AMHOCN

Australian Mental Health Outcomes and Classification Network

'Sharing Information to Improve Outcomes'

An Australian Government funded initiative

Reporting Framework for the National Outcomes and Casemix Collection

Version 1.0

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national mental health strategy

What is Australian Mental Health Outcomes and Classification Network?

The Australian Mental Health Outcomes and Classification Network (AMHOCN) was established by the Australian Government in December 2003 to provide leadership to the mental health sector to support the sustainable implementation of the outcomes and casemix collection as part of routine clinical practice. It aims to support states and territories and to work collaboratively with the mental health sector to achieve the vision of the introduction of outcomes and casemix measures. AMHOCN consists of three components: a data bureau responsible for receiving and processing information; an analysis and reporting component providing analysis and reports of submitted data; and a training and service development component supporting training in the measures and their use for clinical practice, service management and development purposes. Currently, the Australian Government has contracted the following organisations to undertake these roles: Strategic Data Pty Ltd, (data bureau); The University of Queensland (analysis and reporting); The NSW Institute of Psychiatry (training and service development). In February 2005, an AMHOCN State Liaison Manager role was established to coordinate activities between the state and territory health authorities and the AMHOCN components. The Australian Government has contracted Allen Morris-Yates to undertake that role. Further information regarding AMHOCN can be found at http://www.mhnocc.org.

Feedback

Comments on the document are welcomed. Readers are encouraged to submit comments via the on-line NOCC forum at http://www.mhnocc.org/forum/ . Alternatively, comments can be forwarded to:

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Overview

1.1   Introduction

The overall purpose of this Reporting Framework is to provide a conceptual basis for the reporting of analyses of the Mental Health National Outcomes and Casemix Collection (NOCC) Data Sets. It is prepared specifically for those information users who intend to develop and analyse reports from NOCC data collected locally (be it at the jurisdictional or organisational level).

The Reporting Framework details the key underlying assumptions used in the development on the National standard reports to date. It is important for readers to note that as further analyses and reporting is undertaken with the National data, it can be anticipated that there will be refinement to the underlying assumptions. These refinements will be documented in each release of Standard Reports as well as in subsequent versions of the Reporting Framework.

This document is the first version of the Reporting Framework and has been informed by several factors. These include detailed analyses of the available NOCC data, notwithstanding that these data represent both the early experiences with the NOCC Protocol and partial reporting by most jurisdictions. Other relevant sources of information have been conceptual analyses of similar projects, specifically work in the Australian Private Hospital Sector, related Australian initiatives in other sectors of the health and community care sectors and related international initiatives.

Importantly, the Reporting Framework has been informed by the Stakeholder Consultations undertaken by AMHOCN in 2004 as well as ongoing dialogue with the Child & Adolescent, Adult and Older Persons Mental Health Expert Groups, representatives on the Australian Health Ministers' Advisory Council National Mental Health Working Group Information Strategy Committee (ISC) contributors to the on-line Mental Health National Outcomes and Casemix Collection Forum and broader sector consultation with the field as part of an ongoing quality improvement activity. It is anticipated that the Framework will evolve through feedback from these key stakeholders, advances in knowledge that arise from both analyses of the collection and consideration of new research findings and other technical developments.

The structure and content of this document is premised on the following:

1.   Readers of this document are assumed to be familiar with the current version of the *Technical specification of State and Territory reporting requirements for the outcomes and casemix components of 'Agreed Data' (Version 1.5)*;

2.   Readers will also be familiar with the current version of the *NOCC Clinician and Self-Report Measures Overview (Version 1.5)*;

3.   Any changes to these two primary source documents will result in changes to the Reporting Framework;

4.   The Reporting Framework is currently limited to the outcomes and casemix measures. The patient level data reported to the National Minimum Data Sets – Mental Health Care are not further considered at this stage. As noted in the *AMHOCN Stakeholders Report*,[a] there are significant challenges to the linkage of the entire data sets that comprise the overall collection.

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[a] Pirkis J, Burgess P, Coombs T, Clarke A, Jones-Ellis D, Dickson R (2004). Australian Mental Health

5. The standard clinical measures that form the NOCC can be used for the purpose of measuring consumer outcomes or casemix classification, or both. This version of the Reporting Framework is primarily focused on reporting from the perspective of measuring consumers' mental health status and clinical outcomes. Later versions of this Framework will address in more detail case complexity and casemix classification

6. The framework is the primary source reference regarding all standard aggregate data sets and report outputs produced by AMHOCN;

7. AMHOCN's role with respect to the analysis and reporting of the NOCC data sets is primarily focused at a National level. It is not a substitute for analysis and reporting functions that should be implemented at the jurisdictional and local organisational levels;

8. The Aggregate Data Sets and Standard Reports defined in this document are designed to meet the information needs of a variety of stakeholders. It is acknowledged that different stakeholders will have different and diverse information requirements. To a large extent, the Reporting Framework has been designed to meet this diversity. The primary and common goal, however, is to facilitate service development and clinical quality improvement activities;

9. The production of National level, aggregate statistical information can provide Jurisdictions and Mental Health Service Organisations with a baseline against which performance can be evaluated. It is important to note that National norms will not necessarily reflect best or even appropriate clinical practice. It is anticipated, however, that these reports will also facilitate benchmarking activities that are directed to improve service quality and consumer outcomes;

10. An additional goal of the Reporting Framework is to provide clinicians and consumers with normative data that promote informed understanding and interpretation of individual consumer's clinical profiles and patterns of service utilisation.

1.2   Structure of the framework

The NOCC Data Sets allow analysis and reporting from a variety of perspectives. The perspectives can vary as a function of who is the information user (e.g., a policy maker, a service planner, a team leader, an individual clinician, an individual consumer, an academic researcher), what information is required ("What is the profile of consumers at admission to my service?"; "How do these profiles compare with other similar services?"; "Do our consumers have the same outcomes as other similar *consumers* in other similar services?")

It is recognised too that more complex and sophisticated questions can be addressed through *partitioning* and *stratifying* the information. A *partition* of the data represents a high-level categorisation, in which the data are organised into a number of groups within which more meaningful questions of the data can be posed. For example, the outcomes and casemix measures are specific to the age group of consumers, at times specific to the service setting and at other times specific to the reason for collection. These are fundamental partitions (or categories) that are necessary to enable meaningful analysis of the data that is based on like-with-like comparisons. There are other partitions that are

Outcomes and Classification Network: Stakeholder Consultations, 2004. Australian Mental Health Outcomes and Classification Network, Melbourne/Brisbane/Sydney.]

desirable – examples include filtering the NOCC data 'responsible entity' (jurisdiction, mental health service organisation or service unit).

Within a partition, at times it will be useful to 'drill down' and further analyse consumer profiles and outcomes by *stratification* factors. For example, the clinical profiles can be stratified by consumers' Gender to answer questions such as: "Is the clinical profile of male consumers the same as female consumers?" or by consumers' Principal diagnosis to answer questions such as "Are clinical outcomes the same for consumers with schizophrenia versus consumers with affective disorders?" or by consumers' Age – "Do younger consumers have the same clinical profiles as older consumers?".

The common goal is for all stakeholders to use this information to facilitate service development and clinical quality improvement activities. National level reports can provide jurisdictions and mental health service organisations with baselines against which performance can be evaluated. It is important to note that these baselines will not necessarily reflect best or even appropriate clinical practice. It is anticipated, however, that the information derived at a national level will also facilitate benchmarking activities that are directed to improve service quality and consumer outcomes. In addition, it is anticipated that the national level reports will provide clinicians and consumers with reference data that promote informed understanding and interpretation of individual consumer's clinical profiles and patterns of service utilisation.

It is clear therefore that the Reporting Framework must be designed to meet the information needs of a variety of stakeholders and that those different stakeholders will have different and diverse information requirements that cannot be universally met through a single set of reports. Within the Reporting Framework, those perspectives are 'captured' in the design of specific 'aggregations' and 'views' of the data. The framework defines a number of different classes of aggregate statistical outputs, each consisting of an aggregate data set, an associated set of standard views, and based on those views, a set of standard reports.

The aggregate data sets are based on selected permutations of the *Partition and Stratification factors* relevant to the particular subject of the output class. As noted above, a partition of the data represents a high-level categorisation within which questions of the data can be meaningfully posed. For example, the outcomes and casemix measures are specific to the age group of consumers, at times specific to the service setting and at other times specific to the reason for collection. Some questions are best answered by analysis of data restricted to financial years; others to quarters within financial years, etc. These partitions are necessary to enable meaningful analysis of the data. Within a partition, at times it will be informative to 'drill down' and further analyse consumer profiles and outcomes. For example, is the clinical profile of male consumers the same as female consumers? Are clinical outcomes the same for consumers with schizophrenia versus consumers with affective disorders? The Reporting Framework has been designed to enable detailed analysis by partition and stratification.

Finally, it should be noted that there are significant limitations in both the availability and quality of the submitted data for the 2002–2003 and 2003–2004 financial years. Whilst some improvement is expected, it is likely that there will also be significant limitations in the data for the 2004–2005 financial, due for submission by the 31st December 2005. These limitations will have an effect on the degree to which the outputs may be stratified by the various stratification factors and also on what groups of statistics may be reported.

2   Principal concepts

2.1   The NOCC data collection protocol

2.1.1   Conceptual basis of the NOCC data collection protocols

The evaluation of the outcomes of care requires a comparison of consumers' clinical status before and after the provision of that care. Also, because care may sometimes be required over extended periods of time, the assessment of outcomes may also require the consideration of consumers' clinical status at regular intervals during care. The NOCC protocols for routine outcomes assessment are therefore based around the recurrent assessment of individual consumer's clinical status at clinically relevant transition points during the episode or period of mental health care – admission, review, and discharge.

Case classification requires the identification of the principal reasons for the patient or client's utilisation of services during the period or episode of care. Typically, a casemix classification is based on the *Principal diagnosis* and *Principal procedure*. In mental health service settings however, it has been found that indicators of disability and comorbidity are required in addition to diagnostic information, for effective classification. Under the NOCC protocols, some components of the data required for case classification are recorded at the beginning of the episode or period of care (eg, HoNOS ratings), whilst others are collected at the end (eg, Diagnosis, LSP-16 ratings, etc).

In summary, evaluation of outcomes requires the comparison of the consumer's clinical status at the end of a period of care with their status at the beginning of that period of care. Case classification requires the identification of the principal reasons for the consumer's utilisation of services during the period of care. These considerations are illustrated in Figure 1.
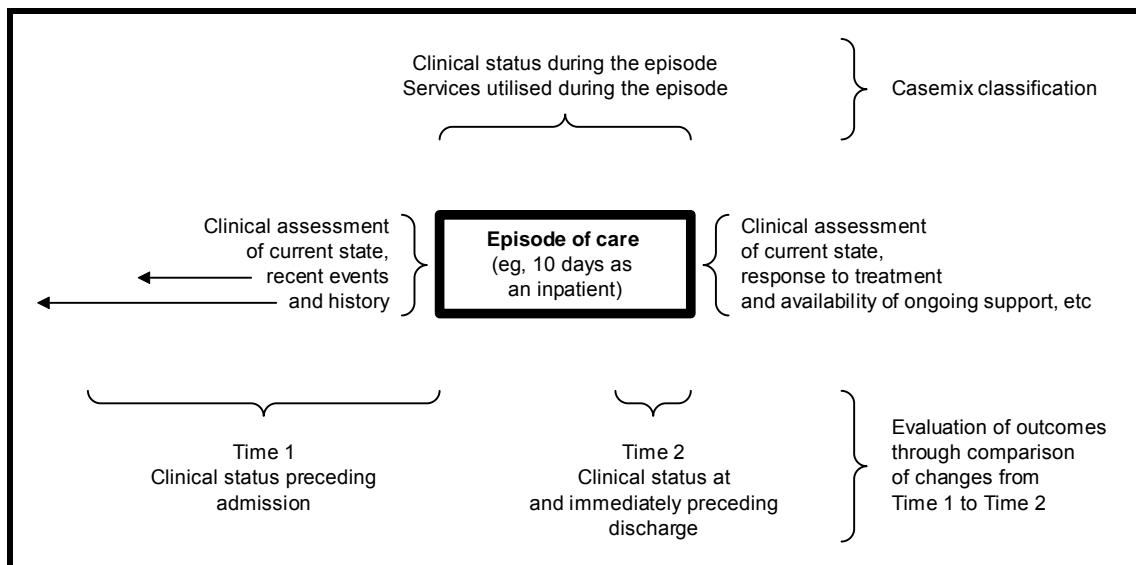
Figure 1: Data collection requirements for outcomes assessment and case classification.

2.1.2 Key features of the NOCC protocol

The NOCC protocol prescribes what is collected and when it is collected. Table 4 from Section 7.1.3 of the *NOCC Technical Specification* summarises the protocol and is reproduced below as Table 1. It is important to note that there has been variation of this national protocol in some jurisdictions (e.g., some measures are mandated locally while not required nationally).

The clinical measures and other data that constitute the NOCC are collected at key occasions within the context of an *Episode of Mental Health Care*.

The technical specification states that:

> an *Episode of Mental Health Care* will be defined as a more or less continuous period of contact between a consumer and a *Mental Health Service Organisation* that occurs within the one *Mental Health Service Setting*.

Two business rules apply in the identification of episodes of mental health care:[b]

> **One episode at a time**: While an individual may have multiple episodes of mental health care over the course of their illness, they may be considered as being in only one episode at any given point of time for a particular Mental Health Service Organisation.

> **Change of setting = New episode**: A new episode is deemed to commence when a person's care is transferred between inpatient, community residential and ambulatory settings. A change of Mental Health Service Setting therefore marks the end of one episode and the beginning of another.

The technical specification further states that:[c]

> a *Collection Occasion* is defined as an occasion during an *Episode of Mental Health Care* when the required dataset is to be collected in accordance with a standard protocol. The broad rule is that collection of data is required at both episode start and episode end.

Figure 1 from Section 5.2.7 of the NOCC Technical Specification summarises the data collection points under various episode scenarios and is reproduced on page 7 as Figure 2.

Of primary significance for the structure of the Reporting Framework is the fact that the clinical measures are specific to:

1. the *Collection Age Group* of the consumer – either Children & Adolescents, Adults or Older Persons;
2. the *Mental Health Service Setting* – either Psychiatric Inpatient, Community Residential or Ambulatory; and
3. the *Type of Collection Occasion* – either Admission, Review or Discharge.

The two principal factors that determine what measures are to be collected – Collection Age Group and Mental Health Service Setting – are the fundamental partitions on which all analyses are based.

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[b] See Section 5.1.7 of the Technical Specifications.

[c] See Section 5.2.1 of the Technical Specifications.

Table 1: Data to be collected at each Collection Occasion within each Mental Health Service Setting, for consumers in each Collection Age Group.

Mental Health Service Setting	INPATIENT			COMMUNITY RESIDENTIAL			AMBULATORY		
Collection Occasion	A	R	D	A	R	D	A	R	D
Children and Adolescents									
HoNOSCA [1]	●	●	●	●	●	●	●	●	●
CGAS	●	●	✘	●	●	✘	●	●	✘
FIHS	✘	●	●	✘	●	●	✘	●	●
Parent / Consumer self report (SDQ) [2,3]	●	●	●	●	●	●	●	●	●
Principal and Additional Diagnoses	✘	●	●	✘	●	●	✘	●	●
Mental Health Legal Status	✘	●	●	✘	●	●	✘	●	●
Adults									
HoNOS [1]	●	●	●	●	●	●	●	●	●
LSP-16 [4]	✘	✘	✘	●	●	●	✘	●	●
Consumer self-report (MHI, BASIS32, K10+) [3,5]	✘	✘	✘	●	●	●	●	●	●
Principal and Additional Diagnoses	✘	●	●	✘	●	●	✘	●	●
Focus of Care [6]	✘	✘	✘	✘	✘	✘	✘	●	●
Mental Health Legal Status	✘	●	●	✘	●	●	✘	●	●
Older persons									
HoNOS 65+ [1]	●	●	●	●	●	●	●	●	●
LSP-16 [1]	✘	✘	✘	●	●	●	✘	●	●
RUG-ADL	●	●	✘	●	●	✘	✘	✘	✘
Consumer self-report (MHI, BASIS32, K10+ [3,5])	✘	✘	✘	●	●	●	●	●	●
Principal and Additional Diagnoses	✘	●	●	✘	●	●	✘	●	●
Focus of Care [6]	✘	✘	✘	✘	✘	✘	✘	●	●
Mental Health Legal Status	✘	●	●	✘	●	●	✘	●	●

Abbreviations and Symbols

A	Admission to Mental Health Care
R	Review of Mental Health Care
D	Discharge from Mental Health Care

● Collection of data on this occasion is mandatory
✘ No collection requirements apply

Notes

(1) Discharge ratings for the HoNOS, HoNOS65+ and HoNOSCA are not required for inpatient episodes less than 3 days duration.

(2) Discharge ratings for the SDQ are not required for any episode of less than 21 days duration because the rating period used at discharge (previous month) would overlap significantly with the period rated at admission.

(3) The classification of consumer self-report measures as mandatory is intended only to indicate the expectation that consumer's will be invited to complete self-report measures at the specified *Collection Occasions*, not that such measures will always be appropriate. Special considerations apply to the collection of self-report measures.

(4) The LSP-16 is not included as a measure for use in inpatient settings as, in its current form; it requires ratings to be based on the consumer's functioning over the previous three months. This is difficult for the majority of inpatient episodes which are relatively brief.

(5) Introduction of adult consumer self-report measures in inpatient episodes is not included as a national requirement at this stage but will be reviewed in the future following experience in use of the measures in other settings. Individual Jurisdictions or service agencies may however choose to trial these measures in inpatient settings.

(6) Restriction of the Focus of Care only to ambulatory care episodes for adults and older persons is based on experience in the MH-CASC study which found it to be of limited value in inpatient and community residential settings and with child/adolescent patients.

Scenario 1: Inpatient Episode, length of stay < 91 days

INPATIENT EPISODE START: Admission

INPATIENT EPISODE END: Discharge

Data collection

Data collection

Scenario 2: Ambulatory Care Episode, ongoing, standard 3 month review

AMBULATORY EPISODE START: Intake

91 days

3 MONTH REVIEW

Data collection

Data collection

Scenario 3: Ambulatory Care Episode, ad hoc review followed by 3 month review

AMBULATORY EPISODE START: Intake

AD HOC CLINICAL REVIEW

91 days

3 MONTH REVIEW

Data collection

Data collection

Data collection

Scenario 4: Ambulatory Care with intervening inpatient admission

INPATIENT EPISODE START Data collection

INPATIENT EPISODE END Data collection

Ambulatory Episode 1 | Inpatient Episode | Ambulatory Episode 2

Data collection COMMUNITY EPISODE START: Intake

Data collection COMMUNITY EPISODE END

Data collection COMMUNITY EPISODE START:

Figure 2: Data collection requirements under four common scenarios.

2.2 Data integrity

The aggregate statistical analyses described under this reporting framework are based on the data collected under the NOCC protocols. That data includes various different kinds of data elements:

- Data elements that are the defining attributes of Collection Occasions (i.e., Mental health provider entity identifier, Person identifier, Age group, Mental health service setting, Reason for collection, Collection occasion date).

- Data elements constituting the various clinical rating scales and the consumer– and carer–completed questionnaires (e.g., HoNOS item 01 – HoNOS Item 12, RUGADL item 01 – RUGADL Item 04, CGAS rating, BASIS32 Item 01 – BASIS32 Item 32, etc.).

- Other individual demographic and clinical data elements (e.g., Sex, Date of birth, Principal diagnosis, Mental health legal status, Focus of care, etc.).

Submitted data that includes invalid values for the defining attributes of Collection Occasions is dealt with by the initial validation processes that are completed when the data is received by AMHOCN. Records with invalid defining attributes are excluded from further consideration.

For the sake of clarity, the measures of clinical status, whether they be clinician rated measures such as those in the HoNOS family, or consumer or carer completed measures such as the BASIS–32 or the SDQ, or the other clinical data elements such as Focus of care, are all referred to here as 'measures' (elsewhere, these have been variously referred to as outcome measures, scales, instruments). The individual data elements that constitute many of the measures will be referred to as 'items'. Items can be aggregated into subscales and total scores (these have been variously referred to as summary and total scores).

2.2.1 Exclusion of measures not required under the NOCC protocols

To a certain extent, the requirements specified under the NOCC protocols can be considered as being basic minimum requirements. Accordingly, some services have extended the collection requirements specified under their locally defined data collection protocols.

For example, in some services consumer–rated measures are being offered to and completed by patients in the Overnight inpatient service setting, even though the NOCC protocol does not require that such measures be offered in that service setting. Other services are asking clinicians to complete clinician–rated measures at occasions when the NOCC protocols do not require their completion. For example, some services may require clinicians to complete the LSP at Admission to as well as at Review during and at Discharge from Ambulatory care.

AMHOCN has found it necessary to develop a policy in respect of these local variations because the data management processes implemented by some Jurisdictions have not excluded such data from the extracts submitted to AMHOCN.

From AMHOCN's perspective, the problem with such local variations is their local nature. The individual services that have implemented additional collection requirements will have had good reason for doing so. For the most part, those reasons will have been determined by the nature of the services being provided, the consumer groups to whom

they are being provided, the availability of resources to support the additional collection requirements, and the service's capacity to make effective use of that additional data. Consequently, there will be substantial variability and unknown biases present in the pattern of such additional collections. Any statistics presented at a national level that were derived from that additional data would be based on a quite different and much more limited clinical population to those derived from the main body of data.

Therefore AMHOCN's policy in respect to the analysis and reporting of data collected outside of the requirements of the NOCC protocols is as follows: **Measures that have been recorded at Collection Occasions where the NOCC protocols state that their collection is not required will be excluded from further consideration or analysis.**

2.2.2 Identification of validly completed measures

The major issue for the analysis and reporting of the NOCC measures is then to identify and appropriately deal with the measures that are not 'valid' with respect to the item ratings provided.

Ratings of items can be described in terms of three mutually exclusive categories:
1. Valid 'clinical' ratings that typically indicate levels of problem severity;
2. Valid 'non-clinical' ratings that typically indicate reasons why problem severity was not rated; and
3. Invalid values such as 'nulls' or values outside of the range for 1 and 2 above.

The validity of a measure is derived from consideration of the validity of the items that comprises that measure. Valid scores can be estimated either when all of the items are clinically valid OR when a sufficient number of items are clinically valid. Two questions require resolution:
1. How many items need to have a valid clinical rating in order for the overall measure to be considered valid?
2. If one or more of the items does not have a valid clinical rating, how does this impact on the scoring of subscale and total scores?

In order to answer these questions, AMHOCN undertook descriptive analyses of the available data. Judgements regarding the validity of a measure were based on several principles. The overarching goal was to minimise potential loss of data via exclusion of partially completed measures and to balance that with the retention of measures that would still enable statistical analysis. While there are sophisticated methods for resolving 'missing data', a further principle was to implement transparent solutions that can be replicated readily at local levels.

The frequency distributions of partially completed measures were examined and thresholds specific to each measure were determined as minimal requirements for analysis. It is important to note that these criteria are based on analyses of the data available as at April 2005; these criteria may change over time as the quality of the submitted data improves and will be published with each release of national level reports.

Table 2 shows the criteria used to determine whether a NOCC measure had been validly completed for the purposes of subsequent statistical reporting. These criteria apply to each of the Standard Reports where NOCC measures are further analysed and address the first question, "How many items need to have a valid clinical rating in order for the overall measure to be considered valid?"

2.2.3 Derivation of composite Sub–scores and Total scores

In regards to the second question, "If one or more of the items does not have a valid clinical rating, how does this impact on the scoring of subscale and total scores?" Only the valid clinical ratings of the items comprising a measures subscale or total scores are considered. If a component item is 'missing', it was treated as contributing '0' to the overall score' If all of the items comprising a subscale were 'missing', then the overall subscale score was set to missing with no valid observations.

It should be noted that this method results in 'averages' that are biased downwards in the sense that the fewer items that are completed, the less opportunity exists to achieve a high score. For example, the maximum of a HoNOS with only 10 completed items is 40. The dilemma is that in the real clinical situation, there almost always will be missing data. While reporting of subtotal and total statistics could have been restricted to those measures where there were no missing data, in some ways this introduces other biases and additional concerns. Specifically, the means and standard deviations only apply to populations where there are no missing data and the estimate of the statistics will be based on a smaller set of observations. While there are alternative methods for handling 'missing data', it was decided that by setting a high threshold for a measure to be considered valid and setting 'missing ratings' to 0 was a conservative and valid approach.

Table 2: 'Valid completion' criteria for each of the measures.

Consumer– or Carer–completed measures	
BASIS-32	At least 24 items have Valid Clinical Ratings***
K10+	At least 9 items have Valid Clinical Ratings
MHI-38	At least 30 items have Valid Clinical Ratings
SDQ – all Versions	At least 20 of the first 25 items have Valid Clinical Ratings
Clinician–rated measures	
HoNOS	At least 10 items have Valid Clinical Ratings
HoNOS 65+	At least 10 items have Valid Clinical Ratings
HoNOSCA	At least 11 of the first 13 items have Valid Clinical Ratings
LSP-16	At least 14 items have Valid Clinical Ratings
RUG-ADL	All 4 items have Valid Clinical Ratings
CGAS	The item has a Valid Clinical Rating
FIHS	At least 6 of the 7 items have Valid Clinical Ratings
Other demographic and clinical measures	
Age	Children & Adolescents: Aged at least 1 day to less than 25 years inclusive Adults: Aged between 15 and 110 years inclusive Older Persons: Aged between 55 and 110 years inclusive
Sex	Either Male or Female Sex recorded
Principal Diagnosis	Valid ICD10-AM or accepted Code
MHLS	Either Voluntary or Involuntary Status recorded
FoC	The item has a Valid Clinical Rating

3 The general structure of the reporting framework

3.1 Content of the framework

The reporting framework described here is based on the key elements of the NOCC described in the preceding section. Essentially, the data collected describes consumers' clinical status at certain points in the clinical pathway, referred to as Collection Occasions, within the context of Episodes of Mental Health Care.

Aggregate statistics are reported. For categorical measures such as Diagnoses, Mental Health Legal Status, and Focus of Care, the percentage of cases having each possible substantive (i.e., valid, non–missing) value of the measure will be reported. For continuous measures such as the HoNOS, LSP, BASIS32, etc, indicators of the central tendency and variability of the distribution of scores will be reported. Depending on the level of detail required, both just the Mean and Standard Deviation will be reported or in addition, the Median and Inter-Quartile Range.

Aggregate statistics based on the data collected at each kind of Collection Occasion, as defined by its Reason for Collection, within each kind of Mental Health Service Setting (and Collection Age Group), will provide a comprehensive description of consumers' clinical status at those various points.

Where Episodes of Care and Periods of Care can be fully identified by their Start and End occasions, three sets of aggregate statistics will be reported. First, the consumer's clinical status at the Start of the episode or period. Second, the consumer's clinical status at the End of the episode or period. Third, two sets of indicators of the change in consumers clinical from Start to End. The first of these is the Mean and Standard Deviation of the simple difference between the consumers score on a given measure at the End occasion compared with the Start occasion, referred to as the Change Score. The second is the Effect Size of the change. An effect size is a standardised aggregate statistic that enables changes on different measures to be directly compared.

3.2 The requirement for a flexible model of reporting

3.2.1 The problem

A major problem that must be addressed in the specification of a reporting framework for such complex data as that collected under NOCC is the question of how to provide users with information in a comprehensible manner without completely masking the inherent complexity of the subject matter.

It is well understood that people in need of mental health care have varied problems that require varied types of care. Consequently, a very simple reporting model that does not allow the partitioning and stratification of the information by important clinical and service utilisation related variables is not adequate. Two related solutions to this problem are widely discussed.

One approach is to provide aggregate statistics partitioned and stratified within a very limited framework based only on the most high level partition factors, that is *Reference*

periods, *Responsible entities*, *Mental health service settings* and *Age groups.*[d] Within that limited partitioning, all aggregate statistics are presented after risk-adjustment.[e] Typically the factors used in that statistical adjustment would include all relevant indicators of Case complexity.[f] In the current context, the partitioned aggregate statistical data set would, at the highest level of aggregation, include between 10 to 40 rows of information for each *Responsible entity* in each *Reference period*.

The utility of this approach depends very heavily on the validity of the case classification scheme used for the risk-adjustment. For example, under certain conditions, particularly where a Service Unit has a relatively large number of cases classified in stratum that are somewhat differently weighted in one scheme compared with other alternative schemes, application of different schemes can produce markedly different results.

At this stage in the development of the AMHOCN Reporting Framework it is not possible to specify a comprehensive risk adjustment model for the statistics to be reported. And in any case, for questions asked at the level of whole Service Units, it is generally considered essential to be able to examine both adjusted and unadjusted statistics regarding service utilisation. Unadjusted statistics enable information users to answer questions regarding actual absolute levels of service utilisation, clinical status and outcomes for specified Responsible entities. Consequently, it is essential that there be a capacity to review statistics at relatively detailed levels of stratification.

A second approach, that which is worked out most fully in this first version of the framework, is to specify a framework that enables the presentation of aggregate statistical information at all relevant levels of stratification within various partitions related to high level service provision factors. Careful choice of partitioning and stratification factors that are related to variations in service utilisation and outcomes then provides an alternative method of risk–adjustment. At lower levels of stratification, like can be compared directly against like. However this approach cannot be applied without limitation. In the current context, where the relevant partitioning will at least include *Peer groups*, *Mental health service settings*, and *Collection Age Groups* and the stratification factors will include Reasons for Collection or Service Paths and on or other of several different kinds of *Case complexity factors*, the fully partitioned and stratified aggregate statistical data sets will include several million rows of information. Were the aggregate data sets to also be partitioned by Mental Health Service Organisations and Service Units within MHSOs and all Reference periods since the initiation of the collection, then they would include many millions of rows and occupy several terabytes of storage. Clearly, all possible permutations of all conceivably relevant partition and stratification factors cannot be made available in a single report, whatever format it were to be made available in.

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[d] Partitioning by Age Group is required in the NOCC reporting framework because different measures are required to be collected in accordance to the service-related Age Group the consumer has been assigned to. In collections where service-related Age Groups were not defined or not reported on, Age would likely be included as a case classification variable in the risk-adjustment algorithm.

[e] For a complete and accessible (i.e., non-mathematical) discussion of risk adjustment see the collection of papers in L.I. Iezzoni (Ed.) 2003. *Risk Adjustment for Measuring Health Care Outcomes* (3rd ed.). Chicago, IL: Health Administration Press.

[f] The need for a standard patient classification is discussed in detail in Appendix [N]. Briefly, if different classes of patient require different levels of service and Service Units differ in the proportion of each of those classes of patient they provide services for, simple aggregate statistical comparisons between the Service Units can be misleading.

The presentation of highly partitioned and stratified information can also, very obviously, easily overwhelm information users. The idea of a person being unable to see the forest for the trees is an entirely apt description of what would result were information users to be presented with such an enormous volume of detail in a single report. Even presenting information users with just the highest levels of aggregate statistics can quickly overwhelm those not familiar with statistical data. Clearly, an effective reporting framework must enable information users to see both the forest and its constituent trees. However, there is no cost–effective way to make use of or even produce a paper–based report that contains over a million lines of statistical information. Some other means for presenting information must be employed.

3.2.2 Report classes

The solution to the problem described in the preceding section that has been employed in the present framework is to define a number of different classes of aggregate statistical outputs, each consisting of an *Aggregate data set*, an associated set of *Standard views*, and based on those views, a set of *Standard reports*. Together, these three components will be described as a *Report class*.

Three major Report classes are outlined in this version of the framework. They are:

- Analyses of the volume, completeness and integrity of the submitted data
- Aggregate statistics for Collection Occasions, Periods of care and Episodes of care
- Clinical reference statistics (for selected Demographic and Diagnostic groups by Reason for Collection within Setting)

The Aggregate data sets contain all the required permutations of the *Partition and stratification factors* relevant to the particular subject of the Report class. The Aggregate data sets are designed to facilitate querying using standard SQL based database applications.

Within each Report class, an associated set of Standard Views and Standard Reports are based on the particular underlying Aggregate data set.

The Standard views of the data enable a consistent format for presentation of the data contained within the Aggregate data sets. These views are intended to be used whenever the data is displayed, regardless of the medium used for the display of the data. Consequently, the views are designed to enable the effective presentation of the data in all possible mediums, including the standard printable A4 paper page.

The Standard report formats are based on the standard Views. Due to the very large number of permutations of the partition and stratification factors that will exist in most Report classes, it will be impractical to provide information users with Standard reports that include all possible views of the available data. Consequently, the Standard reports contain only a limited sub–set of the data available in the Aggregate data set for any given Report class.

The standard Views will not include all the data elements available within the aggregate data sets. Nor can they include all possible arrangements of the records contained within the data sets. Information users will need to directly query the data set and format their own Views and Reports, if they wish to gain access to very specific details or to review those details in arrangements not defined under the standard Views. Ultimately therefore, the primary means of access to the Aggregate data sets should be via interfaces that

enable non-technical users to easily retrieve and compare statistics for specified sub-sets of data defined by the intersection of specific strata within the various factors used in the partition and stratification of the data.

4 The subjects of analysis – Collection Occasions, Periods of Care, and Episodes of Care

Three distinct subjects for analysis can be identified on the basis of the NOCC data. They are *Collection Occasions*, *Periods of Care* and statistical *Episodes of Care*.[g]

The terms *Episode of care* and *Period of care* both refer to formally defined statistical concepts. In particular, when the term *Episode of care* is used, it always refers to the statistical *Episode of care* defined in this document.

A *Period of Care* may be defined as the interval between two consecutive *Collection Occasions* within the same *Mental Health Service Setting*. An *Episode of Care* may be defined as the interval between the first and last of a consecutive series of *Collection Occasions* within the same *Mental Health Service Setting*. The identification of any given *Episode of Care* is complicated by the fact that the determination of which *Collection Occasions* are defined as the first and last in any given series depends on both the *Start date* and *End date* of the *Reference Period*. The definition and identification of *Periods of care* and *Episodes of care* is discussed in detail in the sub–sections following the discussion of *Collection Occasions* below.

4.1 Collection Occasions

The *Collection Occasion* is the basic unit of reporting under the NOCC protocol. Analyses based on the Collection Occasion as the subject of analysis would involve the reporting of aggregate statistics for the various measures collected at each type of occasion. Within the reports the principal stratification would be by Reason for Collection, whilst the primary partitions would be Mental Health Service Setting within Collection Age Group.

Table 3 on page 17 provides an example of the kind of information that might be derived from such an analysis. The example shows a limited sub-set of statistics for just one measure, the HONOS, for one panel only of a partition, that for Adults in Ambulatory Care.[h]

As can be seen in the example shown, this type of simple analysis can provide a wealth of information about consumers' clinical status at various stages in the clinical paths within services.

Comparison of aggregate statistics just at different types of Collection Occasion cannot however give a definitive description of the full pattern of changes in consumers' clinical status. In particular, within this type of analysis it is not possible to identify the average magnitude and degree of variability of change in scores from one type of Collection Occasion to the next. For example, it would be useful to know if consumers identified as "New referrals" to Ambulatory Care at one Collection Occasion have a different outcome at

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[g] Where the term "episode", written in all lower case and not italicised, is used in this document it should be taken to refer quite generally and informally to any contiguous sequence of care provided in a specific *Mental health service setting*. The existence of such an episode is implicitly identified by the presence of even a single *Collection occasion*.

[h] The statistics shown in this example are from Table 2.1.4.2 in the Adult

a subsequent occasion when compared with consumers who were identified as having been transferred to Ambulatory care from another setting.

Table 3: An example of the results of an analysis based on Collection Occasions (HoNOS subscale scores for Adults in Ambulatory care).

Adults in Ambulatory Care at	Collection Occasions	HoNOS Behavioural problems Summary score		HoNOS Impairment Summary score		HoNOS Symptomatic problems Summary Score		HoNOS Social problems Summary score		HoNOS 10-item Total score	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Admission (all)	**50,120**	**2.3**	2.3	**1.4**	1.6	**3.9**	2.2	**3.8**	3.1	**9.9**	5.3
New referral	36,607	2.3	2.3	1.4	1.6	4.0	2.2	3.8	3.1	10.1	5.2
From other setting	10,663	2.2	2.3	1.3	1.5	3.4	2.3	3.8	3.1	9.2	5.6
Other	2,850	2.4	2.3	1.5	1.5	3.9	2.3	4.0	3.0	10.4	5.4
Review (all)	**69,852**	**1.4**	1.8	**1.5**	1.5	**3.0**	2.2	**3.6**	3.0	**8.2**	5.3
91-day review	57,846	1.3	1.7	1.4	1.5	2.9	2.2	3.5	3.0	8.0	5.2
Other	12,006	1.7	2.1	1.6	1.6	3.3	2.3	4.1	3.2	9.1	5.6
Discharge (all)	**26,101**	**1.6**	2.1	**1.1**	1.5	**2.5**	2.3	**2.9**	3.0	**7.1**	5.7
No further care	13,873	1.2	1.7	0.9	1.4	1.9	1.8	2.3	2.6	5.5	4.6
Change of setting	9,799	2.3	2.4	1.4	1.6	3.4	2.6	3.9	3.4	9.5	6.4
Death	71	2.4	2.5	2.9	2.2	3.4	2.8	4.7	4.0	11.6	7.3
Other	2,358	1.3	1.9	1.0	1.5	2.4	2.0	2.5	2.8	6.4	5.2

4.2   Periods of Care

Periods of Care are derived from sequential pairs of *Collection Occasions* within the same *Mental Health Service Setting*.   That is, an Admission immediately followed by a Discharge, an Admission immediately followed by a Review, a Review immediately followed by a Review, or a Review immediately followed by a Discharge. At the very least therefore, it is first necessary to correctly identify sequences of Collection Occasions within Mental Health Service Settings that relate to individual (though clearly not personally–identified) persons. Once a valid sequence of Collection Occasions has been established for a person, that sequence can then be assembled into Periods of Care. The problem of identifying valid sequences of Collection Occasions is discussed in detail under Section 4.4 beginning on page 22.

Note that, whilst by implication a singleton Admission identifies the presence of a following period, a singleton Review identifies the presence of both a preceding and a following period, and a singleton Discharge identifies a preceding period, in none of those cases is there sufficient information to actually formally specify a Period of Care suitable for statistical analysis. Consequently, singleton Collection Occasions do not contribute in any way to analyses based on Periods of Care.

Due to the simplicity of their definition, *Periods of Care* can be identified independently of consideration of the *Reference Period* within which they are to be analysed. As will be seen later, this is not the case for statistically–defined *Episodes of Care*.

4.3   Episodes of Care

Like the identification of a *Period of care*, the identification of an *Episode of care* is primarily determined by the presence of two *Collection occasions*, referred to as the "Start" and "End" occasions.   An *Episode of care* can not be identified by a single *Collection occasion.*   The rule is: **Regardless of what counting rules are applied, an *Episode of care* can only be counted if both a *Start occasion* and an *End occasion* can be identified.**   Consequently, singleton *Collection occasions* do not contribute in any way to analyses based on statistical defined *Episodes of care*.

The identification of an *Episode of care* is complicated by the censoring of the data sequence for each person. That is, the sequence of records is *left–censored* by the simple fact that, for each Service Unit, the collection and reporting of data under the NOCC protocols started at a certain point in time. Similarly, the sequence of records are *right–censored* by the simple fact that data is only available up to the end of the period of time included in the most recent data submission by the Mental Health Service Organisation.

Also, unlike *Periods of care*, the identification of the *End occasion* for *Episodes of care* that are longer in duration than the *Reference period* is determined by the *Reference period* in which context the *Episodes of care* are to be analysed.

Statistical analyses of *Episodes of care* are based on all records where the *Episode end date* falls within the *Start* and *End dates* of the *Reference Period*. That is, *Episodes of care* that start during the *Reference period* but which end after the *End date* of the *Reference period* are not included within the analysis. Also, *Episodes of care* that are not identified by a *Collection occasion* during the *Reference period*, even though the person is in care during the *reference period*, are not included within the analysis. However they will be picked up in a following *Reference period*.

To help explain how the censoring of the data sequence and the interaction between the *Reference period* and episode duration affects the identification of *Episodes of care*, the various examples illustrated in Figure 3 on page 21 will be discussed.

During the illustrated *Reference period* there are nine episodes that could potentially be defined as occurring within its context. Under the generally accepted counting rules used in the analysis of episodes of acute overnight inpatient care (psychiatric or otherwise), only two of those episodes could be counted within the *Reference period* because their dates of separation (the Scheduled Collection Date of the Discharge occasion) occur during the *Reference period* – the 2nd episode for Person C and the 1st episode for Person F. The remaining seven episodes – the 2nd episode for Person A, the 1st episodes for Persons C, D and E, the 2nd episode for Person F, and the 1st episode for Person G – would not be counted.

For episodes of acute overnight inpatient care, the majority of which do not exceed 28 days in length, the standard counting rule noted in the preceding paragraph is very acceptable. It will identify the majority of statistically defined *Episodes of care* even when the *Reference period* is as short as one month. The application of the standard counting rule to extended episodes of Community–based residential and Ambulatory care could however clearly give rise to results that substantially misrepresented the number and nature of the *Episodes of care* being provided.

It was partly for this reason that, under the NOCC protocols, the Review occasion was identified explicitly to deal with the fact that episodes of mental health care can continue over extended periods of time.

Alternative episode identification rules that may use either Review or Discharge occasions as episode *End occasions* and either Admission or Review occasions as episode *Start occasions*, enable right–censored, left–censored and complete *Episodes of care* to be identified in a statistically coherent and clinically meaningful manner.

The issues regarding the identification of censored *Episodes of care* and the specification of counting rules for *Complete episodes, Right–censored episodes, Left–censored episodes*, and *Right and left–censored episodes* are discussed below.

Complete episodes

A complete *Episode of care* is defined as one where its' Discharge occasion is present and it occurs during the *Reference period* and its' Admission occasion is present and linked to the Discharge occasion (i.e. it has not been left–censored by either recent initiation of the data collection process or some other problem with the data submission process). That is, a complete *Episode of care* is counted if its Discharge occasion occurs within the *Reference period*. Once counted, all service utilisation and clinical data collected between that Discharge occasion and the Admission occasion identifying the start of the episode are included for consideration within statistical analyses.

Right–censored episodes

In practice, many episodes will be right–censored by the end of the *Reference period*. That is, the Discharge occasion is later than the end of the *Reference period*. These will be referred to as Right–censored episodes of care. If at all possible, we want to count these right–censored episodes. The rule is: **Count right–censored episodes if they have a Review occasion within the *Reference period*. If more than one Review occasion is recorded within the *Reference period* then the latest Review within the *Reference period* will be identified as the End occasion for such Right–censored episodes.**

Returning to the application of the standard counting rule, it can be seen that an *Episode of care* is identified and counted if its *End occasion* occurs within the *Reference Period*. Once counted, all service utilisation and clinical data collected between that *End occasion* and the Admission occasion identifying the start of the episode are included for consideration within statistical analyses.

In the illustration, there are six right–censored episodes (2nd episode for Person A, 1st episode for Person B, 1st episode for Person D, 1st episode for Person E, the 2nd episode for Person F, and the 1st episode for Person G). If we apply the above defined rule to those episodes, the following results are obtained. The 2nd episode for Person A is counted with the *End occasion* being the 1st Review occasion in that episode. The 1st episode for Person B is counted, with the *End occasion* being the 2nd Review in the episode. The 1st episode for Person D is counted with the *End occasion* being the 2nd Review. Neither the 1st episode for Person E, the 2nd episode for Person F, nor the 1st episode for Person G is counted because in all three cases no Review within the episode is recorded during the *Reference period*.

A critical point to note is that the identification of the *End occasion* for Right–censored *Episodes of care* depends on and will vary as a function of the *Start* and *End* dates of the *Reference period*. Changing the *Reference period* will require the *End occasions* of all right–censored *Episodes of care* to be re–identified. This exposes a fundamental difference between *Periods of care* and right–censored *Episodes of care*. *Periods of care*

are invariant across *Reference Period* sub–sets, but right–censored *Episodes of care* are not. For example, a *Period of care* counted in the 1st Quarter of the 2003-2004 financial year will have exactly the same *Start* and *End* dates when it is counted within the whole of the 2003-2004 Financial year. However, a right–censored *Episode of care* counted in that 1st Quarter will, when identified within the encompassing Financial year, change to a complete *Episode of care* if it has a Discharge occasion sometime in the 2nd, 3rd or 4th quarters. Or, if it remains right–censored at the end of the Financial year, at the very least the End date will most likely have changed because, under the NOCC protocols, at least three more Reviews should have been completed.

Left–censored episodes

As mentioned in the first part of this discussion, the sequence of records is *left–censored* by the simple fact that, for each Service Unit, the collection of data under NOCC started at a certain point in time. In practice this means that some episodes will be left–censored by the start of the collection process. That is, the initial Admission occasion is not recorded within the given episode's sequence of *Collection occasions*. These will be referred to as Left–censored episodes of care. If at all possible, we want to also count these left–censored episodes. The rules are: **Count left–censored episodes if they have a Review or Discharge occasion within the *Reference period*. If more than one such occasion pertaining to the episode is recorded *within* the *Reference period* then the latest occasion within the *Reference period* will be identified as the *End occasion* for such left–censored *Episodes of care*. The earliest Review occasion within the sequence of recorded occasions is identified as the *Start occasion*.**

Recall that, once an *Episode of care* is identified and counted, all service utilisation and clinical data collected between that *End occasion* and the *Start occasion* are included for consideration within statistical analyses.

In the illustration shown in Figure 3, there are two Left–censored episodes – the 1st episode for Person C and the 1st episode for Person D.

The end of the first of these episodes is clearly identified by the Discharge occasion within the *Reference period*. The start of the episode is identified by the earliest (and only) recorded Review.

The second of these episodes is also Right–censored. In identifying this episode, both sets of rules must be applied. Thus, within the context of the identified *Reference period*, the *Episode of care* starts with the 1st Review and ends with the 2nd Review.
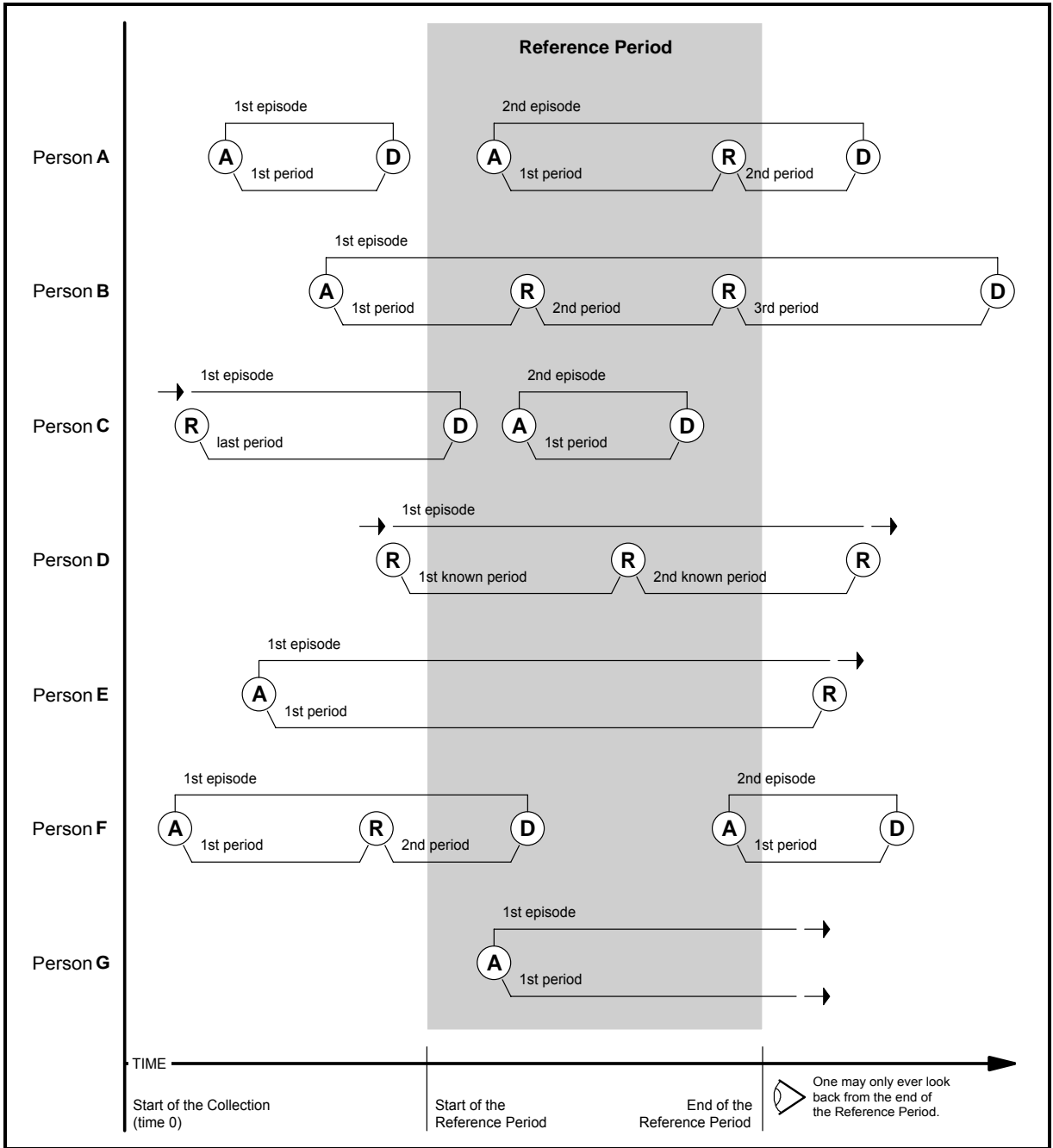
Figure 3: The identification of Collection Occasions, Episodes of Care and Periods of Care within a specified Accounting Period.

4.4　Identifying valid sequences of Collection Occasions

Where the unit of analysis is the Collection Occasion, all Collection Occasions that pass AMHOCN's data validation processes are considered valid with respect to analysis and reporting.　However, fully partitioned and stratified statistical analyses of *Collection occasions* require specific information that is not collected at certain occasions.　In particular, under the NOCC protocols, *Principal diagnosis*, *Focus of care* and *Mental health legal status* are only collected at Review and Discharge.　Therefore, Admission occasions may only be assigned any kind of case classification that requires knowledge of one or more of those data elements, if they can be linked to a subsequent Review or Discharge occasion.　Consequently, in order to complete the full analysis, the *Collection occasions* must be linked in sequence so that the required information can be derived.　In practice, this will mean that Admissions near the end of the most recent period for which data has been submitted will be unclassifiable, because it is unlikely that the following Review or Discharge occasion will have been included in the submission.

Where the unit of analysis is either Periods of Care or Episodes of Care, by definition it is necessary to assemble sequences of Collection Occasions.

A valid sequence of collection occasions requires a logical ordering of events, for a given consumer who receives mental health services from a given provider, in a particular setting. The initial checks for the validity of the collection occasion sequences require specific relationships among five key fields:

1. Who provided? (i.e., which Mental Health Service Organisation);
2. To whom? (i.e., the Consumer);
3. When? (i.e., the Date of the Collection Occasion);
4. Where? (i.e., the Mental Health Service Setting);
5. Why? (i.e., the Reason for Collection).

The sequencing process begins with identifying all of the Collection Occasions for a consumer at a Mental Health Service Organisation. These are then organised chronologically.　Sequences are then evaluated in terms of the logical relations among the Reasons for collection (e.g., Admissions precede Reviews which in turn precede Discharge) as well as the Service Setting in which the collection occurred.

In the first edition of the *NOCC Standard Reports*, a strict algorithm was implemented where all of a consumer's Collection Occasions at a specific Mental Health Service Organisation were excluded from further analysis if it was found that the sequence was corrupted.

Some examples of the problems encountered

Figure 4 on the following page illustrates some of the common problems encountered in the identification of linked sequences of Collection Occasions.

In scenario A an example of a straightforward sequence is provided.　There is no issue in this case; the Admission to Inpatient care is immediately followed by a Discharge from Inpatient care.　The two Collection Occasions can be linked together to identify both a Period of care and an Episode of care.

In scenario B an Admission to Ambulatory care is followed seven days later by a second Admission to Ambulatory care.　This is an invalid sequence.　It is impossible to determine

whether the two Admissions identify two distinct Episodes of care or whether some other clinical path is being represented. For example, it is possible that the recorded occasions represent an initial intake assessment followed by a more comprehensive assessment completed when the person was assigned to a case manager. Or it could be that the person was transferred from one team into the care of another, with the Discharge from the care of the first team not being recorded. In any case, the recorded information is not consistent with the NOCC protocols.

In scenario C a Review in Ambulatory care is followed five weeks later by an Admission to Inpatient care and then, 12 days later, a Discharge from Inpatient care. This is a relatively common scenario. Whilst it is clear that, under the NOCC protocols, a Discharge from Ambulatory care should have been recorded some time between the Review and the subsequent Admission, it is not possible to identify when that would have taken place. The person may have been lost to care from the Ambulatory service setting, with their having no knowledge of the person having been admitted to Inpatient care. If occasions of service data from the Ambulatory setting could be linked with the NOCC data then it would at least be possible to identify when the person was last seen prior to their Admission to Inpatient care. Without that information it is not possible to even reliably impute when the Discharge from Ambulatory care should be dated. The best that can be done is to treat the episode of Ambulatory care as a right–censored episode.

In scenario D an Admission to Ambulatory care is followed over three months later by an Admission to Inpatient care, then 4 days later a Review in Ambulatory care is recorded, followed by a Discharge from Inpatient care 12 days after the Admission. This sequence of occasions is completely corrupted. Whilst clinical experience might suggest that the Admission and Discharge in Inpatient care refer to the one episode and could be linked, the intervening Review in Ambulatory care corrupts the sequence. A number of possibilities as to what have happened can be suggested. Perhaps the date of the Review was actually the 7th of May, but a hastily written 5 has been misread as a 6, placing the record out of sequence. Perhaps the service setting of the Review was incorrectly recorded as Ambulatory, when in fact the Review was completed within the inpatient setting.

In scenario E a Review in Ambulatory care is followed by two Collection Occasions recorded on the same day, a Discharge from Ambulatory care and an Admission to Inpatient care. These two are then followed by a Discharge from Inpatient care. This set of Collection Occasions can be resolved to form two valid sequences. However any algorithm which is used to complete that linkage would need to embody a quite complex set of judgements. Also, if the clinician completing the record of Discharge from Ambulatory care happened to do so on the 23rd and mistakenly recorded that as the date of Discharge from Ambulatory care, then that simple error would have corrupted this sequence.

Scenario **A**: Admission followed by Discharge within Inpatient care.

```
   (  Ai  )——✓——(  Di  )

     14/2/03            21/2/03
```

Scenario **B**: Admission to Ambulatory care followed by a second Admission to Ambulatory care.

```
   ( Aa )  ✖  ( Aa )

    8/6/04      15/6/04
```

Scenario **C**: Review in Ambulatory care, Followed by Admission to Inpatient care, then a Discharge from Inpatient care.

```
   (  Ra  )        ✖        ( Ai )——✓——( Di )

     17/10/03               28/11/03      9/12/03
```

Scenario **D**: Admission to Ambulatory care followed several months later by an Admission to Inpatient care, followed by a Review in Ambulatory care, then a Discharge from Inpatient care.

```
   (  Aa  )              ✖              ( Ai ) ✖ ( Ra ) ✖ ( Di )

     19/2/04                             3/6/04    7/6/04    15/6/04
```

Scenario **E**: Review in Ambulatory care, followed by a Discharge from Ambulatory care and an Admission to Inpatient care on the same day, then a Discharge from Inpatient care.

```
   (  Ra  )————✓————(  Da  )

                              ( Ai )——✓——( Di )

     5/7/03                    22/8/03      29/8/03
```

Scenario **F**: Admission to Inpatient care, followed by a second Admission to Inpatient care, then a Discharge from Inpatient care and then another Discharge from Inpatient care.

```
   ( Ai ) ✖ ( Ai )—?—( Di )        ✖        ( Di )

    4/11/03    10/11/03   14/11/03             5/12/03
```
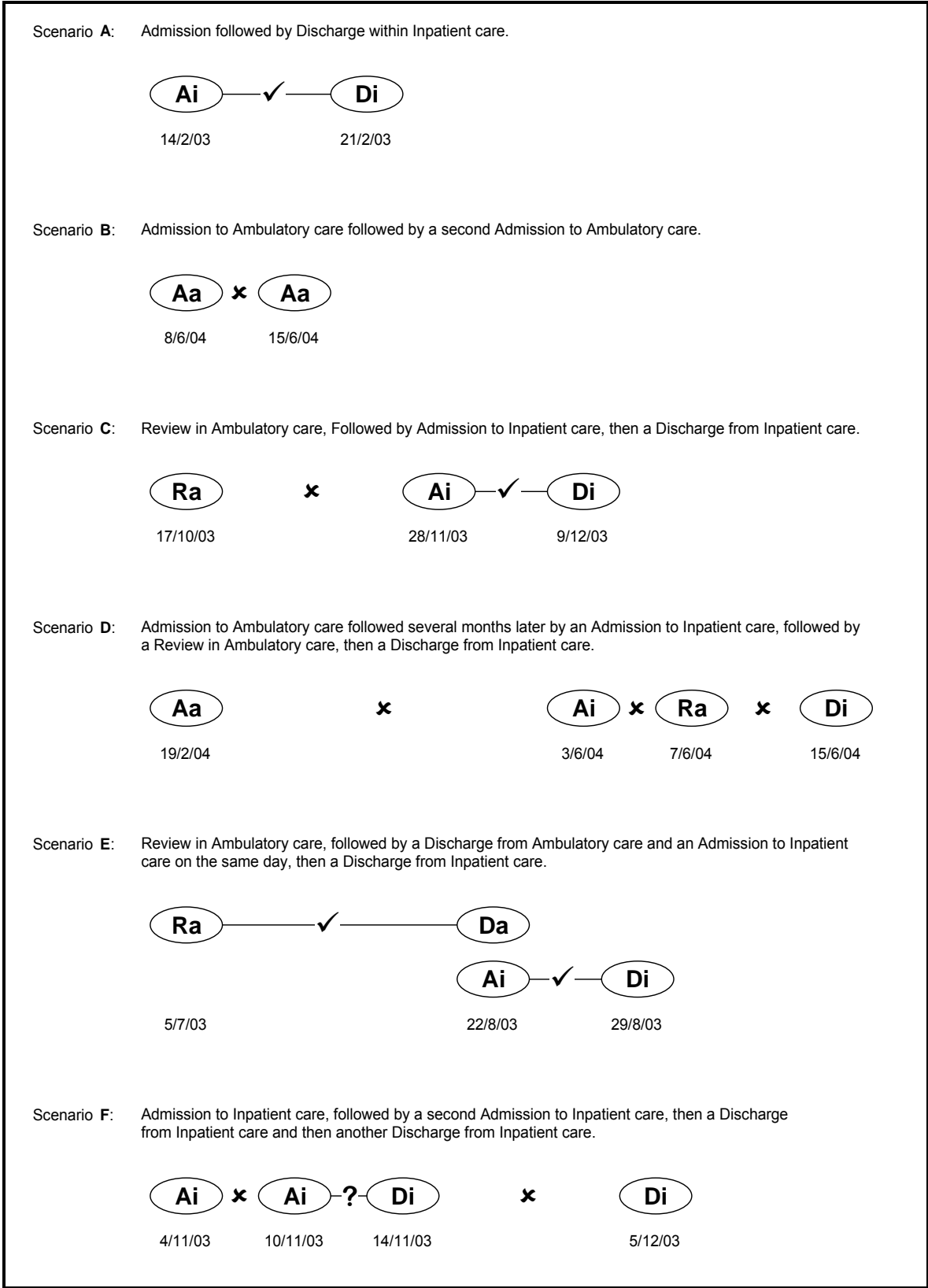
Figure 4: Various scenarios illustrating common problems encountered in the identification of linked sequences of Collection Occasions.

In scenario F an Admission to Inpatient care is followed six days later by a second Admission to Inpatient care, then fours days later a Discharge from Inpatient care, then finally, three weeks later another Discharge from Inpatient care is recorded. The admission on the 10th could be linked with the Discharge on the 14th, but the overall sequence within which that pair of occasions sits is corrupted, so it is not clear that that would be correct. Several possibilities can be envisaged. The person may have been initially admitted but then left hospital against medical advice. They may then have been readmitted a day or two later. Following their Discharge on the 14th, they may have been readmitted, but no record of that third Admission was recorded. Alternatively, the person may have been initially admitted to a general psychiatric unit, then, transferred to an intensive care unit within the same hospital, following which they were then transferred back to the general unit, from which they were subsequently discharged. Under the NOCC protocols the first of the two alternatives should have been recorded as three distinct episodes, each having an Admission and a Discharge occasion recorded. The second alternative should have been recorded as one distinct episode, with the transfer into and out of the intensive care unit possibly being recorded as Reviews, rather than as an Admission and a Discharge. From an external perspective, without knowledge of the practices of the service units responsible for the data, either of the two possibilities are plausible. Consequently the recorded sequence of four Collection Occasions should probably be identified as corrupted.

The need for an Episode of Mental Health Care Identifier

The current NOCC Technical Specification does not explicitly specify how Collection Occasion records are related in terms of an Episode of Mental Health Care. Episodes of Mental Health Care are fundamental to the analyses and reporting of outcomes, casemix classifications and underpin benchmarking processes.

At Section 5.2.4, the NOCC documentation identifies three *Collection Occasions* within an episode when the required data are to be collected: Admission to, Discharge from, and Review of a mental health care episode. The NOCC documentation, however, does not further specify how Episodes of Mental Health Care are to be reported by jurisdiction in their regular extractions of the 'agreed data'.

Ideally, data extracted from the National Minimum Data Sets for Admitted Patient Mental Health Care and for Community Mental Health Care would inform identification of Episodes of Mental Health Care. These data are not readily accessible and, given variability in the person identifiers across these data sets within jurisdictions, reliable record linkage will not be available in the short-term.

Accordingly, Episodes of Mental Health Care have been derived by AMHOCN from the NOCC Data Extracts by applying a logical sequence to the order of Collection Occasions as reported.

It is proposed that the Collection Occasion entity definition be amended to include an additional data element, Episode of Mental Health Care Identifier. That identifier would be used to link Collection Occasions which arise from the same Episode of Mental Health Care. As such a single Admission occasion, any number of Review occasions and a single Discharge occasion would share the same value on this identifier.

4.4.1.1 Specifying the start and end of Periods and Episodes of care

Periods of care

For the purposes of statistical analyses of Periods of care, the **first** Collection Occasion is referred to as the *Start Occasion*, whilst the **second** Collection Occasion is referred to as the *End Occasion*. Data elements representing Items or Summary Scores from Clinical Measures that represent the person's clinical status immediately preceding either Collection Occasion are all retained during the assembly process. However, in order to avoid confusion the names of the affected data elements are modified depending on whether they are from the occasion at the Start or the End of the period. So for example, the Item 1 of the HoNOS recorded at the Start occasion would be referred to as *HoNOS Item 01 Start*, whilst its counterpart recorded at the End occasion would be referred to as *HoNOS Item 01 End*.

For those Other Clinical Data Items that are defined as referring to the person's status during the preceding period of care, the instance of the data element in the Collection Occasion representing the Start of the period is dropped during the assembly process. In those cases renaming of the data elements is not required. This applies to Principal and Additional diagnoses, Mental health legal status and Focus of care.

Episodes of care

Similar rules as those used in the specification of the Start and End of Periods of care are applied to Episodes of care.

For the purposes of statistical analyses of Episodes of care, the **first** Collection Occasion in the series is referred to as the *Start Occasion*, whilst the **last** Collection Occasion is referred to as the *End Occasion*. Data elements representing Items or Summary Scores from Clinical Measures that represent the person's clinical status immediately preceding either the Start or End Occasion are all retained during the assembly process. All data of that kind from any other Collection Occasions recorded between those two occasions is ignored. Again, in order to avoid confusion the names of the common data elements are modified depending on whether they are from the occasion at the Start or the End of the Episode.

5   Partition and stratification factors

The content of the reports defined in this version of the reporting framework are relatively straightforward representations of the NOCC data, partitioned and stratified principally by factors built into the collection from its inception as key data elements (Collection Age Group, Mental Health Service Setting and Reason for Collection). A number of other important demographic and clinical stratification factors are also derived from certain other data elements.

The content of the aggregate data sets are based on selected permutations of various *Partition and stratification factors*. The factors include *General partition factors*, *Case classification factors* that enable stratification by demographic and clinical factors, and *Service delivery factors* that enable stratification by the points within the clinical path defined by the Reason for collection data element. Those defined in this version of the reporting framework include:

- General partition factors
  - Reference Period (e.g., Financial year, Quarter within a financial year)
  - Responsible Entity[i]
  - Peer Group
  - Collection Occasion Age Group
  - Mental Health Service Setting

- Case complexity factors
  - Casemix classifications – will include at least the following:
    - o Mental Health Diagnostic Group
    - o MH-CASC Group
    - o AR-DRG (applies only within the Overnight Inpatient Mental Health Service Setting)
  - Demographic group within Collection Occasion Age Group
  - Mental Health Legal Status
  - Focus of Care

- Service pathway factors
  - Reason for Collection
  - Service Path (Reason for Period Start and Finish, Reason for Episode Start and Finish)

The definition, issues in their identification and the domain of each of the above factors is described below. It is important to note that the stratification factors will evolve as further analysis work is undertaken that explores the utility of such factors.

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[i] Provision of identified information regarding specified Jurisdictions, Mental Health Service Organisations or Service Units will only occur under agreed protocols that protect the privacy and confidentiality of the identified entities.

5.1 General partition factors

5.1.1 Reference Period

Definition

The time frame for which any given set of aggregate statistics are calculated and reported will be referred to as the Reference Period.

Collection Occasions are assigned to a specific Reference Period on the basis that the Collection Date of the occasion falls within period defined by the Start and End dates of the Reference Period.

Periods of Care and Episodes of Care are assigned to a specific Reference Period on the basis that the End date of the Period or Episode falls within period defined by the Start and End dates of the Reference Period. As discussed under Section 4.3 beginning on page 18, the identification of Episodes of care is also dependent on the Reference period.

Specification of the domain

The domain of the Reference Period stratification may potentially include:
- o All available valid data
- o [specified] Calendar year
- o [specified] Month in a [specified] Calendar year
- o [specified] Financial year
- o [specified] Quarter in a [specified] Financial year

Assuming that an aggregate data set is based on a maximum of three years of data, the Reference Period stratification could include a maximum of 55 strata.

5.1.2 Responsible Entity

5.1.2.1 Definition

The Responsible Entity is the Jurisdiction, Mental Health Service Organisation or Service Unit within an identified Mental Health Service Organisation that was responsible for the provision of the services to the consumer.

Generally the only aggregate data sets and reports produced by AMHOCN that will be partitioned by Responsible entity will be those that refer to the Volume and Quality of Submitted data.

5.1.2.2 Assignment of responsibility

Under the NOCC protocols the *Service unit* primarily responsible for providing treatment and care during the *Episode of mental health care* is identified at each *Collection occasion*.[j] By definition a *Service unit* is a member of a *Mental health service*

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[j] See the definition of *Mental Health Service Provider Entity Identifier* and its component data elements in the reference document *Mental Health National Outcomes and Casemix Collection: Technical specification of State and Territory reporting requirements for the outcomes and casemix components of 'Agreed Data', Version 1.5.*

organisation. For the purposes of the data collection protocol, transfer of a patient or client between *Mental health service organisations* is equivalent to a change of *Mental health service setting*. Consequently, their should never be any ambiguity about responsibility for *Periods* or *Episodes of care* at the *Mental health service organisation* level. The NOCC data dictionary also specifies that what should be recorded as the Service Unit at each Collection Occasion is the identity of the Service Unit of the Mental Health Service Organisation primarily responsible for providing the treatment and care during the Episode of Mental Health Care. However, it is quite likely that what will actually be recorded will be the identity of the Service Unit currently responsible for the provision of services. Thus, at the level of the Service Unit, particularly in Ambulatory care, it is possible that the specific identified *Service unit* may change from one *Collection occasion* to the next.

Two distinct examples may serve to illustrate the issue being raised.

First, consider a person initially admitted to Ambulatory care by an "acute care team". Some three weeks later this person is transferred to the care of a case management team. In accordance with the standard protocol, a Review of the person is recorded approximately 3 months following their admission. During the period of care bounded by the Admission and 1st Review, the person received approximately the same number of occasions of service from each of the two teams, but the duration of care was clearly different. Which *Service unit* should be identified as the *Responsible service unit*?

Second, consider a person in the care of a *Mental health service organisation* with responsibility for the population of several large towns all within half a day's travel of each other. Each town has its own small mental health team. At the occasion of the person's 3rd Review during an episode of Ambulatory care they reside in town A and are in the care of *Service unit* A. Some few weeks later the person moves to town B and their care is taken over by *Service unit* B. The service has a policy that upon such transfers the person should be reviewed, however in this person's case that isn't completed for some time. Nevertheless, at their 4th Review they are identified as being in the care of *Service unit* B. During the period of care bounded by the 3rd and 4th Reviews, the majority of occasions of service were provided by *Service unit* B. Given the sequence and timing of data collection, which *Service unit* should be identified as the *Responsible service unit*? What about if the 4th Review had been completed by *Service unit* B almost immediately, within the first few occasions of service they provided, rather than some time later?

If all analyses only required the partitioning or stratification of service characteristics at the level of the Mental health Service Organisation level rather than down to the level of the Service Unit within such Organisations then such discrepancies need not be resolved. However, if characteristics identified at the level of the Service Unit need to be included in analyses, the definition of both *Periods of care* and *Episodes of care* will need to include rules for definitely and unambiguously identifying the *Service unit* responsible for the period or episode.

There are several ways in which such rules might be defined.

If NMDS data is linked with NOCC data then it might be possible to use a complex assignment of responsibility based on relative proportions of care provided. This approach would be consistent with the definition of *Service unit* as the *Service unit* of the *Mental health service organisation* primarily responsible for providing the treatment and care during the *Episode of mental health care*. However, the specification of such rules would be complex and difficult to implement. Its implementation also requires that NOCC data

be linked with NMDS data, which, at this stage in the implementation of NOCC within most jurisdictions, is not possible.

An alternative approach would be to assign responsibility to the *Service unit* either initially or most recently identified as being responsible for the person within the context of the period or episode in question, that is, the *Service unit* identified at either the Start occasion or the End occasion of a *Period* or *Episode of care*. One or other must be chosen. A clinically sensitive choice could be based on the considerations identified in the preceding discussion, but, as has been noted, that option is not available. One aspect of the NOCC protocols that may give us some guidance is that there are a number of other elements of clinical data that are ascertained at the End of each Period of care. These include *Diagnoses*, *Focus of care*, and *Mental health legal status*. We therefore choose the *End occasion*, for both *Periods* and *Episodes of care*, as the anchor point for responsibility.

In conclusion, the recommended rule for the identification of the particular *Service unit* within the *Mental health service organisation* responsible for the provision of care during a *Period* or *Episode of care* is that identified at the *End occasion*.

Structure of the domain

The domain of the Responsible Entity stratification may potentially include:
- o All
- o [specified] Jurisdiction
- o [specified] Mental Health Service Organisation within a [specified] Jurisdiction
- o [specified] Service Unit within a [specified] Mental Health Service Organisation

In cases where a Jurisdictions report is to be partitioned by Mental Health Service Organisations or Service Units, the number of Responsible Entity partitions within a data set will be the sum of the number of Mental Health Service Organisations plus the number of Service Units plus two (one for All jurisdictions and one for the Jurisdiction as a whole). For example, if a Jurisdiction had 12 MHSOs with 120 Service Units in total then there would be 134 Responsible Entity partitions in their Aggregate data set.

5.1.3 Service Unit Peer Group

Peer groups may be defined at the level of the Mental health Service Organisation or at the level of the Service Unit. The definition of appropriate criteria for grouping either class of entities has yet to be developed. For the present, the following are suggested as possible criteria.

- Principal clinical population for which services are provided.
- Principal or secondary type of services provided.
- Type of Service Unit (e.g. Stand–alone psychiatric hospital, Co–located psychiatric unit, etc).
- General location of the Organisation or Unit (e.g., as specified in accordance with the ABS defined Rurality of the location).
- Access to or availability of a range of services (e.g. for a community-based mental health team, their proximity in kilometres to a designated psychiatric inpatient unit).

5.1.4 Collection Age Group

The Collection Age Group is the first of the two principal partition factors. Due to the fact that, under the NOCC data collection protocols, the measures collected vary as a function of this data element it may not be used as a stratification factor.

The domain of the Collection Age Group partition is restricted to the following:
- o Child and adolescent
- o Adult
- o Older person

5.1.5 Mental Health Service Setting

The Mental Health Service Setting is the second of the two principal partition factors. Due to the fact that, under the NOCC data collection protocols, the measures collected vary as a function of this data element, it may not be used as a stratification factor.

The domain of the Mental Health Service Setting partition is restricted to the following:
- o Overnight inpatient mental health care
- o Community-based residential mental health care
- o Ambulatory mental health care

5.2 Case complexity factors

The case complexity factors that can be identified on the basis of the NOCC data include various casemix classifications (Mental Health Diagnostic Groups, Mental Health Case Classification Groups (MH–CASC) and Australian Refined Diagnosis Related Groups (AR–DRG)); consumers Mental Health Legal Status; and demographic classifications based on consumers' Sex and Age.

Only the simplest of the above case complexity factors are fully specified in this first version of the Reporting framework. Later versions of the framework will include specifications of the relevant aspects of the MH–CASC and AR–DRG classifications.

5.2.1 Demographic group within collection age group

5.2.1.1 Specification of the domain

The domain of this stratification varies as a function of Collection Age Group and includes the following:

- Children and Adolescents
  - o All (males and females of all ages)
  - o Both males and females aged 0 to 5 years
  - o Both males and females aged 6 to 11 years
  - o Both males and females aged 12 to 14 years
  - o Both males and females aged 15 to 17 years
  - o Both males and females aged 18 to 24 years
  - o Males of all ages
  - o Males aged 0 to 5 years
  - o Males aged 6 to 11 years
  - o Males aged 12 to 14 years
  - o Males aged 15 to 17 years
  - o Males aged 18 to 24 years
  - o Females of all ages

- o Females aged 0 to 5 years
- o Females aged 6 to 11 years
- o Females aged 12 to 14 years
- o Females aged 15 to 17 years
- o Females aged 18 to 24 years
- Adults
  - o All (males and females aged 15 to 110)
  - o Both males and females aged 15 to 24 years
  - o Both males and females aged 25 to 34 years
  - o Both males and females aged 35 to 44 years
  - o Both males and females aged 45 to 54 years
  - o Both males and females aged 55 to 64 years
  - o Both males and females aged 65 to 110 years
  - o Males aged 15 to 110
  - o Males aged 15 to 24 years
  - o Males aged 25 to 34 years
  - o Males aged 35 to 44 years
  - o Males aged 45 to 54 years
  - o Males aged 55 to 64 years
  - o Males aged 65 to 110 years
  - o Females aged 15 to 110
  - o Females aged 15 to 24 years
  - o Females aged 25 to 34 years
  - o Females aged 35 to 44 years
  - o Females aged 45 to 54 years
  - o Females aged 55 to 64 years
  - o Females aged 65 to 110 years
- Older Persons
  - o All (males and females aged 55 to 110)
  - o Both males and females aged 55 to 74 years
  - o Both males and females aged 75 to 84 years
  - o Both males and females aged 85 to 110 years
  - o Males aged 55 to 110
  - o Males aged 55 to 74 years
  - o Males aged 75 to 84 years
  - o Males aged 85 to 110 years
  - o Females aged 55 to 110 years
  - o Females aged up to 74 years
  - o Females aged 75 to 84 years
  - o Females aged 85 to 110 years

For the Child and Adolescent Age Group there are 15 strata, for the Adult Age Group there are 21 strata and for Older persons Age Group there are 12 strata.

5.2.2 Mental health summary diagnostic group within collection age group

5.2.2.1 Definition

Mental Health Summary Diagnostic Group is a high level classification based on Principal diagnosis. The aggregation of diagnoses into summary groups differs as function of the consumer's Age Group. The mapping from ICD-10-AM diagnoses to Mental Health

Diagnostic Groups and thence to Mental Health Summary Diagnostic Groups within Age Group will be made available on the mhnocc website shortly.

Under the NOCCC data collection protocols, the data element *Principal diagnosis* is not required at Admission collection occasions in any *Mental health service setting*. Consequently, for analyses at the level of *Collection occasions*, it will only be possible to stratify Admission collection occasions where those occasions are able to be linked with a subsequent Review or Discharge occasion having a valid *Principal diagnosis*.

5.2.2.2 Specification of the domain

The domain of this stratification varies as a function of Collection Age Group and includes the following:

- Children and Adolescents
    - All (regardless of diagnosis)
    - Disorders of childhood and adolescence
    - Mood disorders
    - Stress and adjustment disorders
    - Other diagnoses

- Adults
    - All (regardless of diagnosis)
    - Schizophrenia and related disorders
    - Mood disorders
    - Other diagnoses

- Older Persons
    - All (regardless of diagnosis)
    - Organic disorders
    - Schizophrenia and related disorders
    - Mood disorders
    - Other diagnoses

For the Child and Adolescent Age Group there are 5 strata, for the Adult Age Group there are 4 strata and for Older persons Age Group there are 5 strata.

5.2.3 Identification of the key data elements required for the identification of the case complexity factors

Most of the data elements required in defining the various case complexity factors — Principal and Additional Diagnoses, Mental Health Legal Status and Focus of Care — are ascertained at either Review or Discharge occasions and refer to aspects of consumers' clinical status during the preceding Period or Episode of care. Whilst the rules that govern the collection of these data elements are clearly specified under the NOCC protocols, there subsequent identification for use within the various classifications is not quite as straightforward as it may at first appear. The various issues that must be addressed are discussed below.

The data elements Principal diagnosis, Additional diagnoses, Mental health legal status, and Focus of care all are defined as referring to the person's status during the preceding period of care. For these measures that are defined as referring to the person's status during the preceding Period of care, the identification issue is more complex. In particular, in an Episode of care that includes more than one Period of care, there will be more than one Collection Occasion where those data elements have been recorded.

An example of an Episode of care illustrating these issues is given below in Table 4.

Table 4: An example of an Episode of care during which the values of Diagnoses, Mental health legal status and Focus of care change from occasion to occasion.

Occasion	Principal diagnosis	Additional diagnosis	Additional diagnosis	Mental health legal status	Focus of care
Admission – from other setting	-	-	-	-	-
Review – other	F20.0	F12.1	-	Involuntary	Intensive extended
Review – 91 day	F20.4	F12.1	-	Voluntary	Maintenance
Review – 91 day	F20.4	Z86.42	-	Voluntary	Maintenance
Discharge – to other setting	F20.0	Z59.0	Z86.42	Voluntary	Maintenance

In the scenario illustrated above, a person is discharged from Overnight inpatient care on a Community Treatment Order. During the first period of Ambulatory care, they are case managed by an Assertive case management team. Initially on discharge from Overnight care the person still has significant problems with hallucinations and delusions and is given a Principal diagnosis of Paranoid schizophrenia (F20.0) with an additional diagnosis of Harmful use of cannabis (F12.1). That data is recorded at the Review completed on the person's release from the CTO. At they time they transferred into the care of a different case management team. At their first 91 day Review of the person, the Principal diagnosis is Post-schizophrenic depression (F20.4) with an Additional diagnosis of Harmful use of cannabis (F12.1) based on the fact that at the beginning of that Period of care the person still occasionally used cannabis, even though they now understood that using it made their problems with hallucinations and delusions more severe. By the second 91 Review, that situation had changed somewhat, so the whilst their Principal diagnosis was still F20.4, their Additional diagnosis was now Personal history of drug use disorder (Z86.42) reflecting the fact that they no longer used Cannabis at all. Subsequently however the person has a relapse, is evicted from their rental accommodation, and is then admitted back into Overnight inpatient care. At the Discharge from Ambulatory care, their Principal diagnosis is once again Paranoid schizophrenia (F20.0) this time with Additional diagnoses of Homelessness (Z59.0) and Personal history of drug use disorder (Z86.42). The latter being recorded because that was still a focus of the work being done with the person by their case manager.

Identification of Principal diagnosis

For any given Period of care, the Principal diagnosis is, by definition that identified at the End occasion of the period.

For any given Episode of Care, there is no specific data element defined as the Principal diagnosis occasioning the Episode of care. Where the Episode of care consists of just of two Collection Occasions, then the Principal diagnosis recorded at the end occasion is naturally also the Principal diagnosis for the Episode of care. Where the Episode of care consists of two or more Periods of care, there will be at least two Collection occasions having a Principal diagnosis. The diagnosis recorded at each occasion may be the same

or it may be different. For example, in the scenario illustrated in Table 4 on page 34, the person has two distinct, though related Principal diagnoses.

In practice, it is likely that this issue will not cause a significant problem. Typically, a person's Principal diagnosis may change at the level of the sub–type of diagnosis; however they are much less likely to be assigned to a different Mental Health Diagnostic Group from one occasion to the next.

As with the assignment of Responsibility, two different approaches can be envisaged. The principal diagnosis could be derived from a particular collection occasion that may or may not be the last in the series constituting the episode. The rationale for the selection of the particular occasion could be based on clinical or service utilisation criteria. Implementing such a solution would be complex and at present, given that no service utilisation data is available, not able to be implemented. Accordingly, a similar solution to that used in identifying the Responsible service unit will be recommended.   That is, the Principal diagnosis that is recorded at the End occasion of the episode should be assigned as the Principal diagnosis for the Episode of care.

Identification of Additional diagnoses

For any given Period of care only the Additional diagnoses recorded at the End occasion will be relevant to that period. By definition, those recorded at the Start occasion refer to the preceding Period of care and so do not have any defined relationship to the period following the Start occasion.

For any given Episode of Care the issue is more complex. The diagnosis given as the Principal diagnosis at the End occasion will be assigned as the Principal diagnosis for the episode. If the Episode of care is constituted only of two Collection Occasions, then only those diagnoses recorded as Additional diagnoses at the End occasion will be assigned as the Additional diagnoses for the episode. However, if the Episode of Care is constituted of three or more Collection Occasions then the question becomes, should the Principal and Additional diagnoses assigned to Periods of care other than the last in the Episode of care be included as Additional diagnoses.

Take the scenario illustrated in Table 4 on page 34. Following the rule for assignment given in the preceding sub–section, the Principal diagnosis for the episode will be F20.0. During the episode, their were two Review occasion when the F12.1 was identified as an Additional diagnosis, although at the final Discharge occasion, Z86.42 rather than F12.1 was identified because the person no longer used cannabis at all. Over the whole Episode of care it would seem to make more clinical sense to include F12.1 as an Additional diagnosis, since for at least Period of care during the Episode of care that was an identified Additional diagnosis for at least part of the Episode of care.

At least initially then, it is proposed that all Additional diagnoses from all Periods of care be assigned as Additional diagnoses for the Episode of care.

Identification of Mental health legal status

If the person's Mental Health Legal Status is Involuntary at any Period of care within an Episode of care then their Mental Health Legal Status for the Episode of care should be identified as Involuntary.

Identification of Focus of care

The same rule as that used to identify Principal diagnosis will be used to identify Focus of care. That is, the Focus of care recorded at the End occasion will be identified as the Focus of care for the Episode of care.

5.3 Service pathway factors

The aggregate statistics that are derived from the measures of consumers' clinical status must be placed within the context within which they were collected. Without that context it is not possible to properly interpret the results.

For aggregate statistics based on Collection Occasions, the Reason for collection provides the context.

For Periods of care and Episodes of care, the combination of the Reason for collection of the Start occasion and the Reason for collection of the End occasion provide a succinct specification of the context within which the period or episode is located.

5.3.1 Reason for collection within type of occasion

5.3.1.1 Definition

The stratification of statistics regarding *Collection occasions* is based primarily on the data element *Reason for collection*. However, statistics at the higher level of aggregation represented by the *Collection occasion type* (Admission, Review, and Discharge) are also likely to be required. Consequently the actual data element used for the purposes of stratification includes both attributes and is named *Reason for collection within type of occasion*.

5.3.1.2 Specification of the domain

The domain of this stratification includes the following:
- o Admission (all associated Reasons)
- o Admission – New referral
- o Admission – Admitted from other treatment setting
- o Admission – Other reason
- o Review (all associated Reasons)
- o Review – Three month review
- o Review – Other
- o Discharge (all associated Reasons)
- o Discharge – No further care
- o Discharge – To change of treatment setting
- o Discharge – Death
- o Discharge – Other

This factor includes 12 strata.

5.3.2 Service path

5.3.2.1 Definition

Each *Episode* or *Period of care* occurs within a context that can be defined on the basis of the *Reason for collection* of the *Collection occasions* at the *Start* and *End* of the period or episode. Exactly named, the data element representing all possible pairings of the reasons for collection would be named "Reason for episode or period start and finish". For convenience and to capture the sense of context it implies, the data element is instead named *Service path*.

The most straightforward way of deriving a classification scheme to represent the pattern of reasons for start and finish is to cross-tabulate the possible Reasons for collection. An episode or period may only start with either an Admission or Review occasion and may only end with either a Review or Discharge occasion. Thus all possible reasons for episode or period start and finish can be mapped out in a five row by six column matrix as shown in Figure 5.

	91-day review	Other review	No further care	Change of setting	Death	Other
New referral	1 > 4	1 > 5	1 > 6	1 > 7	1 > 8	1 > 9
From other setting	2 > 4	2 > 5	2 > 6	2 > 7	2 > 8	2 > 9
Other admission	3 > 4	3 > 5	3 > 6	3 > 7	3 > 8	3 > 9
91-day review	4 > 4	4 > 5	4 > 6	4 > 7	4 > 8	4 > 9
Other review	5 > 4	5 > 5	5 > 6	5 > 7	5 > 8	5 > 9

Note: Each combination of Reason for collection at the Start and the End occasions in a Period or Episode of care is represented by the code value of Reason for collection at the Start occasion, the ">" character indicating the interval between the Start and End, then the code value of the Reason for collection at the End occasion.

Figure 5: Matrix of Reasons for collection of Collection occasions at the Start and End of an Episode or Period of care.

Each cell in the matrix represents one possible path into and out of an *Episode* or *Period of care*. Comparison of the relative proportion of episodes or periods in each cell may provide a comprehensive description of the use of various service pathways. Similarly, the comparison of aggregate statistics (Mean, Standard deviation, Change score, or Effect size) for the various clinical measures in each cell may help information users identify important similarities or differences between those various service pathways.

The matrix presented above is one useful way of presenting the information and for some purposes it may be appropriate. However, in the form presented above it does not allow all possible questions about service paths to be answered. Also, at both the Mental Health Service Organisation and Service Unit levels, some of the cells in the matrix are likely to be sparsely populated, so the reliability or utility of statistics in those cells may be reduced. For those reasons, it is also useful to be able to present statistics aggregated to the level

of *Collection occasion type* and above (i.e., all Reasons for start or finish). The resulting eight row by nine column matrix is illustrated in Figure 6 on page 39.

The matrix presentation of statistics will likely be found very useful for certain comparisons, however, to remain within our self-imposed A4 portrait oriented page limitation, only one or two statistics can be fitted in each cell. To enable the contents of the matrix to be presented in a standard tabular form, a coding scheme for *Service path* has been developed. This coding scheme is a little counter–intuitive, however, it has the benefit of allowing the matrix of possibilities to be ordered in a useful and rational way when laid out as rows in a table.

The coding scheme for Service path consists of four numeric characters as follows: 1st character – Start occasion type; 2nd character – End occasion type; 3rd character – Reason within Start occasion type; 4th character – Reason within End occasion type. For the purposes of this coding scheme, Reason for collection has been recoded to a sub-type within each Collection occasion type. The code set is therefore assembled using the following set of values:

Start or End Occasion Type	*Reason within Start or End occasion type*
(0) Any type of occasion	(0) Any reason
(1) Admission	(0) Any reason (1) New referral (2) Change of setting (3) Other admission
(2) Review	(0) Any reason (1) 91-day review (2) Other review
(3) Discharge	(0) Any reason (1) No further care (2) Change of setting (3) Death (4) Other discharge

The domain of Service path includes 72 possibilities. (The complete specification of the domain consisting of codes and associated labels is given below on page 39.) The grey filled cells contain the only completely unique data in the matrix. All other cells are aggregates of data in two or more of those "primary" cells. It could be argued that no more than those 30 unique cells need be displayed. However, the aggregate cells provide access to summary data that will be useful when constructing alternative views of the information. In that sense, the matrix is not a simple cross-tabulation of mutually exclusive categories. This needs to be made clear to information users. In standard views, a sub–set of 34 *Service paths* will be displayed. The members of that sub–set are shown in bold in the figure.

	Any review or discharge	Any review	91-day review	Other review	Any discharge	No further care	Change of setting	Death	Other
Any admission or review	0000	0200	0201	0202	0300	0301	0302	0 303	0304
Any admission	1000	**1200**	1201	1202	**1300**	1301	1302	1303	1304
New referral	1010	1210	**1211**	**1212**	1310	**1311**	**1312**	**1313**	**1314**
From other setting	1020	1220	**1221**	**1222**	1320	**1321**	**1322**	**1323**	**1324**
Other admission	1030	1230	**1231**	**1232**	1330	**1331**	**1332**	**1333**	**1334**
Any review	2000	**2200**	2201	2202	**2300**	2301	2302	2303	2304
91-day review	2010	2210	**2211**	**2212**	2310	**2311**	**2312**	**2313**	**2314**
Other review	2020	2220	**2221**	**2222**	2320	**2321**	**2322**	**2323**	**2324**

Figure 6: Complete matrix of *Reasons for collection* and *Collection occasion types* of *Collection occasions* at the *Start* and *End* of an *Episode* or *Period of care*, including the *Service path* code for each cell in that matrix.

5.3.2.2 Specification of the domain

0000   Any admission or review > Any review or discharge

0200   Any admission or review > Any review

0201   Any admission or review > 91-day review

0202   Any admission or review > Other review

0300   Any admission or review > Any discharge

0301   Any admission or review > No further care

0302   Any admission or review > Change of setting

0303   Any admission or review > Death

0304   Any admission or review > Other discharge

1000   Any admission > Any review or discharge

1010   New referral > Any review or discharge

1020   From other setting > Any review or discharge

1030   Other admission > Any review or discharge

1200   **Any admission > Any review**

1201   Any admission > 91-day review

1202   Any admission > Other review

1210   New referral > Any review

1211   **New referral > 91-day review**

1212   **New referral > Other review**

1220   From other setting > Any review

1221   **From other setting > 91-day review**

1222   **From other setting > Other review**

1230   Other admission > Any review

1231   **Other admission > 91-day review**

1232   **Other admission > Other review**

1300   **Any admission > Any discharge**

1301   Any admission > No further care

1302   Any admission > Change of setting

1303   Any admission > Death

1304   Any admission > Other discharge

1310   New referral > Any discharge

1311   **New referral > No further care**

1312   **New referral > Change of setting**

1313   **New referral > Death**

1314   **New referral > Other discharge**

1320   From other setting > Any discharge

1321   **From other setting > No further care**

1322   **From other setting > Change of setting**

1323   **From other setting > Death**

1324   **From other setting > Other discharge**

1330   Other admission > Any discharge

1331   **Other admission > No further care**

1332   **Other admission > Change of setting**

1333   **Other admission > Death**

1334   **Other admission > Other discharge**

2000	Any review > Any review or discharge	2301	Any review > No further care
2010	91-day review > Any review or discharge	2302	Any review > Change of setting
		2303	Any review > Death
2020	Other review > Any review or discharge	2304	Any review > Other discharge
		2310	91-day review > Any discharge
2200	**Any review > Any review**	**2311**	**91-day review > No further care**
2201	Any review > 91-day review	**2312**	**91-day review > Change of setting**
2202	Any review > Other review	**2313**	**91-day review > Death**
2210	91-day review > Any review	**2314**	**91-day review > Other discharge**
2211	**91-day review > 91-day review**	2320	Other review > Any discharge
2212	**91-day review > Other review**	**2321**	**Other review > No further care**
2220	Other review > Any review	**2322**	**Other review > Change of setting**
2221	**Other review > 91-day review**	**2323**	**Other review > Death**
2222	**Other review > Other review**	**2324**	**Other review > Other discharge**
2300	**Any review > Any discharge**		

The full domain of Service Path includes 72 strata. The sub–set of 34 Service paths displayed in Standard views are listed in bold type. The sub–set of 34 paths are unique and will be sufficient for most reporting purposes. The other 38 strata represent various combinations of unique paths. It is essential that the statistics for these combined paths are available within the aggregate data sets. This will allow information users to ask very detailed questions about the outcomes of care.

For example, the basic sub–set of strata includes 'Any review > Any discharge', but excludes all the subsidiary paths from Any review to a specific Reason for discharge. That exclusion is logical and is essential if the number of strata is to be reduced to a set that can be reasonably reported on a single A4 printable page. But the other remaining strata enable many other questions to be quickly answered.

Examples of results reported with stratification by Service path

The two tables shown below provide examples of how the stratification of the Aggregate statistics by Service path highlights important differences in Start and End scores and in the change scores and effect sizes. (The statistics reported in these two tables are based on the results reported in the 1st edition, version 1.1 of the AMHOCN Standard Reports.)

The most important point to be noted in these results is that substantial differences in Start and End scores, with associated variations in Change scores and Effect sizes can be observed as a function of the different Service Paths.

Table 5: An example of the results of an analysis based on Periods of Care (HoNOS Total scores at Start and End, Change scores and Effect sizes for Adults in Ambulatory care).

	N	% complete	Start	End	Change Score	Correlation (ρ)	Effect Size (δ)
Any Admission > Any Review	**7927**	**79%**	**11.0**	**9.4**	**1.6**	**0.51**	**0.26**
New referral > Any Review	4815	82%	11.5	9.2	2.3	0.56	0.40
From Other Setting > Any Review	2004	85%	9.7	9.7	0.0	0.38	0.00
Any Admission > Any Discharge	**14942**	**46%**	**11.4**	**7.9**	**3.5**	**0.52**	**0.57**
New Referral > No Further Care	5453	61%	11.4	6.5	4.9	0.55	0.93
New Referral > Change of Setting	2781	48%	12.4	10.5	1.9	0.61	0.32
From Other Setting > No Further Care	1195	67%	11.0	7.2	3.8	0.46	0.63
From Other Setting > Change of Setting	687	66%	10.4	13.8	−3.3	0.30	−0.40
Any Review > Any Review	**25306**	**87%**	**9.3**	**8.8**	**0.4**	**0.70**	**0.09**
Any Review > Any Discharge	**6782**	**65%**	**8.6**	**7.5**	**1.1**	**0.66**	**0.22**
Any Review > No Further Care	4074	68%	7.8	5.5	2.3	0.69	0.56
Any Review > Change of Setting	1851	71%	10.3	11.8	−1.4	0.61	−0.24

Table 6: An example of the results of an analysis based on completed Episodes of Care (HoNOS Total scores at Start and End, Change scores and Effect sizes for Adults in Ambulatory care), with accompanying statistics based on Collection occasions.

	N		% cmp	Start	End	Change Score	Correlation (ρ)	Effect Size (δ)
Any Admission > Any Discharge	**17246**		**48%**	**11.3**	**7.9**	**3.4**	**0.47**	**0.52**
New Referral > Any Discharge	13650	79%	45%	11.5	7.4	4.1	0.55	0.76
New Referral > No further care	6480	47%	62%	11.3	6.3	5.0	0.52	0.93
New Referral > Change of Setting	3025	22%	49%	12.4	10.6	1.7	0.58	0.28
From Other Setting > Any Discharge	2575	15%	65%	10.6	9.9	0.6	0.35	0.18
From Other Setting > No Further Care	1467	57%	66%	10.8	6.9	3.8	0.42	0.62
From Other Setting > Change of Setting	955	37%	70%	10.1	14.2	−4.1	0.23	−0.47
Comparison with Collection Occasion statistics								
Any Admission	59047		85%	11.3				
New Referral	41546	70%	88%	11.5				
From Other Setting	13454	23%	79%	10.7				
Any Discharge	46792		56%		8.2			
No Further Care	20595	44%	67%		6.3			
Change of Setting	15485	33%	63%		10.9			

Other methods of presentation

The basic stratification model for the presentation of statistics is likely to be the most usual method for the presentation of statistics. There are alternatives however.

For example, by filling each cell (excepting 0000) of Figure 6 with the pair of row and column proportions (expressed as percentages) of the count of each type of episode or period as defined by its' *Service path* it is possible to provide a complete view of the

relative extent to which each possible pathway into and from episodes or periods of care has been made use of. The pattern of proportions would be expected to be similar for services that provided care for patients or clients with similar needs for care.

Some specific examples may help illustrate the utility of this presentation.

In the cell coded 1200, the row proportion, calculated as N (1200) over N (1000), indicates what proportion of episodes beginning with Admission for any reason ended at a Review for any reason. The column proportion, calculated as N (1200) over N (0200), indicates what proportion of episodes ending at Review for any reason began with Admission for any reason.

In the cell coded 1311, the row proportion, calculated as N(1311) over N(1010), indicates what proportion of episodes beginning with Admission as a New referral ended with Discharge to No further care. The column proportion, calculated as N (1311) over N (0301), indicates what proportion of episodes ending with Discharge to No further care began with Admission as a New referral.

6 Technical issues regarding reporting of statistics

This section identifies and, where necessary defines, each of the statistics which may be derived from analyses of the data and presented in the specified reports.

6.1 Statistical indicators of the distribution of values

6.1.1 Percentage

Definition

Percentage of observations where the specified data element met the specified criteria.

The unambiguous specification of the numerator and denominator is a critical component in the definition of the underlying data element. In particular, the denominator will depend on a range of factors, including the requirement for the collection of the data element under the NOCC protocol.

Note that within the Aggregate data set this statistic should be recorded as the simple numeric ratio of the numerator to denominator (i.e. a number between 0 and 1). Missing values are indicated by the negative integer values shown in the domain listing which follows this definition. On formatting within a View, valid values should be formatted as percentages, whilst missing values should be translated to the appropriate labels.

Data element naming

The suffix Pct should be appended to the base data element name.

6.1.2 Frequency distribution

Definition

Percentage of observations found for each value of a data element.

Note that it is expected that this level of detail will only be reported in the *Clinical Reference Data* output class.

Data element naming

The suffix Pct[value code] should be appended to the base data element name.

For example, individual HoNOS items may take one of five values ranging from 0 through to 4. The percentage of ratings coded 3 on HoNOS Item 9 would be identified by a data element named `HonosItem09Pct3`. Specification of the frequency distribution of item values for each HoNOS item therefore requires five data elements corresponding to the valid clinical ratings of 0, 1, 2, 3 and 4.

6.1.3 Median

Definition

The Median is a measure of the central tendency of the distribution of observations. It is the value which marks the centre of the distribution of observations: Half the group will have observations above that value; the other half will have observations below that value.

Where the distribution of observations is not symmetrical, the median may be a more useful descriptive indicator of central tendency than the mean.

Data element naming

The suffix Mdn should be appended to the base data element name. For example, the median of the HoNOS Total Score would be named `HonosTotalScoreMdn`.

6.1.4 Inter–quartile range

Definition

The Inter–quartile range is a measure of the variability of the distribution of observations. The lower quartile (Q_1) is the value which marks the lower end of the distribution of observations. One quarter of the group will have observations less than that value. The upper quartile (Q_3) is the value which marks the upper end of the distribution. One quarter of the group will have observations greater than that value.

Data element naming

The suffixes Q1 for the lower quartile and Q3 for the upper quartile should be appended to the base data element name. For example, the two values of the inter–quartile range of the HoNOS Total Score would be named `HonosTotalScoreQ1` and `HonosTotalScoreQ3`.

6.1.5 Mean

Definition

The (arithmetic) Mean is a measure of the central tendency of the distribution of observations. It is simply the sum of valid, non–missing, observation values divided by the number of cases with valid observations.

The unambiguous specification of the sample over which the Mean is to be calculated (the denominator) is a critical component in the definition of this data element. In particular, the denominator will depend on a range of factors, including the requirement for the collection of the data element under the NOCC protocol.

Data element naming

The suffix Avg should be appended to the base data element name. For example, the mean of the HoNOS Total Score would be named `HonosTotalScoreAvg`.

6.1.6 Standard Deviation

Definition

The standard deviation is a measure of the variability of the distribution of observations. It is the square root of the average of the sum of squared deviations about the mean. That is:

$$sd = \sqrt{(\sum(x - m)^2 / n)}$$

where *x* is each observation, **m** is the mean of those observations, and **n** is the number of observations.

In any sample where the observations are normally distributed, approximately two thirds of all observations will fall within 1 standard deviation of the mean.

As with the Mean, the unambiguous specification of the sample over which the Standard deviation is to be calculated (the denominator) is a critical component in the calculation of this data element.

Data element naming

The suffix StDev should be appended to the base data element name. For example, the standard deviation of the HoNOS Total Score would be named `HonosTotalScoreStDev`.

6.1.7 Coefficient of Variation

Definition

The standard deviation expressed as a proportion of the mean. That is:

$$cv = sd / m$$

where **sd** is the standard deviation of observations and **m** is the mean.

This statistic is particularly useful for making comparisons of the degree of variability in situations where the standard deviation changes in proportion to the mean, as is the case with *Length of stay*.

Data element naming

The suffix CfVar should be appended to the base data element name. For example, the coefficient of variation of the HoNOS Total Score would be named `HonosTotalScoreCfVar`.

6.2   Indicators of change

Ultimately, the overall objective of the National Mental Health Strategy is to improve the clinical outcomes for individual consumers who use mental health services. Measuring change in the mental health status of consumers is one way to assess the effectiveness of mental health services.

While the measurement of change is a simple and attractive idea, there are substantial conceptual and technical challenges and debates about how best to go about this task. Some of this complexity is reflected in the national protocol whereby changes can be assessed from both the clinicians' and the consumers' perspectives.

In the scientific community, there are ongoing debates regarding the relative merits of 'statistical' versus 'clinical' change. 'Statistically significant' change can occur where there is a large number of observations but only a small difference in the overall change score; 'Clinical' change can occur where there is a large difference in an overall change score but that difference may not be statistically significant.

Currently, there is no single, optimal solution to these dilemmas. It is beyond the scope of the current document to comprehensively review the range of methodological options – these may be considered in subsequent editions. In this first edition of Standard Reports, AMHOCN has determined that an effect size statistic is the preferred index of change. Simple change scores are also sometimes useful and should be reported.

6.2.1 Change Score

Definition

The change score is the simple difference between the score at End occasion and the score at the Start occasion. That is: $cs = x_{End} - x_{Start}$

Data element naming

The suffix CS should be appended to the base data element name. For example the change score derived from HoNOS Total Scores at period start and end would be named `HonosTotalScoreCS`.

6.2.2 Effect Size

Definition

The effect size statistic quantifies the size of the difference in change scores where change scores indicate the difference in measurement over time (i.e., from 'start' to 'end' of either a Period of Care or an Episode of Care). In the most recent edition of the Standard Reports, following Morris (2000), effect size statistics have been calculated from a repeated measures design perspective – that is, the same person measured at two points in time, namely with Clinical Ratings at <u>both</u> Start and End of a Period of Care or Episode of Care.

Method of calculation

The Effect Size statistic used in the Standard Reports is derived using the formulae reported by Morris (2000)[k]. In this document, reference is made to the formulae numbering and notation of Morris.

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[k] Morris SB. (2000). Distribution of the standardized mean change effect size for meta-analysis on repeated measures. British Journal of Mathematical and Statistical Psychology, 53, 17–29.

The sample standardised mean change effect size, g, is defined as:

$$g = \frac{\bar{Y} - \bar{X}}{s}, \tag{1}$$

Where

$$\bar{X} \text{ and } \bar{Y}$$

are the mean start and mean end scores respectively; and

s is the standard deviation of the mean change score.

Morris noted that the sample standardised mean change effect size tends to overestimate the population effect size and that more accurate results occur by computing the unbiased estimator:

$$d = c(n-1)g. \tag{8}$$

where:

$$c(n-1) \approx 1 - \frac{3}{4(n-1)-1}, \tag{11}$$

where:

n is the number of observations that comprise the mean change score.

The variance of the unbiased estimator is defined as:

$$\sigma^2(d) = [c(n-1)]^2 \left(\frac{2(1-\rho)}{n}\right)\left(\frac{n-1}{n-3}\right)\left(1 + \frac{n}{2(1-\rho)}\delta^2\right) - \delta^2. \tag{9}$$

where:

ρ is the correlation between the start mean and end mean change scores.

The equation for the correlation coefficient is:

$$Correl(X,Y) = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \sum (y-\bar{y})^2}}$$

where x & y are individual observations for the start and the end scores respectively.

Interpretation of the effect size

Cohen (1987) classified effect size (ES) values into three different categories of "small", "medium", and "large". In the case of comparing two means, Cohen defined an effect size of 0.20 as 'small', indicating negligible clinical importance; an effect size of 0.50 as 'medium', indicating moderate clinical importance; and an effect size of 0.80 as 'large' indicating critical clinical importance.

If certain statistical assumptions about the distribution of change scores are met, then an effect size can be related to the standard normal distribution (Morris & DeShon, 2002). This greatly facilitates interpretation of the 'size of the effect'.

A change score of 0 implies that the change would be positive for 50% of the population and would be negative for 50% of the population. That is, zero change overall. A change score of 0.2 implies that the change would be positive for approximately 58% of the population. Cohen describes this as 'small'. A change score of 0.5 implies that the change would be positive for approximately 69% of the population. Cohen describes this as 'moderate'. A change score of 0.8 implies that the change would be positive for approximately 79% of the population. Cohen describes this as 'large'.

Effect sizes tell us the **size** of the effect and not the **statistical significance** of the effect. If the 95% confidence interval of the effect size includes zero (i.e., the lower estimate is a negative value **AND** the upper estimate is a positive value), then the result is not statistically significant. That is, the observed mean change effect size is not significantly different from zero (i.e., no change).

Data element naming

The suffix ES should be appended to the base data element name. For example, the effect size of the change in HoNOS Total Scores from period start to end would be named `HonosTotalScoreES`.

6.3   Indicators of statistical significance

6.3.1 Confidence Interval

Definition

Statistical confidence intervals may be specified for proportions, means and effect sizes. The method of calculation of confidence interval depends on which of those types of statistics the interval refers to.

Data element naming

The following suffixes should be appended to the base data element name: L80Ci (lower 80% confidence interval), U80Ci (upper 80% confidence interval), L95Ci (lower 95% confidence interval) and U95Ci (upper 95% confidence interval).