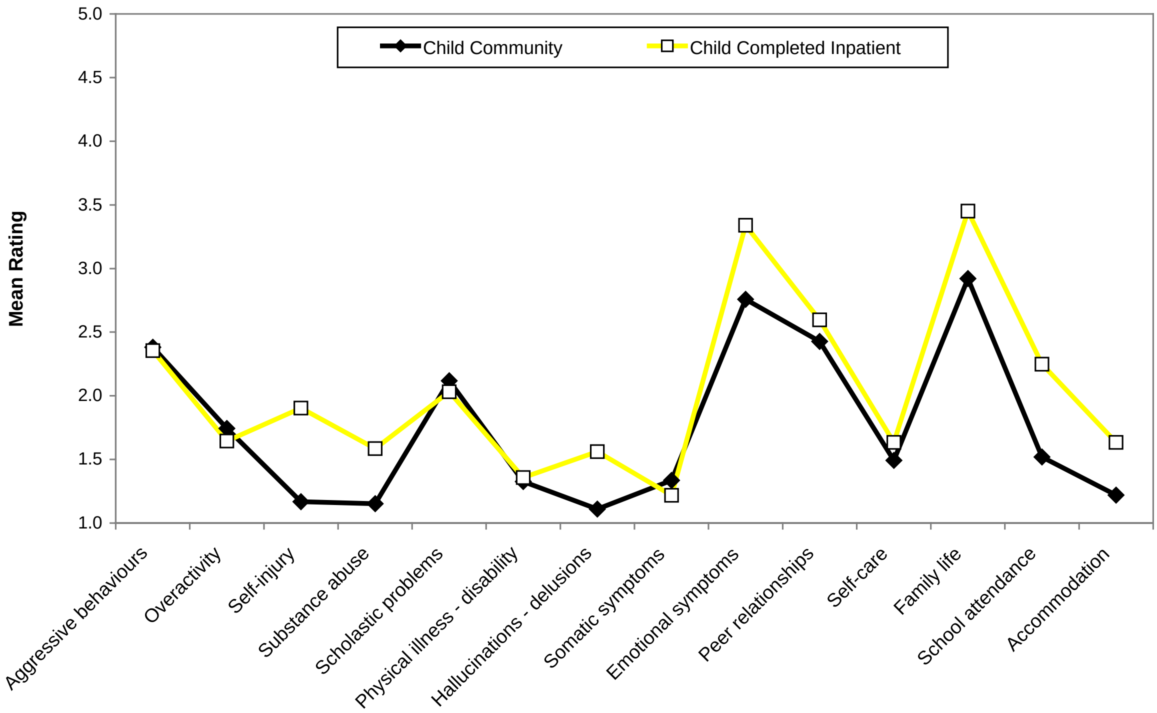
The Life Skills Profile (Figure 50) also shows higher ratings on all of the 16 items for people in Ongoing Inpatient Episodes compared with community and completed inpatient episodes. This is consistent with advice provided to the Project Team by clinicians, that the long-stay facilities are now dealing with patients with high levels of clinical severity and low functioning.

The HoNOS and LSP-16 clinical ratings for Adult Community and Completed Inpatient Episodes are less differentiated. The HoNOS ratings are slightly higher for Completed Inpatient than Community Episodes on the Aggressive behaviours, Suicidal behaviours, Substance Abuse, Hallucinations and Delusions, and Depressed Mood scales.

This may reflect the lack of amplification of symptoms and functioning in the scales, or suggest that there is still considerable scope for substitutability between community and acute inpatient settings.

The child/adolescent cohorts are less well differentiated on the summary clinical measures, although differences are evident when the individual HoNOSCA scales are examined (Figure 51). Patients within the Completed Inpatient sample have more elevated scores on 8 of the 15 HoNOSCA scales: Self-injury, Substance Abuse, Hallucinations and Delusions, Somatic Symptoms, Emotional Symptoms, Family Life, School Attendance, Accommodation.

Figure 51: HoNOSCA scores for Community and Completed Inpatient Episodes (Child and Adolescent)



Review of the individual cohorts

The remainder of this chapter presents a summary of the demographic, clinical and cost details of each of the five MH-CASC setting-specific analysis cohorts. Full details of the distribution of scores on all measures collected in the study are presented in Part E of Volume 2.

Adult Completed Inpatient Episodes

The age and sex distributions of patients in this cohort are summarised in Table 59. Average age of the group was 39.8 years; 11% of patients were 65 years or older.

Table 59: Adult Completed Inpatient Episodes – Age and Sex distribution

		% Cohort
Age		
	Under 15	0.6%
	15-24	17.5%
	25-49	57.8%
	50-64	13.1%
	65-84	9.9%
	85+	1.1%
Sex (% female)		48.7%

Mood Disorder was the most frequent diagnosis recorded for patients in the cohort, accounting for approximately one third of episodes, followed by Schizophrenia, Paranoia, Acute Psychotic Disorders. A summary of the Principal Diagnoses recorded at completion of episodes is presented in Table 60.

Table 60: Adult Completed Inpatient Episodes – Distribution of Principal Diagnoses

Principal Diagnosis	% Cohort
Organic Disorders	3.9%
Substance Abuse Disorders	8.3%
Schizophrenia, Paranoia, Acute Psychotic Disorders	32.6%
Mood Disorders	34.4%
Anxiety Disorders	2.0%
Obsessive Compulsive Disorders	0.3%
Stress and Adjustment Disorders	8.4%
Somatoform Disorders	0.1%
Eating Disorders	0.7%
Behavioural Syndromes	1.0%
Personality Disorders	7.8%
Sexual Disorders	0.0%
Mental Retardation	0.3%
Disorders of Psychological Development	-
Disorders of Childhood and Adolescence	0.1%

Based on this cohort, there is reasonable variation between patients in the specific types of problems and levels of severity of patients admitted for short-term ('acute') inpatient care. The distribution of HoNOS and LSP total scores are shown in Figure 52 and Figure 53.

Figure 52: Adult Completed Inpatient Episodes - Distribution of HoNOS total scores

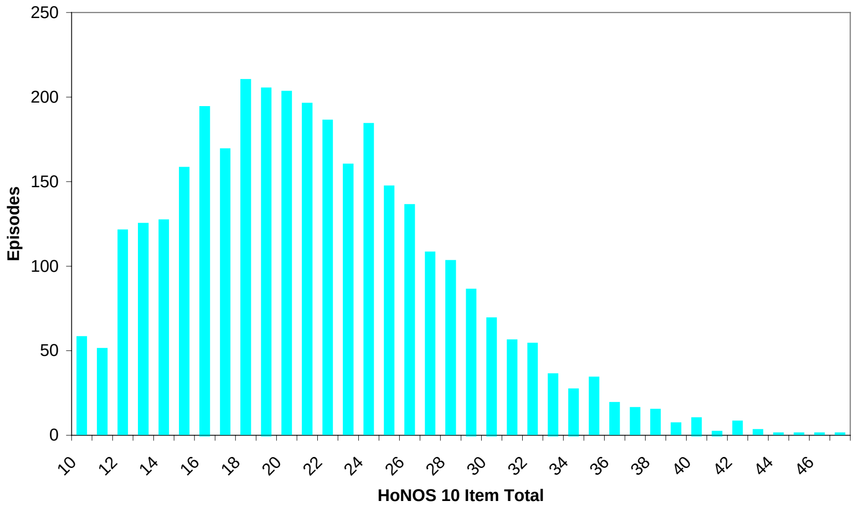
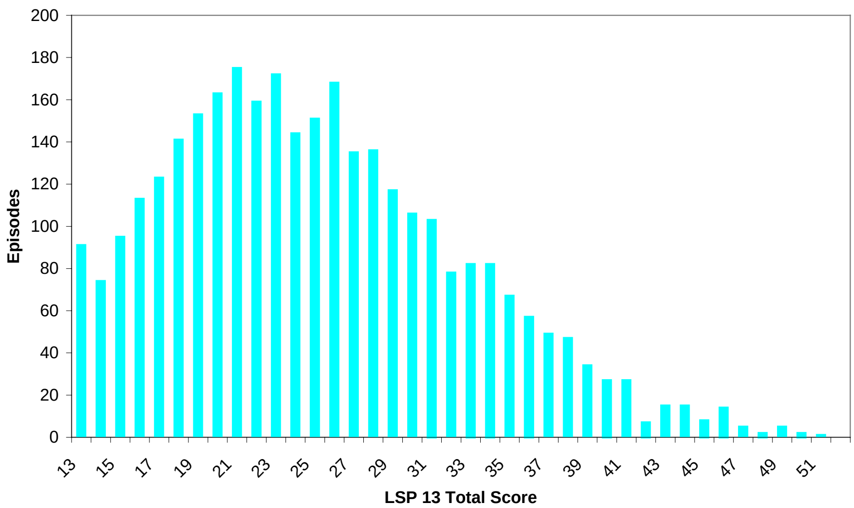


Figure 53: Adult Completed Inpatient Episodes – Distribution of LSP total scores



As indicated Table 54, average length of stay for the cohort was 14.1 days, and total episode cost was $4,562. The distribution of scores on each of these variables is shown in Figure 54 and Figure 55

Figure 54: Adult Completed Inpatient Episodes – Distribution of length of stay

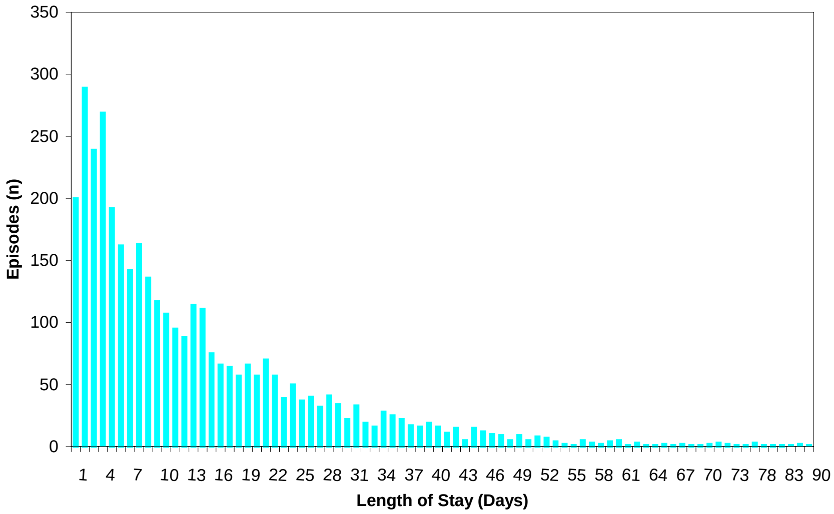
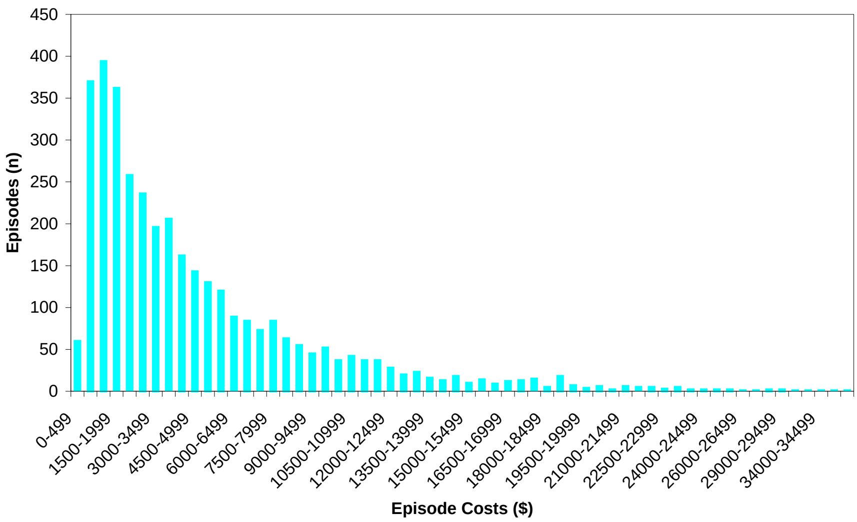


Figure 55: Adult Completed Inpatient Episodes - Distribution of episode costs



Adult Ongoing Inpatient Episodes

The average age for this group (53.7 years) was significantly higher than the Completed Inpatient cohort, due to a greater proportion of patients (39%) in the 65 years and older range. However, the age distribution is bimodal, highlighting that it contains both a young-middle age sub group as well as an elderly patient sub group (see Table 61). Approximately two-thirds of patients were male.

Table 61: Ongoing Inpatient Episodes – Age and Sex distribution

		% Cohort
Age		
	Under 15	0.1%
	15-24	6.4%
	25-49	38.1%
	50-64	16.4%
	65-84	35.8%
	85+	3.1%
Sex (% female)		35.1%

Schizophrenia, Paranoia, Acute Psychotic Disorders was the most frequent diagnostic category recorded for patients in the cohort, accounting for 55% of episodes. Organic Disorders was the second largest group, accounting for 22% of episodes. Table 60 provides the summary details.

Table 62: Ongoing Inpatient Episodes – Distribution of Principal Diagnoses

Principal Diagnosis	% Cohort
Organic Disorders	22.4%
Substance Abuse Disorders	1.3%
Schizophrenia, Paranoia, Acute Psychotic Disorders	55.0%
Mood Disorders	11.7%
Anxiety Disorders	0.4%
Obsessive Compulsive Disorders	0.1%
Stress and Adjustment Disorders	0.4%
Somatoform Disorders	-
Eating Disorders	0.6%
Behavioural Syndromes	-
Personality Disorders	4.1%
Sexual Disorders	0.3%
Mental Retardation	3.2%
Disorders of Psychological Development	0.3%
Disorders of Childhood and Adolescence	0.1%

As indicated earlier, the ongoing inpatient cohort has the most ‘severe’ problems, based on their elevated HoNOS and LSP profiles. There is also considerable variation between patients on total HoNOS and LSP scores, as show in Figure 56 and Figure 57.

Figure 56: Ongoing Inpatient Episodes - Distribution of HoNOS total scores

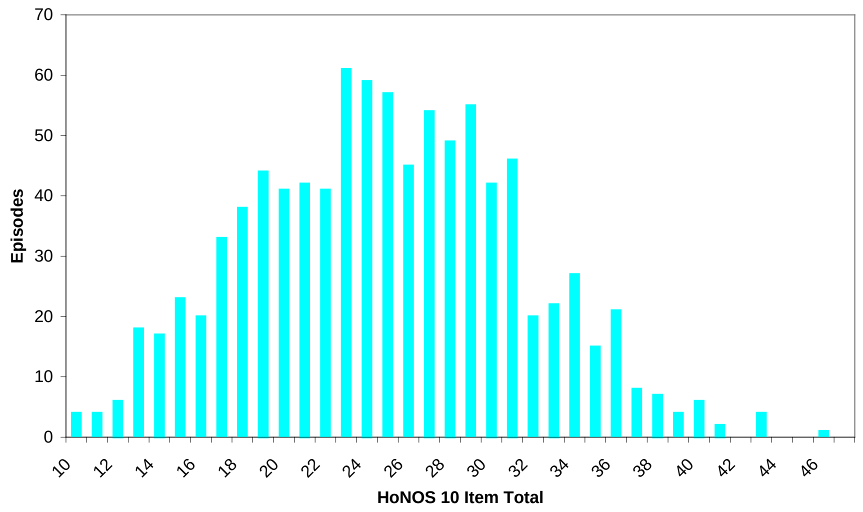
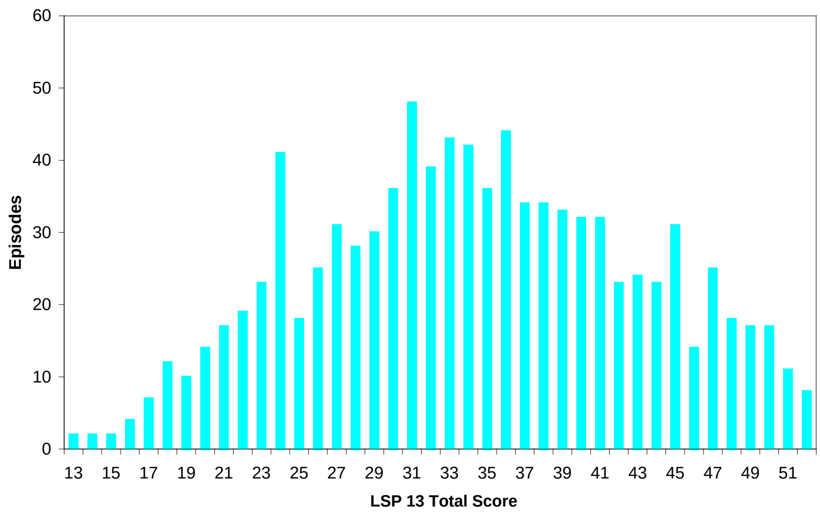
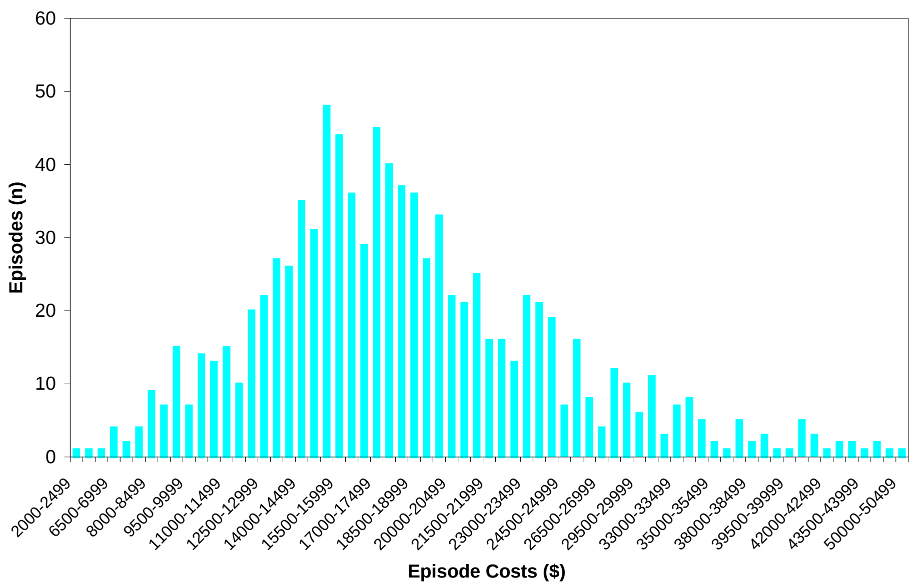


Figure 57: Adult Ongoing Inpatient Episodes – Distribution of LSP total scores



Total episode costs over the eight-week period ranged from less than $2,000 (accounted for by patients on long leave of absence) to $50,000. The distribution of 8-week episode cost for the cohort is shown in Figure 58.

Figure 58: Ongoing Inpatient Episodes – Distribution of episode costs



Adult Community Episodes

Patients treated in community services were similar to the adult completed inpatient cohort in their age and sex distributions. The average age of the cohort was 42.7 years, with 14.3% of episodes accounted for patients 65 years and older. The cohort comprised roughly equal numbers of men and women. Table 63 presents the summary data.

Table 63: Adult Community Episodes – Age and Sex distribution

		% Cohort
Age		
	Under 15	0.4%
	15-24	14.0%
	25-49	55.2%
	50-64	16.0%
	65-84	12.6%
	85+	1.7%
Sex (% female)		50.7%

Approximately one half of the Adult Community Episodes were accounted for by patients assigned a Principal Diagnosis of Schizophrenia, Paranoia, Acute Psychotic Disorders. Mood Disorders was the second most common diagnosis, accounting for 26% of episodes. A summary of the Principal Diagnoses recorded at completion of the episode is presented in Table 64.

Table 64: Adult Community Episodes – Distribution of Principal Diagnoses

Principal Diagnosis	% Cohort
Organic Disorders	5.8%
Substance Abuse Disorders	1.5%
Schizophrenia, Paranoia, Acute Psychotic Disorders	50.2%
Mood Disorders	25.9%
Anxiety Disorders	4.1%
Obsessive Compulsive Disorders	0.9%
Stress and Adjustment Disorders	6.0%
Somatoform Disorders	0.3%
Eating Disorders	0.3%
Behavioural Syndromes	0.4%
Personality Disorders	4.1%
Sexual Disorders	0.2%
Mental Retardation	-
Disorders of Psychological Development	0.1%
Disorders of Childhood and Adolescence	0.1%

The distributions of HoNOS and LSP total score are presented in Figure 59 and Figure 60. They show similar characteristics to those observed for completed inpatient episodes.

Total Treatment Days for the cohort ranged from a minimum of 1 to maximum of 56 days during the 8-week episode. The top 10% of community patients (measured in number of Treatment Days) were seen on 17 or more of the 56 days, highlighting the presence of a significant number of adult patients who were managed on an intensive community basis. The distribution of Treatment Days for the cohort is shown in Figure 61.

Figure 59: Adult Community Episodes - Distribution of HoNOS total Scores

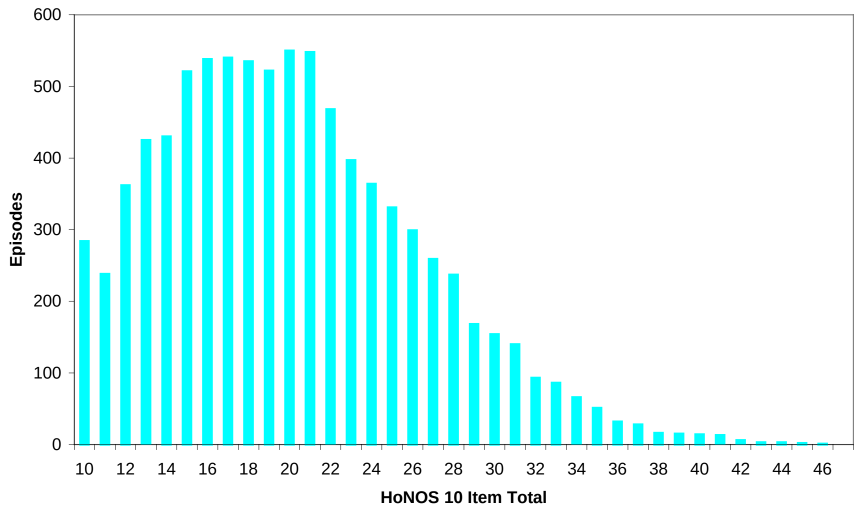


Figure 60: Adult Community Episodes – Distribution of LSP total scores

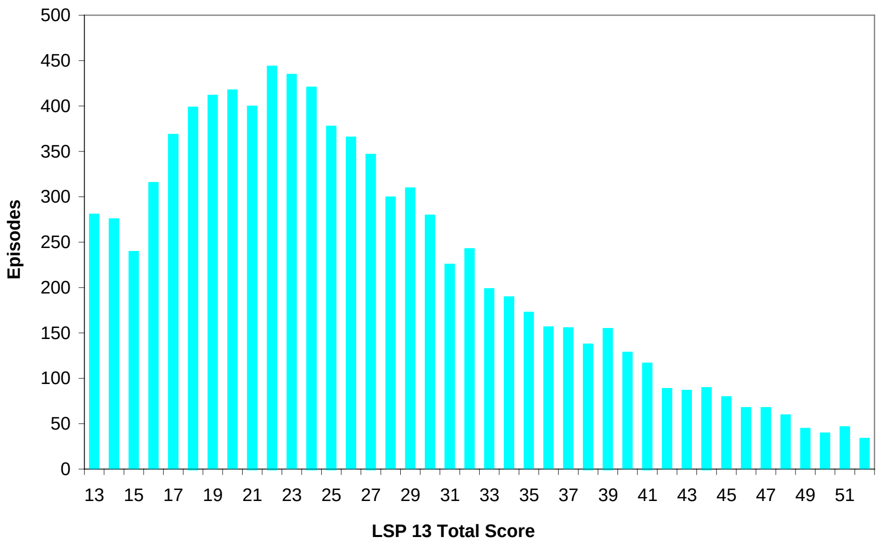
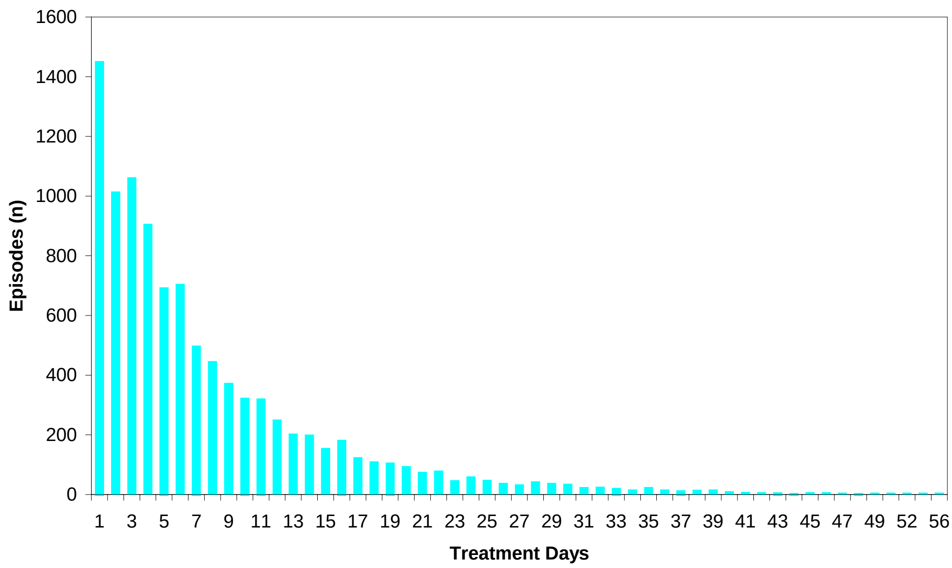
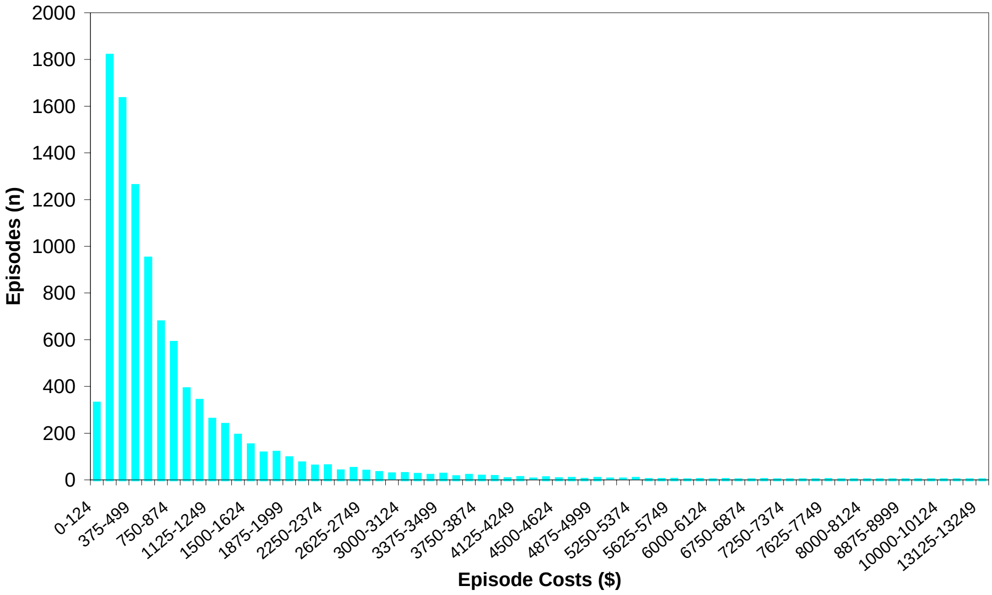


Figure 61: Adult Community Episodes – Distribution of treatment days



Total Episode Costs over the eight-week period ranged from less than $100 to more than $13,000. Eight week costs for the top 10% of patients were $1555 or more. The distribution of 8-week episode cost for the cohort is shown in Figure 62.

Figure 62: Adult Community Episodes - Distribution of episode costs



Child and Adolescent Completed Inpatient Episodes

The age and sex distributions of patients in this cohort is summarised in Table 65. The average age of the group was 14.4 years. The majority (59%) were adolescents in the 15-19 year age range.

Table 65: Child and Adolescent Completed Inpatient Episodes – Age and Sex distribution

		% Cohort
Age		
	0-4	0.8%
	5-9	11.2%
	10-14	28.8%
	15-19	56.8%
	20+	2.4%
Sex (% female)		55.2%

Depressive Disorders was the most frequent diagnosis recorded for patients in the cohort, accounting for 20% of episodes, followed by Mixed Disorders of Conduct and Emotions (16%). The low number of episodes in the child/adolescent inpatient sample limits the extent to which the diagnostic profile can be generalised from Table 66.

Table 66: Child and Adolescent Completed Inpatient Episodes – Distribution of Principal Diagnoses

Principal Diagnosis	% Cohort
Depressive episodes; bipolar disorders, current episode depressed	20.2%
Mixed disorders of conduct and emotions	16.3%
Conduct disorders	5.4%
Acute and transient psychotic disorders	5.4%
Anorexia nervosa and atypical anorexia nervosa	4.7%
Psychological / behavioural factors associated with disorder	3.9%
Emotionally unstable personality disorders (includes borderline personality disorder)	3.9%
Anxiety disorders including phobic anxiety, panic disorder,	3.1%
Disorders of social functioning with onset specific to child	3.1%
Persistent mood disorders including cyclothymia and dysthymia	3.1%
Psychotic disorders due to psychoactive substance use	3.1%
Other behavioural and emotional disorders with onset usually	2.3%
Adjustment disorders: Brief depressive reactions	2.3%
Post-traumatic stress disorders	2.3%
Other psychoactive substance intoxication, harmful use, dependence	2.3%
Schizotypal disorders	2.3%
Delusional disorders	2.3%
Other adjustment disorders	1.6%
Obsessive - compulsive disorders	1.6%
Adjustment disorders: Prolonged depressive reactions	1.6%
Somatoform disorders	1.6%
Non-organic sleep disorders	1.6%
Unspecified mental disorders/Other disorders	5.3%

Note: Principal Diagnosis profile based on the 61 item version of the abbreviated ICD-10 coding system used for MH-CASC data collection. In contrast, the adult cohorts presented in this section are summarised at the 15 item level.

HoNOSCA and CGAS total score distributions are presented in Figure 63 and Figure 64.

As indicated Table 54, average length of stay for child/adolescent episodes was 18.1 days, 28% greater than adult inpatient episodes. Similarly, average total episode costs were 45% greater ($6,639 compared with $4,562 for adults), contributed to by both higher average per diem costs and greater length of stay. The distributions of Total Episode Cost and Length of Stay are shown in Figure 65 and Figure 66.

Figure 63: Child and Adolescent Completed Inpatient Episodes - Distribution of HoNOSCA total Scores

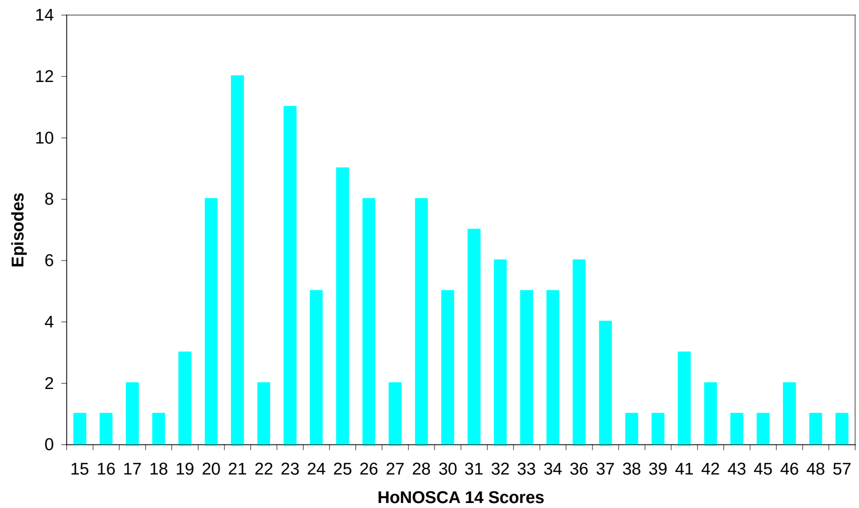


Figure 64: Child and Adolescent Completed Inpatient Episodes – Distributionof CGAS total scores

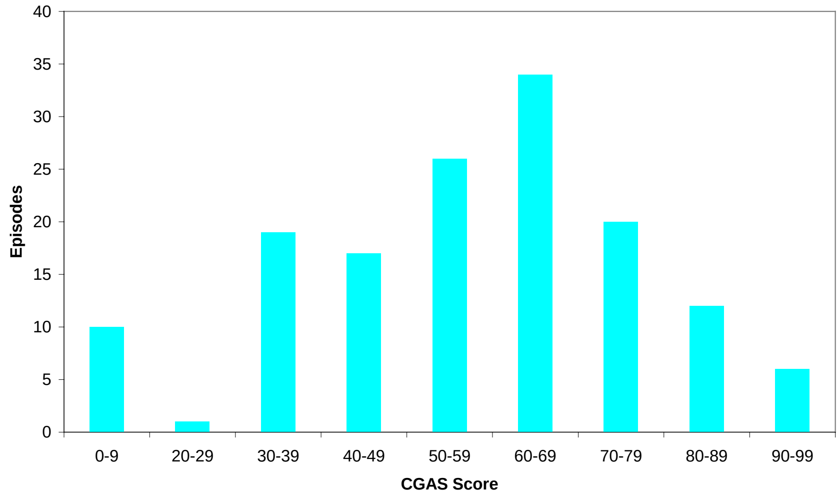


Figure 65: Child and Adolescent Completed Inpatient Episodes – Distributionof length of stay

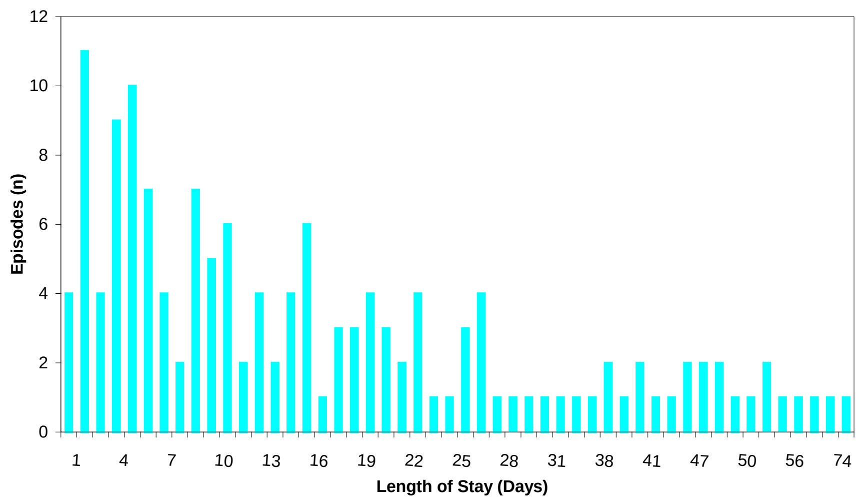
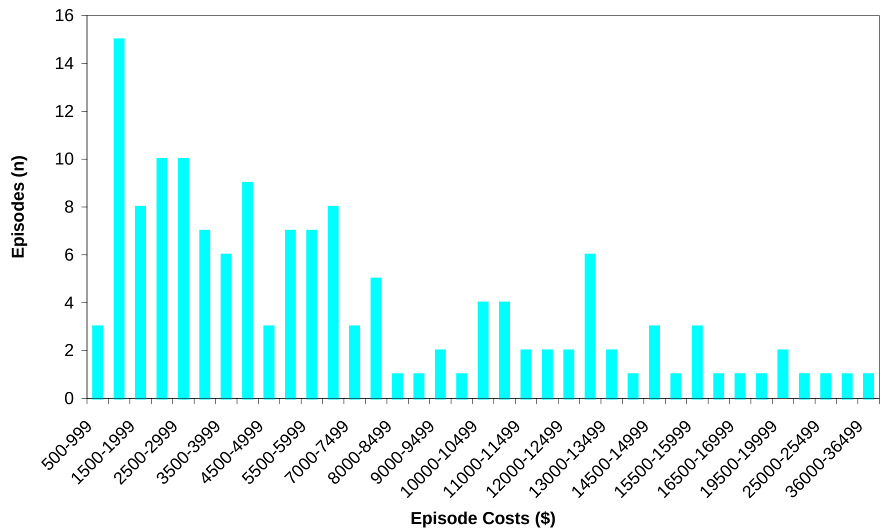


Figure 66: Child and Adolescent Completed Inpatient Episodes – Distributionof episode costs



Child and Adolescent Community Episodes

Child and Adolescent patients treated in community services were, on the whole, a younger group than their inpatient counterparts, with an average age of 11.0 years (cf. 14.3 for inpatients). Seventy two per cent of the cohort was 14 years of less. Approximately two of every three patients were males (Table 67).

Table 67: Child and Adolescent Community Episodes – Age and Sex distribution

		% Cohort
Age		
	0-4	5.5%
	5-9	33.2%
	10-14	38.9%
	15-19	21.7%
	20+	0.7%
Sex (% female)		38.3%

Mixed Disorders of Conduct and Emotions was the most frequent diagnosis recorded for Child and Adolescent community patients, accounting for 21% of episodes, followed by Conduct Disorders and Hyperkinetic disorders (9% each; see Table 68).

Table 68: Child/Adolescent Community Episodes – Distribution of Principal Diagnoses

Principal Diagnosis	% Cohort
Mixed disorders of conduct and emotions	21.2%
Conduct disorders	8.9%
Hyperkinetic disorders	8.6%
Emotional disorders with onset specific to childhood	6.0%
Anxiety disorders including phobic anxiety, panic disorder,	5.8%
Other adjustment disorders	5.3%
Depressive episodes; bipolar disorders, current episode depressed	4.3%
Psychological / behavioural factors associated with disorder	3.6%
Specific developmental disorders of speech and language	3.5%
Other behavioural and emotional disorders with onset usually	3.0%
Disorders of social functioning with onset specific to child	3.0%
Adjustment disorders: Brief depressive reactions	2.4%
Obsessive - compulsive disorders	2.2%
Adjustment disorders: Prolonged depressive reactions	2.2%
Post-traumatic stress disorders	2.1%
Mixed specific developmental disorders	1.9%
Specific developmental disorders of scholastic skills	1.9%
Mild mental retardation	1.4%
Persistent mood disorders including cyclothymia and dysthymia	1.4%
Pervasive developmental disorders	1.3%
Unspecified behavioural syndromes associated with physiological disorders	1.1%
Anorexia nervosa and atypical anorexia nervosa	0.9%
Organic, including symptomatic, mental disorders	0.7%
Other	3.6%

Note: Principal Diagnosis profile is based on the 61-item version of the abbreviated ICD-10 coding system used for MH-CASC data collection. In contrast, the adult cohorts presented in this section are summarised at the 15-item level.

HoNOSCA and CGAS total score distributions are presented in Figure 67 and Figure 68.

Figure 67: Child/Adolescent Community Episodes - Distribution of HoNOSCA total scores

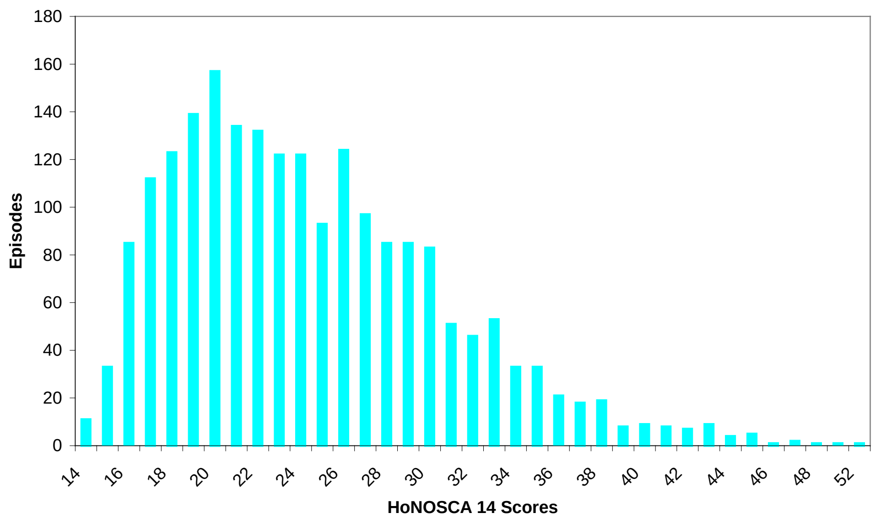
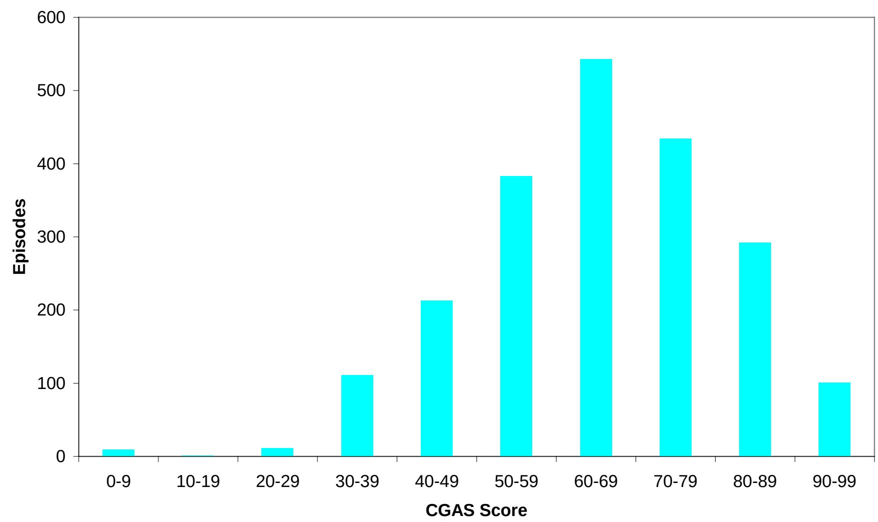


Figure 68: Child/Adolescent Community Episodes – Distribution of CGAS total scores



Total Treatment Days for the cohort ranged from a minimum of 1 to a maximum of 38 days during the 8-week episode. The top 10% of community patients (measured in number of Treatment Days) were seen on 9.9 or more of the 56 days. Comparing this to the adult cohort, it can be concluded that the care packages provided to the highest service use child/adolescent patients are considerably less intensive than those provided to their adult counterparts. The distribution of Treatment Days for the cohort is shown in Figure 69

Total Episode Costs over the eight-week period ranged from less than $100 to more than $5,600. Eight week costs for the top 10% of patients were $1000 or more, approximately two thirds of the highest cost adult patients. The distribution of 8-week episode cost for the cohort is shown in and Figure 70.

Figure 69: Child and Adolescent Community Episodes – Distribution of treatment days

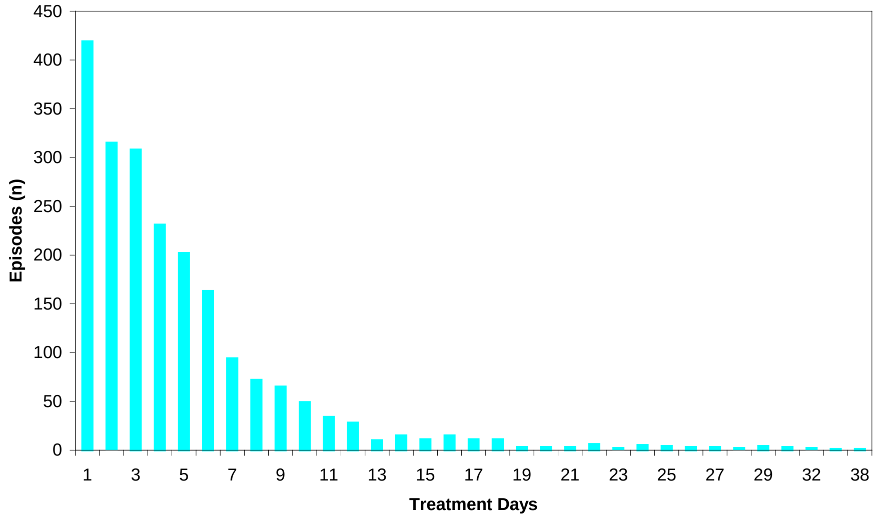
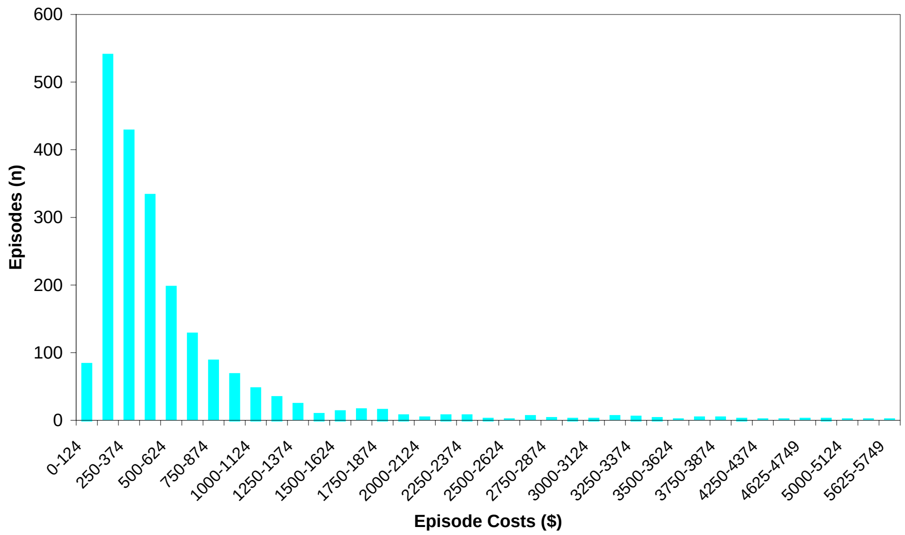


Figure 70: Child and Adolescent Community Episodes - Distribution of episode costs



SECTION 6

Classification Development

Sequence of analysis

The analyses described in this section proceed in the following order.

First, the MH-CASC dataset was used to assess the performance of AN-DRGs in the completed inpatient cohort. As these represent the only partial classification for mental health services, this was seen as an important initial benchmark. MH-CASC also provided the first opportunity for MCD19 AN-DRGs to be tested using costing data and drawing only on specialised mental health services.

Second, the hypotheses generated by the clinical panels in the first part of the Project were tested. This involved creating rules for how the patient data items were grouped to define the 50 classes proposed by the clinical panels (see Appendix B-3, Volume 2).

Finally, new classification models were formulated in attempt to improve on the results obtained by each of the above approaches.

In each of the analyses, calculation of costs included only those items considered core: patient attributable time, general time and overhead/infrastructure costs – as described in Chapter 8.

Chapter
14

Performance of the AN-DRG3 Classification

The MH-CASC Project undertook to assess the performance of AN-DRG3 in predicting resource use in the inpatient setting.

Background

AN-DRG3 splits the Mental Disorders Major Diagnostic Category (MDC19) into eight DRGs:

841 Schizophrenia disorders

842 Paranoia and acute psychotic disorders

843 Major affective disorders

844 Other affective and somatoform disorders

845 Anxiety disorders

846 Eating disorders and obsessive-compulsive disorders

847 Personality disorders and acute reactions

848 Childhood mental disorders

The Australian Casemix Clinical Committee (ACCC)[92] recommended that two same day intent DRGs should be added to MDC19 in Version 4 of the AN-DRG classification. The committee proposed that 'intended same day' should be a high level split which ignores diagnosis, and is based purely on the same day flag being applied to the particular admission. This same day class would be further split by administration of ECT, resulting in the addition of the following DRGs:

- Intended same day with administration of ECT
- Intended same day without the administration of ECT.

Additional splits were proposed for AN-DRG 841 on the basis of legal status (ever an involuntary status vs. never an involuntary status) and for AN-DRG 842 with major complication and/or comorbidity and on the basis of legal status (per AN-DRG 841)

The ACCC conducted an analysis of the ability of MDC19 to predict length of stay, using both the existing AN-DRG3 and the proposed modification. They found that the existing eight groups accounted for 11.7% of variance in length of stay, and the proposed ten groups accounted for 35.6%.

The ACCC recommendations were accepted and subsequently incorporated in the AN-DRG Version 4 classification.

Episodes included in the AN-DRG3 analysis

To maximise comparability with these benchmark findings, all completed inpatient episodes (acute and non-acute, and adult and child/adolescent) were included in the current analysis.

It should be noted, however, that there were two key sampling differences between the two analyses. Firstly, episodes in the current analysis were taken from specialised mental health services, whereas those in the ACCC's analysis were drawn from non-specialised services. Secondly, the current analysis relied on admissions occurring over a three-month period in 1996 from a sample of sites in most States and Territories. By contrast, the ACCC's analysis involved all admissions occurring in the twelve months of 1993-94 at sites in only three States (NSW, SA and WA).

Episodes registered with the MH-CASC study and recorded as inpatient episodes were identified. These episodes were matched with morbidity data, using URNO, episode start date (admission date) and episode end date (discharge date). At one of the sites, matching was not possible and as a consequence the site was excluded from this analysis.

This process identified 3,758 completed inpatient episodes. MDC19 accounted for 67.6% of completed inpatient episodes occurring in the specialised mental health services participating in the study (Table 69). Of note is the relatively high proportion of episodes for substance abuse disorders (MDC20, 7.5%) and nervous system disorders (MDC1, 3.1%). No AN-DRG was available for 716 episodes, the majority of which occurred at the aforementioned site.

Table 69: Inpatient episodes by Major Diagnostic Category

Major Diagnostic Category		Frequency	Percent
1	Nervous System	117	3.1
2	Eye	1	0.0
3	Ear Nose Mouth & Throat	2	0.1
4	Respiratory	2	0.1
5	Circulatory	2	0.1
6	Digestive	8	0.2
8	Musculoskeletal	7	0.2
9	Skin	2	0.1
10	Endocrine	3	0.1
14	Puerperium	28	0.7
18	Infectious	4	0.1
19	Mental Disorders	2,541	67.6
20	Substance Abuse	280	7.5
21	Injury – Poisoning	36	1.0
23	Factors influencing health status	9	0.2
24	Ungrouped - Missing Principal Diagnosis	716	19.1
Total		3,758	100

For the purposes of this analysis, the 2,541 episodes with MDC19 were split into 'intended same day' and 'not intended same day'. The morbidity data provided to the MH-CASC Project did not reliably identify single day admissions as 'intended same day' or 'not intended same day', so the reason for episode end as recorded on the *Final Clinical Ratings Form* was used as a proxy measure of intent. Consistent with the *National Health Data Dictionary*, those whose single day admission ended because of death or transfer to another service were considered not to have had an intended same day admission, and were included among the 'not intended same day' group. Any other reason for episode end was taken to indicate that a single day admission was an 'intended same day admission'. This process identified 52 of the 2,541 inpatient episodes on the MH-CASC database identified as 'intended same day'.

In addition to the above 2,541 inpatient episodes, a further 2,039 'intended same day' admissions were identified from morbidity data. These were episodes appearing in the morbidity data which occurred for people registered to the MH-CASC study, but which were not recorded as inpatient admissions in the MH-CASC dataset. As noted earlier, they occurred because staff in the MH-CASC study had been requested to record same day inpatient admissions as community episodes. By a second matching process, same day episodes appearing in the morbidity dataset and occurring within the start and end date boundaries of a community episode recorded against a corresponding URNO were considered to be 'intended same day' admissions. It is acknowledged that this may have over-counted 'intended same day' admissions, but no reliable data were available on 'same day intent'.

In total, 4,580 episodes were available for the current analysis. Table 70 provides a summary of the source and type of these episodes.

Table 70: Inpatient episodes included in AN-DRG3 analysis

	Not 'intended same day'	'Intended same day'	TOTAL
Episodes registered as inpatient episodes with MH-CASC study which were assigned to MDC19 in local morbidity collections	2,489	52	2,541
Episodes registered as community episodes with MH-CASC study but which were coded as 'intended same day' inpatient episodes in local morbidity collections	-	2,039	2,039
TOTAL	2,489	2,091	4,580

Data preparation and analysis

The data were first analysed by AN-DRG only and then with the addition of intended same day status.

In both analyses, the data were first analysed in their untrimmed state, and then again once a trimming process had been applied.

The trimming process involved three steps, as used by Ben-Tovim, Elzinga and Burgess[15] . Firstly, the upper (Q_3) and lower (Q_1) bounds of the inter-quartile range for each AN-DRG were calculated. Secondly, the upper trim point (T_H) was defined according to the formula $T_H = Q_3 + 1.5\ (Q_3 - Q_1)$. Finally, any episodes which had a length of stay (or a total episode cost) greater than the high trim point were excluded from the analysis. No lower trim point was calculated or applied.

For each analysis, the coefficient of variation (CV) of each group was computed, and the overall reduction in variance (RIV) was calculated.

Performance of DRGs alone

In the first instance, only the 2,541 episodes registered to the MH-CASC study as inpatient episodes were included in this analysis. This compares with 53,197 admissions included in the ACCC's equivalent analysis.

Table 71 shows the results for the DRG only analysis, using length of stay as the dependent variable. Untrimmed, DRGs accounted for 5.0% of variance in length of stay, and trimmed they accounted for 11.3%. This is comparable with the RIV of 11.7% reported by the ACCC.

Using the trimmed data, the mean length of stay for individual DRGs ranged from 6.4 days for Personality and Acute Stress Disorders to 15.8 days for Major Affective Disorders. Compared with the results of the ACCC, mean lengths of stay for each DRG tended to be considerably longer, reflecting the fact that this first analysis did not include the same day episodes identified through morbidity data.

The coefficients of variation indicate that there was moderate homogeneity within each DRG. The ACCC found greater dispersion around the mean, and again this may be explained by the fact that the current analysis excluded same day episodes identified through morbidity data.

The explanatory power of DRGs with regard to total episode cost was then considered, using the same 2,541 episodes. Such detailed cost data has not previously been available in work with AN-DRGs in mental health, and it was therefore thought that presentation of these results could make an important contribution.

The results are shown in Table 72. Prior to trimming, DRGs accounted for 3.8% of the variance in total costs per episode. After trimming, this figure rose to 9.9%. Using the trimmed data, the mean cost per episode ranged from $1,917 for Personality and Acute Stress Disorders to $4,923 for Eating and Obsessive Compulsive Disorders. Again, the coefficients of variation indicate that there was moderate homogeneity within each DRG.

Figure 71 compares graphically the 90% confidence intervals for average episode costs for each of the eight AN-DRG classes. It highlights that, while within-class homogeneity is satisfactory for most classes, there is substantial overlap between classes. The relatively low RIV result stems from this limited differentiation between classes with respect to episode cost.

The differences in length of stay between the current analysis and that of the ACCC were considered further in an additional analysis, which attempted to make the two samples more comparable. This took the 2,541 inpatient episodes identified in the MH-CASC dataset, and added to them the additional 2,039 'intended same day' episodes identified through morbidity data, in an attempt to overcome any bias towards longer stay episodes in the MH-CASC episode sample. Each of the 2,039 episodes was grouped by DRG.

Table 73 shows the results. Prior to trimming in this analysis, DRGs accounted for 5.2% of variance in length of stay. When all DRGs were trimmed, the figure rose to 14.3%. However, the trimming process identified the trim point for Eating and Obsessive Compulsive Disorders as 1.0 day (meaning that there was no variance to explain), so an alternative trimming process was conducted where all DRGs except this one were trimmed. After this trimming process, DRGs explained 12.8% of the variance in length of stay. These figures are comparable to the RIV of 11.7% in the ACCC's analysis. By adding the 'intended same day' episodes into the analysis the mean length of stay decreased, and the dispersion of length of stay around the mean for individual DRGs increased, bringing the results more in line with those of the ACCC's analysis.

The analysis was not re-run using episode cost as the dependent variable, because prior analysis indicated that the difference between cost and length of stay in explaining variance was unlikely to produce a different result.

Table 71: AN-DRG3 length of stay analysis

Untrimmed episode statistics						
Class	N	Mean LoS		CV		Hi Trim point
Schizophrenia	702	15.6		0.87		47.5
Paranoia & Acute Psychotic	135	14.9		0.72		42.0
Major Affective	904	16.8		0.82		51.0
Other Affective & Somatoform	120	12.2		0.93		33.0
Anxiety	80	14.4		0.92		44.0
Eating & OCD	28	19.8		0.80		57.4
Personality & Acute Stress	565	9.4		1.13		23.0
Childhood Mental	7	13.7		1.44		34.5
All Untrimmed	2,541	14.5		0.91		44.0
Trimmed episode statistics						
	n	Mean LoS	(Comparison mean LoS[1])	CV	(Comparison CV[1])	% Trimmed
Schizophrenia	677	14.1	(8.0)	0.78	(1.18)	3.6%
Paranoia & Acute Psychotic	133	14.4	(8.8)	0.68	(1.01)	1.5%
Major Affective	883	15.8	(7.5)	0.76	(1.27)	2.3%
Other Affective & Somatoform	113	10.1	(3.8)	0.73	(1.09)	5.8%
Anxiety	76	12.3	(2.8)	0.77	(0.88)	5.0%
Eating & OCD	27	18.1	(8.1)	0.74	(1.42)	3.6%
Personality & Acute Stress	508	6.4	(2.5)	0.79	(1.00)	10.1%
Childhood Mental	6	6.5	(1.0)	0.86	(0)	14.3%
Trimmed	2,423	12.9		0.84		4.6%
RIV Untrimmed	5.0%					
RIV Trimmed @ Hi	11.3%					
(Comparison RIV[1])	(11.7%)					

1. Comparison figures from Australian Casemix Clinical Committee[92]

All completed inpatient episodes in MH-CASC dataset with MDC19

Table 72: AN-DRG3 episode cost analysis

Untrimmed episode statistics				
Class	n	Mean episode cost	CV	Hi Trim point
Schizophrenia	702	$4,580	0.96	$13,199
Paranoia & Acute Psychotic	135	$5,112	0.77	$12,575
Major Affective	904	$5,204	0.96	$15,753
Other Affective & Somatoform	120	$3,721	0.98	$9,586
Anxiety	80	$4,215	0.94	$13,375
Eating & OCD	28	$4,923	0.71	$15,491
Personality & Acute Stress	565	$2,928	1.24	$7,040
Childhood Mental	7	$4,667	1.15	$15,780
All Untrimmed	2,541	$4,415	1.02	$12,479
Trimmed episode statistics				
	n	Mean episode cost	CV	% Trimmed
Schizophrenia	666	$3,860	0.80	5.1%
Paranoia & Acute Psychotic	128	$4,475	0.63	5.2%
Major Affective	866	$4,508	0.81	4.2%
Other Affective & Somatoform	112	$3,040	0.75	6.7%
Anxiety	77	$3,696	0.80	3.8%
Eating & OCD	28	$4,923	0.71	0.0%
Personality & Acute Stress	507	$1,917	0.79	10.3%
Childhood Mental	7	$4,667	1.15	0.0%
Trimmed	2,391	$3,687	0.86	5.9%
RIV Untrimmed	3.8%			
RIV Trimmed @ Hi	9.9%			

Figure 71: AN-DRG3 90% confidence intervals for average episode costs

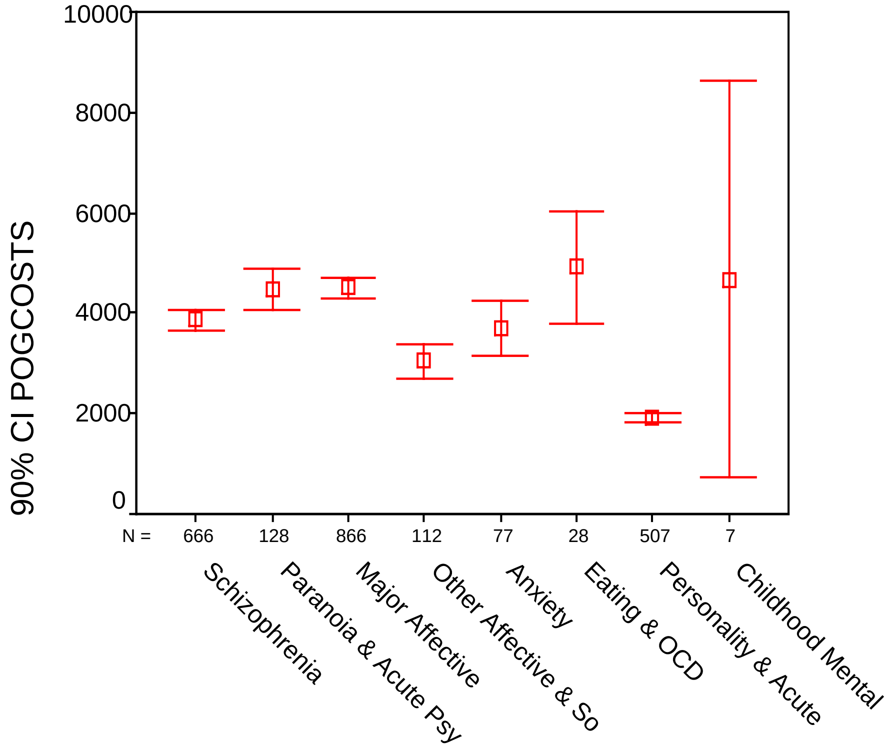


Table 73: AN-DRG3 length of stay analysis – including 'intended same day' admissions from morbidity data

Untrimmed episode statistics						
Class	n	Mean LoS		CV		Hi Trim point
Schizophrenia	957	11.7		1.13		41.0
Paranoia & Acute Psychotic	150	13.5		0.82		43.1
Major Affective	1,772	9.1		1.39		33.5
Other Affective & Somatoform	152	9.8		1.12		34.5
Anxiety	275	4.9		1.91		8.5
Eating & OCD	240	3.2		2.52		1.0
Personality & Acute Stress	1,024	5.6		1.59		13.5
Childhood Mental	10	9.9		1.74		30.4
All Untrimmed	4,580	8.5		1.40		28.5
Trimmed episode statistics						
	n	Mean LoS	(Comparison mean LoS[1])	CV	(Comparison CV[1])	% Trimmed
Schizophrenia	913	9.8	(8.0)	1.02	(1.18)	4.6%
Paranoia & Acute Psychotic	148	13.0	(8.8)	0.77	(1.01)	1.3%
Major Affective	1,653	6.6	(7.5)	1.27	(1.27)	6.7%
Other Affective & Somatoform	145	8.1	(3.8)	0.93	(1.09)	4.6%
Anxiety	230	1.5	(2.8)	0.97	(0.88)	16.4%
Eating & OCD	212	1.0	(8.1)	-	(1.42)	11.7%
Personality & Acute Stress	912	3.0	(2.5)	0.99	(1.00)	10.9%
Childhood Mental	9	4.7	(1.0)	1.12	(0)	10.0%
Trimmed	4,222	6.2		1.30		7.8%
RIV Untrimmed				5.2%		
RIV Trimmed @ Hi				14.3%		
RIV Trimmed @ Hi (Eating & OCD untrimmed)				12.8%		
(Comparison RIV[1])				(11.7%)		

1. Comparison figures from Australian Casemix Clinical Committee[92]

Performance of DRGs and 'intended same day' status

In this analysis, 'intended same day' status was added as a classification variable. All 4,580 inpatient episodes were included in this analysis. In the comparable analysis conducted by the ACCC, 54,926 admissions were included.

All 'intended same day' episodes (n=2,091, 46% of total) were assigned to a single end class, regardless of diagnosis. Available data did not permit further splitting of this group by ECT administration. The remaining group of 'not intended same day' episodes was split by DRG.

Table 74 presents the results of the analysis. Untrimmed, the resultant groupings accounted for 36.6% of variation in length of stay, and when the data were trimmed, the figure rose to 44.1%. Again, these results are comparable with the RIV of 35.6% of the ACCC.

Using the trimmed data, the shortest mean length of stay was for the 'intended same day' group (1.0 days), by definition. Excluding Childhood Mental Disorders because of small numbers, the next shortest mean length of stay was for Personality and Acute Stress Disorders (6.6 days). At the other extreme, the longest mean length of stay was for Major Affective Disorders, at 15.9 days. The mean lengths of stay in this analysis were closer to those of the ACCC, although they still tended to be somewhat longer.

Again, the coefficients of variation indicated moderate homogeneity within groups. In this analysis, the coefficients of variation were more similar to those in the ACCC's analysis, reflecting the fact that both analyses included 'intended same day' episodes and treated them in a similar fashion.

The summary statistics are provided in Table 74 below. A more detailed outline (including interquartile ranges) can be found in Part F of Volume 2.

Table 74: Proposed modification to AN-DRG3 length of stay analysis – including 'intended same day' admissions as an end class

Untrimmed episode statistics						
Class	n	Mean		CV		Hi Trim point
Intended Same day	2,091	1.0		-		1.0
Schizophrenia	685	16.0		0.84		48.5
Paranoia & Acute Psychotic	133	15.1		0.71		42.0
Major Affective	896	17.0		0.81		51.0
Other Affective & Somatoform	117	12.5		0.91		32.5
Anxiety	78	14.8		0.89		44.6
Eating & OCD	28	19.8		0.80		57.4
Personality & Acute Stress	545	9.7		1.11		23.0
Childhood Mental	7	13.7		1.44		34.5
All Untrimmed	4,580	8.5		1.40		28.5
Trimmed episode statistics						
	n	Mean	(Comparison mean LoS[1])	CV	(Comparison CV[1])	% Trimmed
Intended Same day	2,091	1.0	(1.0)	-	(0)	0.0%
Schizophrenia	664	14.6	(12.7)	0.76	(0.94)	3.1%
Paranoia & Acute Psychotic	131	14.6	(10.1)	0.66	(0.91)	1.5%
Major Affective	875	15.9	(15.4)	0.75	(0.86)	2.3%
Other Affective & Somatoform	109	10.1	(7.1)	0.69	(0.94)	6.8%
Anxiety	74	12.6	(4.2)	0.74	(0.78)	5.1%
Eating & OCD	27	18.1	(21.3)	0.74	(0.95)	3.6%
Personality & Acute Stress	488	6.6	(5.4)	0.76	(0.94)	10.5%
Childhood Mental	6	6.5	(5.3)	0.86	(1.13)	14.3%
All Untrimmed	4,465	7.5		1.33		2.5%
RIV Untrimmed	36.6%					
RIV Trimmed @ Hi	44.1%					
(Comparison RIV[1])	35.6%					

1. Comparison figures from Australian Casemix Clinical Committee[92]

Discussion of findings

The current AN-DRG3 analysis indicates that DRGs alone account for a relatively small proportion of the variance in resource use in inpatient episodes, whether resource use is measured in terms of length of stay or total episode cost.

The predictive value of DRGs increases considerably when 'intended same day' status is used as a classification variable. This would be expected, since the independent variable and the dependent variable in this approach are highly inter-related. The ACCC itself acknowledged *" that including a DRG with a specified length of stay of one day, in a variable length of stay system, would make applying standard tests of appropriateness, such as variance reduction, meaningless. The variance in length of stay for a same day intent group must be zero". (p228)* [92]

The results of this analysis show a similar trend to those reported by the ACCC. This suggests that the MH-CASC dataset is not atypical, and provides a suitable base for testing the performance of the AN-DRG classification.

There were, however, some specific differences in the performance of DRGs in the two sets of analyses. In particular, there was a tendency for the average length of stay for a given DRG to be longer in the current analysis. This may be explained by a number of factors, including sampling differences (specialised vs. non-specialised services; different States and Territories; different time periods) and different definitions of 'intended same day' episodes.

Overall, the Version 4 modifications to AN-DRGs achieve high levels of variance explanation in the MH-CASC dataset, through differentiating the 'intended same intended' episode type from overnight episodes. The issue of the statistical and clinical appropriateness of using 'intended same day' in mental health casemix classification was discussed earlier (Chapter 11) and is re-considered in the final chapter of this report.

Chapter

15

Performance of Clinical Panels' Classification

Chapter 2 described the process by which the MH-CASC Project convened clinical panels that generated 50 classes, within 9 diagnostically-based super classes. Each class, by virtue of its clinical characteristics, was hypothesised to have differential resource requirements. This chapter summarises the performance of the 50 groups hypothesised by the clinical panels in predicting resource use.

Operationalising the clinical groups

The initial step in this process required the clinical groups to be operationalised, using the information available from the Repeat and Final Clinical Ratings Forms. As an example, Group 1 of the schizophrenia, paranoia and acute psychotic reactions tree, was characterised by a diagnosis of schizophrenia, paranoia and acute psychotic reactions, a recent onset, and complicating clinical factors. This was operationalised in the following way:

- a Principal Psychiatric Diagnosis of: 05 ('Psychotic disorders due to psychoactive substance abuse'); 06 ('Schizophrenia'); 07 ('Schizotypal disorders'); 08 ('Delusional disorders'); 09 ('Acute and transient psychotic disorders'); 10 ('Schizoaffective disorders'); 11 ('Other non-organic psychotic disorders').

AND

- recency of onset of less than 2 years, as defined by a rating of 1-4 on 'Time since first psychiatric treatment'

AND

- one of the following complicating clinical factors:
  - substance abuse, defined by (a) an Additional Psychiatric Diagnosis of: 03 ('Alcohol intoxication, harmful use, dependence and withdrawal') or 04 ('Other psychoactive substance intoxication, harmful use, dependence and withdrawal'); or (b) a score above 2 on HoNOS Item 3 ('Problem drinking or drug taking') or HoNOSCA Item 4 ('Problems with alcohol, substance/solvent misuse');
  - risk of harm to self or others, as defined by a score above 2 on HoNOS Items 1 or 2 ('Problems resulting from overactive, aggressive, disruptive or agitated behaviour' and 'Suicidal thoughts or behaviour, non-accidental self-injury'), or HoNOSCA Items 1 and 3 ('Problems with disruptive, antisocial or aggressive behaviour' and 'Non-accidental self-injury').

– non-cooperation with treatment, defined by an average score of greater than 3 on the Compliance sub-scale items of the LSP-16: Item 10 ('Does this person generally look after and take her or his own prescribed medication (or attend for prescribed injections on time) without reminding?'); Item 11 ('Is this person willing to take psychiatric medication when prescribed by a doctor?') and Item 12 ('Does this person cooperate with health services (e.g., doctors and/or other health workers)?').

A small number of concepts used by the clinical panels could not be operationalised due to the lack of a suitable measure, or because of the lack of cost-benefit of collecting the item across the whole study group. For example, the clinical panels identified 'delay in treatment' as an additional complicating clinical factor but this was not captured in the data collection due to reliability problems. Similarly, although non-cooperation with treatment could be operationalised for episodes in adult services, no equivalent data items were available for episodes in specialist child/adolescent services. In most cases where a variable could not be operationalised, it was one of a set of variables on which a particular group might be further split (i.e., usually one of a list of complicating clinical factors). Where this was not the case, the proposed split could not be operationalised. It was not possible, therefore, to develop operational criteria that defined all groups hypothesised by the clinical panels.

Full details of the way in which the groups hypothesised by the clinical panels were operationalised can be found in Appendix B-3.

Distribution of episodes

Separate analyses were undertaken, investigating the ability of the hypothesised clinical groups to predict resource use across the five analysis cohorts, using the units of counting described in Chapter 11.

Table 75 shows the distribution of the hypothesised clinical groups by episode type. In addition to the 50 groups hypothesised by the clinical panels, there were:

- nine groups, generated where no further classification was possible within each of the super classes (identified by the suffix 0)
- eight groups which were outside the scope of the groups proposed by the clinical panels (identified by the prefix X)

These 17 groups were excluded from all analyses. In addition, any class with less than 20 cases within one of the five analysis cohorts was excluded from that particular analysis.

The final number of episodes included in each of the five analyses is shown in the bottom row of Table 75.

Table 75: Hypothesised clinical groups by episode type

Group	Literal	Adult Completed Inpatient	Adult Ongoing Inpatient	Adult Community	Child/ Adolescent Completed Inpatient	Child/ Adolescent Community
A0	Anxiety Disorders: NFC	3		33		
A1	Anxiety Disorders: Uncomplicated	41	2	248		
A2	Anxiety Disorders: Moderate Complications	20	1	106		
A3	Anxiety Disorders: Severe Complications	6	1	32		
C0	Obsessive-Compulsive Disorders: NFC			8		
C1	Obsessive-Compulsive Disorders: Low Complications	7	1	56		
C2	Obsessive-Compulsive Disorders: Med Complications	3		29		
C3	Obsessive-Compulsive Disorders: High Complications			1		
E0	Eating Disorders: NFC	2			1	4
E1	Eating Disorders: Anorexia Acute High Functioning	13	1	1	1	5
E3	Eating Disorders: Anorexia Non-Acute No c/c	1	2	1	1	4
E4	Eating Disorders: Anorexia Non-Acute With c/c	5	1	8	3	9
E5	Eating Disorders: Bulimia No c/c	1	1	4		2
E6	Eating Disorders: Bulimia With c/c	4	1	11		3
K0	Child & Adolescent: NFC				12	262
K1	Child & Adolescent: Psychoses				18	51
K2	Child & Adolescent: Low				23	789
K3	Child & Adolescent: Medium				15	545
K4	Child & Adolescent: High					37
K5	Child & Adolescent: Severe				71	1,011
M0	Mood Disorders: NFC	58	3	135		
M1	Mood Disorders: Manic Episode with c/c	166	20	133		
M2	Mood Disorders: Manic Episode no c/c	162	16	436		
M3	Mood Disorders: Major Depression with Melan & c/c	94	10	93		
M4	Mood Disorders: Major Depression with Melan no c/c	43	3	70		
M5	Mood Disorders: Major Depression no Melan & c/c	161	19	185		
M6	Mood Disorders: Major Depression no Melan no c/c	458	31	1,108		
M7	Mood Disorders: Other Depressions	58	10	367		
O0	Organic Disorders: NFC	35	12	111		
O1	Organic Disorders: No c/c: Low Dependency	11	18	83		
O2	Organic Disorders: No c/c: Med Dependency	5	4	12		
O3	Organic Disorders: No c/c: High Dependency	1	1	4		
O4	Organic Disorders: With c/c: Low Dependency	13	11	40		
O5	Organic Disorders: With c/c: Med Dependency	1	5	15		
O6	Organic Disorders: With c/c: High Dependency	5	7	14		
O7	Organic Disorders: With Severe c/c	64	154	272		
P0	Personality Disorders: NFC	47		50		
P1	Personality Disorders: No Complications	80	14	128		
P2	Personality Disorders: Moderate Complications	32	9	100		
P3	Personality Disorders: Severe Complications	112	16	129		
S0	Schizophrenia Disorders: NFC	214	41	709		
S1	Schizophrenia Disorders: Recent with c/c	271	34	595		
S2	Schizophrenia Disorders: Recent non c/c	188	26	594		
S3	Schizophrenia Disorders: With c/c: Hi Functioning	29	5	80		
S4	Schizophrenia Disorders: With c/c: Med Functioning	49	15	173		
S5	Schizophrenia Disorders: With c/c: Low Functioning	222	256	1,035		
S6	Schizophrenia Disorders: No c/c: Hi Functioning	31	15	404		
S7	Schizophrenia Disorders: No c/c: Med Functioning	46	38	578		
S8	Schizophrenia Disorders: No c/c: Low Functioning	86	93	592		
T0	Stress & Adjustment Disorders: NFC	7		25		
T1	Stress & Adjustment Disorders: Brief & no c/c	53		70		
T2	Stress & Adjustment Disorders: Brief & with c/c	126	1	197		
T3	Stress & Adjustment Disorders: Prolonged & no c/c	48	2	178		
T4	Stress & Adjustment Disorders: Prolonged & with c/c	57	1	202		
X1	Substance Abuse Disorders	289	12	196		
X2	Somatoform Disorders	4		26		
X3	Behavioural Syndromes	34		42		
X4	Sexual Disorders	1	3	20		
X5	Mental Retardation	11	30	71		
X6	Child Disorders: Adult Services	5	4	20		
X7	No Psychiatric Disorder	23		41		
X8	No Diagnosis	105	3	468		
	GRAND TOTAL	3,611	953	10,339	145	2,722
	TOTAL INCLUDED IN ANALYSIS	2,697	652	8,313	94	2,433

Results

Adult Completed Inpatient Episodes

The explanatory power of the hypothesised clinical groups was first considered with regard to the total episode cost of Adult Completed Inpatient Episodes. Table 76 presents the results.

Prior to trimming, the hypothesised clinical groups accounted for 6.4% of the variance in total costs, rising to 11.6% after trimming. Using trimmed data, the mean cost per episode ranged from $1,469 for Personality Disorders with Severe Complications (P3) to $6,717 for Anxiety Disorders with Moderate Complications (A2). The coefficients of variation indicate that there was moderate homogeneity within each clinical group.

Adult Ongoing Inpatient Episodes

The capacity of the clinical groups to predict resource use in Adult Ongoing Inpatient Episodes was less than that for Completed Episodes, accounting for only 5.6% of the variance in 8-week period costs untrimmed, and 6.8% trimmed.

Although there was good within-group homogeneity (as indicated by the low coefficients of variation), there was little variation in 8-week period costs across groups, ranging only from a mean of $12,245 for Schizophrenia Disorders with No Complicating Clinical Factors and Low Functioning (S8) to a mean of $15,687 for Schizophrenia Disorders with Recent Onset and Complicating Clinical Factors (S1), when the trimmed data were used.

Adult Community Episodes

The clinical groups also performed only moderately in predicting the 8-week period costs of Adult Community Episodes, as can be seen from Table 78.

Prior to trimming, the clinical groups predicted only 2.7% of the variance in 8-week period costs. After trimming, this figure rose to 7.1%. Mean costs ranged from $256 for Brief Stress and Adjustment Disorders with Complicating Clinical Factors (T2) to $704 for Schizophrenia Disorders with Complicating Clinical Factors and Low Functioning (S5). The coefficients of variation indicate that there was moderate homogeneity within each clinical group.

Child/Adolescent Completed Inpatient Episodes

Table 79 indicates that the clinical groups performed poorly in predicting the total episode costs of Child/Adolescent Completed Inpatient Episodes. It should be stressed, however, that this analysis was limited to only 94 episodes, and only two clinical groups had sufficient numbers of episodes to be included in the analysis.

Untrimmed, the clinical groups had no predictive power. Trimmed, they could only predict 0.3% of the variance in total episode costs. Although there was moderate within-group homogeneity (as indicated by the coefficients of variation), there was little differentiation between the two groups in terms of total episode costs. The mean total episode costs for Child and Adolescent Disorders with Severe Complicating Clinical Factors (K5) and Child and Adolescent Disorders with Low Complicating Clinical Factors (K2) were $6,506 and $7,147, respectively.

Child/Adolescent Community Episodes

The clinical groups performed better in predicting the 8-week period costs of Child/Adolescent Community Episodes than they did in predicting the Completed Inpatient episode costs, although their predictive ability was still only moderate. Table 80 shows the results.

Untrimmed, the clinical groups accounted for 2.8% of the variance in 8-week period costs, increasing to 6.5% using trimmed data. The mean 8-week period cost ranged from $278 for Child and Adolescent Disorders with Low Complicating Clinical Factors (K2) to $659 for Child and Adolescent Disorders with Psychoses (K1). Groups were relatively homogeneous, as indicated by the coefficients of variation.

Discussion of findings

Overall, the performance of the hypothesised clinical groups was variable. The groups performed best in predicting the total episode costs of adult inpatient completed episodes, but elsewhere their performance was only moderate.

Having said this, the factors that formed the basis of the clinical groups made clinical sense, and in general the episode costs increased in magnitude in an intuitively reasonable fashion across groups (i.e., costs increasing with the complexity of the group). As such, the clinical groups formed a sound basis for the subsequent class-finding work described in the following chapter.

Table 76: Hypothesised clinical groups: Adult Completed Inpatient Episode costs

Untrimmed Episode Statistics				
Class	n	Mean	CV	Hi Trim point
Anxiety Disorders: Uncomplicated (A1)	41	$3,873	0.82	$13,245
Anxiety Disorders: Moderate Complications (A2)	20	$6,717	0.73	$21,336
Mood Disorders: Manic Episode with c/c (M1)	166	$6,197	0.87	$17,727
Mood Disorders: Manic Episode no c/c (M2)	162	$5,494	0.80	$16,432
Mood Disorders: Major Depression with Melan & c/c (M3)	94	$6,616	1.24	$20,069
Mood Disorders: Major Depression with Melan no c/c (M4)	43	$5,103	1.08	$15,214
Mood Disorders: Major Depression no Melan & c/c (M5)	161	$5,194	0.98	$16,436
Mood Disorders: Major Depression no Melan no c/c (M6)	458	$4,994	0.92	$14,824
Mood Disorders: Other Depressions (M7)	58	$4,615	0.88	$12,848
Organic Disorders: With Severe c/c (O7)	64	$6,659	0.70	$18,041
Personality Disorders: No Complications (P1)	80	$3,608	1.18	$9,131
Personality Disorders: Moderate Complications (P2)	32	$3,316	1.58	$6,523
Personality Disorders: Severe Complications (P3)	112	$2,252	1.26	$4,400
Schizophrenia Disorders: Recent with c/c (S1)	271	$4,918	1.03	$14,161
Schizophrenia Disorders: Recent non c/c (S2)	188	$4,653	0.88	$12,455
Schizophrenia Disorders: With c/c: Hi Functioning (S3)	29	$3,533	1.20	$11,981
Schizophrenia Disorders: With c/c: Med Functioning (S4)	49	$3,875	0.79	$11,849
Schizophrenia Disorders: With c/c: Low Functioning (S5)	222	$6,141	0.85	$18,746
Schizophrenia Disorders: No c/c: Hi Functioning (S6)	31	$4,148	0.70	$12,274
Schizophrenia Disorders: No c/c: Med Functioning (S7)	46	$5,508	0.91	$21,385
Schizophrenia Disorders: No c/c: Low Functioning (S8)	86	$5,777	0.75	$15,587
Stress & Adjustment Disorders: Brief & no c/c (T1)	53	$2,172	1.23	$5,529
Stress & Adjustment Disorders: Brief & with c/c (T2)	126	$2,017	1.42	$5,160
Stress & Adjustment Disorders: Prolonged & no c/c (T3)	48	$4,746	0.89	$16,910
Stress & Adjustment Disorders: Prolonged & with c/c (T4)	57	$3,888	1.02	$12,097
All Untrimmed	2,697	$4,849	0.99	$14,565
Trimmed Episode Statistics				
Class	n	Mean	CV	% Trimmed
Anxiety Disorders: Uncomplicated (A1)	41	$3,873	0.82	0.0%
Anxiety Disorders: Moderate Complications (A2)	20	$6,717	0.73	0.0%
Mood Disorders: Manic Episode with c/c (M1)	159	$5,513	0.78	4.2%
Mood Disorders: Manic Episode no c/c (M2)	157	$5,064	0.73	3.1%
Mood Disorders: Major Depression with Melan & c/c (M3)	86	$4,653	0.98	8.5%
Mood Disorders: Major Depression with Melan no c/c (M4)	38	$3,415	0.89	11.6%
Mood Disorders: Major Depression no Melan & c/c (M5)	154	$4,534	0.90	4.3%
Mood Disorders: Major Depression no Melan no c/c (M6)	441	$4,419	0.80	3.7%
Mood Disorders: Other Depressions (M7)	54	$3,806	0.73	6.9%
Organic Disorders: With Severe c/c (O7)	63	$6,402	0.65	1.6%
Personality Disorders: No Complications (P1)	71	$2,379	0.78	11.3%
Personality Disorders: Moderate Complications (P2)	30	$2,048	0.76	6.3%
Personality Disorders: Severe Complications (P3)	101	$1,469	0.68	9.8%
Schizophrenia Disorders: Recent with c/c (S1)	255	$3,985	0.81	5.9%
Schizophrenia Disorders: Recent non c/c (S2)	175	$3,854	0.74	6.9%
Schizophrenia Disorders: With c/c: Hi Functioning (S3)	28	$2,861	0.80	3.4%
Schizophrenia Disorders: With c/c: Med Functioning (S4)	48	$3,691	0.76	2.0%
Schizophrenia Disorders: With c/c: Low Functioning (S5)	217	$5,755	0.80	2.3%
Schizophrenia Disorders: No c/c: Hi Functioning (S6)	31	$4,148	0.70	0.0%
Schizophrenia Disorders: No c/c: Med Functioning (S7)	45	$5,126	0.85	2.2%
Schizophrenia Disorders: No c/c: Low Functioning (S8)	82	$5,137	0.64	4.7%
Stress & Adjustment Disorders: Brief & no c/c (T1)	51	$1,753	0.63	3.8%
Stress & Adjustment Disorders: Brief & with c/c (T2)	117	$1,491	0.80	7.1%
Stress & Adjustment Disorders: Prolonged & no c/c (T3)	47	$4,457	0.84	2.1%
Stress & Adjustment Disorders: Prolonged & with c/c (T4)	54	$3,230	0.87	5.3%
All Untrimmed	2,565	$4,193	0.87	4.9%
RIV Untrimmed	6.4%			
RIV Trimmed @ Hi	11.6%			

Table 77: Hypothesised clinical groups: Adult Ongoing Inpatient Episode costs (8 weeks)

Untrimmed Episode Statistics				
Class	n	Mean	CV	Hi Trim point
Mood Disorders: Manic Episode with c/c (M1)	20	$15,950	0.35	$25,188
Mood Disorders: Major Depression no Melan no c/c (M6)	31	$16,295	0.46	$29,686
Organic Disorders: With Severe c/c (O7)	154	$13,931	0.21	$22,616
Schizophrenia Disorders: Recent with c/c (S1)	34	$15,687	0.42	$34,988
Schizophrenia Disorders: Recent non c/c (S2)	26	$12,300	0.32	$22,981
Schizophrenia Disorders: With c/c: Low Functioning (S5)	256	$13,656	0.29	$21,025
Schizophrenia Disorders: No c/c: Med Functioning (S7)	38	$12,497	0.36	$26,405
Schizophrenia Disorders: No c/c: Low Functioning (S8)	93	$12,618	0.25	$19,042
All Untrimmed	652	$13,753	0.31	$22,500
Trimmed Episode Statistics				
Class	n	Mean	CV	% Trimmed
Mood Disorders: Manic Episode with c/c (M1)	19	$14,951	0.23	5.0%
Mood Disorders: Major Depression no Melan no c/c (M6)	30	$15,177	0.28	3.2%
Organic Disorders: With Severe c/c (O7)	153	$13,865	0.21	0.6%
Schizophrenia Disorders: Recent with c/c (S1)	34	$15,687	0.42	0.0%
Schizophrenia Disorders: Recent non c/c (S2)	26	$12,300	0.32	0.0%
Schizophrenia Disorders: With c/c: Low Functioning (S5)	247	$13,188	0.23	3.5%
Schizophrenia Disorders: No c/c: Med Functioning (S7)	38	$12,497	0.36	0.0%
Schizophrenia Disorders: No c/c: Low Functioning (S8)	89	$12,245	0.21	4.3%
All Trimmed	636	$13,421	0.26	2.5%
RIV Untrimmed	5.6%			
RIV Trimmed @ Hi	6.8%			

Table 78: Hypothesised clinical groups: Adult Community Episode costs (8 weeks)

Class	n	Mean	CV	Hi Trim point
Untrimmed Episode Statistics				
Anxiety Disorders: Uncomplicated (A1)	248	$468	1.04	$1,212
Anxiety Disorders: Moderate Complications (A2)	106	$590	0.96	$1,567
Anxiety Disorders: Severe Complications (A3)	32	$791	1.01	$2,104
Obsessive-Compulsive Disorders: Low Complications	56	$681	1.47	$1,177
Obsessive-Compulsive Disorders: Med Complications	29	$625	0.96	$1,641
Mood Disorders: Manic Episode with c/c (M1)	133	$905	1.16	$2,700
Mood Disorders: Manic Episode no c/c (M2)	436	$836	1.39	$1,904
Mood Disorders: Major Depression with Melan & c/c	93	$672	0.92	$1,569
Mood Disorders: Major Depression with Melan no c/c	70	$788	0.99	$2,260
Mood Disorders: Major Depression no Melan & c/c (M5)	185	$667	1.08	$1,916
Mood Disorders: Major Depression no Melan no c/c	1,108	$631	1.24	$1,714
Mood Disorders: Other Depressions (M7)	367	$594	1.55	$1,570
Organic Disorders: No c/c: Low Dependency (O1)	83	$518	1.09	$1,431
Organic Disorders: With c/c: Low Dependency (O4)	40	$724	1.09	$2,247
Organic Disorders: With Severe c/c (O7)	272	$507	1.20	$1,366
Personality Disorders: No Complications (P1)	128	$892	1.17	$2,653
Personality Disorders: Moderate Complications (P2)	100	$645	0.98	$1,618
Personality Disorders: Severe Complications (P3)	129	$835	1.31	$1,826
Schizophrenia Disorders: Recent with c/c (S1)	595	$823	1.16	$2,280
Schizophrenia Disorders: Recent non c/c (S2)	594	$761	0.97	$2,019
Schizophrenia Disorders: With c/c: Hi Functioning (S3)	80	$741	0.97	$2,292
Schizophrenia Disorders: With c/c: Med Functioning	173	$820	1.05	$2,056
Schizophrenia Disorders: With c/c: Low Functioning	1,035	$933	1.16	$2,524
Schizophrenia Disorders: No c/c: Hi Functioning (S6)	404	$569	1.07	$1,551
Schizophrenia Disorders: No c/c: Med Functioning (S7)	578	$687	1.07	$1,902
Schizophrenia Disorders: No c/c: Low Functioning (S8)	592	$854	1.06	$2,252
Stress & Adjustment Disorders: Brief & no c/c (T1)	70	$527	1.19	$1,053
Stress & Adjustment Disorders: Brief & with c/c (T2)	197	$412	1.22	$776
Stress & Adjustment Disorders: Prolonged & no c/c (T3)	178	$545	1.63	$1,229
Stress & Adjustment Disorders: Prolonged & with c/c	202	$616	1.44	$1,172
All Untrimmed	8,313	$719	1.21	$1,874
Trimmed Episode Statistics				
Class	n	Mean	CV	Hi Trim point
Anxiety Disorders: Uncomplicated (A1)	228	$354	0.74	8.1%
Anxiety Disorders: Moderate Complications (A2)	99	$479	0.78	6.6%
Anxiety Disorders: Severe Complications (A3)	30	$620	0.71	6.3%
Obsessive-Compulsive Disorders: Low Complications	46	$306	0.67	17.9%
Obsessive-Compulsive Disorders: Med Complications	27	$497	0.75	6.9%
Mood Disorders: Manic Episode with c/c (M1)	124	$682	0.89	6.8%
Mood Disorders: Manic Episode no c/c (M2)	395	$568	0.73	9.4%
Mood Disorders: Major Depression with Melan & c/c	85	$524	0.64	8.6%
Mood Disorders: Major Depression with Melan no c/c	65	$633	0.86	7.1%
Mood Disorders: Major Depression no Melan & c/c (M5)	172	$508	0.82	7.0%
Mood Disorders: Major Depression no Melan no c/c	1,033	$473	0.82	6.8%
Mood Disorders: Other Depressions (M7)	340	$427	0.79	7.4%
Organic Disorders: No c/c: Low Dependency (O1)	76	$391	0.86	8.4%
Organic Disorders: With c/c: Low Dependency (O4)	36	$495	0.78	10.0%
Organic Disorders: With Severe c/c (O7)	256	$390	0.77	5.9%
Personality Disorders: No Complications (P1)	119	$663	0.85	7.0%
Personality Disorders: Moderate Complications (P2)	91	$490	0.77	9.0%
Personality Disorders: Severe Complications (P3)	114	$508	0.75	11.6%
Schizophrenia Disorders: Recent with c/c (S1)	559	$643	0.82	6.1%
Schizophrenia Disorders: Recent non c/c (S2)	553	$604	0.72	6.9%
Schizophrenia Disorders: With c/c: Hi Functioning (S3)	78	$669	0.84	2.5%
Schizophrenia Disorders: With c/c: Med Functioning	160	$620	0.70	7.5%
Schizophrenia Disorders: With c/c: Low Functioning	963	$704	0.81	7.0%
Schizophrenia Disorders: No c/c: Hi Functioning (S6)	371	$424	0.80	8.2%
Schizophrenia Disorders: No c/c: Med Functioning (S7)	544	$545	0.77	5.9%
Schizophrenia Disorders: No c/c: Low Functioning (S8)	552	$660	0.75	6.8%
Stress & Adjustment Disorders: Brief & no c/c (T1)	63	$352	0.62	10.0%
Stress & Adjustment Disorders: Brief & with c/c (T2)	172	$256	0.62	12.7%
Stress & Adjustment Disorders: Prolonged & no c/c (T3)	165	$354	0.74	7.3%
Stress & Adjustment Disorders: Prolonged & with c/c	178	$366	0.66	11.9%
All Trimmed	7,694	$539	0.83	7.4%
RIV Untrimmed	2.7%			
RIV Trimmed @ Hi	7.1%			

Table 79: Hypothesised clinical groups: Child/Adolescent Completed Inpatient Episode costs

Class	n	Mean	CV	Hi Trim point
Untrimmed Episode Statistics				
Child & Adolescent: Low (K2)	23	$7,147	0.77	$28,129
Child & Adolescent: Severe (K5)	71	$7,476	0.91	$23,383
All Untrimmed	94	$7,396	0.88	$25,514
Trimmed Episode Statistics				
Class	n	Mean	CV	Hi Trim point
Child & Adolescent: Low (K2)	23	$7,147	0.77	0.0%
Child & Adolescent: Severe (K5)	68	$6,506	0.77	4.2%
All Trimmed	91	$6,668	0.76	3.2%
RIV Untrimmed	0.0%			
RIV Trimmed @ Hi	0.3%			

Table 80: Hypothesised clinical groups: Child/Adolescent Community Episode costs

Class	n	Mean	CV	Hi Trim point
Untrimmed Episode Statistics				
Child & Adolescent: Psychoses (K1)	51	$846	0.99	$2,468
Child & Adolescent: Low (K2)	789	$351	1.06	$864
Child & Adolescent: Medium (K3)	545	$422	1.38	$1,000
Child & Adolescent: High (K4)	37	$479	1.24	$981
Child & Adolescent: Severe (K5)	1,011	$531	1.28	$1,285
All Untrimmed	2,433	$454	1.29	$1,065
Trimmed Episode Statistics				
Class	n	Mean	CV	Hi Trim point
Child & Adolescent: Psychoses (K1)	47	$659	0.82	7.8%
Child & Adolescent: Low (K2)	740	$278	0.67	6.2%
Child & Adolescent: Medium (K3)	503	$298	0.72	7.7%
Child & Adolescent: High (K4)	35	$354	0.65	5.4%
Child & Adolescent: Severe (K5)	935	$373	0.74	7.5%
All Untrimmed	2,260	$331	0.76	7.1%
RIV Untrimmed	2.8%			
RIV Trimmed @ Hi	6.5%			

Chapter

16

The MH-CASC Classification Model

The two classification models described in the preceding chapters each offer only a limited understanding of how patient factors contribute to cost variation. In this Chapter, an alternative model is presented.

The model is described in two parts.

The first describes the main classification model developed for the setting-specific episode types. It presents and discusses the 'tree' for each episode type that best meets criteria outlined below.

The second part describes the Project Team's exploratory work in moving beyond setting-specific approaches. It describes a classification for the cross-setting or 'Bundled Episodes' that were defined earlier in Chapter 11. This analysis concentrates only on adult episodes occurring over the three-month period study period, but demonstrates the potential for further development in this area.

Criteria to guide classification development

A number of factors were used to guide the development of the classification model.

1. Use of patient related variables to explain cost

A 'casemix' classification should define patient classes by patient characteristics. The aim was not to create a 'service' classification, where funding would be based on the number and type of services used, regardless of the characteristics of the patient. Of course, provider factors may be important in explaining variation in costs, but the aim of casemix classification and funding is to design payment systems around the type of patient, not the variable practice of providers.

2. Variance reduction

The classification should give minimum variation within each class and maximum variation across the classes. Reduction in variation within classes is normally measured by the Coefficient of Variation (CV) measure. The accepted standard used in Australian casemix development is that each class should have a CV of less than 1.0.

The Reduction in Variance (RIV) statistic is used to assess the overall performance of the classification, or parts of the classification. The more classes, the higher RIV one would expect to see. The RIV is usually applied to the trimmed dataset, and a classification also seeks to achieve an acceptable RIV without major trimming of exceptional cases, particularly the high outlier group.

The total AN-DRG classification sets a comparison, giving 35.4% RIV for length of stay in overnight medical episodes with approximately 11% of episodes excluded through trimming.[93] When surgical and same day cases are included, as independent variables in the analysis, the variance explanation increases to 50.8%.

The level of RIV that can be achieved is dependent upon the amount of variation within the data that requires explanation. As discussed in Chapter 13, the MH-CASC data were relatively homogeneous from the outset (i.e., not much variation between patients in resource use) compared with the variation observed in the more diverse general health sector. It follows that the best result that can be achieved with the MH-CASC dataset can only be at the lower end of the RIV range achieved in the general health sector.

3. Sensible clinical groups

Clinical factors have to be balanced alongside the statistical criteria. Higher explanation of variance can almost always be achieved without reference to whether a classification has underlying clinical logic or recognition. Thus, the classification is looking for classes where there is clinical similarity, particularly in the patient characteristics defining the class and the treatment program needed for people in the particular class.

4. Ease of data collection

The variables used to define the patient classes should be capable of routine collection, coding and data entry, and ideally be a by-product of clinically related information needs. Many instruments for measuring patient characteristics were proposed to the study team, but most required excessive staff time for relatively small patient cohorts. The instruments that were selected for the study are conducive to relatively easy collection.

From the single set of variables collected, the classification development work allowed for them to be combined in various ways, depending on the episode 'branch' of the classification. This does not impose extra data collection, as a simple grouping program can draw on the common set of variables to produce different classes depending on the episode type.

The key point is that it is the number of data elements, not the number of classes, that determines the viability of any new casemix classification system.

Steps in the analysis

Development of the model followed four stages for each of the episode types.

Analysis Step 1: Identify candidate predictor variables

First, a preliminary analysis was conducted in which descriptive statistics and univariate regression analyses were produced for each of the independent variables. The aim here was to gain an understanding of the distribution characteristics of the clinical and socio-demographic measures as well as determine their relative power in explaining cost variation.

A summary of the descriptive statistics and reduction in variance for the main independent measures is presented for each episode type later in this chapter.

The univariate analyses provided only a limited view of the potential of any particular variable, simply indicating its explanatory power if used as a single predictor at the 'top' of the classification tree. Predictor variables may operate differently when used in conjunction with other variables, or at different levels of the classification algorithm. Consequently, this stage also explored relationships between the independent measures to identify which combinations had best potential for the design of the classification. Special interest centred on how each of the clinical scales (HoNOS, LSP etc) performed, and whether particular items could be identified to form a subscale which was more powerful than the scale global scores in differentiating high and low cost patients. The end result of this stage was to define the list of 'candidate' variables that would be used in the next step of the analysis.

Four aspects of the Project Team's approach to the selection of classification variables need to be noted.

HoNOS scales	Preparation of total scores for this instrument excluded scales 11 and 12 (Accommodation Problems and Occupational/Recreational ability) on the grounds that they are primarily measures of the patient's environment, rather than patient attributes *per se*. A secondary ground for their exclusion was that inter-rater reliability on these scales is reported to be the lowest of all the HoNOS measures, and of doubtful acceptability.[74,94] They have been excluded from analysis for this reason in at least one other recent published study.[95] To emphasise the exclusion of scales 11 and 12, the sum of the HoNOS scores is referred to as HoNOS-10.
Focus of Care	Focus of Care was excluded as an independent variable in the classification analyses for all episode types except Adult Community Episodes. General concern was raised in the various committees advising the Project Team about use of Focus of Care as a classification variable, mainly because it is a 'hybrid' measure, combining elements of the independent variable in the description of patient characteristics (e.g., acute focus definition includes 'recent onset or exacerbation of psychiatric disorder') and the independent variable with its descriptions of treatment goals (e.g., acute focus includes the treatment goal of 'short term reduction in the severity of symptoms'). The argument was that the dependent variable (i.e., what the clinician said he/she was going to do) should not be used to predict the dependent variable (i.e., what the clinician actually did). An additional concern was that it may be easily 'gamed'

if applied in a funding context as the measure relied on clinician intent which could not be subject to a verification process.

The one exception to the exclusion of Focus of Care from the classification was for Adult Community Episodes. Focus of Care was used here because, in its absence, few other variables came forward as good predictors; and the type of split proposed by the statistical algorithms (intensive extended care vs other focus of care) separated patients on clinical variables primarily related to illness history, a concept that was not measured elsewhere in the study but which has strong clinical recognition. Issues relating to the appropriateness of Focus of Care as a classification variable are discussed in Chapter 18. Descriptive data on the characteristics of the measure in each of the episode types are presented in Appendix J-1 of Volume 2.

Life Skills Profile Sub-scales

Calculation of an aggregate measure of level of functioning, based on the LSP total score, excluded the three items comprising the Compliance subscale. The rationale for this approach was that the remaining three scales (Withdrawal, Self-Care, Antisocial) were more clearly related to aspects of everyday functioning whereas compliance and co-operation with treatment services had previously been argued by the clinical panels as a separate concept. Additionally, the preliminary analyses found that the four subscales behaved inconsistently during class finding and a more robust solution occurred when only the items from Withdrawal, Self-Care and Antisocial scales were combined. This also allowed for the concept of compliance to be measured separately from more global concepts of levels of functioning.

To emphasise the exclusion of Compliance sub scale from the LSP total, the sum of the LSP scores is referred to as LSP-13.

Negative correlations

Several clinical variables produced paradoxical, negative correlations with costs. For example, higher levels of suicide risk and substance abuse were found to be predictive of shorter stays (less cost) in Adult Completed Inpatient Episodes. While inclusion of these variables would have assisted the statistical performance of the classification, they were excluded from class finding on the basis of clinical advice that they pointed to poor quality practice. Retaining such items in a classification model would only reinforce such practices.

Specific predictor items with negative correlations are identified in relevant tables for each of the analysis cohorts described in the following pages.

Overall, the following sub-scales emerged as the best candidates for building a classification:

HoNOS-10 item total	Total HoNOS score for all items except Scales 11 and 12 as noted above.
HoNOS-5 scale	Total HoNOS score for the five items measuring clinical symptoms: Item 1 Aggressive behaviours Item 2 Suicidal behaviours Item 3 Substance Abuse Item 4 Cognitive Problems Item 6 Hallucinations and Delusions

Life Skills Profile Sub-scales	LSP-13 total as noted above.
RUG-ADL	Sum of the scores on the four RUG-ADL items for differentiating service needs of people aged 65 or more years.

Analysis Step 2: Exploratory Class Finding

The second stage involved exploratory class finding. Statistical tools were used to configure the measures into a classification tree which best accounted for variation on the dependent variable (episode cost). The primary tool used was CART (Classification and Regression Trees), a commercially available package based on multiple regression models.[96] The CART logic compares each of the independent variables to determine which one offers the best binary split – that is, the variable that divides the sample into two groups (or branches), where the members of each branch are as similar to each other as possible, but as different as possible from members of the other group. CART then performs successive binary splits down each branch until there is no significant improvement to be made in terms of achieving further reduction of variance.

In parallel with the application of the CART technology, PC-Group[97] was also used as an alternative modelling tool to assist in generating and confirming hypotheses.

The 'best' tree emerging from these approaches is defined solely on statistical criteria that may or may not be clinically acceptable. For example, the result may 'recommend' patients with Alzheimer's disease to be grouped with young people with schizophrenia because they use similar levels of resources when treated in hospital. This proposition would be rejected by clinicians on the basis that the patients represent separate clinical entities, distinguished by their differing treatment requirements, prognoses and aetiologies.

Analysis Step 3: Clinical adjustment

The third step in the development of the classification model introduced the 'clinical reality' factor. The trees generated by CART and PC-Group were reviewed and where necessary, modified by either 'forcing' or removing particular splits to improve clinical meaning. Variables identified as 'competitors' were sometimes used in preference to the recommended splitting variable where a more clinically coherent solution was achieved. The revised classification tree was then modelled using SPSS[98] (Statistical Package for the Social Sciences) and variance reduction statistics re-calculated for the overall tree and each branch in the tree.

Analysis Step 4: Trimming for high cost outliers

The final stage involved trimming each class by removal of high cost outliers. The trimming process adopted the interquartile range method used for testing AN-DRGs and the Clinical Panels groups, described in Chapters 14 and 15 (Ben-Tovim, Elzinga and Burgess[15]). Coefficients of variation (CV) and the overall reduction in variance (RIV) were re-calculated for each final class using the trimmed dataset.

The MH-CASC setting-specific classification

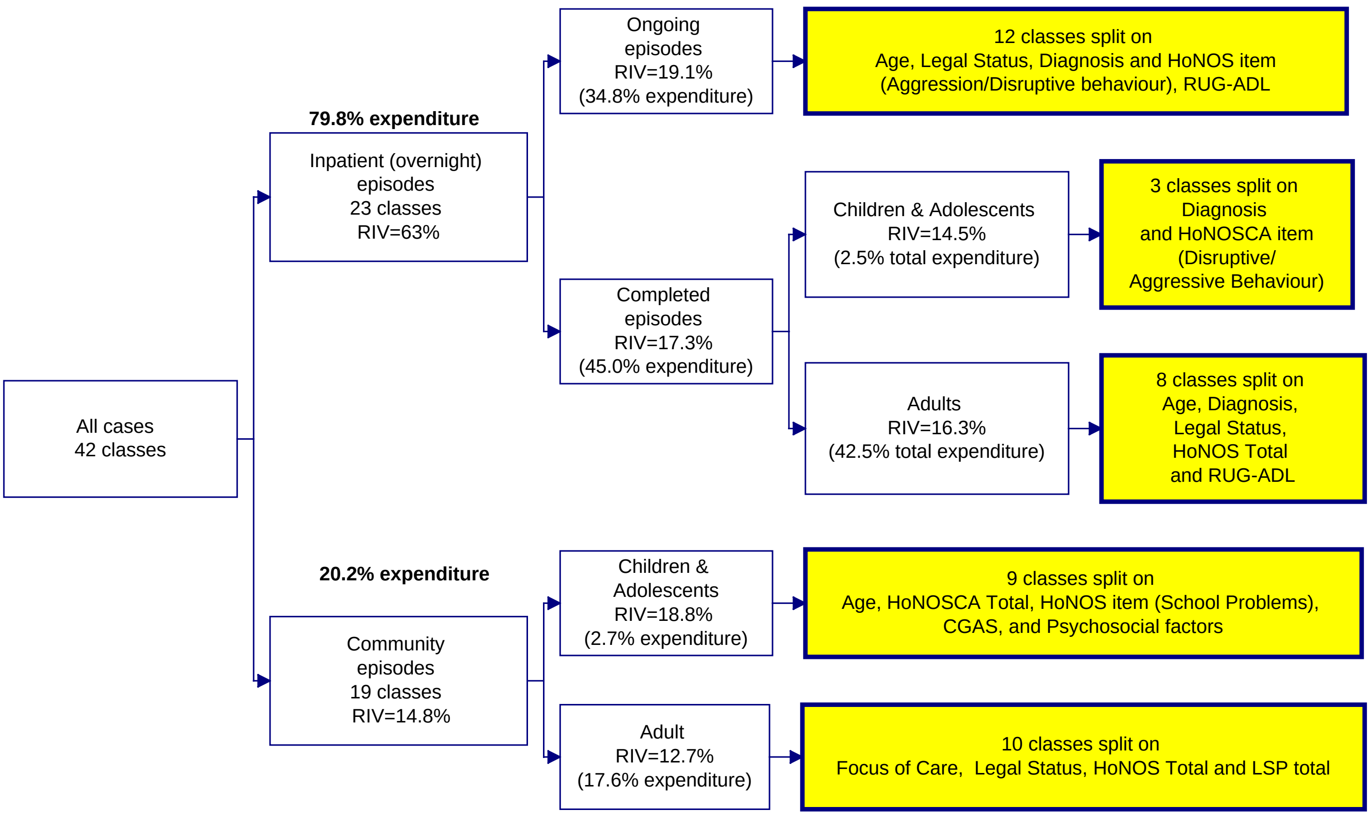
Figure 72 presents a summary view of the setting-specific classification model. In total, the classification proposes 42 classes, accounting for 78% of the variance in episode costs. Of these, 23 are inpatient episodes (which account for 79.8% of total expenditure) and 19 are community episodes (which account for 20.2% of total expenditure).

The five 'branches' of the tree are based on the setting-specific episode types, each of which ultimately split into end classes on the basis of the following patient attributes:

- Adult Completed Inpatient Episodes (split on age, diagnosis, severity, legal status and ADL dependency);
- Adult Ongoing Inpatient Episodes (split on age, legal status, diagnosis, aggressive/disruptive behaviour and ADL dependency);
- Adult Community Episodes (split on focus of care, legal status, severity and disability);
- Child Completed Inpatient Episodes (split on diagnosis and aggressive/disruptive behaviour); and
- Child Community Episodes (split on age, severity, global functioning, aggressive/disruptive/ behaviour, psychosocial factors and school attendance problems).

The performance of the MH-CASC Classification in predicting episode costs within each of these branches is described in detail below, and includes summary statistics for each of the cohorts. Detailed data for each cohort can be found in Part H of Volume 2.

Figure 72: Summary of MH-CASC setting-specific classification



Adult Completed Inpatient Episodes

Univariate analyses were conducted on the array of clinical and socio-demographic measures to assess their performance in explaining variation in the total episode costs (see Table 81). No single factor could explain more than 4% of the variation in episode costs, if used as the first splitting variable at the top of the classification tree. Findings from this analysis foreshadowed that patient factors could explain only a relatively small proportion of the variation in total episode costs. The better performing variables were:

- Principal Psychiatric Diagnosis accounted for 3.9% of the variance.
- Focus of Care was the second best predictor of costs, accounting for 3.0% of the variance, but as indicated earlier, was excluded from the class finding analysis for inpatient episodes.
- Legal Status – defined in terms of whether the patient had ever been involuntary during the course of the community episode – explained 2.2% of cost variation. On this basis it was included as a variable in the class finding analysis.
- Substance Abuse is a factor worthy of comment. As a single item from the HoNOS, it alone explained 2.5% of the variation in total episode cost. Paradoxically, however, higher scores on this single item were associated with lower overall episode costs. A similar relationship was noted for the HoNOS item measuring risk to self ('Suicidal behaviours').

Table 81: Adult Completed Inpatient Episodes – Results of univariate regression analyses for selected independent variables

Independent variables		% RIV	
Age		1.5%	
Focus of Care		3.0%	
Legal Status		2.2%	
Diagnosis		3.9%	
HoNOS Items	Aggressive behaviours	0.2%	
	Suicidal behaviours	1.5%	*
	Substance Abuse	2.5%	*
	Cognitive Problems	1.8%	
	Physical Illness/Disability	0.7%	
	Hallucinations and Delusions	1.6%	
	Depressed Mood	0.0%	
	Other Mental Problems	0.5%	
	Social Problems	0.5%	
	Overall Disability	1.5%	
	Accommodation problems	0.6%	
	Occupational/Recreational problems	0.5%	
HoNOS 10 item Total		2.0%	
HoNOS 5 item total		0.5%	
LSP-16 Sub-scales	Withdrawal	0.1%	
	Self-care	0.6%	
	Compliance	0.2%	
	Anti-social	0.0%	
LSP 13 Total Score		0.2%	

Note: Asterisked items indicate a negative correlation

Figure 73 summarises the design of the adult completed inpatient branch of the classification tree. Descriptive statistics for trimmed and untrimmed data are presented in Table 82.

Overall, the eight classes generated by this model achieved a variance reduction of 16.3% with trimmed data (n=3,426).

The classification tree was first split on age, with those patients aged over 85 forming a terminating class with an average total episode cost of $8,710. This class was low in volume (n=31), but was regarded as sufficiently different from other classes to justify its inclusion as a discrete class.

Those aged between 65 and 85 with high ADL dependency were partitioned from their low ADL dependency counterparts to form two more terminating classes with average total episode costs of $6,655 and $5,426 respectively. The former was also a relatively low volume class (n=59), but was considered sufficiently different from other classes to warrant its inclusion.

Those patients aged less than 65 with a diagnosis other than schizophrenia, mood or eating disorders formed a fourth terminating class, with an average total episode cost of $2,484. It was recognised that this group was clinically heterogeneous, accounting for 30% of total Adult Completed Inpatient episodes. However, further partitioning to create more clinically meaningful groups could not be justified by the data.

Those aged less than 65 with a diagnosis of schizophrenia, mood or eating disorders were then split on voluntary status. For those whose status was involuntary, there was a further split on overall severity as measured by the HoNOS-10 total score. Those with high severity had an average total episode cost of $5,727, and those with low to medium severity had an average total episode cost of $4,591.

For those aged less than 65 with a diagnosis of schizophrenia, mood or eating disorders whose status was voluntary, there was also a split on severity as measured by the HoNOS-10 score. Those with high severity had an average episode cost of $4,386 compared with $2,864 for those with medium severity.

The coefficients of variation are all lower than 1, indicating that each class is relatively homogeneous. Figure 74 compares graphically the 90% confidence intervals for average episode costs of the eight classes. It highlights that, while within-class homogeneity is satisfactory, there is overlap between several of the classes. The relatively low RIV result in fact stems from this limited differentiation between classes with respect to episode cost.

Figure 73: MH-CASC Classification Tree: Adult Completed Inpatient Episodes

8 classes, RIV=16.3% (trimmed), Episode Cost=$3,900, LoS=12.4 days, Per Diem=$331

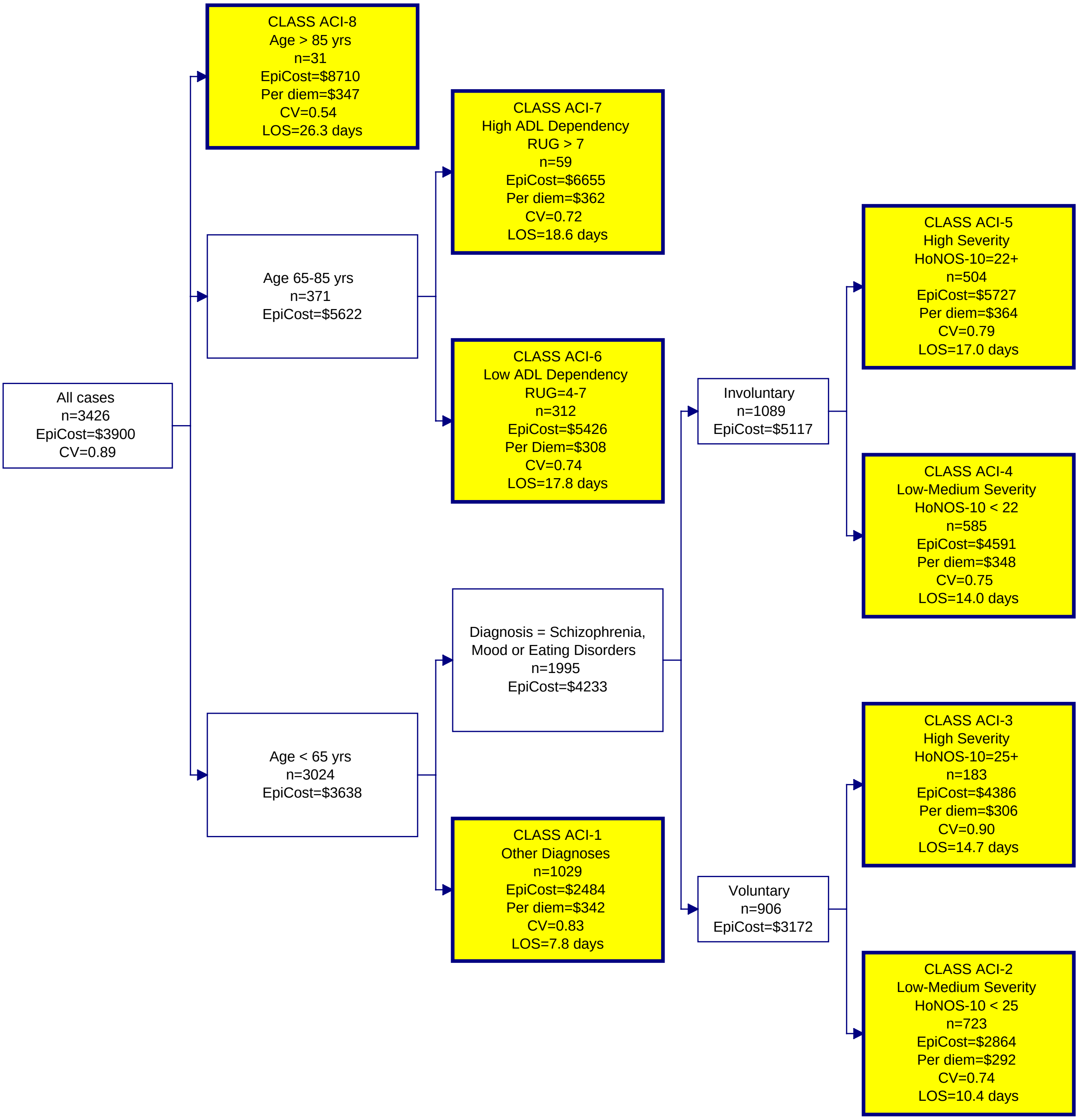


Table 82: MH-CASC Classification for Adult Completed Inpatient Episodes

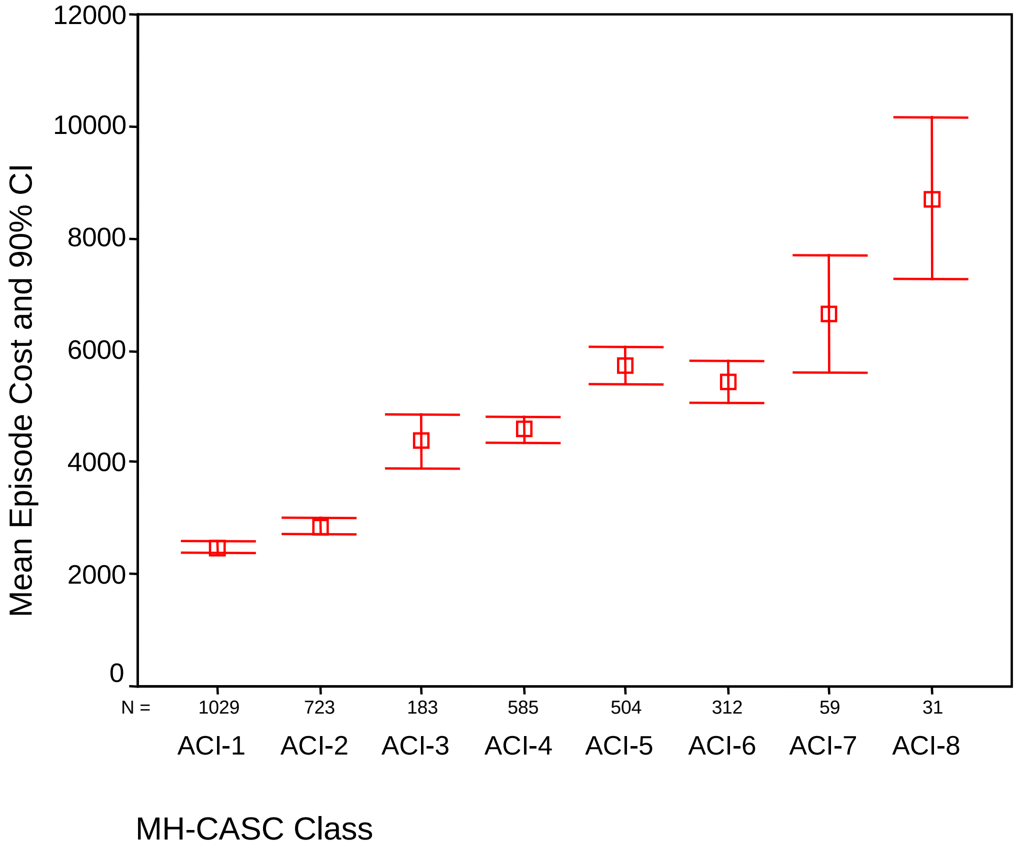
Code	Class	n	Mean Episode Cost	CV	Hi Trim point
	Untrimmed Episode Statistics				
ACI-1	Age < 65 years, diagnosis other than schizophrenia or mood or eating disorder	1,098	$3,210	1.15	$8,897
ACI-2	Age < 65 years, schizophrenia or mood or eating disorders, voluntary status, low-medium severity[1]	769	$3,524	0.98	$9,827
ACI-3	Age < 65 years, schizophrenia or mood or eating disorders, voluntary status, high severity[2]	195	$5,417	1.08	$15,958
ACI-4	Age < 65 years, schizophrenia or mood or eating disorders, involuntary status, low/medium severity[3]	615	$5,312	0.88	$15,271
ACI-5	Age< 65 years, schizophrenia or mood or eating disorders, involuntary status, high severity[4]	523	$6,372	0.89	$18,813
ACI-6	Age 65-85 years, low ADL dependency[5]	320	$5,806	0.80	$18,320
ACI-7	Age 65-85 years, high ADL dependency[6]	60	$6,916	0.74	$20,368
ACI-8	Age > 85 years	33	$9,607	0.60	$21,997
	Total Untrimmed	3,613	$4,562	1.01	$13,393

Code	Class	n	Mean Episode Cost	CV	% Trimmed
	Trimmed Episode Statistics				
ACI-1	Age < 65 years, diagnosis other than schizophrenia or mood or eating disorder	1,029	$2,484	0.83	6.3%
ACI-2	Age < 65 years, schizophrenia or mood or eating disorders, voluntary status, low-medium severity[1]	723	$2,864	0.74	6.0%
ACI-3	Age < 65 years, schizophrenia or mood or eating disorders, voluntary status, high severity[2]	183	$4,386	0.90	6.2%
ACI-4	Age < 65 years, schizophrenia or mood or eating disorders, involuntary status, low/medium severity[3]	585	$4,591	0.75	4.9%
ACI-5	Age< 65 years, schizophrenia or mood or eating disorders, involuntary status, high severity[4]	504	$5,727	0.79	3.6%
ACI-6	Age 65-85 years, low ADL dependency[5]	312	$5,426	0.74	2.5%
ACI-7	Age 65-85 years, high ADL dependency[6]	59	$6,655	0.72	1.7%
ACI-8	Age > 85 years	31	$8,710	0.54	6.1%
	Total trimmed	3,426	$3,900	0.89	5.2%
	RIV Untrimmed	**8.7%**			
	RIV Trimmed @ Hi	**16.3%**			
	RIV Trimmed @ Hi & Same day	**16.6%**			

Split points used for class definition:

[1] HoNOS-10 < 25
[2] HoNOS-10 = 25+
[3] HoNOS-10 < 22
[4] HoNOS-10 = 22+
[5] RUG = 4-7
[6] RUG > 7

Figure 74: 90% confidence intervals for average episode costs - Adult Completed Inpatient Episodes



Adult Ongoing Inpatient Episodes

Univariate analyses were conducted on the array of clinical and socio-demographic measures to assess their performance in explaining variation in the costs of Adult Ongoing Inpatient Episodes (see Table 83). The better performing variables were:

- Focus of Care was the best predictor of costs, accounting for 10.3% of the variance but as indicated earlier, was excluded from the class finding analysis for inpatient episodes..
- Principal Psychiatric Diagnosis accounted for 5.7% of the variance.
- Risk to Self ('Suicide'), as a single item from the HoNOS, alone explained 2.1% of the variation in total episode cost. In contrast to this variable's performance in completed inpatient episodes, higher scores were associated with greater episode costs
- Age accounted for 2.0% of the variation in episode costs. In contrast also to the findings noted for completed inpatient episodes, younger patients in this episode type had higher episode costs than older patients.

Table 83: Adult Ongoing Inpatient Episodes – Results of univariate regression analyses for selected independent variables

Independent variables		% RIV	
Age		2.0%	*
Focus of Care		10.3%	
Legal Status		1.5%	
Diagnosis		5.7%	
HoNOS Items	Aggressive behaviours	1.7%	
	Suicidal behaviours	2.1%	
	Substance Abuse	0.0%	
	Cognitive Problems	0.2%	
	Physical Illness/Disability	0.0%	
	Hallucinations and Delusions	0.3%	*
	Depressed Mood	1.2%	
	Other Mental Problems	0.2%	
	Social Problems	0.0%	
	Overall Disability	0.0%	
	Accommodation problems	1.2%	
	Occupational/Recreational problems	1.0%	
HoNOS 10 item Total		0.9%	
HoNOS 5 item total		1.1%	
LSP-16 Sub-scales	Withdrawal	0.6%	*
	Self-care	0.3%	*
	Compliance	0.5%	
	Anti-social	1.4%	
LSP 13 Total Score		0.0%	

Note: Asterisked items indicate a negative correlation

Figure 75 shows the classification design for Adult Ongoing Inpatient Episodes. Descriptive statistics for trimmed and untrimmed data are presented in Table 84.

The classification accounts for 19.1% of the variation in 8-week costs for these episodes, using trimmed data. In total, there were 919 episodes included in the analysis post-trimming, and these split into 12 classes. As a result, there were a number of relatively low volume classes included in the classification tree. All of these were retained, on the grounds that they were sufficiently differentiated from the other classes., both in terms of the cost differentials and clinical characteristics.

The first-level split was made on age, streaming patients into three groups. Patients aged 33 years or less were then partitioned on diagnosis., with those with a diagnosis other than schizophrenia or organic disorder forming a terminating class with an average 8-week cost of $17,632. Their counterparts with a diagnosis of schizophrenia or organic disorder were split again on voluntary status. Those with a voluntary status formed a terminating class with an average 8-week cost of $10,229. Patients with an involuntary status were partitioned further into two terminating classes: those with high aggressive behaviours (average 8-week cost of $15,624) and those with low aggression (average 8-week cost of $14,145).

Patients in the age range 34 to 64 years were also split on diagnosis. Those with a diagnosis other than schizophrenia or organic disorder formed a terminating class with an average 8-week cost of $14,989. The remaining group, with a diagnosis of schizophrenia or organic disorder, were split further into two terminating classes, distinguished by the presence or absence of aggressive behaviours (average 8-week cost of $13,088 and $12,110, respectively).

Patients 65 years or older were split three ways on the basis of diagnosis. Those with a diagnosis of other than organic disorder, schizophrenia, substance abuse or mental retardation formed a terminating class with an average 8-week cost of $14,559. Those with a diagnosis of organic disorder were divided further into two terminating classes, characterised by high ADL dependency (average 8-week cost of $15,352) and low ADL dependency (average 8-week episode cost of $13,242) respectively. Those with a diagnosis of schizophrenia, substance abuse or mental retardation were split into two terminating classes that were also distinguished by high and low ADL dependency. Those with high ADL dependency had an average 8-week cost of $13,917 and those with low ADL dependency had an average 8-week cost of $11,787.

All terminating classes had coefficients of variation well below 1, pointing to very resource homogeneous classes. Figure 76 indicates that there was reasonable separation between most, though not all, of the 12 classes in terms of the 90% confidence intervals that bounded the average 8-week costs.

Figure 75: MH-CASC Classification Tree: Adult Ongoing Inpatient Episodes

12 classes, RIV=19.1% (trimmed), 8-week period costs=$13,722, Per Diem=$254

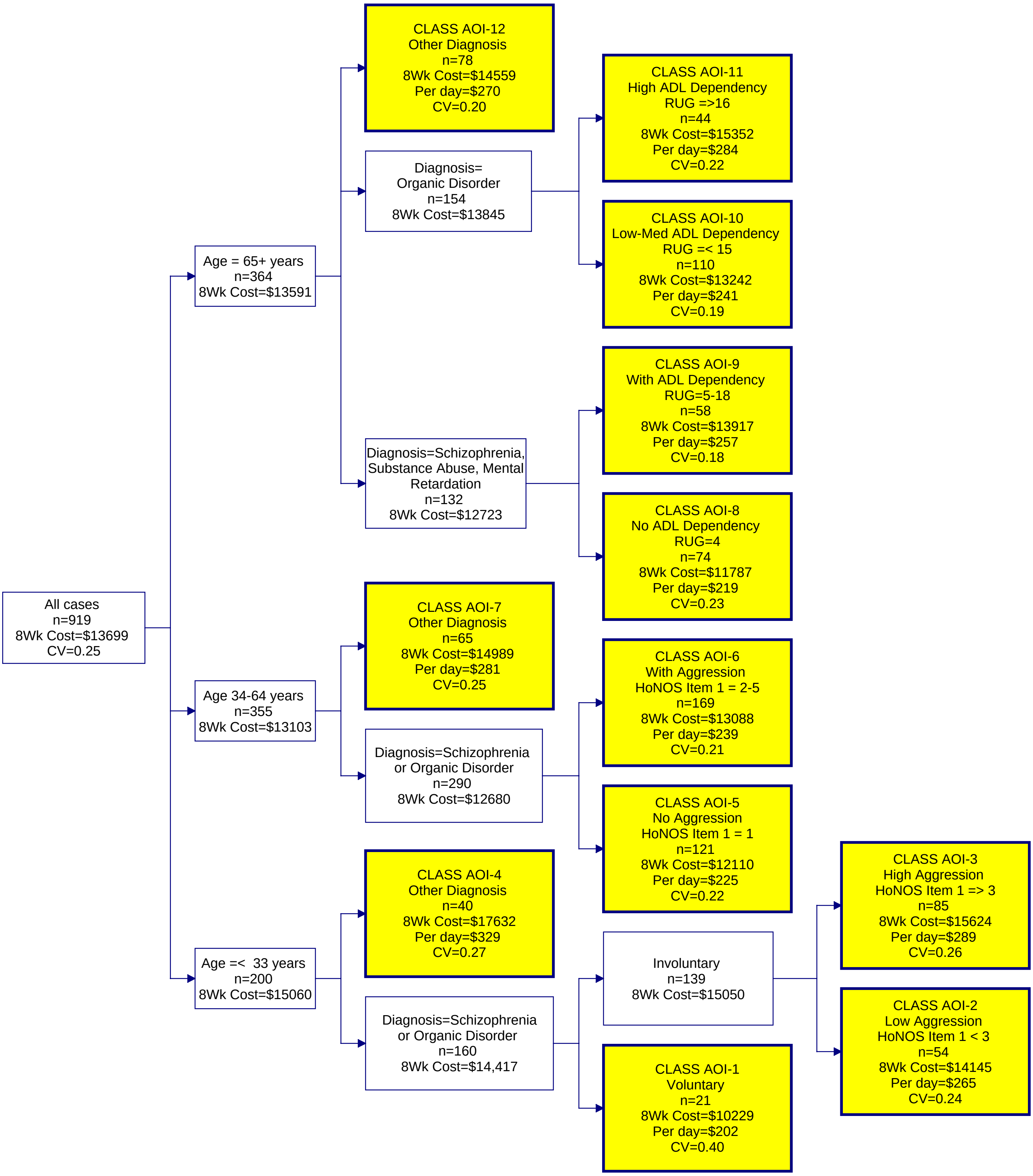


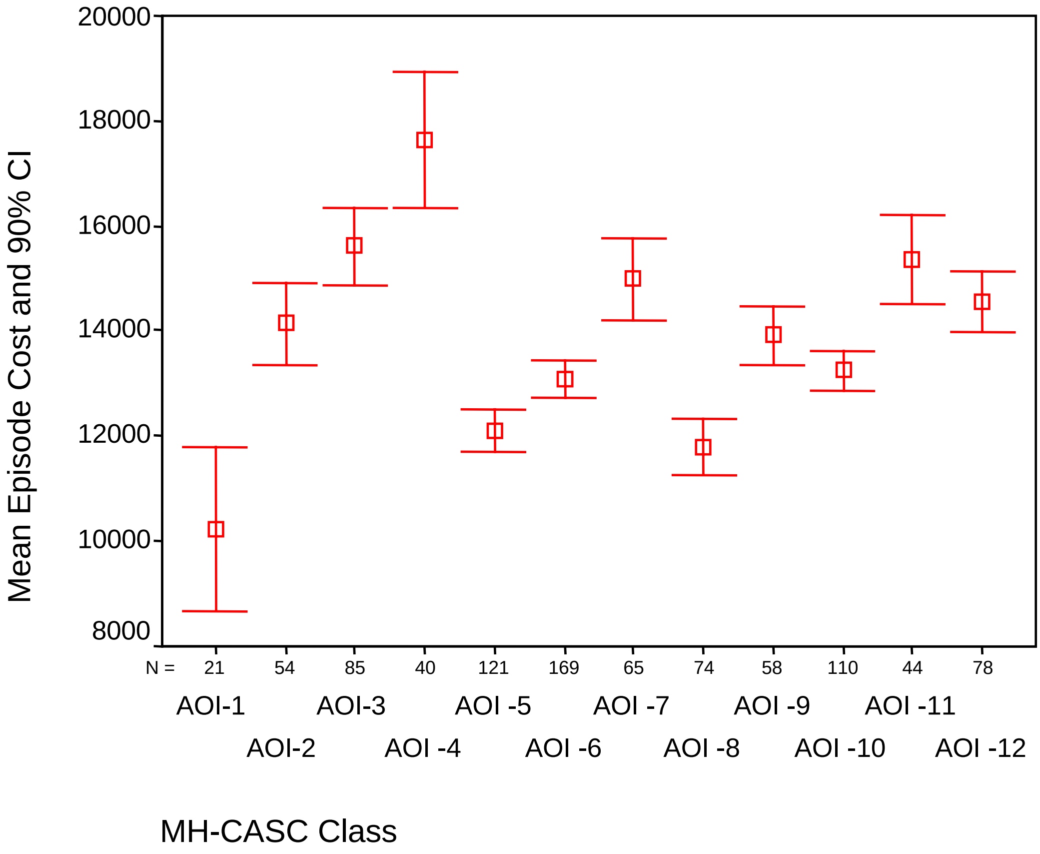
Table 84: MH-CASC Classification for Adult Ongoing Inpatient Episodes

Code	Class	n	Mean Episode Cost	CV	Hi Trim point
Untrimmed Episode Statistics					
AOI-1	Age ≤ 33 years, schizophrenia or organic disorder, voluntary	21	$10,229	0.40	$21,701
AOI-2	Age ≤ 33 years, schizophrenia or organic disorder, involuntary, low aggression[1]	55	$14,336	0.26	$22,680
AOI-3	Age ≤ 33 years, schizophrenia or organic disorder, involuntary, high aggression[2]	89	$16,477	0.35	$28,135
AOI-4	Age ≤ 33 years, diagnosis other than schizophrenia or organic disorder	44	$19,546	0.40	$31,299
AOI-5	Age 34-64 years, schizophrenia or organic disorder, no aggression[3]	125	$12,377	0.24	$19,439
AOI-6	Age 34-64 years, schizophrenia or organic disorder, with aggression[4]	179	$13,698	0.28	$20,572
AOI-7	Age 34-64 years, diagnosis other than schizophrenia or organic disorder	67	$15,344	0.27	$24,084
AOI-8	Age 65+ years, schizophrenia or substance abuse or mental retardation, no ADL dependency[5]	74	$11,787	0.23	$19,109
AOI-9	Age 65+ years, schizophrenia or substance abuse or mental retardation, with ADL dependency[6]	58	$13,917	0.18	$22,525
AOI-10	Age 65+ years, organic disorder, low-medium ADL dependency[7]	111	$13,339	0.20	$20,883
AOI-11	Age 65+ years, organic disorder, high ADL dependency[8]	44	$15,352	0.22	$24,958
AOI-12	Age 65+ years, diagnosis other than organic disorder or schizophrenia	82	$15,668	0.39	$23,607
	Total Untrimmed	949	$14,201	0.32	$23,424
Trimmed Episode Statistics					
Code	**Class**	**n**	**Mean Episode Cost**	**CV**	**% Trimmed**
AOI-1	Age ≤ 33 years, schizophrenia or organic disorder, voluntary	21	$10,229	0.40	0.0%
AOI-2	Age ≤ 33 years, schizophrenia or organic disorder, involuntary, low aggression[1]	54	$14,145	0.24	1.8%
AOI-3	Age ≤ 33 years, schizophrenia or organic disorder, involuntary, high aggression[2]	85	$15,624	0.26	4.5%
AOI-4	Age ≤ 33 years, diagnosis other than schizophrenia or organic disorder	40	$17,632	0.27	9.1%
AOI-5	Age 34-64 years, schizophrenia or organic disorder, no aggression[3]	121	$12,110	0.22	3.2%
AOI-6	Age 34-64 years, schizophrenia or organic disorder, with aggression[4]	169	$13,088	0.21	5.6%
AOI-7	Age 34-64 years, diagnosis other than schizophrenia or organic disorder	65	$14,989	0.25	3.0%
AOI-8	Age 65+ years, schizophrenia or substance abuse or mental retardation, no ADL dependency[5]	74	$11,787	0.23	0.0%
AOI-9	Age 65+ years, schizophrenia or substance abuse or mental retardation, with ADL dependency[6]	58	$13,917	0.18	0.0%
AOI-10	Age 65+ years, organic disorder, low-medium ADL dependency[7]	110	$13,242	0.19	0.9%
AOI-11	Age 65+ years, organic disorder, high ADL dependency[8]	44	$15,352	0.22	0.0%
AOI-12	Age 65+ years, diagnosis other than organic disorder or schizophrenia	78	$14,559	0.20	4.9%
	Total Trimmed	919	$13,722	0.25	3.2%
	RIV Untrimmed	**16.8%**			
	RIV Trimmed @ Hi	**19.1%**			

Split points used for class definition:

[1] HoNOS Item 1 < 3 [2] HoNOS Item 1 ≥ 3 [3] HoNOS Item 1 =1 [4] HoNOS Item 1 = 2-5
[5] RUG = 4 [6] RUG = 5-18 [7] RUG ≤ 15 [8] RUG ≥ 16

Figure 76: 90% confidence intervals for average episode costs - Adult Ongoing Inpatient Episodes



Adult Community Episodes

Results of the univariate analyses are summarised in Table 85. Only Focus of Care could explain more than 2.0% of the variation of costs with only one HoNOS item ('Psychotic Symptoms') explaining more than 1.0% of the variation of costs.

The better performing variables were:

- Focus of Care was the best predictor of costs, accounting for 2.6% of the variance. Essentially, this separated patients rated 'intensive extended' from all other Focus of Care categories.
- Legal Status – defined in terms of whether the patient had ever been involuntary during the course of the community episode – explained 1.6% of cost variation. On this basis it was included as a variable in the class finding analysis.
- Principal Psychiatric Diagnosis accounted for 1.5% of the variance.
- Clinical severity, as measured through the HoNOS-10 and the HoNOS-5, accounted for approximately 1.6% and 1.5% respectively

Table 85: Adult Community Episodes – Results of univariate regression analyses for selected independent variables

Independent variables		% RIV	
Age		0.8%	*
Focus of Care		2.6%	
Legal Status		1.6%	
Diagnosis		1.5%	
HoNOS Items	Aggressive behaviours	0.7%	
	Suicidal behaviours	0.2%	
	Substance Abuse	0.1%	
	Cognitive Problems	0.3%	
	Physical Illness/Disability	0.0%	
	Hallucinations and Delusions	1.3%	
	Depressed Mood	0.1%	
	Other Mental Problems	0.1%	
	Social Problems	0.7%	
	Overall Disability	0.6%	
	Accommodation problems	0.4%	
	Occupational/Recreational problems	0.2%	
HoNOS 10 item Total		1.6%	
HoNOS 5 item total		1.5%	
LSP-16 Sub-scales	Withdrawal	0.7%	
	Self-care	1.0%	
	Compliance	0.8%	
	Anti-social	1.6%	
LSP 13 Total Score		1.5%	

Note: Asterisked items indicate a negative correlation

Figure 77 shows the classification design for Adult Community Episodes. Descriptive statistics for trimmed and untrimmed data are presented in Table 86.

In total, 10 classes were generated and these accounted for a 12.7% reduction in variation, using trimmed data (n=9,096).

These 9,096 episodes were first split on Focus of Care. Those with an intensive extended Focus of Care were further partitioned into two terminating classes based on voluntary status. Those with an involuntary status had an average 8-week cost of $1,068, and those with a voluntary status had an average 8-week cost of $717.

The remainder of episodes, which had a focus of care other than intensive extended were also split into involuntary and voluntary groups. Those with an involuntary status were split further to form two terminating classes based on clinical severity, calculated from the HoNOS-5 total score. Those with moderate to high clinical severity had an average 8-week cost of $679; the corresponding figure for those with low clinical severity was $444.

Those with a Focus of Care other than intensive extended and a voluntary status were also split on clinical severity. Those with high clinical severity formed a terminating class with an average 8-week cost of $556. Those with moderate clinical severity split further into two terminating classes distinguished by high disability (average 8-week cost of $572) and low to moderate disability (average 8-week cost of $443). Those with low clinical severity were further separated to form three terminating classes, characterised by high disability, moderate disability and low disability, with average 8-week costs of $442, $387 and $304, respectively.

None of the classes were low in volume, and all had coefficients of variation around 0.80, indicating that they were relatively homogeneous.

Figure 78 shows that the classes had tight confidence intervals bounding their estimates of average 8-week costs, but there is overlap between several of the classes.

Figure 77: MH-CASC Classification Tree: Adult Community Episodes

10 classes, RIV=12.7% (trimmed), 8-week period costs=$526, Treatment Days=6.3, Per Diem=$94

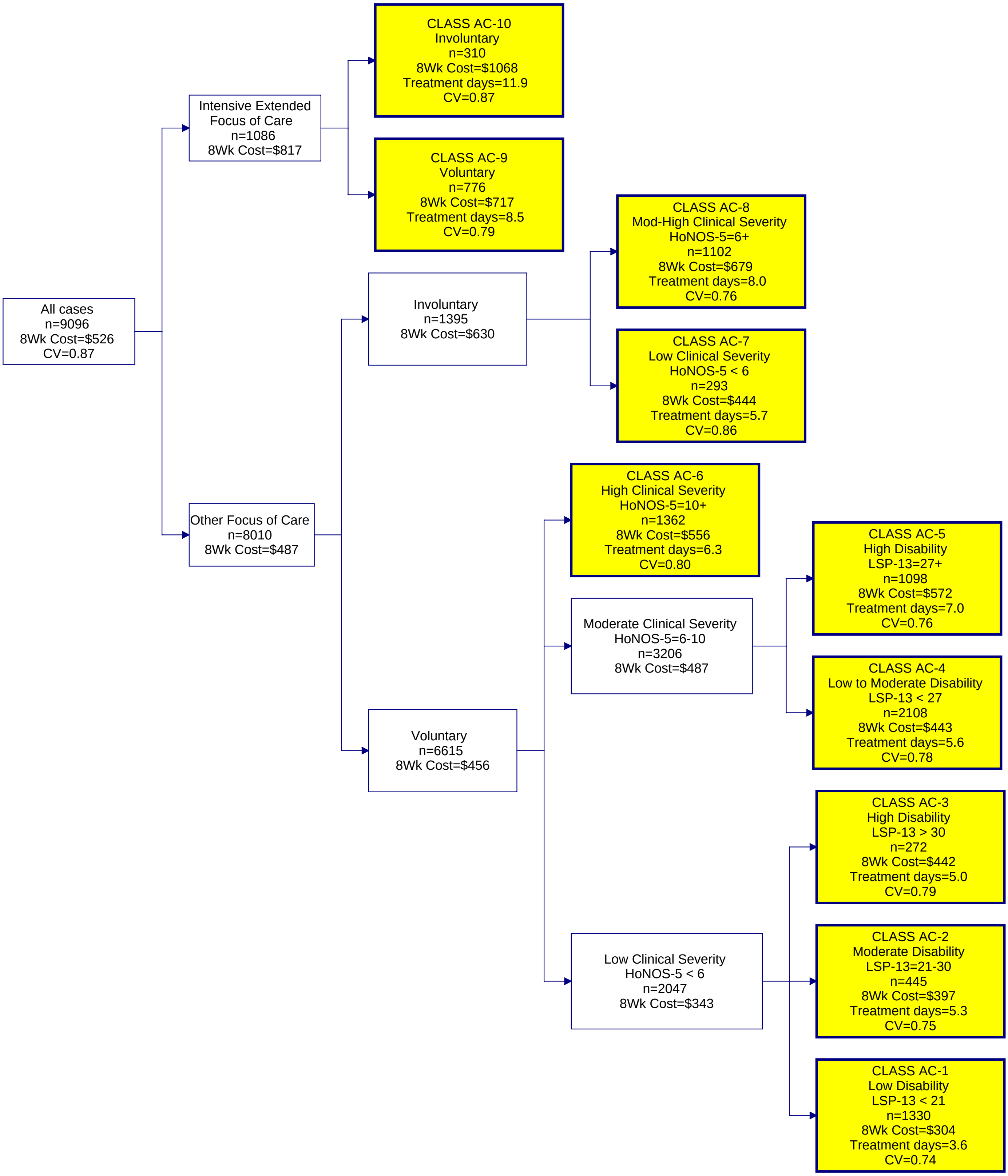


Table 86: MH-CASC Classification for Adult Community Episodes

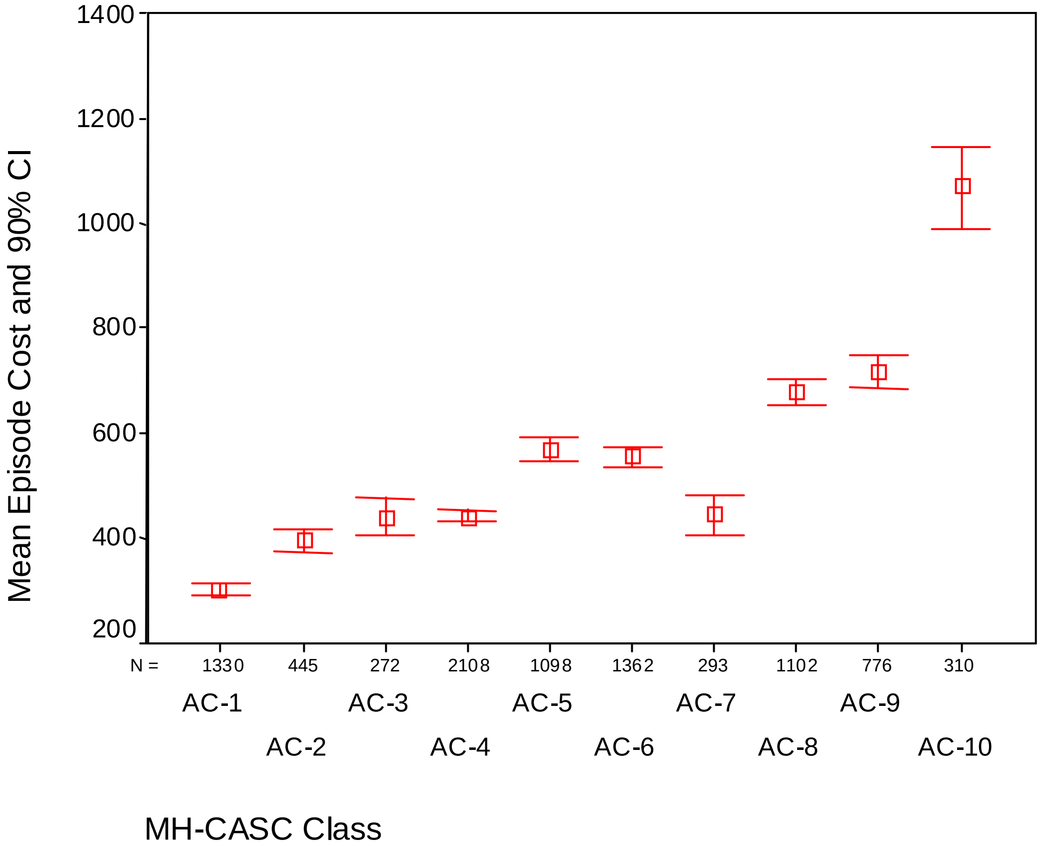
Untrimmed Episode Statistics					
Code	**Class**	**n**	**Mean Episode Cost**	**CV**	**Hi Trim point**
AC-1	Other focus of care, voluntary, low clinical severity[1], low disability[2]	1,449	$424	1.21	$1,026
AC-2	Other focus of care, voluntary, low clinical severity[1], moderate disability[3]	483	$537	1.15	$1,360
AC-3	Other focus of care, voluntary, low clinical severity[1], high disability[4]	299	$698	1.44	$1,558
AC-4	Other focus of care, voluntary, moderate clinical severity[5], low-moderate disability[6]	2,254	$563	1.07	$1,525
AC-5	Other focus of care, voluntary, moderate clinical severity[5], high disability[7]	1,187	$753	1.12	$1,937
AC-6	Other focus of care, voluntary, high clinical severity[8]	1,469	$751	1.23	$2,005
AC-7	Other focus of care, involuntary, low clinical severity[9]	317	$599	1.18	$1,666
AC-8	Other focus of care, involuntary, moderate-high clinical severity[10]	1181	$888	1.16	$2,284
AC-9	Intensive extended focus of care, voluntary	835	$922	1.04	$2,437
AC-10	Intensive extended focus of care, involuntary	332	$1,344	1.03	$3,670
	Total Untrimmed	9,806	$694	1.22	$1,794

Trimmed Episode Statistics					
Code	**Class**	**n**	**Mean Episode Cost**	**CV**	**% Trimmed**
AC-1	Other focus of care, voluntary, low clinical severity[1], low disability[2]	1,330	$304	0.74	8.2%
AC-2	Other focus of care, voluntary, low clinical severity[1], moderate disability[3]	445	$397	0.75	7.9%
AC-3	Other focus of care, voluntary, low clinical severity[1], high disability[4]	272	$442	0.79	9.0%
AC-4	Other focus of care, voluntary, moderate clinical severity[5], low-moderate disability[6]	2,108	$443	0.78	6.5%
AC-5	Other focus of care, voluntary, moderate clinical severity[5], high disability[7]	1,098	$572	0.76	7.5%
AC-6	Other focus of care, voluntary, high clinical severity[8]	1,362	$556	0.80	7.3%
AC-7	Other focus of care, involuntary, low clinical severity[9]	293	$444	0.86	7.6%
AC-8	Other focus of care, involuntary, moderate-high clinical severity[10]	1,102	$679	0.76	6.7%
AC-9	Intensive extended focus of care, voluntary	776	$717	0.77	7.1%
AC-10	Intensive extended focus of care, involuntary	310	$1,068	0.79	6.6%
	Total Trimmed	9,096	$526	0.87	7.2%
	RIV Untrimmed	**5.7%**			
	RIV Trimmed @ Hi	**12.7%**			

Split points used for class definition:

[1] HoNOS-5 <6	[2] LSP-13 < 21	[3] LSP-13 = 21-30	[4] LSP-13 >30
[5] HoNOS-5 = 6-10	[6] LSP-13 < 27	[7] LSP-13 = 27+	[8] HoNOS-5 = 10+
[9] HoNOS-5 < 6	[10] HoNOS-5 =6+		

Figure 78: 90% confidence intervals for average episode costs - Adult Community Episodes



Child and Adolescent Completed Inpatient Episodes

A summary of the univariate analyses of the performance of clinical and socio-demographic measures in explaining variation in the costs of completed inpatient episodes is in Table 87.

The better performing variables were:

- Principal Psychiatric Diagnosis accounted for 9.3% of the variance.
- Focus of Care was the second best predictor of costs and accounted for 8.9% of the variance.
- The Children's Global Assessment Scale (CGAS) accounted for 2.6%
- 'Substance Abuse problems', as a single item from the HoNOSCA, alone explained 2.5% of the variation in total episode cost but the correlation was negative. In contrast to this variable's performance in completed inpatient episodes, higher scores were associated with greater episode costs

Table 87: Child / adolescent completed inpatient episodes – Results ofunivariate regression analyses for selected independent variables

Independent variables		% RIV	
Age		0.4%	*
Focus of Care		8.9%	
Diagnosis		9.3%	
HoNOSCA Items	Aggressive, disruptive, antisocial behaviours	0.0%	
	Overactivity	0.0%	
	Non accidental self-injury	0.3%	*
	Substance Abuse	2.5%	*
	Scholastic Problems	0.1%	*
	Physical Illness/Disability	0.7%	*
	Hallucinations and Delusions	0.7%	*
	Somatic Symptoms	0.0%	
	Emotional Symptoms	0.0%	
	Peer Relationship Problems	0.6%	
	Self-Care	0.2%	*
	Family Life	1.8%	
	School Attendance Problems	0.8%	*
	Accommodation Problems	0.0%	
HoNOSCA 14 item Total		1.4%	
HoNOSCA 5 item total		0.0%	
CGAS		2.6%	
Factors Influencing Health Status		0.1%	

Note: Asterisked items indicate a negative correlation

Figure 79 shows the classification design for Child/Adolescent Completed Inpatient Episodes. Descriptive statistics for trimmed and untrimmed data are presented in Table 88.

This classification accounted for 14.5% of the variance in total episode costs for these episodes, once trimming had occurred. The relatively low number of trimmed episodes included in this analysis (n=139) resulted in each of the classes being relatively low volume. This should be taken into account when interpreting the classification results described below.

The Child/Adolescent Completed Inpatient Episodes branch of the MH-CASC Classification was partitioned into three terminating classes.

The first split occurred on the basis of diagnosis. Those with a diagnosis of mood, somatoform or eating disorders formed the first terminating class, and had an average total episode cost of $8,339.

Those with other diagnoses split further on the basis of aggressive/disruptive behaviour. Those with high aggressive/disruptive behaviour formed a second terminating class, with an average total episode cost of $6,839. Their counterparts with low disruptive/aggressive behaviour formed a third terminating class, with an average total episode cost of $3,802.

This association of disruptive/antisocial behaviour with higher costs is consistent with views expressed by the clinical panels. Child/adolescent mental health experts advised that conduct disorders in children typically cost more because they required involvement of the child's social and school network and occasional work arising from the juvenile justice system. Conduct disorders in children are mainly diagnosed in young males. Consistent with this, 77% of cases in the high disruptive/aggressive class were males with an average age of 11.5 years.

As with the adult final classes, the coefficients of variation indicate considerable homogeneity within each of the classes. The 90% confidence intervals (see Figure 80) highlight that there is good differentiation of the least expensive class in terms of average total costs, but there is considerable overlap between the two remaining classes.

Figure 79: MH-CASC Classification Tree: Child/Adolescent Completed Inpatient Episodes

3 classes, RIV=14.5% (trimmed), Episode Cost=$6,048, LoS=16.6 days, Per Diem=$415

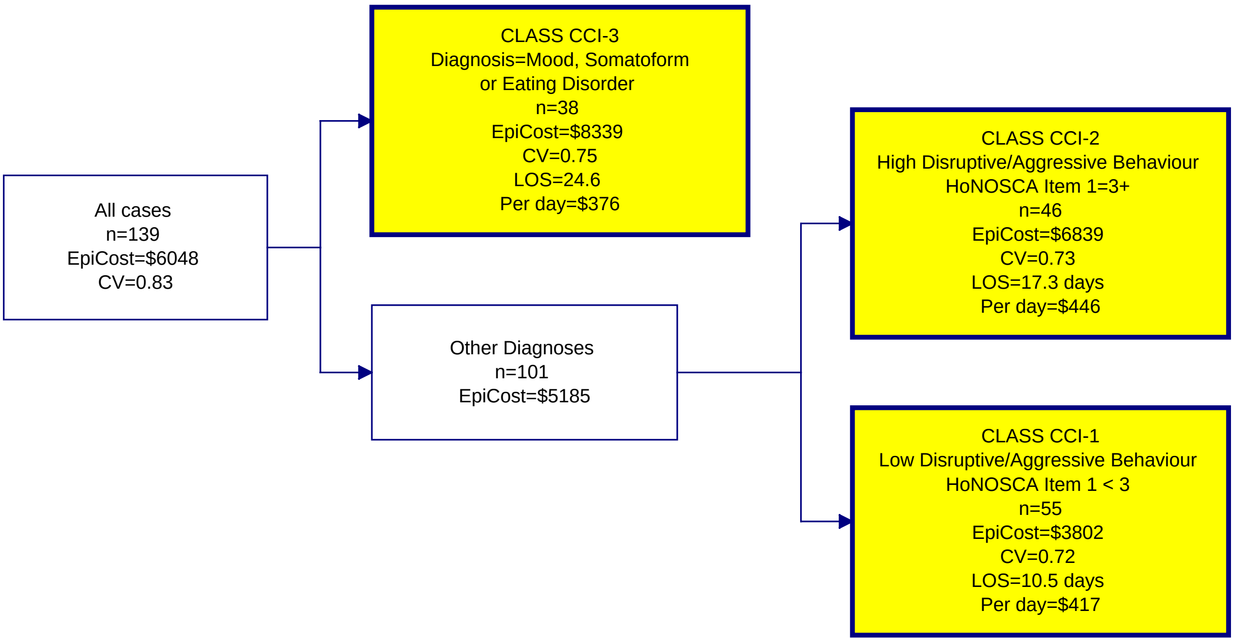


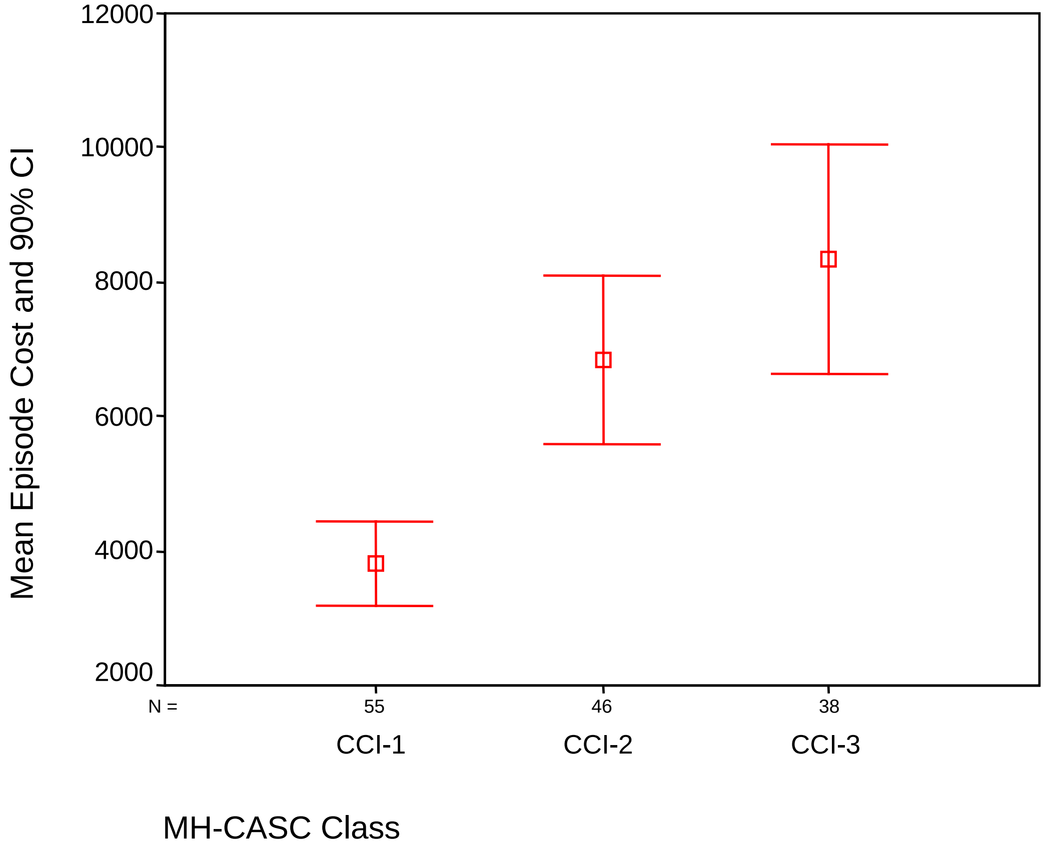
Table 88: MH-CASC Classification for Child/Adolescent Completed Inpatient Episodes

	Untrimmed Episode Statistics				
Code	**Class**	**n**	**Mean Episode Cost**	**CV**	**Hi Trim point**
CCI-1	Other diagnoses, low disruptive/aggressive behaviour[1]	59	$4,541	0.85	$12,502
CCI-2	Other diagnoses, high disruptive/aggressive behaviour[2]	46	$6,839	0.73	$22,578
CCI-3	Mood, somatoform, or eating disorder	40	$9,505	0.85	$26,434
	Total Untrimmed	145	$6,639	0.90	$22,252
	Trimmed Episode Statistics				
Code		**n**	**Mean**	**CV**	**% Trimmed**
CCI-1	Other diagnoses, low disruptive/aggressive behaviour[1]	55	$3,802	0.72	6.8%
CCI-2	Other diagnoses, high disruptive/aggressive behaviour[2]	46	$6,839	0.73	0.0%
CCI-3	Mood, somatoform, or eating disorder	38	$8,339	0.75	5.0%
	Total Trimmed	139	$6,048	0.83	4.1%
	RIV Untrimmed	**11.6%**			
	RIV Trimmed @ Hi	**14.5%**			
	RIV Trimmed @ Hi & Same day	**14.4%**			

Split points used for class definition:

[1] HoNOSCA Item 1 < 3
[2] HoNOSCA Item 1 = 3+

Figure 80: 90% confidence intervals for average episode costs - Child/Adolescent



Completed Inpatient Episodes

Child and Adolescent Community Episodes

The univariate analyses conducted for this cohort are presented in Table 89. The better performing variables were:

- 'School Attendance Problems', as a single item from the HoNOSCA, alone explained 5.8% of the variation in total episode cost.
- Principal Psychiatric Diagnosis accounted for 5.4% of the variance.
- Overall severity as measured through the HoNOSCA-14 accounted for approximately 4.6% of the variance
- Age accounted for 4.2% of the variation in costs with older patients have higher episode costs than younger patients.
- 'Substance Abuse problems' measured by HoNOSCA item 4 explained 2.6% of the variation in total episode cost. In contrast to this variable's performance in completed inpatient episodes, higher scores were associated with greater episode costs.

Table 89: Child/Adolescent Community Episodes – Results of univariate regression analyses for selected independent variables

Independent variables		% RIV	
Age		4.2%	
Focus of Care		0.8%	
Diagnosis		5.4%	
HoNOSCA Items	Aggressive, disruptive, antisocial behaviours	0.3%	
	Overactivity	0.0%	
	Non accidental self-injury	2.6%	
	Substance Abuse	1.7%	
	Scholastic Problems	0.2%	
	Physical Illness/Disability	0.1%	
	Hallucinations and Delusions	0.9%	
	Somatic Symptoms	0.7%	
	Emotional Symptoms	2.8%	
	Peer Relationship Problems	3.2%	
	Self-Care	0.2%	*
	Family Life	1.3%	
	School Attendance Problems	5.8%	
	Accommodation Problems	0.8%	
HoNOSCA 14 item Total		4.6%	
HoNOSCA 5 item total		2.1%	
CGAS		1.3%	
Factors Influencing Health Status		1.2%	

Note: Asterisked items indicate a negative correlation

Figure 81 shows the classification tree for Child/Adolescent Community Episodes. Descriptive statistics for trimmed and untrimmed data are presented in Table 90.

This tree comprised nine final classes which together accounted for an 18.8% reduction in variance in 8-week episode costs, using trimmed data (n=1,956).

The classifications first partitions episodes according to the patients age. Those aged over 12 split further on severity, as measured by the HoNOSCA total score. Those with high severity split into two terminating classes on the basis of psychosocial complications, with those with high psychosocial complications having an average 8-week cost of $817 and those with low psychosocial complications having an average 8-week episode cost of $445. Those with low severity split into two terminating classes distinguished by low functioning (average 8-week cost of $439) and high functioning (average 8-week cost of $333).

Those aged 6-12 years split further on school attendance problems. Those with the more severe school attendance problems formed a terminating class with an average 8-week cost of $547. This class was relatively low volume (n=48) but was considered to be sufficiently different from the other classes to warrant its inclusion as a separate class. Those with low to moderate school attendance problems split further into two terminating classes characterised by high disruptive/antisocial behaviour (average 8-week cost of $404) and low disruptive/antisocial behaviour (average 8-week cost of $304).

Those aged less than six split further into two terminating classes, based on level of functioning. Those who were not high functioning had an average 8-week cost of $294, and their high functioning counterparts had an average 8-week cost of $165. The latter group was relatively low volume (n=37), but again it was thought that they were sufficiently distinct from the other classes to be included as a discrete class.

Figure 82 shows that there is reasonable differentiation between most classes, indicated by the non overlapping 90% confidence intervals.

Figure 81: MH-CASC Classification Tree: Child/Adolescent Community Episodes

9 classes, RIV=18.8% (trimmed), 8-week period costs=$377, Treatment Days=4.1,
Per Diem=$95

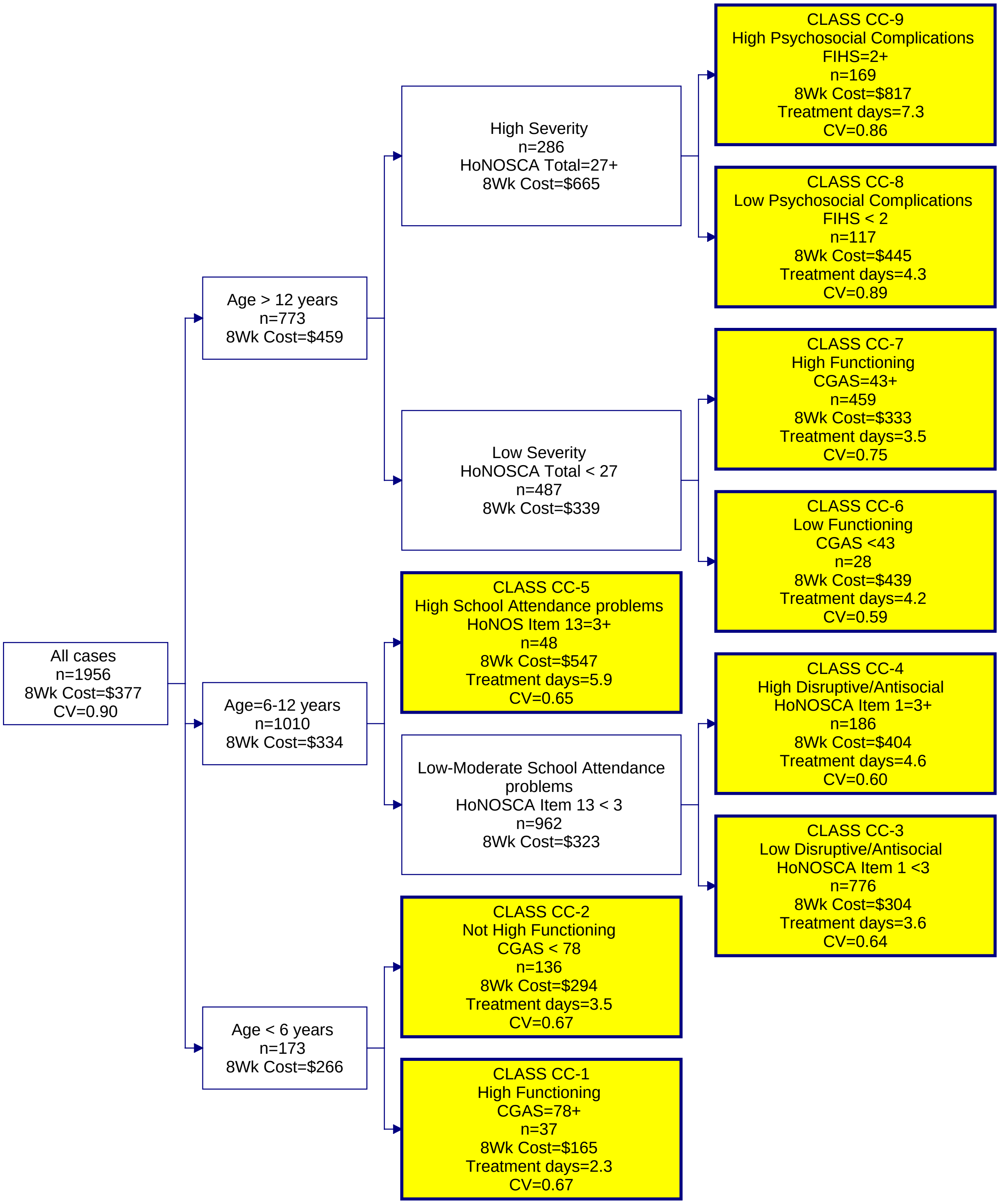


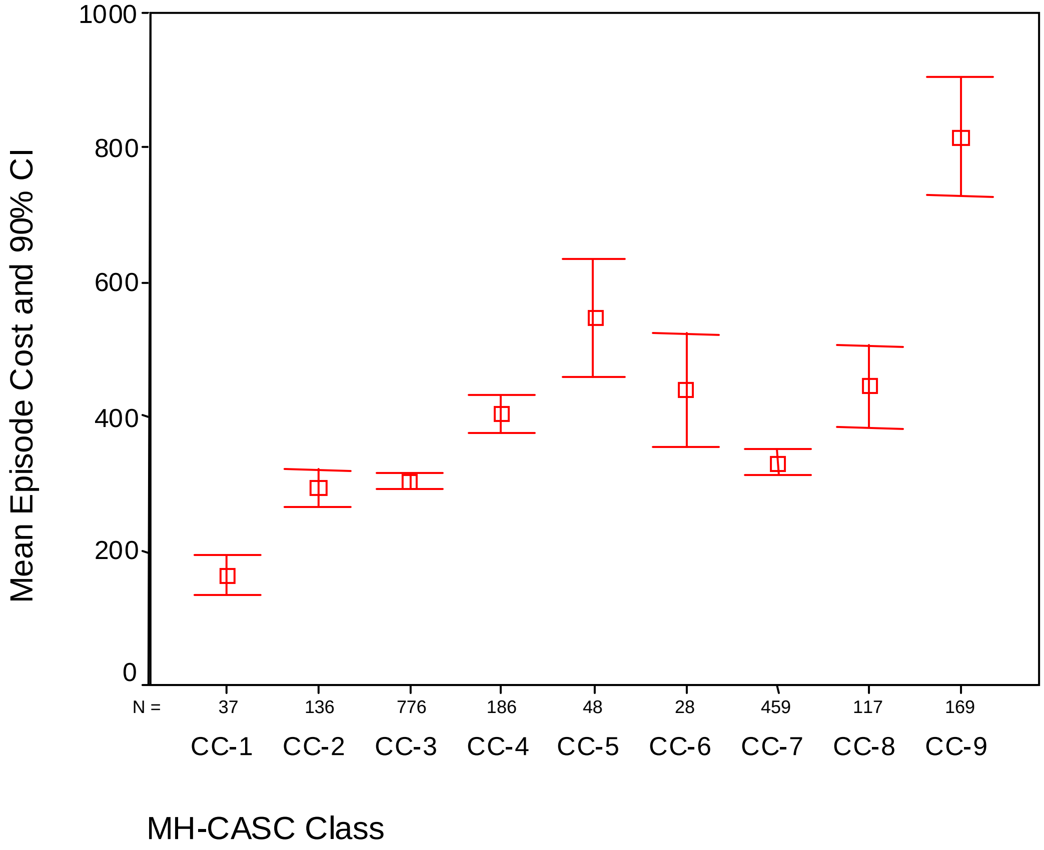
Table 90: MH-CASC Classification for Child/Adolescent Community Episodes

	Untrimmed Episode Statistics				
	Class	**n**	**Mean Episode Cost**	**CV**	**Hi Trim point**
CC-1	Age < 6; High functioning[1]	39	$201	0.95	$560
CC-2	Age < 6; Not high functioning[2]	146	$353	0.84	$908
CC-3	Age 6-12; Low-moderate school attendance problems[3], Low disruptive/antisocial behaviour[4]	821	$354	0.81	$890
CC-4	Age 6-12; Low-moderate school attendance problems[3], High disruptive/antisocial behaviour[4]	199	$476	0.78	$1,177
CC-5	Age 6-12; High school attendance problems[5]	53	$789	1.08	$1,779
CC-6	Age > 12; Low severity[6] ; Low functioning[7]	33	$822	1.23	$1,608
CC-7	Age > 12; Low severity[6] ; High functioning[8]	493	$453	1.23	$1,098
CC-8	Age > 12; High severity[9] ; Low psychosocial complications[10]	131	$758	1.38	$1,834
CC-9	Age > 12; High severity[9]; High psychosocial complications[11]	183	$1,048	1.02	$3,151
	Total Untrimmed	2,098	$490	1.24	$1,155
	Trimmed Episode Statistics				
		n	**Mean Episode Cost**	**CV**	**% Trimmed**
CC-1	Age < 6; High functioning[1]	37	$165	0.67	5.1%
CC-2	Age < 6; Not high functioning[2]	136	$294	0.67	6.8%
CC-3	Age 6-12; Low-moderate school attendance problems[3], Low disruptive/antisocial behaviour[4]	776	$304	0.64	5.5%
CC-4	Age 6-12; Low-moderate school attendance problems[3], High disruptive/antisocial behaviour[5]	186	$404	0.60	6.5%
CC-5	Age 6-12; High school attendance problems[6]	48	$547	0.65	9.4%
CC-6	Age > 12; Low severity[7] ; Low functioning[8]	28	$439	0.59	15.2%
CC-7	Age > 12; Low severity[7] ; High functioning[9]	459	$333	0.75	6.9%
CC-8	Age > 12; High severity[10] ; Low psychosocial complications[11]	117	$445	0.89	10.7%
CC-9	Age > 12; High severity[10]; High psychosocial complications[12]	169	$817	0.86	7.7%
	Total Trimmed	1,956	$377	0.90	6.8%
	RIV Untrimmed	**12.4%**			
	RIV Trimmed @ Hi	**18.8%**			

Split points used for class definition:

[1] CGAS = 78+
[2] CGAS < 78
[3] HoNOSCA Item 13 < 3
[4] HoNOSCA Item 1 < 3
[5] HoNOSCA Item 1 = 3+
[6] HoNOSCA Item 13 = 3+
[7] HoNOSCA Total < 27
[8] CGAS < 43
[9] CGAS = 43+
[10] HoNOSCA Total = 27
[11] FIHS < 2
[10] FIHS = 2+

Figure 82: 90% confidence intervals for average episode costs - Child/Adolescent Community Episodes



Cross-setting classification

Classification development in which episodes of care are defined across treatment settings is unexplored territory in Australian casemix research. Few precedents were available to guide the analysis approach taken by the Project Team.

Cohort definition

As discussed in Chapter 11, the low number of multiple, cross-setting episodes in the study sample limited the degree to which particular 'bundles of care' could be explored. For example, initial interest in defining a new type of episode that combined the pre-admission and post discharge care periods with the cost of inpatient care could not be pursued due to the insufficient number of patients with care patterns of this type.

The approach taken was to develop a classification of 'Bundled Episodes' where the episode is defined as the total care provided over an 8-week period. All costs associated with treatment of the patient over the period were included in calculating total episode costs.

To demonstrate the potential for development of cross-setting models, this analysis concentrated only on the adult patient cohort, representing 83% of the study sample. As previously described, the final analysis cohort selected only those patients who were under care during the study period for a minimum of four weeks[a], and excluded patients treated at sites where comprehensive information was not collected on community service use. These criteria defined a final analysis cohort of 8,067 patients, or 54% of the total adult patients registered to the study.

For each patient, 8 week episode costs were calculated, with upward and downward scaling applied to patients who were under care during the study for less than or greater than 8 weeks respectively.

Initial exploratory analyses pointed to three variables as good predictors of 8-week costs (Table 91).

- Inpatient status – an indicator of whether the patient had been admitted in the study period – alone accounted for 42.1% of the variance. While this is not an independent variable and was not considered for inclusion in class finding, it highlights the importance of inpatient care as the key contributor to cost variation between patients. It also indicates that the task of predicting variation within the cohort is one of finding the clinical variables that can predict whether the patient had been admitted to hospital.
- Focus of care was the second best predictor of costs, accounting for 9.5% of the variance. Essentially, this separated patients rated 'acute' from all other focus of care categories. Given that most patients (83%) with inpatient status were rated as acute, as compared with only 20% of non-admitted patients, focus of care is best treated as a dependent variable rather than an independent measure when applied in a cross-setting analysis. Consequently, it was also excluded from class finding.

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a Operationally, the minimum care period was defined as 30 days to overcome measurement-induced bias in episode length created by the 14-day clinical rating cycle.

Table 91: Adult 'Bundled Episodes' – Results of univariate regression analyses for selected independent variables

Independent variables		% RIV
Age		0.0%
Inpatient Indicator		42.1%
Focus of Care		9.5%
Legal Status		8.2%
Diagnosis		1.0%
HoNOS Items	Aggressive behaviours	3.8%
	Suicidal behaviours	0.8%
	Substance Abuse	0.1%
	Cognitive Problems	2.0%
	Physical Illness/Disability	0.2%
	Hallucinations and Delusions	2.6%
	Depressed Mood	0.1%
	Other Mental Problems	0.0%
	Social Problems	0.3%
	Overall Disability	0.9%
	Accommodation problems	0.8%
	Occupational/Recreational problems	0.5%
HoNOS 10 item Total		2.3%
HoNOS 5 item total		3.6%
LSP-16 Sub-scales	Withdrawal	0.2%
	Self-care	0.9%
	Compliance	2.2%
	Anti-social	2.9%
LSP13 Total Score		1.6%

Note: All correlations were positive

- Legal Status – defined in terms of whether the patient had ever been involuntary during the study period – explained 8.2% of cost variation. While this measure is also biased toward inpatients (51% of inpatient episodes and 19% of community episodes included patients who had been involuntary at some stage), it was included as a variable in the class finding analysis because:
  - the relationship to inpatient status is less direct than focus of care;
  - it emerged as a consistently strong variable in the setting-specific analyses, indicating that even when setting is controlled, it points to underlying differences between patients in costs; and
  - legal status has been accepted as classification variable in AN-DRG 4.

Results of the class finding analysis are summarised in Table 92 and Figure 83. The classification design proposes 12 classes that account for 27.9% of the variation in 8-week costs, using trimmed data. This result is heavily influenced by the trimming procedure as discussed below.

Figure 83: MH-CASC Classification Tree - Adult 'Bundled Episodes' (8-week period cost)

12 Classes, RIV 27.9% (trimmed), 8Wk Cost=$1,007, Treatment Days = 10.4

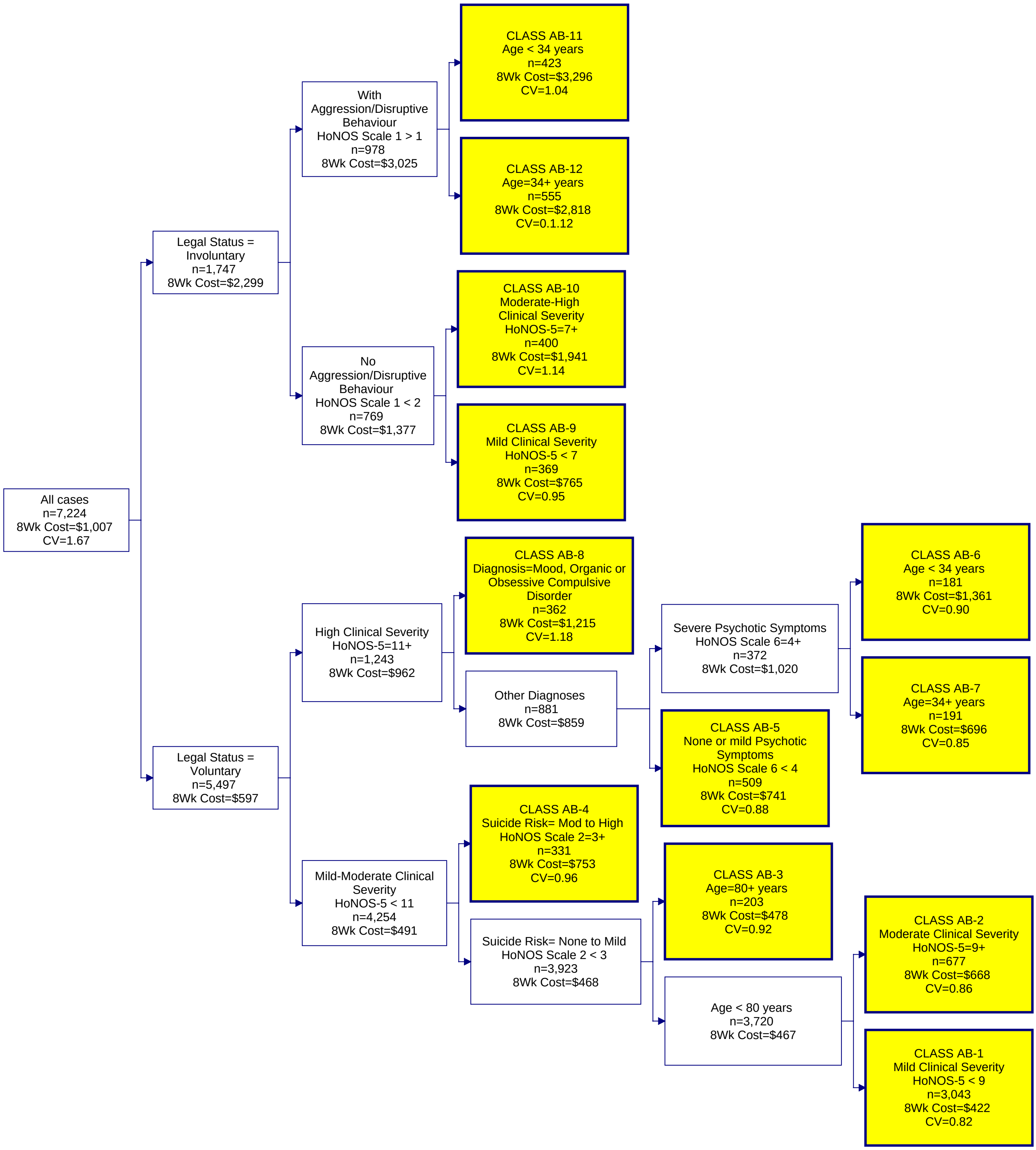

Table 92: MH-CASC classification – Adult 'Bundled Episodes' (8 week cost)

Code	Class	n	Mean episode cost	CV	Hi Trim point
	Untrimmed Episode Statistics				
AB-1	Voluntary, mild clinical severity, low suicide risk, age less than 80 years	3,398	$803	2.08	$1,602
AB-2	Voluntary, moderate clinical severity, low suicide risk, age less than 80 years	764	$1,276	1.75	$2,706
AB-3	Voluntary, mild-moderate clinical severity, low suicide risk, age 80+ years	237	$1,774	2.10	$2,194
AB-4	Voluntary, mild-moderate clinical severity, high suicide risk	378	$1,502	1.57	$3,571
AB-5	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, low psychotic symptoms	562	$1,264	1.62	$2,930
AB-6	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, severe psychotic symptoms, age less than 34 years	206	$2,577	1.47	$6,036
AB-7	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, severe psychotic symptoms, age 34+ years	212	$1,233	1.55	$2,780
AB-8	Voluntary, high clinical severity, diagnosis mood, organic disorder or obsessive compulsive disorder	408	$2,423	1.69	$6,176
AB-9	Involuntary, none or mild aggressive/disruptive behaviour, mild clinical severity	412	$1,671	1.91	$3,408
AB-10	Involuntary, no aggressive/disruptive behaviour, moderate to high clinical severity	438	$2,922	1.35	$9,138
AB-11	Involuntary, with aggressive/disruptive behaviour, age less than 34 years	452	$4,321	1.22	$13,725
AB-12	Involuntary, with aggressive/disruptive behaviour, age 34+ years	600	$3,948	1.31	$12,628
	Total untrimmed	8,067	$1,670	1.90	$3,184
	Trimmed Episode Statistics				
		n	**Mean**	**CV**	**% Trimmed**
AB-1	Voluntary, mild clinical severity, low suicide risk, age less than 80 years	3,043	$422	0.82	10.4%
AB-2	Voluntary, moderate clinical severity, low suicide risk, age less than 80 years	677	$668	0.86	11.4%
AB-3	Voluntary, mild-moderate clinical severity, low suicide risk, age 80+ years	203	$478	0.92	14.3%
AB-4	Voluntary, mild-moderate clinical severity, high suicide risk	331	$753	0.96	12.4%
AB-5	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, low psychotic symptoms	509	$741	0.88	9.4%
AB-6	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, severe psychotic symptoms, age less than 34 years	181	$1,361	0.90	12.1%
AB-7	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, severe psychotic symptoms, age 34+ years	191	$696	0.85	9.9%
AB-8	Voluntary, high clinical severity, diagnosis mood, organic disorder or obsessive compulsive disorder	362	$1,215	1.18	11.3%
AB-9	Involuntary, none or mild aggressive/disruptive behaviour, mild clinical severity	369	$765	0.95	10.4%
AB-10	Involuntary, no aggressive/disruptive behaviour, moderate to high clinical severity	400	$1,941	1.14	8.7%
AB-11	Involuntary, with aggressive/disruptive behaviour, age less than 34 years	423	$3,296	1.04	6.4%
AB-12	Involuntary, with aggressive/disruptive behaviour, age 34+ years	555	$2,818	1.12	7.5%
	Total trimmed	7,244	$1,007	1.67	10.2%
	RIV Untrimmed	**12.6%**			
	RIV Trimmed @ Hi	**27.9%**			

The first split occurred on legal status, separating the 25% of patients who had received involuntary care at any time during the study period from those who were voluntary. The cost differential between the groups is highly significant, with the involuntary group having an average cost ($2,299) nearly four times that of the voluntary patients ($597).

The involuntary group was then further partitioned to create four of the twelve end classes. First splits were made on aggressive and disruptive behaviour, measured by HoNOS scale 1. The optimal split point identified for the group was low, simply separating those patients with no problems from those with any level of aggression or disruptive behaviour problem.

The 'with aggression' involuntary patients were than partitioned on age, separating patients into under-34 and 34 years and older final classes. Average costs for the under 34 year group ($3,296) were 17% higher than their older counterparts ($2,818).

For the involuntary, non-aggressive group, a single split on clinical severity (as measured by the 'HoNOS-5' subscale) produced a further two end classes. Average costs for the class of patients rated with moderate to high severity ($1,941) were 2.5 times higher than those rated with mild severity ($765)

Of the two final classes produced at this node of the tree, the 'involuntary, non aggressive, mild clinical severity' group appears anomalous, with its combination of low clinical severity and involuntary status. However, this may reflect the differing time frames used by clinicians when determining legal status and clinical symptomatology. As discussed in Chapter 18, patients may be assigned to involuntary status on the basis of past behaviour evident more than two weeks earlier (e.g., an established history of non compliance with treatment), or low risk-high impact behaviours (e.g., sporadic violence) that presents significant risk for the patient or the community. In contrast, clinicians were explicitly requested to make the HoNOS ratings only on the basis of behaviour over the previous fortnight.

The remaining eight classes comprise voluntary patients, with first splits occurring on clinical severity (HoNOS-5 subscale), creating two branches (high and a mild-moderate). Patients assigned to the high clinical severity branch were then divided on diagnosis, separating mood and organic disorders into a single final terminating class. Average 8-week costs for this group ($1,215) are 41% higher for patients with other diagnoses.

Three final classes were the created within the 'non-mood, non-organic' voluntary patients, based on severity of psychotic symptoms (HoNOS scale 6) and age. Patients with no or only mild psychotic symptoms (hallucinations and delusions) were assigned to a final class with an average cost of $741, while patients with moderate to severe psychotic symptoms were split on age, with 33 years again being identified as the optimal split point.

As in other branches of the MH-CASC classification model where 'young adults' were partitioned from other adults, costs for the younger group are significantly higher ($1,361 versus $696).

Those patients with voluntary status and mild to moderate severity formed the remaining four end-classes, branching first on suicide problems (HoNOS Scale 2). Patients with moderate to high suicide problems were assigned to a terminating class, with average 8-week costs 61% higher than patients without significant suicide problems (average cost of $753 compared with $468). For the 'low suicide' group - which collectively account for 54% of the total analysis cohort - splits on age and clinical severity produced three final classes. Patients aged 80 years or more formed an end class, with an average 8-week cost of $478. Patient less than 80 years were separated on the basis of the HoNOS-5 scale into two classes

- low clinical severity and moderate clinical severity. Average costs for the moderate severity group were 58% higher than the low severity class.

Overall, seven variables are used to create the classification. Apart from the split of organic and mood patients within one of the branches, neither diagnosis nor level of functioning feature as key factors in the differentiation of classes.

Table 93 provides some insight into how the range of clinical disorders is distributed across the 12 classes. Although each diagnostic category is represented in most of the classes, several patterns in the diagnosis-class relationships are suggested:

- patients with a diagnosis of schizophrenia, substance abuse or behavioural syndromes are more likely to be assigned to one of the four higher-cost classes than patients in other diagnostic groups (29%, 37% and 61% of cases respectively; average for all diagnostic groups - 21%);
- conversely, patients diagnosed with anxiety, eating and obsessive compulsive disorders are more likely to be assigned to one of the four lower-cost classes than patients in other diagnostic groups (78%, 72% and 70% of cases respectively; average for all diagnostic groups - 53%).

From the cost perspective, coefficients of variation for 8 of the 12 end classes are reasonable (less than 1, trimmed costs), suggesting the classes to be relatively homogeneous. Figure 84 however points to a degree of overlap between several of the classes, indicated by the overlapping 90% confidence intervals. This suggests that on statistical grounds there may be room for consolidation, although reduction in the number of classes would be likely to reduce their clinical validity.

Figure 84: 90% confidence intervals for average episode costs - Adult 'Bundled Episodes'

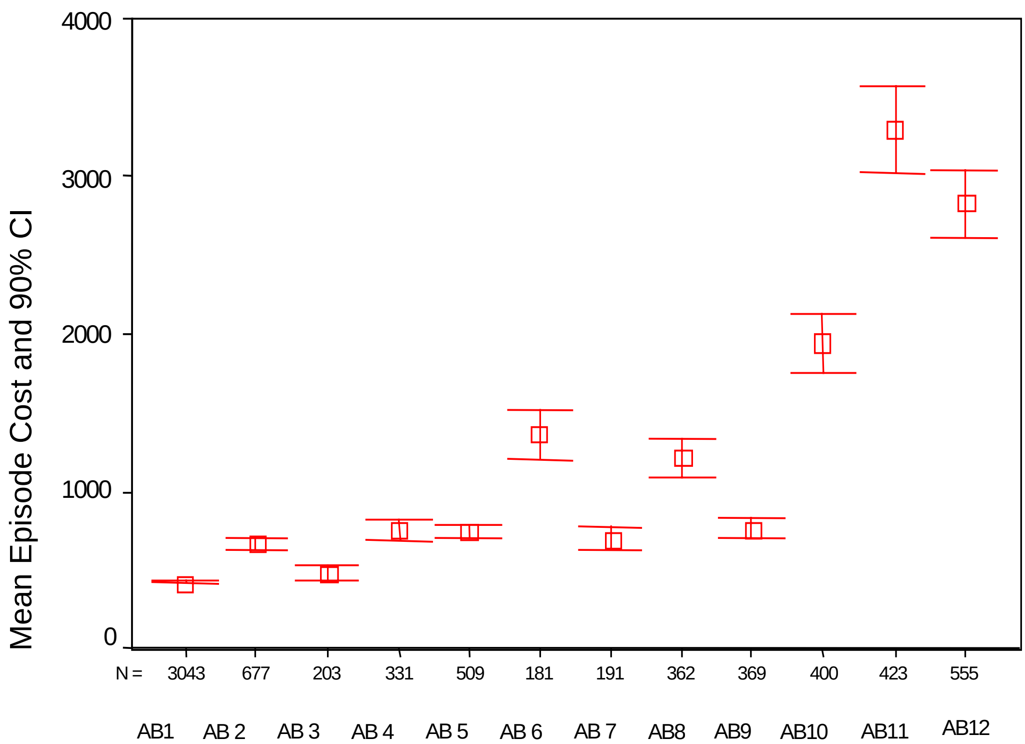

Table 93: Distribution of diagnoses groups across the 12 Adult 'Bundled Episodes' classes

DIAGNOSTIC CATEGORY	N Cases	CLASS CODE and Av. COST ← *Higher Cost* —— *Lower Cost* →												
		AB-11 $3,296	AB-12 $2,818	AB-10 $1,941	AB-6 $1,361	AB-8 $1,215	AB-9 $765	AB-4 $753	AB-5 $741	AB-7 $696	AB-2 $668	AB-3 $478	AB-1 $422	All Classes
Organic Disorders	479	1%	9%	5%		28%	2%	1%			15%	20%	18%	100%
Substance Abuse Disorders	135	16%	11%	9%	1%		3%	4%	25%	2%	8%	1%	19%	100%
Schizophrenia, Paranoia & Acute Psychotic Disorders	3,745	8%	8%	7%	5%		6%	1%	9%	5%	12%	1%	38%	100%
Mood Disorders	2,131	3%	9%	4%		12%	6%	9%			6%	4%	47%	100%
Anxiety Disorders	342	1%	3%	3%			3%	4%	8%	1%	5%	4%	68%	100%
Obsessive Compulsive Disorders	78	1%		1%		15%	8%	4%			9%	1%	60%	100%
Stress & Adjustment Disorders	445	3%	4%	3%	1%		3%	15%	16%		7%	1%	49%	100%
Eating Disorders	25	8%		8%			12%				4%		68%	100%
Behavioural Syndromes	28	39%	11%	11%					11%			14%	14%	100%
Personality Disorders	348	7%	5%	2%	1%		2%	14%	24%	2%	9%	1%	32%	100%
Other disorders	39	10%	5%	10%			13%	3%	21%	3%	8%		28%	100%

Key to Class Codes

Code	Class
AB-1	Voluntary, mild clinical severity, low suicide risk, age less than 80 years
AB-2	Voluntary, moderate clinical severity, low suicide risk, age less than 80 years
AB-3	Voluntary, mild-moderate clinical severity, low suicide risk, age 80+ years
AB-4	Voluntary, mild-moderate clinical severity, high suicide risk
AB-5	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, low psychotic symptoms
AB-6	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, severe psychotic symptoms, age less than 34 years
AB-7	Voluntary, high clinical severity, diagnosis other than mood or organic disorder, severe psychotic symptoms, age 34+ years
AB-8	Voluntary, high clinical severity, diagnosis mood, organic disorder or obsessive compulsive disorder
AB-9	Involuntary, none or mild aggressive/disruptive behaviour, mild clinical severity
AB-10	Involuntary, no aggressive/disruptive behaviour, moderate to high clinical severity
AB-11	Involuntary, with aggressive/disruptive behaviour, age less than 34 years
AB-12	Involuntary, with aggressive/disruptive behaviour, age 34+ years

Notes to table:
1. % based on total cohort, less missing Diagnosis
2. Av cost = trimmed
3. Other diagnoses comprises Somatoform Disorders (10), Sexual Disorders (16) Disorders of Psychological Development (3) and Disorders of Childhood and Adolescence (10)

Overriding these considerations, three features of the classification are prominent. The first concerns the substantial heterogeneity in the untrimmed cost data, as indicated by the overall CV ranging from 1.22 to 2.10. Variation within the overall cohort is substantially higher than in any of the setting-specific cohorts, as are the untrimmed CVs for each of the end classes. As evidenced in Table 91, this heterogeneity in the dependent variable is primarily a function of bringing together higher cost admitted patients and lower cost community patients. The higher RIV achieved in this classification relative to the setting specific cohorts is partly because there is more variance to explain.

The second feature of the cohort is related to this point. Standard casemix trimming formulae bring the intra-group variation to reasonable levels but in so doing, 10.8% of high cost cases are excluded. This is more severe than the trim applied to the setting-specific cohorts (6.9% episodes trimmed across all setting-based classes). When translated to funding design, higher trimming requires more complex adjustments to manage cost outliers, and potentially undermines clinician confidence in the classification. It is important to note however, that the 10.8% trim compares favourably with the overall trim rate used in development of the AN-DRG 3 classification (11%).

Finally, the imbalance in the volume of cases between the 12 classes is significant. In particular, 42% of cases are assigned to a single end class (voluntary, mild clinical severity, low suicide risk, age less than 80 years), which has the lowest average cost ($422 compared with an overall average of $1,004). Although trimming reduced the coefficient of variation from a very high 2.08 to an acceptable 0.82, the class potentially spans a wide range of clinical disorders. It is the most clinically 'anonymous' group emerging across all the classes within the MH-CASC classification model. Attempts to further divide the group into more coherent sub-units were unsuccessful.

The average episode cost for this large group is equivalent to a service pattern of fortnightly outpatient contact at an average cost of $100 per occasion, suggestive of maintenance community care. Despite the implied clinical heterogeneity and mix of clinical needs within the group, this pattern may in fact represent the service delivery reality for the majority of mental health patients in Australia. The issue to resolve is the clinical validity of such a large end-class and whether it provides a sufficient base for clinical protocols to be defined.

Balancing these concerns is the fact that the classification represents an interesting first step toward designing a casemix model that promotes the service development and innovation advocated under the National Mental Health Strategy. This issue is discussed further in Chapter 18.

SECTION 7

Discussion of the Classification Model

Chapter

17

Is There a Relationship Between Patient Factors and Service Costs?

The core hypothesis of the MH-CASC Project is that patient attributes predict resource use, provided the right variables are measured. These patient attributes can then be configured into a casemix classification system.

The study found there is a clinically logical relationship between patient attributes and resource use in Australian mental health services. Patients who are expected to cost more usually do cost more.

Table 94 summarises the patient cost drivers found to be influential in each of the episode types.

Table 94: Patient cost drivers for each of the episode types

	Inpatient Episodes	Community Episodes
Adult services	*Completed Inpatient Episodes* • Age (very old = highest cost) • Diagnosis, with Schizophrenia, Mood and Eating disorders the highest costs • Overall severity (as measured by HoNOS total score) • Involuntary legal status • ADL dependency (for >65 years only) *Ongoing Inpatient Episodes* • Age: Young adults more expensive (when combined with other attributes) • Diagnoses other than Schizophrenia and Organic Disorders associated with higher cost • Aggressive/disruptive behaviour • Involuntary legal status • ADL dependency (for > 65 years only)	• Clinical Focus: Intensive Extended Care vs Other • Involuntary legal status • Overall clinical severity (as measured by HoNOS clinical scales) • Disability (as measured by LSP)
Child and Adolescent Services	*Completed Inpatient Episodes* • Diagnosis: Mood, Eating and Somatoform disorders more expensive • Disruptive/Aggressive behaviour	• Age: Distinguish pre-school, primary and secondary • Overall clinical severity • Level of functioning • Disruptive/aggressive behaviour • ‘Psychosocial complications’ • Problems at school

However, the statistical relationship is relatively modest. The AN-DRG classification sets an overall benchmark, explaining 35.4% of variance in length of stay in overnight medical episodes with approximately 11% of episodes excluded through trimming. When surgical and same day cases are included the variance explanation increases to 50.8%.[93]

A core feature of the MH-CASC dataset needs to be considered when interpreting the degree to which the classification explains variance within each of the episode types. Analyses presented in Chapter 13 highlighted the restricted range of costs in each of the patient cohorts and concluded that there is substantially less variance in the MH-CASC data than is found in the 'mainstream' AN-DRG dataset. The conclusion from the data presented in that chapter is that the application of classification tools to the MH-CASC dataset can only achieve, at best, a modest reduction in variance simply because there is less variance to explain.

This chapter summarises the classes and allows assessment of whether the classification moves in the 'right direction' clinically. The statistical performance of the classification for each episode type is also summarised..

The expected number of observations nationally is also presented as an indicative guide only. Previous AN-DRGs standards have required 200 observations per year nationally to justify the creation of a new AN-DRG.

Adult Episode classification

Completed Inpatient Episodes

The Completed Inpatient Episode classification shows a reasonable distribution in costs and lengths of stay. Fifty one per cent of cases are in the two low cost classes ($2,864 and $2,484), and the remaining cases are in classes with at least 53% higher average costs (over $4,386), with the three highest cost classes having more than double the costs of the bottom two classes.

Those patients with higher severity and dependency (measured by the HoNOS and RUG-ADL) and with involuntary status consume more resources than those patients with lower dependency and severity. The most expensive diagnostic groups are Schizophrenia, Mood Disorders, and Eating Disorders.

The number of people in each class is sufficient to satisfy the national standard of 200.

The coefficients of variation range from 0.54 to 0.90, with most around the 0.7-0.8 level. These CVs are regarded as acceptable, and suggest that the classes are homogeneous.

However, the overall explanation of variance remains at the lower end of what is sought in casemix classifications, where the lowest performing MDCs achieve 20%+ RIV. The 8 classes of the MH-CASC Adult Completed Inpatient Episodes classification have an RIV of 16.3% (trimmed).

Table 95: MH-CASC Adult Completed Inpatient Episodes

Code	Class	Cost per episode	Episode Cost Weight	Length of Stay (Days)	Cost per Day	Time per Day (Hours)	National annual sample estimate*
ACI-1	Age < 65 years, diagnosis other than schizophrenia or mood or eating disorder	$2,484	0.64	7.8	$342	2.6	17,550
ACI-2	Age < 65 years, schizophrenia or mood or eating disorders, voluntary status, low-medium severity	$2,864	0.73	10.4	$292	2.0	12,300
ACI-3	Age < 65 years, schizophrenia or mood or eating disorders, voluntary status, high severity	$4,386	1.12	14.7	$306	2.4	3,100
ACI-4	Age < 65 years, schizophrenia or mood or eating disorders, involuntary status, low/medium severity	$4,591	1.18	14.0	$348	2.9	9,850
ACI-5	Age< 65 years, schizophrenia or mood or eating disorders, involuntary status, high severity	$5,727	1.47	17.0	$364	3.1	8,350
ACI-6	Age 65-85 years, low ADL dependency	$5,426	1.39	17.8	$308	2.6	5,100
ACI-7	Age 65-85 years, high ADL dependency	$6,655	1.71	18.6	$362	3.9	950
ACI-8	Age > 85 years	$8,710	2.23	26.3	$347	3.8	550
	TOTAL (trimmed)	$3,900	1.00	12.4	$331	2.6	57,750

* Note: MH-CASC observed sample multiplied by a factor of 16, comprising
multiplying the number in the 3-month study by 4 to annualise the sample
multiplying by 4 to scale the sample up to the national level
rounded to the nearest 50 to acknowledge the indicative nature of the estimate

The interpretation usually applied to this mix of statistics is that it implies that, while the classes are homogeneous, there remains overlap between the classes, or that the classes are not sufficiently differentiated from each other. However, an important contribution to this difference is the low starting point in between-patient variation in the adult completed inpatient cohort (CV=1.01), which limits the extent to which to which a casemix classification can further achieve reduction in cost variance.

The only benchmark comparison is the AN-DRG3 classification. The MH-CASC dataset collected the necessary information to cost AN-DRG3 for acute inpatient services. To place the MH-CASC finding alongside AN-DRG3, both adult and child & adolescent completed inpatient episodes must be pooled in the comparison samples, thus the results presented below (Table 96) differ from the individual cohort results presented in Chapter 16. However, the same trimming policies were used.

The 9.9% RIV finding is comparable with the 11.7% RIV published by the Australian Casemix Clinical Committee, which used length of stay as the dependent variable, and drew on the national hospital morbidity dataset including non-specialised mental health services.

Table 96: Comparison of AN-DRGs and MH-CASC classifications for Completed Inpatient Episode costs (adult and child/adolescent combined)

	AN-DRG	MH-CASC
Number of classes	8	11
Reduction in variance (RIV)		
- Untrimmed	3.8%	8.7%
- Trimmed	9.9%	17.3%
Range of Coefficient of Variance (CV)		
- Untrimmed	0.71 to 1.24	0.60 to 1.15
- Trimmed	0.63 to 1.15	0.54 to 0.90

Subsequent adjustments to AN-DRGs for the fourth version have included 'intended same day' as a patient predictor variable, with RIV results of 35.6%. The MH-CASC dataset confirms this finding. When the analysis included the 'intended same day' group in the acute inpatient cohort, and split this group from overnight episodes, an untrimmed RIV for AN-DRGs of 36.6% and a trimmed figure of 44.1% was achieved. This is dealt with in more detail in Chapter 14.

Such an analysis is not seen as desirable or statistically credible and so this line of analysis was not pursued in MH-CASC. First, there is ambiguity in how 'intended same day' is defined by service agencies, with day programs being defined by some as community services and as inpatient admissions by other agencies. Second, as discussed in Chapter 11, there is little difference in staff resource input between community and intended same day. Third, there would be an incentive to bring patients in for hospital based programs because of the funding attached to inpatient status, rather than treat in the community. Finally, the approach uses a dependent variable (one day length of stay) to predict a dependent variable (length of stay). The preferred approach to casemix classification uses patient characteristics as the independent variable, so that resource input (dependent variable) can be matched to patient need (independent variable).

Ongoing Inpatient Episodes

The twelve classes in the Ongoing Inpatient Episode classification have a clinical logic, with costs moving generally in the expected direction. The younger group is the most expensive, reflecting current practice that to be admitted to a non-acute inpatient unit a person now must need intensive support.

Those patients with diagnoses other than schizophrenia or organic disorder are generally more costly than patients with other diagnoses. For the young and middle age group, higher aggression and involuntary legal status are associated with more expensive episodes. Splits within the younger groups classes based on aggression/disruptive behaviour are consistent with a growing body of clinical research that indicates that young adult patients with high levels of socially disruptive behaviour are replacing the older patient group in long stay psychiatric units and account for substantial costs to the public health system.[52]

For the older group, Activities of Daily Living are the key differentiator, with patients with higher ADL scores being more costly. This is consistent with experience in the general aged care health sector.

Table 97: MH-CASC Ongoing Inpatient Episodes (8 week period)

Code	Class	Cost per episode	Episode Cost Weight	Cost per day	Time per day (Hours)	National annual sample estimate*
AOI-1	Age ≤ 33 years, schizophrenia or organic disorder, voluntary	$10,229	0.75	$202	1.8	100
AOI-2	Age ≤ 33 years, schizophrenia or organic disorder, involuntary, low aggression	$14,145	1.03	$265	2.0	250
AOI-3	Age ≤ 33 years, schizophrenia or organic disorder, involuntary, high aggression	$15,624	1.14	$289	2.3	400
AOI-4	Age ≤ 33 years, diagnosis other than schizophrenia or organic disorder	$17,632	1.28	$329	2.8	200
AOI-5	Age 34-64 years, schizophrenia or organic disorder, no aggression	$12,110	0.88	$225	1.6	560
AOI-6	Age 34-64 years, schizophrenia or organic disorder, with aggression	$13,088	0.95	$239	1.9	800
AOI-7	Age 34-64 years, diagnosis other than schizophrenia or organic disorder	$14,989	1.09	$281	2.3	300
AOI-8	Age 65+ years, schizophrenia or substance abuse or mental retardation, no ADL dependency	$11,787	0.86	$219	1.4	330
AOI-9	Age 65+ years, schizophrenia or substance abuse or mental retardation, with ADL dependency	$13,917	1.01	$257	2.0	260
AOI-10	Age 65+ years, organic disorder, low-medium ADL dependency	$13,242	0.97	$241	2.1	500
AOI-11	Age 65+ years, organic disorder, high ADL dependency	$15,352	0.97	$284	3.0	200
AOI-12	Age 65+ years, diagnosis other than organic disorder or schizophrenia	$14,559	1.06	$270	2.2	370
	TOTAL (trimmed)	$13,722		$254	2.0	4,270

* Note: Scaling factor of 4.5, comprising: multiple of 3 to scale to national sample; multiple of 1.5 to reflect average turnover of 1.5 patients per bed per year. Rounded to nearest 10.

A key feature of the adult ongoing inpatient cohort is the low level of variation between patients (CV=0.32), severely restricting the scope for further variance reduction. However, over a 12 month period, a long-stay unit would incur $48,100 higher costs for treating a person in the highest cost class compared with the lowest cost, a result likely to be of considerable interest to funders.

Unlike acute inpatient services, there are no benchmark comparisons for specialised non-acute inpatient mental health services. Table 98 shows that the classification has excellent CVs (mostly around 0.2), pointing to very resource homogeneous classes. Given this, the low starting point between-patient variation, and the lack of prior studies in this area, an RIV of 19.1% trimmed is a reasonable result.

Table 98: Statistical performance of MH-CASC Ongoing Inpatient Episode classification

	MH-CASC
Number of classes	12
Reduction in variance (RIV)	
- Untrimmed	16.8%
- Trimmed	19.1%
Range of Coefficients of Variance (CV)	
- Untrimmed	0.18 to 0.40
- Trimmed	0.18 to 0.40

Adult Community Episode classification

The community episodes are much lower cost than the inpatient episodes, but are higher in volume, making the financial implications of applying the classification still significant.

The current study found that similar patient variables driving costs in the inpatient setting are also important in the community (with the exception of diagnosis and ADL dependency) but, because the patterns of care are different, the relative importance of the variables differs across the two settings.

Table 99: MH-CASC Adult Community Episodes (8 week period)

Code	Class	Cost per episode	Episode cost weight	Treatment days	Cost per Treatment Day	Time per Treatment Day (Hours)	National annual sample estimate*
AC-1	Other focus of care, voluntary, low clinical severity, low disability	$304	0.58	3.6	$99	0.9	11,590
AC-2	Other focus of care, voluntary, low clinical severity, moderate disability	$397	0.75	5.3	$84	0.8	3,860
AC-3	Other focus of care, voluntary, low clinical severity, high disability	$442	0.84	5.0	$94	0.9	2,390
AC-4	Other focus of care, voluntary, moderate clinical severity, low-moderate disability	$443	0.84	5.6	$90	0.9	18,030
AC-5	Other focus of care, voluntary, moderate clinical severity, high disability	$572	1.09	7.0	$88	0.8	9,500
AC-6	Other focus of care, voluntary, high clinical severity	$556	1.06	6.3	$102	1.0	11,750
AC-7	Other focus of care, involuntary, low clinical severity	$444	0.84	5.7	$86	0.9	2,540
AC-8	Other focus of care, involuntary, moderate-high clinical severity	$679	1.29	8.0	$99	1.0	9,450
AC-9	Intensive extended focus of care, voluntary	$717	1.36	8.5	$90	0.9	6,680
AC-10	Intensive extended focus of care, involuntary	$1,068	2.03	11.9	$94	1.0	2,660
	TOTAL (trimmed)	$526	1.0	6.3	$94	0.9	78,450

*Note: Scaling factor of 8, comprising: multiple of 4 to scale to national sample; multiple of 2 to translate to a yearly figure. Rounded to nearest 10.

The highest cost community episodes are for people with an intensive extended focus of care. This measure was intended as a marker for defining episodes, but came forward as a strong predictor of resource use. The variable has clinical logic, reflecting the group of the people living in the community who require frequent follow-up if they are to continue outside the inpatient setting. The number of days on which treatment is provided for the intensive extended group with involuntary legal status is 11.9, double the average for the group, and over three times what is provided to the lowest cost class (other focus of care, voluntary status, low clinical severity, low disability).

In the community a group of five (out of the twelve) HoNOS measures of clinical severity differentiated classes and costs, covering: aggressive/disruptive/overactive behaviour;

suicidal/self-injury; substance abuse; cognitive problems; hallucinations/delusions. Higher scores on these are associated with higher costs in the community.

Recent research publications, using different methodologies and substantially smaller patient samples, have also provided evidence that the HoNOS is a useful tool in explaining cost variation between patients. [99,100] although this has not been validated in all settings[101]. The general weight of the limited published evidence has been sufficient to encourage the United Kingdom National Casemix office to explore application of the HoNOS as a casemix tool. The MH-CASC data, using a sample size that is unprecedented in international terms, provides strong support for these directions.

As predicted by clinicians, level of functioning or disability is also an important driver of costs in the community, as measured by the Life Skills Profile total score.

The HoNOS clinical severity scales and Life Skills Profile interacted in a clinically logical manner, with the combination of moderate clinical severity/high disability costing almost twice the class with low clinical severity and low disability ($572 and $304 respectively).

As was found in inpatient episodes, legal status was an important predictor of community resource use.

Although there is an underlying clinical logic to the community episodes classification, and the classes/costs move in 'the right direction', the overall statistical performance was only moderate. The CVs are acceptable at around 0.8, but the RIV is 12.7% (Table 100). Again, this suggests the groups are internally homogeneous, but not sufficiently different from each other to achieve a higher RIV result.

Table 100: Statistical performance of MH-CASC Adult Community Episode classification

	MH-CASC
Number of classes	10
Reduction in variance (RIV)	
- Untrimmed	5.7%
- Trimmed	12.7%
Range of Coefficients of Variance (CV)	
- Untrimmed	0.18 to 0.40
- Trimmed	0.74 to 0.86

The greater difficulty in accounting for cost variation in the community compared with inpatient settings may reflect the greater complexity of community care. It is arguable that the inpatient environment is more controlled, with key decisions that drive resource consumption being more under the control of the service provider. A range of factors other than patient attributes may be important cost drivers in the community, such as the variable availability of core treatment programs (e.g., 24 hour crisis teams), variations in provider practice or the level of available social and family support.

‘Bundled Episodes’

The final episode type analysed is the bundled cohort that may have had inpatient only, community only, or a mix of episode types over the time period. The dependent variable was total cost for 8 weeks of care.

For this classification the ‘focus of care’ variable was excluded from consideration because the ‘acute focus of care’ became a proxy for acute inpatient admission, and so achieved an artificially high result. This is unlike the community episode classification where the intensive extended focus of care was more likely to be measuring something about the patient’s characteristics or need for care.

As with the other episode types, the costs and classes have a sensible order.

Child and Adolescent Episodes classification

For specialised child and adolescent mental health services there were sufficient observations to develop classifications community episodes, but only a marginally adequate number for completed inpatient episodes.

For Completed Inpatient Episodes only diagnosis and the disruptive/aggressive behaviour item of the HoNOSCA were used to create 3 classes with reasonable cost differentiation. The trimmed RIV was comparable with the other episode types, at 14.5%, and coefficients of variation around 0.7.

The community classification drew on a range of factors to differentiate classes and costs, particularly age, functional and behavioural/severity measures. These factors were identified by the clinical panels as likely to have significance in the child and adolescent area. The CVs were mostly around the 0.6 level, and RIV was 18.8% (trimmed), considerably above that achieved in the adult community branch of the model.

Table 101: MH-CASC Child and Adolescent Completed Inpatient Episode classification

Code	Class	Cost per episode	Episode Cost Weight	Length of stay (days)	Cost per Day	Time per Day (Hours)	National annual sample estimate*
CCI-1	Other diagnoses, low disruptive/aggressive behaviour	$3,802	0.63	10.5	$417	2.9	940
CCI-2	Other diagnoses, high disruptive/aggressive behaviour	$6,839	1.13	17.3	$446	3.5	740
CCI-3	Mood, somatoform, or eating disorder	$8,339	1.38	24.6	$376	2.8	640
	TOTAL (trimmed	$6,048	1.00	16.6	$415	3.1	2,320

Table 102: MH-CASC Child and Adolescent Community Episode classification

		Cost per episode	Episode Cost Weight	Treatment days	Cost per Treatment Day	Time per Treatment Day (Hours)	National annual sample estimate*
CC-1	Age < 6 years, high functioning	$165	0.44	2.3	$77	0.9	310
CC-2	Age<6 years, not high functioning	$294	0.78	3.5	$86	1.1	1,170
CC-3	Age 6-12, low-moderate school attendance problems, low disruptive/antisocial	$304	0.81	3.6	$88	1.0	6,570
CC-4	Age 6-12, low-moderate school attendance problems, high disruptive/antisocial	$404	1.07	4.6	$91	1.0	1,590
CC-5	Age 6-12, high school attendance problems	$547	1.45	5.9	$103	1.2	420
CC-6	Age > 12 years, low severity, low functioning	$439	1.16	4.2	$116	1.0	260
CC-7	Age > 12 years, low severity, high functioning	$333	0.88	3.5	$100	1.0	3,940
CC-8	Age > 12 years, high severity, low psychosocial complications	$445	1.18	4.3	$110	1.1	1,050
CC-9	Age > 12 years, high severity, high psychosocial complications	$817	2.16	7.1	$118	1.1	1,460
	TOTAL (trimmed)	$377	1.00	4.1	$95	1.0	16,770

*Notes to Table 101 and Table 102
Estimated by multiplying observed cases by 4 (to scale up to total national cases) and by 4 for completed inpatient and 2 for community (to approximate annual sample). Rounded to nearest 10.

Provider factors weaken the 'patient signal'

In answering the question of whether there is a relationship between patient attributes and costs, a summary of the statistical evidence is that patient factors do drive costs but the 'signal' is relatively weak. While the restricted variation in patient costs limits the extent to which the variance can be explained, it is important to consider other factors that may account for the study findings. This chapter concludes with an exploration of the alternative factors that may explain patient cost variation.

Broadly, variation in the costs of health care for patients can be construed as having two sources. First, variation may be due to differences in the kinds of patients treated (i.e. casemix), and second, variation may be due to differences in the ways that health services treat patients. As is evident in the MH-CASC data set, casemix differences account for only some of the variation in patient costs. The next step therefore in understanding the variation present in the data set is to explore the role that provider factors play.

The potential for providers to distort the patient signal was a frequent issue raised by clinicians during the early Project planning stages. While there was broad consensus that patient clinical attributes *should* be the major drivers of treatment costs, frequent scepticism was expressed that the Project would find any clear patterns in the type of care delivered to similar patients. This prediction was based on the view that there is little standardisation in the types of services provided by Australian mental health clinicians. Even where protocols have been developed (for example, the clinical protocols published by the RANZCP in the 1980's[102] and more recent publications by Andrews and his colleagues[45,46]), processes have not been established to train the workforce in their use, not are systems in place to monitor adherence to the standards.

Clinicians with experience of the national mental health 'map' advised of their observations of widespread differences across Australia in the services provided to patients with similar conditions. It was argued that what the patient receives depends on where they are treated and who provides the treatment. According to this view, the type of service is governed by factors such as the skills and interests of the local workforce, the mental health resources available within the area and wider factors such as State and Territory mental health policies. The expectation that the MH-CASC Project would be able to find an underlying consistency across such a diverse range of Australian sites, was seen to be overly optimistic.

Evidence presented earlier in this report highlighted the significance of provider factors. Differences between study sites were evident on several dimensions, including:

- the relative proportions of patient care time reported as patient attributable and general time (see Figure 20);
- the mix of clinical staff available for patient care (see Table 31);
- labour input costs (see Figure 47);
- the relative share of patient care costs accounted for by non clinical, overhead and infrastructure components (see Figure 28);
- the unit costs of equivalent programs (see Figure 31 to Figure 33); and
- the relative amounts of time spent on non-patient care activities (see Figure 26).

Similarly, earlier analysis (see Chapter 12) indicated that the variable 'Site' was a significant predictor of patient cost variation in each of the episode types, necessitating cost standardisation adjustments to be made to reduce its effects. In fact, even after staff labour costs were standardised, the site variable continued to be the most significant explanatory factor for cost variation in three of the five setting-specific episode cohorts, and was competitive with better performing patient variables in the remaining two episode types. Table 103 summarises the data.

Table 103: Site contribution to reduction in variance for each of the episode types

Episode Type	Pre-Standardisation of Labour Costs	Post-Standardisation of Labour Costs	Most Significant Variable Overall	Most Significant Patient Classification Variable
	% RIV	% RIV		
Adult Episodes				
Completed Inpatient Episodes	6.9%	5.2%	Site	Principal Diagnosis (3.9%)
Ongoing Inpatient Episodes	25.1%	19.6%	Site	Principal Diagnosis (5.7%)
Community Episodes	2.3%	1.8%	Focus of Care (2.6%)	Focus of Care (2.6%)
Child and Adolescent Episodes				
Completed Inpatient Episodes	3.6%	2.6%	Principal Diagnosis (9.3%)	Principal Diagnosis (9.3%)
Community Episodes	20.9%	17.4%	Site	School Attendance Problems (5.8%)

Note: RIV based on univariate analysis of the performance of the candidate variable when it is placed at the top of the classification tree.

This analysis indicates that, in most cases, where the patient was treated had more of an influence on the costs of care than any single clinical factor. In isolation, however, this finding remains ambiguous as it provides only indirect evidence of the type of provider-driven factors alluded to by clinicians at the commencement of the Project. For example, 'site' may be good predictor of cost because sites differ in their casemix. Sites that specialise in the treatment of complex cases may be expected to have higher costs, while sites that deal with cases of a more routine nature could reasonably be expected to show lower episode costs. Indeed, if such order existed, site would emerge as a powerful explanatory variable simply because it is a proxy for casemix differences.

An adjustment for casemix differences therefore is needed to disentangle the true provider factors from the patient factors that are confounded in the site variable. While research of this type is beyond the scope of the current project, two examples are offered that demonstrate unambiguously that the study sites differed considerably in the type of services provided to patients with similar conditions.

The examples explore the level of servicing to patients within two MH-CASC classes. This method controls for variations between sites that are attributable to patient differences and allows provider variation to be isolated.

Example 1 focuses on inpatient units and examines the level of services provided to patients in the adult class ACI-5. As indicated in the preceding chapter, this class describes patients who are less than 65 years and have a diagnosis of schizophrenia, mood or eating disorders. They were rated as of high clinical severity based on their HoNOS scores, and were placed on an involuntary treatment order at some point during the episode. The class is assigned a cost weight of 1.47 in the MH-CASC classification model, meaning that treatment costs for these patients were 47% higher than the 'average' adult completed inpatient episode.

As patients within the class required involuntary treatment, private hospital sites were excluded from the analysis (5 cases only excluded). The analysis also excluded trimmed cases to avoid care patterns at any particular site being distorted by small numbers of exceptional patients. A total of 499 patients were included in the analysis sample.

Sixteen of the 22 study sites treated patients in this class. Table 104 summarises the episode costs and level of care provided at each of the sites.

Table 104: Site differences in the care of comparable patients – Example 1

Adult Completed Inpatient Episodes, Class ACI-5
Age < 65 years, schizophrenia or mood or eating disorders, involuntary status, high severity

Site	Site Casemix Index (Adult Completed Inpatient Episodes)	Cost per Episode	Length of Stay	Time per Day (Hours)
1	0.94	$12,236	30.0	2.8
2	1.21	$8,734	23.0	5.1
3	0.91	$7,807	14.1	3.2
4	1.05	$7,120	23.6	4.0
5	0.97	$7,007	17.5	3.1
6	1.13	$6,548	23.1	3.7
7	1.00	$6,499	20.9	3.0
8	1.09	$6,424	18.1	3.1
9	0.99	$5,996	24.9	2.7
10	0.99	$5,280	15.3	2.8
11	1.03	$4,942	14.5	2.9
12	0.99	$4,464	11.6	3.0
13	0.94	$4,150	15.7	3.5
14	1.03	$3,796	14.1	1.6
15	1.03	$3,658	10.8	4.6
16	0.92	$3,164	10.7	3.8
Average	1.00	$5,727	17.0	3.1

The table shows a considerable range in episode costs, but it is the variation on the service indicators that point to inconsistent clinical practices. For example, length of stay ranged from 10.7 to 30.0 days, while the amount of clinical time dedicated to the patient varied from 1.6 to 5.1 hours per day.

To add a broader context to the interpretation of the data, an indicator of the type of patients treated at each of the 16 sites has been added each site in Table 104. The indicator, the Site Casemix Index, is an overall measure of the relative case complexity of patients, where the average of all sites is set at the value 1.0. Thus, an index value of 1.1 for a particular site would indicate that patients treated at the site are 10% more complex than average.[a] The purpose of adding this measure was to explore whether the variation between sites in the level of service provided to patients in the AIC-5 class was related to the overall demands upon the site. For example, it is conceivable that a site with more complex patients may be under greater pressure to 'ration' care to all patients than those sites with a less complex caseload.

No relationship is evident in the data presented in Table 104. For example, the overall casemix complexity for Site 1 was 6% less than the average (Casemix Index = 0.94). When this site treated patients in the ACI-5 class, it retained them in hospital for 30.0 days, 76% longer than the average for patients within this class. Yet at Site 13, with an equivalent casemix complexity index, patients were discharged in 15.7 days or 7.6% less than the average. Similar patients treated at Site 2, where the overall complexity of cases was 21% higher than average, received an average length of stay of 23.0 days, a finding that contradicts the hypothesis that units under greater casemix pressure will provide less care than those with a less complex caseload.

Example 2 extends the review of provider factors to community settings and compares sites on the level of service provided to patients in Class AC-6. This class describes patients for whom the Focus of Care was recorded as other than Intensive Extended Care, were of high clinical severity based on their HoNOS scores and who were treated as voluntary patients throughout the community episode. The majority of patients in the class (51%) were assigned a Principal Diagnosis within the Schizophrenia, Paranoia and Acute Psychotic Disorders cluster, and 18% were diagnosed with Mood Disorders. This class is assigned a cost weight of 1.06 in the MH-CASC classification model, meaning that treatment costs were 6% higher than the 'average' adult community episode.

As occurred in Example 1, the analysis excluded trimmed cases. Fourteen of the 22 study sites treated patients in this class, generating a total of 1,362 patients for the analysis sample. Table 105 summarises the level of care provided to these patients at each of the sites.

In parallel with the provider variation evident in inpatient care settings, significant differences are apparent between sites in the level of community care given to equivalent patients. For example, the number of days that a patient could expect to be treated over an 8 week period ranges from 4 to 10.5 days, depending on which of the 14 sites was responsible for their care. They could also expect to be seen for a total of 4.5 to 9.4 hours over that period, a considerable variation in treatment time.

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[a] The Site Casemix Index is an overall measure of the case complexity of patients treated at the site and is based on total volume adjusted for casemix. The Index is calculated by the following formula:

Index = Sum of {(N Class 1 cases x Cost Weight) + (N Class 2 cases x Cost Weight) + … (N Class n cases x Cost Weight)} divided by the Total Number of Cases.

Table 105: Site differences in the care of comparable patients – Example 2

Adult Community Episodes, Class AC-6
Other focus of care, voluntary, high clinical severity

Site	Site Casemix Index (Adult Community Episodes)	Cost per Episode	Treatment Days	Total Treatment Time (Hours)	Time per Treatment Day (Hours)
1	1.00	$790	9.6	8.9	0.9
2	0.88	$720	6.7	5.6	0.8
3	1.05	$637	10.5	9.4	0.9
4	0.99	$609	5.9	6.3	1.1
5	0.98	$606	6.3	5.7	0.9
6	1.02	$575	5.1	5.0	1.0
7	1.00	$535	5.4	4.5	0.8
8	0.99	$533	7.1	6.7	0.9
9	1.05	$513	7.0	6.6	0.9
10	1.03	$507	5.9	6.2	1.0
11	0.96	$491	4.0	4.9	1.2
12	1.01	$429	4.7	5.0	1.1
13	0.96	$402	6.3	5.1	0.8
14	1.02	$387	5.0	4.7	0.9
Class Average	-	$556	6.3	5.9	1.0

These examples illustrate that provider differences exist in Australian mental health services. Even when casemix differences are controlled, the extent of variation between sites remains significant. What this means for consumers of the mental health system is that the type and level of care that they can expect to receive is only partly related to the nature of their disorder, as it depends on where and by whom they are treated.

A final caveat is necessary to conclude this analysis. There are multiple reasons that may underlie provider-driven variation in care provided to patients. These include:

- structural factors, such as the mix of services available e.g., areas in which the service mix is heavily loaded towards inpatient care will be less likely to provide community alternatives;
- resource factors e.g., patients cannot receive the services they need when those services are not available;
- clinical practice differences arising from differences between clinicians in their skill levels or clinical interest patterns; and
- casemix differences.

Only some of these factors are under the control of individual clinical practitioners. The analysis presented in this section addresses only the final alternative, by showing that provider variation continues even when casemix differences are controlled. It does not answer the question of whether those differences are primarily due to clinical practice differences, or differences in resource levels, or broader structural factors relating to the systems in which clinical practitioners are employed. Addressing these issues is beyond the scope of the current Project and remains a challenge for the future.

The key task for mental health community is to work together to strengthen the 'patient signal'. This may be assisted by a range of strategies, including clinical protocols developed by the professions, use of the MH-CASC classification for management information and review, and perhaps piloting of the classification for funding purposes. These issues are taken up in the final chapter of this report.

Chapter

18

Implications for Funding and the National Mental Health Strategy

The MH-CASC Project has wide ranging implications for both the funding of mental health services and, more generally, the National Mental Health Strategy. The MH-CASC classification model described in the previous chapters raises a number of issues that need to be considered as part of a general review of its suitability for use in a funding context. In addition, implementation of the model would place new data collection demands upon mental health service agencies and require a process for the ongoing improvement of the model. Even if the classification is not adopted, the Project findings have general relevance for funding and policy directions for mental health services.

In this final chapter, the implications of the Project are considered.

The suitability of the MH-CASC classification for application

The key questions addressed by this Project, outlined at the beginning of this report (see Table 2), aimed to satisfy casemix criteria as well as meeting the requirements of the National Mental Health Strategy. Table 106 brings together the range of data presented in earlier chapters and summarises the Project findings with respect to the key questions.

Table 106: Answers to the key questions addressed by the Project

Key questions addressed by the Project		Summary of Project findings
1. Is there a relationship between patient attributes, or need, and service costs?	• Do higher need patients cost more?	Higher treatment costs are associated with indicators commonly used to assess individual patient need such as: • clinical severity; • level of ‘psychosocial functioning’; • age; • diagnosis; and • dependency for activities of daily living.
	• How do we classify patient need?	No single measure is suitable to determine need. The classification uses a combination of instruments and measures that assess demographic, clinical and level of functioning characteristics. Similar measures are used in inpatient and community services.

Table 106: Answers to the key questions addressed by the Project

Key questions addressed by the Project		Summary of Project findings
	• Is there a normative clinical pattern in Australia's specialised mental health services?	There is an underlying 'patient signal' upon which a casemix classification can be developed, but the costs being driven by 'casemix' are often confounded by the costs driven by provider variations.
2. Is the pattern sufficiently strong to use it for funding?	• Is it consistent with casemix statistical standards?	Ultimately a question for funders - is it better than what we have now? • RIV competitive: Higher than the AN-DRG mental health classification but is restricted by limited cost variation between patients and is lower than the AN-DRG standards used in the general health system. • CVs for individual classes are lower than those for the AN-DRG mental health classification, indicating more homogeneous groups. CVs for all 42 classes are less than 1.0. • Sufficient numbers are in each class when translated to the national level.
	• Is there clinical logic in the statistical pattern?	The classification has clinical logic. For example: • people in non-acute inpatient settings have higher levels of clinical severity and disability than those living in the community and those who use acute inpatient services; and • the costs go in the clinically expected direction.
3. Can the classification advance the National Mental Health Strategy?	• Can the classification be used to reward continuity of care in the community, by: - reducing the separation of inpatient and community services? - facilitating the movement of patients between hospital and the community?	The classification covers both inpatient and community services. The variables driving costs in inpatient settings are also driving costs in the community but: • the patterns of care are different, so …. • the importance of the variables differs across the two settings.
	• Would its use support integration and mainstreaming?	Adoption of this classification for mental health services may create challenges for mainstreaming but is consistent with a broader recognition that a single classification based on AN-DRGs is inappropriate for many health services, not just mental health. Integration would be facilitated by the use of a classification that covers both inpatient and community mental health care.
	• Does it give priority to high need groups?	The classification provides management and clinical information that can inform funding decisions by giving a greater focus on the different needs of those receiving mental health resources.
	• Can it be used to promote a focus on consumer outcomes?	The classification is built upon the use of measurement instruments explicitly designed for outcome measurement in mental health. Provides a basis for casemix-adjusted outcome measurement.

Undoubtedly, the central question to be asked of the Project is whether the MH-CASC classification model, developed from current patterns of service use, is suitable for use in a funding or management context. There will be different views on this issue, depending on which aspects of the study findings are given prominence.

While the adoption of the classification is ultimately a decision for funders of mental health services, two issues should be considered in reaching a final judgement.

The first and foremost issue concerns the purposes of a casemix classification. Casemix systems have become synonymous with funding models for health services in Australia.

However, their origin was motivated not by a desire for new funding arrangements, but instead, by the need for tools to support quality assurance and utilisation review. They do this by providing a method to describe the products of health care delivery that controls for differences between providers caused by those providers treating different types of patients. By controlling for patient differences, the contribution made by provider differences to patient costs and outcomes can be better understood.

It is important to recall that this was the development path taken with the AN-DRG classification in Australia, with it first being introduced in the mid 1980's for management purposes long before its application in a funding context. The experience gained through this process allowed clinical refinements and improvements in precision to be made, along with modelling of the implications of using casemix for funding purposes.

As Galbraith commented in his review of the early years of casemix in Australia, the current Australian approach " did not emerge out of the ether fully formed. It was built on the foundations of many years thought, work and research."[103]

The point here is that mental health services in Australia are only at an early stage of the casemix development cycle. The types of issues confronting the mental health industry, such as apparent wide variation between providers, the absence of clinical protocols, lack of national benchmarks and other tools to support service reforms, are comparable to those that initially drove the DRG development program. Distinguishing the role of a casemix classification in resolving these issues from its more narrow use as a tool for funding is critical in the decision about how to apply the MH-CASC classification model. Most important is the need to recognise that improvement only comes with practice experience, and that a start often needs to be made using imperfect solutions.

In deciding whether the MH-CASC classification should be pursued, national and state jurisdictions will need to assess the range of uses of the model. These include:

- **Funding purposes.** The utility of the classification for funding will need to be assessed by individual funding authorities, taking account of the adequacy of their existing approach to funding. In its current form, the classification is likely to be useful as a management and clinical information tool that can inform funding decisions by giving a greater focus on who is receiving mental health resources.
- **Costing and benchmark purposes.** The classification may be used to develop cost benchmark information, enabling service agencies to make comparisons with other sites on the costs, length of stay and treatment days for similar cases. This can have an influence on practice, and by itself, strengthen the differentiation of care patterns provided to different patient types.
- **Quality management.** Services may wish to collect the data to monitor the quality of services over time. For example, complexity-adjusted worker caseloads could be generated from the new data, along with the extent of change over time.
- **Clinical protocols**. The classification provides a base for the development of clinical protocols, in terms of establishing a framework for determining what package of services each group should receive. The objective here would be to amplify the classification/costing signal, and encourage more normative practice
- **Outcome measurement.** A longer term monitoring of clinical attributes will assist in determining the outcome of treatment interventions. Several of the measurement instruments upon which the classification is based were designed explicitly to monitor change over time.

The second issue for consideration concerns the alternatives to the MH-CASC classification. Funders are likely to be cautious of immediate use of the classification for funding purposes because of the comparatively low RIV statistics when compared with AN-DRGs for acute inpatient services. However, this will depend on whether they regard the current historical or input (i.e., funding of a service unit regardless of mix and number of patients) based funding systems as preferable.

As indicated in the previous chapter, the classification has advantages over the AN-DRG mental health classification both in terms of its capacity to explain patient cost variation and the statistical homogeneity of its classes. Perhaps more importantly, it provides coverage of both inpatient and community services and avoids the distorted incentives created when a classification is implemented that covers only the acute hospital sector.

Overall, the Project Team believes that the combined benefits to the National Mental Health Strategy of the MH-CASC model are sufficient to justify its adoption as the first version of an Australia mental health casemix classification. The implications for data collection and further research and development are the focus of the remainder of this chapter.

Implications for data collection

For the MH-CASC classification to be used for funding or other purposes, new data items will need to be collected. The classification of each episode type draws on a limited pool of measurement instruments, and then configures selected data items to form a total of 42 different patient classes.

The additional information which would need to be collected to operationalise the classification is summarised in Table 107 and Table 108.

Currently, a subset of the data is collected in standardised form in psychiatric inpatient services, which record Principal Diagnosis, Legal Status and Age and other patient information under the National Minimum Data Set for Institutional Mental Health Care.[88] Other clinical attribute data are less widely collected.

In the community, mental health agencies generally collect basic demographic and diagnosis data, although collection is variable and data quality believed to be poor. As with inpatient services, collection of clinical attribute data of the type required for the MH-CASC classification is collected by only a small proportion of agencies. Reporting arrangements for community mental health services are in place in less than half of the jurisdictions.

A national data set for community mental health services was recently agreed for collection by the States and Territories and is due to be introduced between July 1998 to July 1999. However, this includes few clinical items (Diagnosis, Legal Status) and would be insufficient for classification purposes.

Considerable change in the collection and reporting arrangements would be required, therefore, to introduce the type of data required by the MH-CASC classification and as outlined in Table 107 and Table 108. Such changes are needed as part of a broader set of improvements in mental health data systems to ensure they support quality service delivery, as has been advocated recently by the Department of Health & Family Services.[104]

Table 107: New data requirements for MH-CASC classification – Adult Services

Data Category	Measurement Instrument	Description and Use of Data Items
Diagnosis (a)	ICD 10	Full range of diagnoses are summarised to 5 diagnostic 'clusters': • Schizophrenia • Mood disorder • Eating disorder • Organic disorder • Other diagnosis
Demographic	Date of birth (a)	Age
Clinical Severity	HoNOS	Overall Severity score based on total of scales 1-10. 'Clinical severity' score based on sum of scales 1, 2, 3, 4 and 6. The 12 scales of the HoNOS include: 1. Overactive/aggressive / disruptive / agitated behaviour 2. Suicidal thoughts or behaviour 3. Problem-drinking or drug taking 4. Cognitive problems 5. Physical illness/disability 6. Hallucinations and delusions 7. Depressed mood 8. Other mental or behavioural problems 9. Supportive social relationships 10. Activities of daily living: Overall disability 11. Accommodation 12. Occupational and recreational activities
	Mental Health Legal Status (a)	The range of provisions under State/Territory mental health legislation are dichotomised to: 'Ever / Never Involuntary' within the episode.
	Focus of Care (b)	A four point single item scale, is dichotomised to: • Intended extensive focus of care • Other Focus of Care
Functioning	Abbreviated Life Skills Profile (b)	Abbreviated scale comprises 16 items, with 4 component subscales. An overall disability score is based on the sum of scales 1-3. The 4 scales comprise 1. Withdrawal 2. Anti-social behaviour 3. Self care 4. Compliance
	RUG-ADL	For over 65 age group only: Overall ADL dependency score based on the total of the four items: • Bed mobility • Toileting • Transfer • Eating

(a) Currently included in the National Minimum Data Set for Institutional Mental Health Care, commenced July 1997. Scheduled for collection in the National Minimum Data Set for Community Mental Health Care due for progressive implementation July 1998 – July 1999.

(b) Used only in the classification of Community Episodes.

Table 108: New data requirements for MH-CASC classification – Child/Adolescent Services

Data Category	Measurement Instrument	Description and Use of Data Items
Diagnosis (a)	ICD 10	Full range of diagnoses are summarised to 4 diagnostic 'clusters': • Mood disorder • Eating disorder • Somatoform disorder • Other diagnosis
Demographic	Date of birth (a)	Age
Clinical Severity	HoNOSCA	Overall Severity score based on total of all 14 scales. 1. Disruptive/antisocial/aggressive behaviour 2. Overactivity and attention deficit 3. Non-accidental self-injury 4. Alcohol, substance/solvent misuse 5. Scholastic/Language skills problems 6. Physical illness/disability 7. Hallucinations and delusions 8. Non-organic somatic symptoms 9. Emotional and related symptoms 10. Peer relationships 11. Self-care and independence 12. Family life and relationships 13. Poor school attendance 14. Accommodation arrangements
Functioning	Childrens' Global Assessment of Functioning Scale (CGAS) (b)	Overall level of functioning score based on global rating.
Psycho-social complications	Factors Influencing Health Status (FIHS) (b)	Overall score based on number of items present in the ICD-10 FIHS category. • Maltreatment syndromes • Negative events in childhood • Upbringing problems • Primary support group, inc. Family • Social environment • Psychosocial circumstances (specific) • Other Psychosocial circumstances

(a) Currently included in the National Minimum Data Set for Institutional Mental Health Care, commenced July 1997. Scheduled for collection in the National Minimum Data Set for Community Mental Health Care due for progressive implementation July 1998 – July 1999.

(b) Used only in the classification of Community Episodes.

The frequency and timing of collection would depend on the purpose for which the data was being used, but the study findings show there is no necessity to collect each fortnight as was the case during the MH-CASC study period.

If the sole objective of collection was to group patients into the MH-CASC classification, the schedule depends on the episode type. More frequent collection may be desirable for other purposes such as regular outcome monitoring.

The schedule for classification purposes is outline below:

- **For Completed Inpatient Episodes:** Collection of HoNOS (or HoNOSCA) data should occur 14 days following admission, or at discharge if this occurs sooner. Consistent with practice in the aged health care area, the RUG-ADL should be completed within 24 hours of admission. The intent of these measures is to capture the patient's most severe presentation. Items that require observations to be based on the complete episode (Principal Diagnosis, Legal Status) would be recorded at discharge. For those cases completed within 14 days (approximately 65% of total), all clinical ratings would occur at discharge..
- **For Ongoing Inpatient Episodes:** Defined operationally as those not completed within 3 months. HoNOS (or HoNOSCA) data should be captured in the first 14 days (as per Completed Inpatient episodes). As above, RUG-ADL measures are best completed within 24 hours of admission, or the beginning of the reporting period, to be consistent with practice in the aged health care area. Beyond this, repeated rating and other data collection should occur at three monthly intervals to re-establish the classification. Three monthly assessment cycles are also consistent with the recently endorsed National Standards for Mental Health Services.[105]
- **For Community Episodes:** Collection of data 4 weeks following registration would allow the initial classification to be established. Reassessment should then be conducted at three monthly intervals or at discharge from care if this occurs sooner. A data collection schedule along these lines recognises that the needs of many patients will change over time, and is also consistent with the 'good practice' guidelines noted above.[104, 105]

A summary of the recommended data collection cycle is presented in Table 109, and is structured to achieve a balance between:

- collection of data to assign patients to the MH-CASC classes;
- wider use of the data for clinical review and outcome measurement; and
- coordination of data collection points to simplify the administrative aspects of the process.

Table 109: Recommended data collection cycle required to assign episodes to classes within the MH-CASC classification

Adult Mental Health Services *:*	
a. Inpatient settings	**Data collected at:**
Age	At admission
RUG-ADL (for over 65 years only)	Within 24 hours of admission If Episode continues beyond three months: • reassess at three months and • repeat at 3 monthly intervals thereafter; and
Health of the Nation Outcome Scales Legal Status	14 days following admission, or discharge if occurs sooner. If Episode continues beyond three months: • reassess at three months and • repeat at 3 monthly intervals thereafter; and • repeat at discharge.
Principal Diagnosis	At discharge. If Episode continues beyond three months: • collect at three months and • repeat at 3 monthly intervals thereafter; and • repeat at discharge.
b. Community settings	**Data collected at:**
Age	At registration
Health of the Nation Outcome Scales Focus of Care Legal Status Life Skills Profile (abbreviated version)	4 weeks following registration, or discharge from care if occurs sooner. If Episode continues beyond 3 months: • reassess at 3 months; and • repeat at 3 monthly intervals thereafter; and • repeat at discharge from care.
Child and Adolescent Psychiatry Services	
a. Inpatient settings	**Data collected at:**
Health of the Nation Outcome Scales for Children & Adolescents Principal Diagnosis	14 days following admission, or discharge if occurs sooner. *Note: Collection requirements for ongoing inpatients to be resolved.*
b. Community settings	**Data collected at:**
Age Health of the Nation Outcome Scales for Children & Adolescents Chidrens Global Assessment of Functioning ICD-10 Factors Influencing Health Status	4 weeks following registration, or discharge from care if occurs sooner. If Episode continues beyond 3 months: • reassess at 3 months; and • repeat at 3 monthly intervals thereafter; and • repeat at discharge from care.

Further development of the classification

Development of the MH-CASC classification aimed to provide a structure that was clinically meaningful and to serve as a basis for future development. As a first version, it will need ongoing refinement to improve its clinical relevance and statistical precision. In addition, a number of issues will require early resolution should the classification be adopted for either funding or management information purposes.

Development work leading to the second version of the classification should focus on the following areas.

- The clinical review and refinement of the classification;
- Resolving its relevance to the non-specialised mental health sector and mapping the linkages with other classification systems;
- Resolving the place of same day admitted patients in the classification;
- Exploring the relationship between episode costs and long term costs;
- Developing approaches for high cost outlier patients;
- Using the classification for cost benchmarking;
- Using the classification for 'good practice costing';
- Further development of 'bundled care' and other approaches that support service substitution;
- Exploring alternatives to Age, Legal Status and Focus of Care;
- Improving the sensitivity of the patient measurement instruments;
- Development of funding options for children and adolescents in ongoing inpatient care; and
- Designing funding approaches for patient care activities outside the scope of the classification.

A substantial research and development agenda lies ahead for mental health services. Many of the issues listed above will remain relevant, regardless of whether the MH-CASC model is implemented.

Clinical review and refinement

From the outset, the Project ambition was to develop a classification that was clinically credible. The MH-CASC Project Team was aided through the participation of many clinicians, both formally through their membership of the Project Clinical Reference Group, the Clinical and Technical Advisory Committee, or the Clinical Panels convened during the planning stages, and through more informal channels. The end result is a classification that meets 'first stage' clinical criteria, as outlined in the previous chapter.

A key step in the further development of the classification is to establish similar clinical review processes to those in place for the ongoing refinement of the AN-DRG classification. As a first version, the MH-CASC classification has aspects that could be substantially improved following clinical review. For example, the Class AIC-01 for Adult Completed Inpatients (Age < 65 years, diagnosis other than schizophrenia or mood or eating disorder) was noted to be clinically heterogenous, and accounting for nearly one third of episodes, warrants further subdivision. As noted in Chapter 16, this could not be achieved using statistical tools alone.

The recently restructured Australian Casemix Clinical Committee and its Mental Health Casemix Classification Development Sub Committee would be the appropriate auspice for the ongoing clinical refinement of the classification.

Relevance to the non-specialised mental health sector and linkages with other classification systems

MH-CASC was limited to specialised mental health services. As such, it is not possible to state whether the classification would perform in the same manner in mental health services provided within the general health sector. Given the mainstreaming objective of the National Mental Health Strategy, it would be desirable to explore this question. There is a *prima facie* case, backed up by some evidence[106], that the mental health activity of health services without specialised psychiatric units or teams would be characterised by different casemix, costing structures, and patterns of care. However, this should be investigated further before any attempt is made to apply the MH-CASC classification outside the specialist mental health sector.

As an initial step, it would be valuable to determine how the MH-CASC classification interfaces with other classifications from different sectors, specifically AN-DRGs and AN-SNAP.

AN-DRGs

The statistical evidence does not support the use of AN-DRGs for specialised mental health services in preference to the MH-CASC classification, although such judgements need to be made by funders, taking account of the relative costs and benefits of the extra data involved.

The study cannot draw any conclusions on whether AN-DRGs should be used in general hospitals where a person receives a psychiatric principal diagnosis, but there is not a specialised unit in the hospital. The costings and classifications of MH-CASC have been based on units with the range of specialised mental health staff, who often are not available in general hospitals without a designated psychiatric unit.

AN-SNAP

The AN-SNAP (Australian National Sub-Acute and Non-Acute Patients) classification, developed in parallel with the current Project, includes ambulatory and inpatient classes for psychogeriatric care, defined in part by scores on the HoNOS. Joint planning between the two projects ensured that common data items were collected to enable data pooling. The aim should be to explore the potential for developing an integrated classification approach for older people with mental health problems that could be applied both within and beyond the specialist mental health sector.

The place of 'intended same day' admitted patients in the classification

'Intended same day' admitted patients are included in the MH-CASC community classification, rather than with inpatient episodes. This deviates from the approach adopted for the revised Version 4 of the AN-DRG accepted by the Australian Casemix Clinical Committee in 1997 (ACCC).[92] Resolution of how to best deal with the 'intended same day' category within the mental health classification will be needed.

As noted elsewhere in this report, there is ambiguity in how service agencies define such services as day programs. They may be classified as 'community' or 'intended same day', depending on the funding incentives. It is also clear that problems caused from this ambiguity are increasing. For example, the ACCC commented that:

> *"The problem caused by the use of the AN-DRG classification system to describe psychiatric day-patient care is growing exponentially. It must be resolved. In the 1993-94 hospital morbidity data set there were 23,880 same day intent separations from a total of 58,574 separations in MDC19 (i.e. 40.7%). Psychiatric day care is therefore a specific care type. It is distinct from an outpatient type ambulatory encounter, and is different again from a conventional hospital admission. The Mental Health CCCG considered this area carefully (and) argued that retaining this group of patients within the AN-DRG classification ensured that greater information could be gathered about them than if they were relocated to an ambulatory area. The CCCG believes that there is a compelling case for the creation of same day intent DRGs in MDC 19."*[92]

Data presented in Chapter 11 provide contrary evidence to this proposal, and indicate that the 'intended same day' and 'community' product look similar to each other in terms of staff input. Furthermore, funding of a separate category of 'intended same day' patients carries considerable potential to skew practice towards hospital outpatient work, rather than at community mental health centres or in people's homes. It is significant to note in this context that the exponential growth referred to by the ACCC occurred during a period when funding incentives were operating under the Medicare 'bonus pools' scheme that rewarded increased public sector bed days. A range of pressures were applied by State jurisdictions in this period to increase public hospital bed day 'outputs' as they competed for the bonus pools.

An empirical approach is needed to resolve the issue. The Project Team recommends a review of a representative sample of intended same day programs, from both a clinical 'appropriateness' and a costing perspective. Such a review may in fact identity sub categories of 'intended same day' patients (e.g., same day ECT) for whom it is best to group with inpatient classes, although this group is expected to be relatively small.[a]

Relationship of episode costs to long term costs

For many patients, episodes defined for the purposes of the MH-CASC classification represent only segments of longer episodes of illness which may be of extended duration. For others, the episode of care may be coterminous with the episode of illness, and followed by full recovery.

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[a] Data presented in the ACCC review of the third version of the AN-DRG classification identified 406 cases of 'intended same day ECT' in the morbidity data for New South Wales, South Australia and Western Australia. This translates to an estimated 800 episodes per year when scaled to the national level.

The distinction between episodes of care and episodes of illness is imprecise, but essential to understanding the complexity of many illnesses and health care.[107] In the mental health area, an extensive literature has highlighted the variable course of mental illness and the long periods of care required by many patients. This care may be provided as a continuous stream, or intermittent bouts of care or some combination of these. As indicated earlier, 43% of patients in the study commenced their psychiatric treatment more than 2 years prior to the current episode. For patients in the community, 58% were identified as being in care at the commencement of the study, and 78% of these remained in care at study end.

The construction of episode definitions for the MH-CASC classification was largely dictated by the 91 day study frame, and reflected the 'real world' logistical and measurement constraints that characterise classification development in many areas of health care. Further work is required to understand the relationship between the short term episode costs used in the MH-CASC classification and the long term care costs for individual patients. For example, it is likely that the classes can be differentiated in their longitudinal patterns of care and associated costs. Understanding these relationships may open possibilities for the funding of particular groups on a capitation or bundled care basis, as discussed further below.

A starting point would be to review the care patterns for the MH-CASC patient cohort in the 12 months prior to and following the study period. Research of this type would require linkage of MH-CASC data with service utilisation data collections maintained at the site or State/Territory level. The Victorian PRISM data set provides the best basis to conduct preliminary investigations, but some capacity also exists in the Western Australian and South Australian data.

Developing approaches for high cost outlier patients

As discussed in Chapter 16, trimming of high cost patients occurred post-class finding with an effect of reducing average costs for each of the classes. Trimmed cases ranged from 3.2% in Adult Ongoing Inpatient Episodes to 7.2% of Adult Community Episodes.

While trimming is an accepted procedure to achieve more reliable estimates of average costs, value is likely to be gained from a specific study of high cost patients. A sub group of patients with high cost episodes are also likely to have exceptional long term costs and may be suited to bundled and capitation models of payment, with their incentives for service substitution (see below). At the least, special arrangements will be needed for dealing with 'outliers' should the MH-CASC classification be implemented in a funding model.

Clinical consultation pointed to this group as a key area for further work because of the resource and service focus they demand. Concerns were expressed that they may be overlooked as a consequence of their assignment to 'outlier' status in the trimming process. It was argued that this group, although relatively small in number, collectively account for a significant proportion of resources.

Table 110 substantiates this view, indicating that the top 10% of patients in completed inpatient units accounted for 34% and 29% of resources in adult and child/adolescent units respectively. In the community, 38-39% of resources are consumed by the top 10% group.

Table 110: Percentage of total costs accounted for by the top 10% high cost episodes

Episode Type	All Episodes Average Episode Cost	Top 10% High Cost Episodes Minimum Episode Cost	% Total Costs
Adult Episodes			
Completed Inpatient Episodes	$4,562	$10,607	34%
Ongoing Inpatient Episodes	$14,201	$19,356	17%
Community Episodes	$694	$1,558	38%
Child and Adolescent Episodes			
Completed Inpatient Episodes	$6,639	$14,440	29%
Community Episodes	$490	$997	39%

Note: Based on untrimmed data.

Although patients with higher costs are, by definition, more frequent in those classes with higher cost weights, patients with exceptional episode costs are clinically heterogeneous. For example, they are found in all classes, and have a range of Principal Diagnoses. By way of illustration, Table 111 and Table 112 show the class assignments and Principal Diagnoses of the top 10% cost group within Adult Community Episodes. Even in the two classes with the lowest cost weights (AC-01 and (AC-02), 3.5% and 6.4% of patients respectively had costs which fell above the 90th percentile. Similarly, examples of this exceptional cost group can be found in all Principal Diagnoses.

Table 111: Distribution of top 10% high cost patients across classes within Adult Community Episodes

Class Code	Class Description	Cost Weight	% of High Cost Episodes	% of Class
AC-01	Other focus of care, voluntary, low clinical severity, low disability	0.58	5.2%	3.5%
AC-02	Other focus of care, voluntary, low clinical severity, moderate disability	0.75	3.2%	6.4%
AC-03	Other focus of care, voluntary, low clinical severity, high disability	0.84	2.8%	9.0%
AC-04	Other focus of care, voluntary, moderate clinical severity, low-moderate disability	0.84	14.3%	6.2%
AC-05	Other focus of care, voluntary, moderate clinical severity, high disability	1.09	13.7%	11.3%
AC-06	Other focus of care, voluntary, high clinical severity	1.06	16.6%	11.1%
AC-07	Other focus of care, involuntary, low clinical severity	0.84	3.0%	9.1%
AC-08	Other focus of care, involuntary, moderate-high clinical severity	1.29	17.7%	14.6%
AC-09	Intensive extended focus of care, voluntary	1.36	14.0%	16.4%
AC-10	Intensive extended focus of care, involuntary	2.03	9.7%	28.6%
	Total		100.0%	10.0%

Table 112: Principal Diagnoses of top 10% high cost patients in Adult Community Episodes

Principal Diagnoses	% of High Cost Episodes	% of Diagnostic Group
Organic Disorders	3.2%	5.9%
Substance Abuse Disorders	1.1%	7.6%
Schizophrenia, Paranoia, Acute Psychotic Disorders	58.5%	13.5%
Mood Disorders	23.8%	10.3%
Anxiety Disorders	1.8%	4.7%
Obsessive Compulsive Disorders	0.7%	8.6%
Stress and Adjustment Disorders	3.4%	6.0%
Somatoform Disorders	0.1%	4.0%
Eating Disorders	0.2%	8.7%
Behavioural Syndromes	0.2%	5.7%
Personality Disorders	6.0%	17.4%
Sexual Disorders	0.6%	46.2%
Disorders of Psychological Development	0.1%	14.3%
Disorders of Childhood and Adolescence	0.2%	22.2%
Disorders of Childhood and Adolescence	0.2%	22.2%
Total	100.0%	10.0%

Further work is required to unravel the distinguishing features of exceptional cost patients and explore the relationship between exceptional episode costs and longer term costs. Arrangements will need to be developed in the design of output-based funding systems that provide appropriate reimbursement to those agencies responsible for their care.

Using the classification for cost benchmarking

Three issues should be considered in using costs reported in the MH-CASC study to establish costing benchmarks.

First, the development of the classification excluded the non-core costs such as pharmacy (see Chapter 8), which account for an estimated 5% to 8% of total costs. If the classification system is adopted to fund services, adjustments are needed to reflect this exclusion.

Second, costs used for classification development were standardised for labour cost variations between sites (see Chapter 12). Again, if a given set of services were to be funded on the basis of the MH-CASC classification, upward or downward adjustments would need to be made to more accurately reflect total costs at the jurisdiction or service level.

Third, the effects of trimming need to be considered. In the MH-CASC data for all classes, the distribution of costs was significantly skewed towards the lower cost end, as is evident also in the published AN-DRG data for mental health. A consequence of this was that, in the application of the standard trimming approach (see Chapter 16), no low trim point was adopted and data were only trimmed to exclude high cost episodes. Different trimming methods are available, however, which, if applied, would produce higher estimates of average costs (e.g., trimming the top and bottom 5% of episodes). If the classification were to be adopted for the purposes of funding, agreement would need to be reached with regard to how best to trim the data to reflect average costs.

Using the classification for 'good practice costing'

The MH-CASC classification is based on the costs of 'average practice' as it existed in late 1996. Concerns were raised by various groups about using this as a base to fund future services, as it may not be consistent with 'appropriate care'.

Most concern was expressed that MH-CASC average costs may underestimate the cost of 'good practice' care in the community. Despite the fact that national expenditure on community-based services has grown by 35% since the commencement of the National Mental Health Strategy[83], few services in Australia yet have the full complement of community treatment programs. For example, there are few 24 hour community teams outside of New South Wales and Victoria and only 5 of the 22 MH-CASC study sites provided this type of care.

To test the validity of this concern, consideration should be given to using the MH-CASC classification to establish cost estimates for each of the classes based on 'good practice' clinical protocols. This approach defines the critical pathway for each of the classes based on good practice guidelines developed through clinical consensus. Costs estimates are then assigned to the various elements of the critical pathway to establish a 'good practice' price for each class. Such an approach provides funders with the option of setting prices on the basis of the critical pathway, not on last year's average cost.

As noted by Eagar, the approach is of particular relevance to the management of chronic illnesses.[107] For example, under a 'good practice' care model, the cost of appropriate care over, say, a six or twelve month period could be determined. This would include both inpatient and community care elements and could be used as a basis to fund on a capitation basis as well as individual service components. Such a model has potential to blend current needs-based and output-based funding models.

Next steps for development of 'bundled care' concepts and other approaches to support service substitution

The short timeframe of the study, along with the diverse types of multi-episode sequences, limited the Project's initial ambition to develop a classification that would provide a financial incentive for substitution of inpatient admission by community care.

The adult 'bundled care' analysis described in Chapter 16 offers one approach to bundling, enabling a casemix capitation model. However, the statistical performance is below the other episode trees when trimming and CV levels are taken into consideration.

Further interrogation of the dataset may point to other potential acute inpatient/community bundling opportunities. As noted earlier in this chapter, a longer observation period is required to observe such service use patterns. This could be achieved through various means including:

- Pilot collection of patient attribute data and grouping into the MH-CASC classification, along with recording the number of treatment days (inpatient and community) for these patients. Such a pilot study would not require the onerous data collection of the MH-CASC study. In particular, it would not be necessary to have the fortnightly cycle of clinical ratings and the recording of staff time and costing data.

- States with comprehensive datasets, such as Victoria, could examine the service utilisation pattern of those in the MH-CASC dataset to determine twelve month profiles (see page 281).
- Most value is likely to be gained from the study of high cost patients, who are suited to bundled and capitation models of payment (see page 282).

Use of Age, Legal Status and Focus of Care

Three of the variables used to differentiate patient classes are subject to debate – Age, Legal Status and Focus of Care. The issues for each of these, and options for future development, are discussed below.

Age

The adult inpatient (ongoing and complete) and child and adolescent episode types use age as a top level splitting variable. Debate about the appropriateness of age as a classification variable is not isolated to mental health, as its use to define some AN-DRGs classes has been controversial. The concern is that age is a relatively arbitrary split, and the person's need for care (and associated reimbursement) should be linked more directly to clinical factors.

The converse view takes two forms. The first is that it needs to be acknowledged that any classification which relies on statistical cut-off points has a degree of arbitrariness. A slight increase in the score on one scale will change the patient from being in one class to another. To some extent, this is unavoidable in health service classifications where a person's clinical condition is changing.

The second argument is that broad age groupings do make clinical sense.

In the MH-CASC classification, the influence of age is specific to the episode type. For example, in Adult Completed Inpatient episodes, very old people (defined as over 85 years) are the most expensive. But in longer term inpatient and community care (Ongoing Inpatient and Community episodes, respectively) young adults, or people aged 33 years or less, are most expensive. This is consistent with the clinical literature, that indicates:

- As people with chronic mental illnesses move into old age, there is some remission of the long term illness. A growing body of literature indicates higher long term remission rates than previously believed.[108,109]
- Old people appearing in acute units are often presenting for the first time with illnesses such as severe depression and severe behavioural disturbance associated with Alzheimer's diseases. These patients take a prolonged time to have a diagnosis established and often have concurrent medical conditions requiring additional assessment and treatment.
- People at the beginning of their chronic mental illnesses are now the most difficult to manage in community and longer stay inpatient settings. A growing body of literature has identified the 'young adult chronic patient' as the most resource demanding in current mental health services, due to their turbulent symptoms, frequent co-morbid drug abuse and so on.[110,111] This group were previously placed in long term hospitals but are now managed in the community unless they have an exceptional level of illness.

From the clinician's perspective, the care needs of a younger person with schizophrenia or mood disorder are different from those of an older person. Very old patients have a range of personal care needs, while the younger person is more active and requires a different type and level of staff input.

The differentiation of health services along age lines that has occurred elsewhere in the health system is equally applicable to specialised mental health services. The development of the geriatric psychiatry specialist stream, along with the long-established separation of child and adolescent mental health services, is a recognition of the differences in treatment patterns required.

There is growing acceptance of use of age as a classification variable in AN DRGs. An important aspect of the ongoing clinical review of the MH-CASC classification is to confirm whether there is broad support for the extension of this approach to mental health services.

Legal Status

Some concerns have also been expressed about the use of Legal Status, a key classification variable that emerged across all adult episodes types and which is included in the fourth version of the AN-DRG classification. Use of Legal Status for funding may create an incentive for people to be classified as involuntary to receive higher reimbursement. The contrary view is that the administrative requirements of mental health legislation are such that clinicians are unlikely to take such action, and their professional ethic is to use Legal Status only if it is clearly necessary.

Use of Legal Status as a variable to separate higher from lower cost patients also divides the public and public sectors, given the low frequency of involuntary patients in private facilities. Differences between jurisdictions in the criteria used for involuntary status also raise concerns about the reliability of the measure as a national classification variable.

The preferred position would be to find the mix of clinical factors that can substitute for legal status within the classification. If this were possible, there would be a basis for development of a specific measurement scale for application in future classification work.

To explore the potential for this, further analysis was conducted with the adult 'bundled episode' cohort, selected because of the prominence of the Legal Status within the classification tree. Specifically, we sought to find which HoNOS and LSP-16 variables, or combination of variables, could be used to correctly classify patients according to their legal status.

The results are presented in Appendix J-2 of Volume 2. In summary, a decision tree model using five composite measures (psychotic symptoms, compliance, aggressive/ disruptive behaviour, depressed mood and overall clinical severity) was successful in predicting 97% of voluntary patients but could achieve only 14% accuracy in predicting involuntary status.

This analysis was limited in scope because it was unable to assess a range of factors outside the scope of the MH-CASC data collection that are likely to be involved in a clinician's decisions to use involuntary treatment provisions. For example, the MH-CASC clinical ratings were based on behaviour only over the past two weeks. In practice, patients may be assigned to involuntary status on the basis of past behaviour over a much longer time frame (e.g., an established history of non compliance with treatment), or because of low frequency-high impact behaviours (e.g., sporadic violence) that presents significant risk for the patient or the community.

At this stage, the value of the analysis is to point to the need for further work to 'unbundle' the clinical attributes associated with involuntary mental health care.

Focus of Care

As noted in Chapter 16, Focus of Care was excluded as a classification variable in all episode types except Adult Community Episodes due to general concerns about the measure raised by the various committees advising the Project Team. These included:

- concern about the measure's 'hybrid' status, in that it combined elements of the independent variable set (patient attributes) with those defined as dependent variables;
- a belief that it may be easily 'gamed' if applied in a funding context; and
- concerns that its psychometric properties are unknown, particularly in that has not been subjected to inter-rater reliability trials.

Focus of Care was excluded from the classification despite the fact that it performed relatively well in accounting for cost variance in most of the episode types, as summarised in Table 113. In four of the five episode types, Focus of Care was ranked first or second in its capacity to account for variance if placed at the 'top' of the classification tree. Overall variance reduction of the classification was therefore sacrificed to ensure greater 'purity' of the predictor variables.

In the wider health system, the related concept of 'phase of treatment' is central to the definition of episode types in the National Health Data Dictionary.[88] It is relevant to note that this also has not been subjected to any empirical analysis in the Australian health care context.

Table 113: RIV performance of Focus of Care in each of the episode types (a)

Episode Type	Focus of Care		Most Significant Patient Classification Variable (other than Focus of Care)
	%RIV	RIV Rank (b)	% RIV
Adult Episodes			
Completed Inpatient Episodes	3.0%	2nd	Principal Diagnosis: 3.9%
Ongoing Inpatient Episodes	10.3%	1st	Principal Diagnosis: 5.7%
Community Episodes	2.6%	1st	Clinical Severity-HoNOS-5 Total: 1.5%
Child and Adolescent Episodes			
Completed Inpatient Episodes	8.9%	2nd	Principal Diagnosis: 9.3%
Community Episodes	0.8%	14th	School Attendance Problems: 5.8%

Note: (a) RIV based on univariate analysis of the performance of the candidate variable when it is placed at the top of the classification tree.

(b) RIV Rank based on comparison of RIV performance of Focus of Care with variables used in the classification.

As the MH-CASC Project provided the first opportunity to examine empirically the concept of Focus of Care, supplementary analysis was conducted of its relationships to patient attributes and cost variables in the adult episode cohorts. This analysis is presented in Appendix J-1 of Volume 2. In summary, it demonstrates:

- Focus of Care ratings given by mental health clinicians are strongly related to the context or setting in which the patient is treated, suggesting that item development and training would be necessary to bring the measure to satisfactory levels on reliability and validity criteria.
- Within treatment settings, there is greater internal consistency in the relationship between Focus of Care and clinical attributes.
- Patients rated as 'Intensive Extended' Focus of Care tend to have more elevated HoNOS profiles, suggesting more severe clinical conditions. Consistent with this finding, these patients had higher episode costs in Completed Inpatient and Community episodes although this was not the case in Ongoing Inpatient episodes.

Separation of patients rated as Intensive Extended Focus of Care from other patients is used as the top level splitting variable in Adult Community episodes. Using the 'Focus' variable at the top of the tree in this episode type had a major 'sorting' effect upon other clinical variables, allowing their potential explanatory power to be realised further down the tree. When combined with involuntary status, it defines clearly the highest cost patient class in the community, with twice the average episode cost.

As with legal status, the preference would be to find clinical attributes that correlate with Intensive Extended Focus of Care, but no clear correlation could be identified using the patient attributes collected during the study. This may be because the Intensive Extended Care definition primarily separated patients on clinical variables that were not measured elsewhere in the study, particularly the concept of illness history. Intensive extended care was defined as:

> *'to prevent or minimise further deterioration and reduce risk of harm in a patient who has a stable pattern of severe symptoms/frequent relapses/severe inability to function independently, and is judged to require care over an indefinite period'.*

This concept has strong clinical recognition in the mental health industry, isolating a group of patients who, by virtue of their lack of responsiveness to treatment, non compliance or symptom volatility, are assigned to a treatment course which involves frequent contact, often delivered in an assertive manner. The key element is that patients' needs are judged on the basis of their long histories. It is significant to note in this context that several of the jurisdictions (Victoria, New South Wales, Queensland and South Australia) have developed program models for their community-based services in which teams are established specifically for the purpose of managing such patients in the community. Various titles assigned to these programs, such as 'Mobile Support and Treatment' or 'Assertive Case Management Team'.

It is recognised that use of the Focus of Care measure carries a gaming risk – the level of funding would depend solely on how a person rates on this variable. Most other aspects of the classification are composite scores of multiple variables, and relate to observable behaviours. However, perhaps more than any of the other 'Focus of Care' definitions, the Intensive Extended Care definition can be audited.

Further work is required to understand the Focus of Care concept. If the MH-CASC approach is adopted for classifying community cases, the options for future development are to further refine and test the variable, or to undertake more analysis of the clinical factors that correlate with intensive extended focus of care with a view to measuring them directly.

Alternatively, the assignment of patients to classes on the basis of Focus of Care might be tied to an agreed program of care, with the development effort invested in defining program definitions and criteria.

Refinement of the patient measurement instruments

The majority of the measures used in the MH-CASC classification are captured by rating instruments developed in other studies. All of these need to be subject to ongoing refinement based on experience in their use. Several areas for further development are noted below, based on the experience of the MH-CASC study. Initiatives to improve the measures should be aimed at building a set of broad, multi-purpose instruments that serve both outcome and casemix purposes.

HoNOS

The HoNOS is a deceptively simple instrument, underpinned by complex logic. The Project experience emphasised the need for training as a precondition to use of the HoNOS and a process for ongoing data quality control. Three specific scales were the source of most concerns raised by clinicians participating in the study.

- Scale 8 ('Other Problems') requires better definition. As ten types of 'other problems' may be coded on this scale, interpretation of score patterns cannot be made unambiguously. The concept of a single, residual scale to capture all 'other problems' has a role in the monitoring of individual patients, where review can clarify meaning, but is of less utility when used for broader purposes. Options include removal of this scale, or development of scoring weights attached to each of the 10 problem areas.
- Scale 11 ('Accommodation Problems') and Scale 12 ('Occupational/Recreational Problems') rate the appropriateness of the patient's environment and are therefore not strictly patient measures. A recent Australian study reported these scales to have the lowest inter-rater reliability.[94] Most difficulty was reported by MH-CASC clinicians in non-acute inpatient settings who perceived the instructions as asking them to rate the quality of hospital environment. As noted earlier, Scales 11 and 12 were excluded from the calculation of overall HoNOS severity totals, although they have a clear role in the monitoring of outcomes. Further item development is needed, however, to improve their reliability.

Life Skills Profile

The abbreviated LSP used in the study comprised only 16 of the original 39 items. Given that the full version is the standard currently in use, further work is required to assess the relationship between the two versions and the extent to which of the 16 item form compromises the monitoring of outcome.

HoNOSCA

The HoNOSCA version used for the current study was current at September 1996, when it was being assessed in the United Kingdom pilot trials. Subsequent refinements have been made which need to be incorporated in any version adopted for Australian use. Overall direction for the of child and adolescent measures will need to guided by the results of the

Measurement of Consumer Outcomes in Child and Adolescent Mental Health Services project, initiated recently under the National Mental Health Strategy.

Factors Influencing Health Status and Childrens' Global Assessment Scale

A similar comment applies to each of these instruments. Both measures were selected for use in the MH-CASC study due to the dearth of alternatives, rather than their intrinsic merits. The FIHS, in particular, is crude and represents only a checklist of psychosocial complications prepared from the ICD-10 specifically for the Project. The importance attached by clinician's to the underlying attributes of the FIHS scale warrant the development of an improved measure in this area.

Children and adolescents in ongoing inpatient care

Specialist psychiatric inpatient services for children and adolescents are relatively scarce, with a total of only 216 beds available in June 1996.[83] This creates difficulties in gathering a sufficient number of observations to develop a viable classification.

In the MH-CASC study, no attempt was made to classify people with ongoing episodes in child/adolescent specialist mental health services, due to their small numbers. However, it is recognised that such a group exists and has a genuine need for such ongoing care, and that this group should not just be treated as outliers of shorter term admissions. As such, any proposed funding system would have to cater for this group. Several options exist for funding including:

- a block grant for a fixed period with facility for renewal, or
- capitated funding which integrates all aspects of care; or
- development of clinical protocols that define criteria for children and adolescents who require prolonged hospital care and what that care entails. This could then be used as the basis for developing a payment approach.

Consultation with expert groups will be required to determine the most appropriate approach.

Approaches for patient care activities outside the scope of the classification

The MH-CASC Project identified five different roles for each of the participating sites. These comprised patient attributable activities, to which the classification applies, and four categories of non-patient attributable activities: :

- services to unregistered clients (including clients seen for assessment and referral only);
- teaching, training and research;
- consultation-liaison services; and
- community development

Cost data presented in Chapter 10 identified 11.6% of expenditure to be accounted for by non patient attributable activities, with significant variation between sites. As all four non-patient care activities would fall outside the boundaries of any funding system that allocated resources solely on the basis of casemix output, separate funding options need to be developed for these 'products' of mental health services.

Suggestions for funding model design

Although the objective of the Project was to develop a classification system for mental health, the research work has a number of pointers for future funding model design:

1. *There remains considerable scope for substitution between acute inpatient and community care, and a high risk of distorted incentives if only one service type is funded using casemix. If acute specialised mental health services are to be funded on an activity-basis (whether through AN-DRGs or the MH-CASC classification), then the MH-CASC classification model should also be used to fund community mental health services.*

   Over the three-month period, 7.3% of the sample had some combination of acute and community care. If the study 'window' had been left open longer, this would have been higher.

   Use of the acute inpatient episode classification, without corresponding use of the community episode classification, will create the incentive to hospitalise rather than treat in the community. Activity-based funding of one without the other is likely to create distorted incentives.

   The study confirms prior work that AN-DRGs for mental health perform relatively poorly in explaining cost variation in the acute inpatient setting. Diagnosis has low predictive power in the community and ongoing inpatient settings, and so extending AN-DRGs to other settings is not likely to be sustainable. The MH-CASC classification provides an improved solution by using additional clinical/functioning variables, but still not to the standards of the overall medical AN-DRGs.

2. *Design of any activity-based funding system for the community should be based on the number of services a person receives in a time period, not the cost per occasion of service. Defined periods of time should be the basis for funding community programs.*

   The data shows that the variability in cost between patients using community mental health services relates to the number of times the person is seen (treatment days), and not the cost per service. The number of such treatment days is correlated with the clinical attributes of the client. A cost per encounter funding model is most likely to encourage an increase in community services, but not necessarily related to the needs of clients.

   Recent moves by private health insurers to reimburse private hospitals for community-based care have been welcomed both by providers and consumer groups, but use a per occasion of service payment model. Trialing of an alternative 'per period of care' payment system, using the MH-CASC classification, would be a worthwhile initiative.

3. *The study has identified those clinical factors that predict hospitalisation, which may be useful for utilisation review.*

   The profile of non-acute inpatients is different, with symptoms more elevated and lower functioning levels than acute inpatients or people treated in the community.

It should be possible to identify patients who may be treated in different service settings, and either create funding incentives for this to occur or introduce utilisation review systems.

4. *Funding of an 'intended same day admitted' patient class or episode type should be avoided.*

Evidence gathered in the MH-CASC Project suggests that 'intended same day' patients are best regarded as a type of community care rather than grouped with inpatient services.

Funding of a separate category of 'intended same day' patients carries considerable potential to skew practice towards hospital outpatient work, by creating incentives to bring patients in for hospital-based programs rather than treating them in the community.

5. *Per diem funding should be used to fund non-acute inpatient services, and not completed episodes of care.*

Most non-acute inpatient services are ongoing, and so not suited to an episodic casemix funding system. Payment systems based on differential per diem payment rates, weighted for casemix class, offer the most potential.

6. *The early days of 'acute' inpatient stays do cost more than later days, but not enough to justify a step-down funding system.*

The patient classification system used by private health insurers use step-down periods to encourage shorter lengths of stay. The data does not support continuation of such a system. The alternative is to use episodic payment systems, either AN-DRGs or the MH-CASC classification.

The MH-CASC classification was developed using both public and private inpatient units. This should not deter private health funds from using the system, as the inclusion of the public acute inpatient units assisted in differentiating patients. The current step-down system of funding for the private units influenced the average length of stay towards the funding norm, thus dampening differentiation between patients. Health Funds could use the average length of stay data with the existing *per diem* rates to calculate a cost per completed inpatient episode using the MH-CASC classes.

7. *The data collected during the MH-CASC study do not support funding models which make reimbursement contingent on changes in outcomes as measured by current instruments.*

The clinical measurement instruments (e.g., HoNOS, LSP-16) did not detect significant changes in patient outcomes during the course of the study – the fortnightly repeat ratings showed consistency over time as the dominant pattern.

8. *If casemix funding is introduced to specialised mental health services, then there are other services or 'product lines' that need to be funded apart from casemix, specifically:*

- brief assessments,
- consultation liaison,
- teaching, training and research,
- community development .

MH-CASC costed these, although it should be noted that these will vary for different service types. In total, they accounted for 11.6% of costs in the study sample.

Strengthening the signal

The major challenge for the mental health community is to strengthen the signal so that there is a more normative pattern of service that differentiates the types of patients using specialised mental health services.

Casemix tools are essential for this work to proceed, because they provide a system to describe patients in way that makes sense clinically, and which has meaning in terms of resource utilisation. It is not possible to disentangle the role of provider factors from patient factors without some standard system to adjust for casemix differences between providers. Similarly, a patient classification system is the starting point for development of clinical protocols.

The MH-CASC classification provides a basis for further development of normative patterns of care based on the attributes of people with mental disorders using specialised mental health services. There are a number of initiatives that could be contemplated :

- Use of the classification for management information, benchmarking, outcome and quality review is likely to focus services more directly on the patterns of care being provided to different types of patients. Implementing routine collection of the MH-CASC patient data set, and collation and publication of the data by a national benchmarking unit, could be considered.
- The professional colleges, in collaboration with State and Territory mental health units, could be funded to develop clinical protocols or pathways. The service utilisation patterns for the MH-CASC patient classes are a valuable resource in identifying the type, level, and cost of service over the three-month period of the study. The colleges could compare this with what is regarded as appropriate practice. The MH-CASC database is structured to allow future analyses of these patterns.
- Some sites could be selected for pilot collection of the patient attribute data for grouping into the MH-CASC classes and modelling the impact if they were used for funding purposes. Sites which participated in the study would have the relevant training and expertise for this. Such a pilot should look at more long-term service utilisation patterns, and changes in clinical ratings over time, to enable further development of the bundling options.

Classification development, refinement and implementation are iterative processes. The above list is clearly not exhaustive, and other possibilities will emerge as the mental health industry gains experience in this area. The MH-CASC classification offers a potential base for many future developments in the mental health sector.

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Ms Merinda Epstein	Consumer representative Victorian Mental Illness Awareness Council, Victoria
Ms Leonie Manns	Consumer representative, Mental Health Co-ordinating Council, NSW
Dr Margaret Leggatt	Director, Schizophrenia Australia Foundation, Victoria

Note: Positions refer to the posts held by Committee members during the Project and may not be current.

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Note: Positions refer to the posts held by Committee members during the Project and may not be current.

National Mental Health Funding Models Steering Committee

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Mr Keith Finney	Nominee, Australian Health Insurance Association Manager, Provider Relations National Mutual Health *Alternate for Mr Finney - Ms Judy Hardy*
Mr Mick Green	National Community Advisory Group on Mental Health
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Mr Tony Wade	Joint nominee, Australian Association of Mental Health and the Australian Psychiatric Disability Coalition Principal, Tony Wade and Associates, Brisbane
Dr Yvonne White	Nominee, Australian Medical Association Federal Council (Psychiatrist representative) *Alternate for Dr White - Dr Harry Nespolon*
Mr Peter Williams	Director, Information Services Branch Information and Business Services NSW Department of Health
Ms Tess Withers	Nominee, Australian Private Hospitals Association Formerly Chairperson Psychiatric Subcommittee Australian Private Hospital Association

Note: Positions refer to the posts held by Committee members during the Project and may not be current.

Clinical Panels

Panel One - Schizophrenia, paranoia and acute psychotic disorders, major affective disorders	
Dr Alan Rosen, Chairperson	Director, North Shore Hospital and Community Mental Health Service, New South Wales
Professor Assen Jablensky	Department of Psychiatry, University of Western Australia, Western Australia
Professor Peter Yellowlees	Director, Valley Community Mental Health, Queensland
Mr Kevin Fjeldsoe	Director of Nursing, Wolston Park Hospital, Queensland
Mr John Ballis	Chief Executive Officer, Psychiatry Department, Dandenong Base Hospital, Victoria
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Dr Jonathan Phillips	Consultant Psychiatrist in Private Practice, New South Wales
Professor Daniel O'Connor	Director of Psychogeriatrics, Heatherton Hospital, Victoria
Dr Roger Gurr	Sector/Director, Blacktown and Mount Druitt, New South Wales
Ms Wendy Weir	Mental Health Coordinator, Northern Sydney Area Health Service, New South Wales
Assoc Prof Michael Sawyer	Women's and Children's Hospital, South Australia
Ms Merinda Epstein	Consumer representative, Victoria
Ms Leonie Manns	Consumer representative, New South Wales
Dr Margaret Leggatt	Director, Schizophrenia Australia Foundation , Victoria

Panel Two - Other affective disorders, anxiety disorders, eating and obsessive compulsive disorders, somatoform disorders	
Prof Graham Burrows	Department of Psychiatry, Austin and Repatriation Medical Centre, Victoria
Mr Roco Crino	Clinical Research and Anxiety Disorders Unit, St Vincent Hospital, Sydney, New South Wales
Dr Malcolm Battersby	Senior Lecturer in Psychiatry, Department of Psychiatry, Flinders Medical Centre, South Australia
Prof Steven Touyz	Department of Psychology, Westmead Hospital NSW
Dr Kay Wilhelm	Department of Psychiatry, Prince Henry's Hospital , New South Wales

Panel Three - Personality disorders and acute stress reactions	
Dr David Leonard	Director of Psychiatric Services Mornington Peninsula Hospital Frankston, Victoria
Dr Beth Kotze	Westmead Hospital, New South Wales
Dr Sandra Hacker	Psychiatrist in private practice, Melbourne, Victoria
Dr Ron Spielman	Psychiatrist in private practice, Sydney, NSW
Ms Jane Morton	Clinical Psychologist in private practice, Melbourne, Victoria
Assoc Prof Henry Jackson	Department of Psychology, University of Melbourne, Victoria
Dr Ruth Vine	Rosanna Forensic Psychiatry Centre, Victoria

Panel Four - Childhood and Adolescent disorders	
Dr Sven Silburn	Child Health Research Unit, Princess Margaret Hospital, , WA
Dr Alan Maudsley	South Eastern Child and Family Centre, Melbourne, Victoria
Dr Philip Hazel	Faculty of Medicine, Psychiatry, University of Newcastle
Dr Victor Storm	Director of Clinical Services, Rozelle Hospital, Sydney, NSW
Dr Steve Zubrick	Child Health Research Institute, Princess Margaret Hospital, WA
Dr George Patton	Centre for Adolescent Health, Parkville, Victoria
Dr Joe Rey	Rivendell Adolescent Unit, Thomas Walker Hospital, Concord West, New South Wales
Mr Michael Fotheringham	Research and Evaluation Unit, Women's and Children's Hospital, Adelaide, South Australia
Assoc Prof Michael Sawyer	Research and Evaluation Unit, Women's and Children's Hospital, Adelaide, South Australia
Ms Anne Gannoni	Department of Psychiatry, Women's and Children's Hospital, Adelaide, South Australia
Ms Ian Dobson	CAMHS Western Team, Port Adelaide, South Australia
Prof Beverley Raphael	Department of Psychiatry, Royal Brisbane Hospital, Queensland
Prof Robert Kosky	Department of Psychiatry, Women's and Children's Hospital, Adelaide, South Australia

Panel Five - Organic disorders with psychiatric disturbance	
Professor Daniel O'Connor	Monash University, Academic Unit of Psychogeriatrics, Heatherton Hospital, Victoria
Dr Richard Rosewarne	Monash University, Academic Unit of Psychogeriatrics, Heatherton Hospital, Victoria
Dr John Lloyd	Director of Neuropsychiatry, Royal Melbourne Hospital, Victoria
Dr Sid Williams	Lidcombe Hospital, New South Wales
Dr Steve McLean	Mental Health Realignment Team, South Australian Mental Health Services , South Australia

Note: Positions refer to the posts held by participants at the time the Clinical Panels were conducted.