

Mental Health
**classification
outcomes**
Study



**New Zealand Mental Health Classification
and Outcomes Study:
Final Report**

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The Mental Health Research and Development Strategy is a partnership between the
Ministry of Health, Health Research Council of New Zealand
and Mental Health Commission.

Published in **July 2003** by the Health Research Council of New Zealand
PO Box 5541, Wellesley Street, Auckland, New Zealand
Telephone 09 379 8227, Fax 09 377 9988, Email info@hrc.govt.nz

This document is available on the Health Research Council of New Zealand
Web Site: <http://www.hrc.govt.nz/>

ISBN 0-908700-15-6

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The contents of this comprehensive report are summarised in a Summary Report, which has also been designed as a stand-alone publication. Both this report and the summary report include original material as well as information taken from other sources. Acknowledgement is given to those sources in the reference section.

The resource materials that were prepared during the course of the project are included in the National Study Resource Manual (2001) but are not reproduced here. For further details see the Health Research Council of New Zealand website at: <http://www.hrc.govt.nz/>

Suggested citation:

Gaines P, Bower A, Buckingham W, Eagar K, Burgess P. & Green J. (2003) "*New Zealand Mental Health Classification and Outcomes Study: Final Report*". Health Research Council of New Zealand: Auckland.

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Foreword

The Mental Health Research and Development Steering Committee is pleased to announce the findings from the NZ Mental Health Classification and Outcomes Study.

Interest in conducting research into a mental health casemix classification system that could potentially inform the planning and delivery of mental health services in New Zealand dates back to 1995. At that time a small number of New Zealand DHBs approached the Australian Commonwealth government expressing an interest in being involved in the Australian MH-CASC project. While a trans-Tasman study was not possible at that time, New Zealand continued to follow the outcomes of the Australian project with interest.

The NZ-CAOS project subsequently became one of the four priority areas under the Mental Health Research and Development Strategy and this report marks a substantial investment of time and resources from a large number of individuals and agencies over the last four years who have all in some way contributed to the successful conclusion of this project.

Similar to its Australian counterpart the study has found that there is pattern in the way consumers are treated by specialist mental health services and that this pattern is connected with consumer needs. It also discovered that there is a certain amount of variation between providers.

In its current form this first version casemix classification could have a role as a management information tool in a wide range of quality improvement activities contributing to the advancement of the mental health sector. The eight District Health Board sites that participated in this study have expressed an interest in developing benchmarks using the data collected for this study to compare their services on costs, outcomes and quality. This is a cutting edge initiative and is indicative of the potential utility of the casemix classification to clinicians and managers alongside its role in providing a better picture of actual population mental health need to complement the population based funding approach used by Funders and Planners.

A significant amount of development work has taken place in recent times around the routine collection of outcome measures by mental health services. The linking of a casemix classification to outcomes data is also essential in making best use of outcome measurement as a tool for assessing the quality and effectiveness of service delivery. Whilst this casemix classification has been developed on the basis of internationally validated outcome instruments there are still opportunities to further refine and test it using locally developed instruments as they become available.

The development of NZ-CAOS signals a significant shift in how we might conduct our business as a sector. As a first version development it has its weaknesses but it is a significant step forward in our knowledge and understanding of 'who provides what services to whom and at what cost' and offers us a tool that we did not possess before for improving service delivery in the future.

It is expected that this research will be a stepping-stone for further work. Eventually this approach can be incorporated into routine information collection thereby assisting services and clinicians to achieve greater consistency between providers in terms of determining which treatments work best for particular groups of consumers.

This study involved intense and dedicated effort from a lot of people and all who contributed to it should take pride in these results.

Dr Janice Wilson
Deputy Director-General of Mental Health
Ministry of Health

Acknowledgements

The mental health casemix classification outlined in this report was developed with the assistance of a large number of individuals and reference groups. Whilst it is not possible to identify all those who took part, special mention must be given to the following individuals and groups:

Professor Graham Mellsop who offered invaluable support and guidance throughout the project as Chair of the CAOS National Reference Group.

The members of the CAOS National Reference Group (see appendix four).

Te Puea Winiata (Chair) and Michelle Levy for their feedback and contributions regarding written material and for their advice and leadership as members of the Māori Monitoring and Review Group.

The members of the CAOS Māori Monitoring and Review Group (see appendix five).

The members of the Mental Health Research and Development Steering Committee.

Jenny Fear, Jane Little and Debra Keylard from the MHINC team at NZHIS.

Louanne McLeay, Indrani Govindsamy and Richman Wee from the Health Research Council.

Janet Peters, manager of the Mental Health Research and Development Strategy.

Jim Burdett for his contributions to the study from the consumer perspective.

Dr Grant Patton-Simpson and Anthony Nally for their involvement in the development of the Inpatient Resource Allocation Tool (RAT).

David Ireland as Chair of the group of DHB Costing representatives and who provided the National Project Team with additional expertise during the data clean-up phase of the project.

The DHB site coordinators who managed the project at the local DHB level.

The mental health managers from the participating DHB sites.

Paul Hirini who was employed as the NZ national trainer for the study.

The members of the various clinical working groups that helped us develop the study design and methodology.

The members of the DHB Costing Representatives Group.

Our thanks are also extended to the many consumers, clinical staff, team leaders and managers involved in some way with this study. The project was a significant undertaking for all concerned. The NZ Mental Health Research and Development Steering Committee would also like to thank the Australian Commonwealth Department of Health and Ageing for permission to use the MH-CASC materials.

NB: Additional acknowledgements, including those to the developers of the clinical instruments used in this study, are made in the National CAOS Resource Manual (2001).

Executive Summary

Overview

The project found that there is an underlying episode classification, not just in inpatient care but also in the community. In both settings, the level of service provided to consumers was found to have a clinically and statistically logical relationship to the consumer's clinical status.

Similar to MH-CASC the study found that there is significant variation amongst providers and that this variation appears to be random in nature.

Within the New Zealand context the casemix classification works better than the Australian MH-CASC classification but because of the inclusion of classes defined by the ethnicity of the consumer it is not suitable for use outside New Zealand.

There are systemic differences between groups of consumers that make comparisons between New Zealand and Australia difficult. However, for the purposes of further research regarding the outcome measures used in the study there are sufficient similarities with some of the measures to enable comparisons to be made between the two countries.

The resulting first version casemix classification is sufficiently good enough that it could potentially be used for the following purposes:

1. To better understand random provider variation in the specialist mental health system.
2. To profile the treated consumer population and to benchmark DHB services.
3. To improve routine data collection.
4. To inform funding of DHB mental health services based on the weighted need for care and the weighted cost of care (as a component of a population based funding model)

It is NOT suitable to use as a funding model and its future use needs to be tempered by an appreciation of the following cautions:

- The development of the casemix classification required information to be provided to the National Project Team in a consistent format by all eight participating DHB sites. This report records a number of problems that the National Project Team observed with the quality of the data submitted by the sites that affected the final alignment and subsequent analysis of the data. All sites had a different range of problems associated with each of the three data building blocks; (financial, consumer related information and resources) which points to further work that is required to improve this area.
- The Māori Monitoring and Review Group specifically established for this study raised a number of concerns including the potential for people to over-interpret the data with regards to the profile of tangata whai ora and their utilisation of Kaupapa Māori services. For this reason the findings should be seen as suggestive rather than definitive. They raise a number of interesting issues for Māori that support the findings of other researchers and are worthy of further investigation.
- The study relied on the collection of data associated with actual clinical practice and for a variety of reasons this may not necessarily represent 'best practice'
- Although consumer factors were shown to drive costs, other factors may have contributed to the study findings including resource availability, types of services available and the practice of individual clinicians. For this reason whilst the NZ-CAOS classification can be used to inform management and planning decisions it is important to remember that this is a first version classification only and that it requires further testing and modification to improve it. It may be very difficult to identify and measure those factors extrinsic to the sites that impact on service delivery and for which they cannot be held accountable. Perhaps the best use of the kind of

comparative information offered by this study is to treat the differences amongst sites as suggestive rather than definitive and in this way continue to explore the differences.

- The classification has also been based on an essentially monocultural value system and whilst every attempt has been made to include Māori cultural practices in terms of service inputs and to encourage clinicians to exercise cultural sensitivity when completing the clinical measures it did not include a measurement of outcome that reflected Māori holistic views of health. A smaller cohort study would be required to predict and test the functionality of any new measure that was to be used as part of a second version casemix classification.

This report recommends that this first version casemix classification system be implemented into routine clinical practice and that routinely collected data be used to improve it. Given that the Mental Health Directorate of the Ministry of Health has signaled that the development of an information management strategy is a priority area and the potential impact of the national outcomes initiative (MH-SMART) on MHINC a discussion regarding the possibility of implementing the classification into routine practice is timely.

The eight participating DHBs are also considering using the CAOS dataset as a platform for benchmarking their services.

1. Introduction

1.1 Project Overview

The New Zealand Mental Health Casemix Classification and Outcomes Study (NZ-CAOS) encompasses two of the four priority areas defined under the Mental Health Research and Development Strategy (MHR&DS). The Strategy therefore provides the broad context to understand the origins and aspirations of the current project.

The aim of the Research and Development Strategy is to foster research and development that will assist in the planning and improved delivery of services for those most in need (i.e. the 3% of people with serious mental illness). The Strategy has progressively developed in light of the Government's national mental health strategy, which started in 1994 with *Looking Forward: Strategic Directions for Mental Health Services*. It was further developed in the Ministry of Health's Moving Forward: The National Plan for More and Better Mental Health Services published in 1997. This was refined in the 1997 Mental Health Commission Blueprint for Mental Health Services in New Zealand, which spelt out the essential components and resource guidelines for mental health services. Funding to support the Research and Development Strategy amounts to approximately \$1.6 million per year and is administered by the Health Research Council on behalf of the Ministry of Health.

The overall objective of the MHR&DS is to use research and development to identify ways that will improve the planning, purchasing and delivery of mental health services in New Zealand, and which are consistent with the Treaty of Waitangi and the needs of consumers, family, whanau and other stakeholders. Specifically it aims to:

- Create a research and development culture within the mental health sector
- Facilitate networking between researchers, providers and purchasers
- Better utilise current research and development capacity
- Build research and development capacity
- Encourage evidence-based practice
- Collaborate with other initiatives in the mental health area.

The Strategy focuses on four priority areas as follows:

1. Epidemiology – which aims to measure the incidence and prevalence of different mental health problems in New Zealand populations.
2. Outcomes – which aims to develop and assess measures of mental health outcome.
3. Casemix – which aims to develop and assess a casemix classification system to inform planning, purchasing and delivery of mental health services in New Zealand.
4. Quality and best practice.

This project was principally concerned with the strategy's casemix development objective, but it was also designed to provide significant experience in the routine use of instruments to assess consumer outcomes.

Interest in conducting research into a casemix classification system that could potentially improve the current funding methodology in New Zealand dates back to 1995. At that time a small number of New Zealand District Health Boards approached the Australian Commonwealth government expressing an interest in being involved in the Australian MH-CASC project. While a trans-Tasman study was not possible at that time, New Zealand continued to follow the outcomes of the Australian project with interest. A scoping report outlining a research programme designed to develop a casemix model for

use in New Zealand mental health services was subsequently commissioned in 1999 by the Health Research Council and prepared by two of the consultants involved in the MH-CASC study.

Subsequent to the release of this report, numerous consultations were held with representatives of participating District Health Boards (DHBs) to determine the scope, objectives and specific requirements of a New Zealand study. The design of this study brought together the results of those discussions as well as the recommendations of various clinical advisory groups that were formed during the first stage of the project.

The Māori Monitoring and Review Group (MM&R Group) was established in April 2001 in response to questions raised regarding the benefits of the CAOS project to Māori. The MM&R Group provided leadership and advice to the National Project Team and the National Reference Group on issues that impacted on Māori. The MM&R Group has contributed to an increased awareness of the different paradigms between Māori and non-Māori in relation to wellness and treatment as well as providing the project with direction on the appropriate application of the study findings. It is their strong recommendation that a supplementary paper exploring the issues requiring further contextual qualification and the methodological issues with the study for Māori (see appendix one for additional research topics) be conducted before the final consolidated CAOS dataset is made available to any other researchers.

1.2 Project objectives

The Mental Health Casemix Classification and Outcomes Study was a pilot study and had two objectives:

Primary objective

To develop the first version of a national casemix classification for specialist mental health services in New Zealand that builds on the classification developed in the Australian MH-CASC project.

The first step in the analysis was to test the validity of the Australian casemix classification within the New Zealand service delivery environment. It was found that there were sufficiently significant differences between the two countries that it was necessary to develop a casemix classification model that was more appropriate in the New Zealand context.

Secondary objective

To trial the introduction of outcome measurement into routine clinical practice

The National Mental Health Strategy advocates regular outcome measurement within clinical services. The commitment to incorporate outcome measurement into routine clinical practice in New Zealand is reflected in the Crown Funding Agreements for 2001/02 that specify the District Health Boards will develop a process for measuring outcomes. The Mental Health Research and Development Strategy also funds several projects that may assist in the measurement of outcomes in mental health in the medium and long term. Because the measures collected in this study included several standard outcome instruments, it provided an opportunity to introduce a significant number of clinical staff to routine outcome scales and to collect valuable data on consumer outcomes that could be used to inform future national policy directions.

A separate analysis of the outcomes data generated by this study will follow this publication at a later date.

1.3 Why casemix?

Significant initiatives commenced in the 1980s to introduce casemix classification systems to describe the ‘products’ of health care in New Zealand. However, as in other parts of the world, mental health services stood aside from these initiatives. This may be attributed to three factors.

First, the reform agenda for mental health services focussed on more fundamental structural changes, particularly the shifting of resources from hospital to community based care.

Second, the available casemix tools, based on Diagnosis Related Groups (DRGs), were perceived to be neither relevant to the structural reform agenda nor useful in explaining the varying needs of mental health consumers.

And third, the mental health community has been sceptical of casemix, regarding it as solely a tool for funding and resource rationalisation rather than being useful for broader purposes.

More recently, mental health planners are beginning to embrace the potential value of casemix classifications as clinical and information management tools. In the sections that follow, the role of casemix in advancing mental health service reform is explored.

1.3.1 Casemix defined

The word ‘casemix’ means exactly what it says – it is the mix of cases. Although the term casemix is commonly associated with the health system, it is actually a generic term and is being increasingly used in other parts of the human services sector.

The purpose of a casemix classification system is to classify episodes of care based on those factors which best predict the need for, and the cost of, care. In a casemix classification, episodes of care are grouped into classes based on two criteria. First each class should contain episodes with similar patterns of resource consumption. There is an implicit assumption that consumers who consume similar resources have similar needs. Second, each class should contain episodes that are clinically similar. People with broken legs are in one DRG class and mothers having babies are in another, even if they happen to cost the same to treat.

The best known casemix classification is the Diagnosis Related Groups (DRG) classification. The DRG system is so widely used that it is sometimes believed that the term ‘casemix’ is synonymous with the DRG classification. In consequence, the DRG classification has been frequently used for purposes for which it was not intended.

The DRG system was designed for the classification of acute inpatient episodes. It therefore uses variables which best predict the cost of acute inpatient care. These data items (predominately medical diagnoses, age and procedure) have been shown to be largely satisfactory in predicting resource consumption in acute inpatient services and can be routinely extracted from patient medical record systems.

However, the data items used in the DRG system have proven to be much less satisfactory at dealing with care episodes other than acute inpatient care. Attention in the health sector has focused in recent times on the development and use of other casemix classifications for other care types. The Australian Mental Health Classification and Services Cost (MH-CASC) project is one of several casemix classifications that have been developed to specifically address these needs. MH-CASC is described in more detail in the next section.

1.3.2 Purposes of a casemix classification

Casemix classifications are being increasingly used to fund health care services. In many countries, funders are moving away from historic budget models towards funding on an output basis. In output-based funding, providers are funded based on the number and type of consumers actually treated – that is, on the mix of ‘cases’ or the casemix.

Output based funding is being introduced for several reasons:

- such systems are believed to have superior incentives for productivity;
- they are inherently fairer because the same price is paid for the same service, resulting in a more equitable allocation of resources; and
- output based funding can reinforce best practice by, for example, reducing excessive hospital stays and encouraging community based care.

However, whilst casemix classifications can be used in output-based funding models, their origin was motivated not by financing concerns, but instead, by the need for tools to support quality assurance and utilisation review. They do this by providing a method to describe the products of health care delivery that control for differences between providers caused by those providers treating different types of patients. By controlling for patient differences, the contribution made by provider differences to patient costs and outcomes can be better understood.

Take, for example, the information presented in Table 1. What can we conclude about these providers? Can we conclude that Provider A provides an inefficient community mental health service or that Provider B manages an inefficient inpatient unit and has an unacceptably high admission rate? Quite clearly we can reach few, if any, conclusions about the three mental health providers based on the information presented below.

Table 1: A comparison of some mental health providers

	Provider A	Provider B	Provider C
Average cost per home visit	\$90	\$25	\$45
Average cost per inpatient admission	\$5,800	\$10,000	\$3,400
Average community treatment hours per consumer per week	5	1	8
Consumer: staff ratio	150:1	75:1	300:1
Percentage of consumers receiving care for more than one year	40%	85%	10%
Percentage of consumers admitted to hospital at least once in the year	10%	40%	25%

There are two important points to be made. First, few mental health provider agencies in New Zealand can routinely produce these type of data. Second, the data actually say little about the comparative performance of the three providers. What is obvious in this example is that if we wish to compare the performance of mental health providers on any measure – cost, quality or outcome – we need to take into account the types of consumers they serve. The key idea is that variation is a fact of life across the whole of the human services sector, be it the mental health sector, the general health system or disability services. If we are to understand the mental health sector, and thereby learn how to systematically improve it, we need measurement tools that help us to understand the different sources of variation.

In summary, while casemix classifications can be used to fund services, they are also key information tools that can be used to support:

- *quality assurance and service utilisation reviews* – by understanding variations in casemix, agencies can better focus on differences between providers in the way in which services are delivered;

- *reviews of consumer outcomes* – understanding casemix differences is essential for the interpretation of variation between agencies in consumer outcomes;
- *cost benchmarking* – adjustments for casemix differences are needed to enable service agencies to make comparisons between themselves and other organisations on costs, length of stay and similar cost-related performance indicators;
- *development of clinical protocols* – a casemix classification provides a base for the development of clinical protocols, in terms of establishing a framework for determining what package of services particular consumer groups should receive.

The drive to develop a casemix classification for New Zealand recognises all of these potential applications, and the fact that casemix is a means and not an end in itself. There is also recognition that mental health services are only at an early stage of the casemix development cycle. The types of issues confronting the sector, such as apparent wide variation between providers, the absence of clinical protocols, lack of national benchmarks and other tools to support service reforms, are comparable to those that initially drove the DRG development program.

Distinguishing the role of a casemix classification in resolving these issues from its more narrow use as a tool for funding is critical. In the funding context, the Ministry of Health has advised that there are no immediate plans to introduce purchasing on a casemix basis for mental health services. Of course, the option exists to design a payment system around casemix in which services are paid according to the volume and complexity of consumers treated. Arguably, such a model would provide a more equitable method for funding mental health services than the current approach to funding based on numbers of staff and inpatient beds. However, this is a separate decision for the future and has not been the prime driver of the project.

The limitations of the data preclude its immediate use as a funding tool (see chapter 11) but the findings do offer valuable information that, when combined with the results of the epidemiology study, will give a greater focus to the different needs of specified populations. This approach is consistent with the objectives outlined in the New Zealand Health Strategy (2000) whereby ‘DHBs will help ensure that services reflect the needs of individuals and communities at a local level’. The findings will also complement the population-based approach to the funding and provision of mental health care in New Zealand.

1.4 The Australian MH-CASC classification

By the time Australia’s National Mental Health Strategy began (1992), all State and Territory Health Ministers had endorsed the establishment of a nationally consistent casemix system that could be used to describe the activities and products of health care. Recognising that the accepted casemix standard (AN-DRGs or Australian National Diagnosis Related Groups) was not appropriate for describing the ‘outputs’ of mental health services, the Australian National Mental Health Strategy set as one of its priorities the development of an alternative casemix classification model that was consistent with the principles of the strategy. This subsequently became one of the largest investments on any single project funded over the period. It is also significant in that it is one of few mental health casemix development studies designed to build a classification from ‘bottom up’.

The Mental Health Classification and Service Costs Project (MH-CASC) commenced in 1995 and continued over the next three years. The study collected detailed socio-demographic and service use data on approximately 18,000 consumers attending specialised mental health services. The sample was significant, covering 25% of Australia’s private and public mental health services. Service utilisation data were provided by approximately 4,500 staff who maintained daily diaries of all activities over the three month period 1 September to 30 November 1996. The scale and complexity of the study had no international precedent.

The aim of the project was to determine whether clinical factors explained service costs, and whether these could be used to build a consumer casemix classification that was both clinically meaningful as

well as resource homogeneous. Clinical measures were selected to cover the broad domains of diagnosis, clinical severity and level of functioning (disability). Of most importance, the project based its design on using patient measurement instruments that were seen as clinically useful in their own right, drawn from the same ‘family’ of instruments developed to measure consumer outcomes.

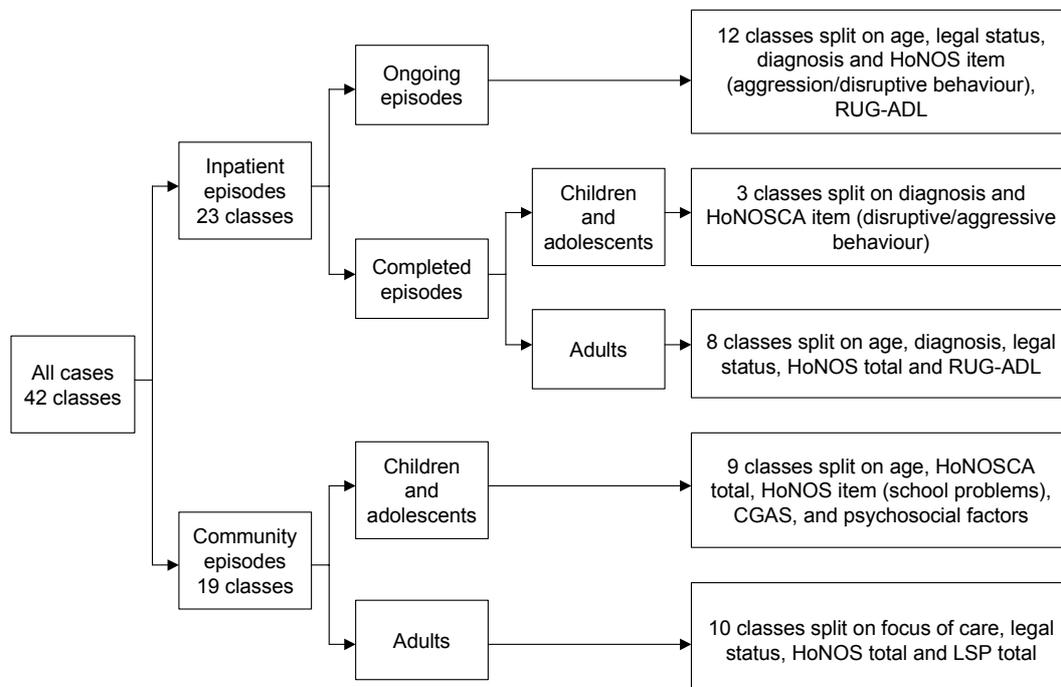
The project found that there is an underlying episode classification, not just in inpatient care but also in the community. In both settings, the level of service provided to patients was found to have a clinically and statistically logical relationship to the patient’s clinical status.

The project’s final report, completed in September 1998, has major implications for future mental health data collections. The project found:

- the costs being driven by ‘casemix’ are often confounded by the costs driven by provider variations, reducing the overall variance that can be explained by clinical factors. In fact, provider variation emerged as a major explanatory factor for the volume of services received by any particular consumer.
- the variables driving costs in inpatient settings are also driving costs in the community but the patterns of care are different, so the importance of the variables differs across the two settings.
- while explanation of variance was found to be at the low end of acceptability, it was above that achieved using the AN-DRG mental health classification system. Thus, while diagnosis in itself was important in understanding differences between patients, a ‘mix’ of measures including clinical severity and level of functioning was required to better differentiate care patterns.

The project recommended a first version casemix classification model, which includes 42 patient classes – 19 for community episodes, and 23 for inpatient episodes. A summary of the model is shown in Figure 1.

Figure 1: Summary of MH-CASC classification



From the policy and planning perspective, four conclusions emerged from the MH-CASC Project that are particularly relevant for the New Zealand study:

- First, the project demonstrated that a meaningful casemix classification is possible which can subsequently be used to describe the activities of mental health services.
- Second, there is a clear convergence in the measures used for this purpose with those with demonstrated utility in outcome measurement.
- Third, it demonstrated the value of casemix information tools in highlighting the degree of variation in mental health clinical practice.
- And finally, the project added important new concepts for defining episodes in the community, by using a definition based on the concept of ‘period of care’.

1.5 Overview of the study

For the purposes of developing a mental health casemix classification, a substantial empirical study is necessary. Although background work has been conducted in Australia and overseas, the project required new concepts to be trialed and innovative data collection approaches to be developed. Research and development work of this scale and complexity had not previously been conducted in mental health services in New Zealand and considerable reliance was placed upon District Health Board (DHB) sites to both provide the necessary data and to assist in the coordination of tasks.

The study design began with a test of whether the Australian casemix classification held up in the New Zealand service delivery environment. This required that all information necessary to assign episodes to the MH-CASC classes were collected in the New Zealand study. Additionally, a small number of variations were made to:

- overcome limitations in the Australian model and to allow flexibility to refine the casemix classification to suit New Zealand requirements; and
- incorporate the outcomes objectives of the study.

Summary details of the study design are outlined in chapters two and three.

1.5.1 Project Scope:

The scope of the casemix classification model includes all specialist mental health services provided directly by DHBs, which are funded by the Mental Health Directorate of the Ministry of Health. This covers all:

- Child and youth mental health services;
- Adult mental health inpatient and community care services; and
- Forensic mental health services.

Mental health services for the elderly do not easily fit within this rule due to the variable funding arrangements that are shared between the Mental Health and the Disability Support Service Directorates. As a compromise, the study included those services managed by the participating DHB sites and which were funded by the Mental Health Directorate only.

The following services were excluded from the study:

1. *Services provided by non-government organisations (NGOs)* – a key consideration was whether or not NGO services were largely substitutable for services that would otherwise be provided by a DHB. Given that NGO services are predominately orientated towards meeting the support needs of consumers rather than their clinical needs, a decision was made to exclude them from the study. An additional consideration was that the cost and complexity of

the data collection would have significantly increased the overall costs of the study and would more than likely have proven prohibitive for most NGOs.

2. *Alcohol and Drug services* – as A&D services are not included within the management of Australian mental health services they were not included in the design of the equivalent Australian casemix study, Mental Health Classification and Service Costs Project (MH-CASC). Consequently there was no foundation upon which to build a casemix classification in New Zealand that also covered primary alcohol and drug disorders. However, consumers with a diagnosis of substance abuse were included in the study, but only if they were treated within the specialist mental health sector.
3. *Residential services provided by DHBs* – a few of the sites provide residential accommodation services. A decision was made to treat these services the same as those residential services provided by NGOs and they were therefore excluded from the study.

1.5.2 Participating sites

Eight District Health Boards participated in the study. In some cases DHBs participated on a partial basis only because they considered that clinical staff in some parts of their organisation were already dealing with the pressure of significant workloads and could not sustain the collection of additional CAOS related data over the six-month period of the study. The eight DHB sites that participated in the study are as follows:

- Northland DHB
- Waitemata DHB (regional forensic services only)
- Auckland DHB
- Counties-Manukau DHB (excluding adult community health services)
- Waikato DHB (excluding adult community services)
- Lakes DHB
- Capital and Coast DHB
- Otago DHB

Site coordinators were appointed by each DHB site to manage the local data collection and data quality issues. The coordination and liaison roles that these staff offered to the National Project Team were essential to the success of the project and accordingly we would like to specifically acknowledge their contributions.

1.5.3 Study sample

The study sample included services that are representative of New Zealand. Overall the eight District Health Boards covered approximately 22.44% of New Zealand mental health services. The broad indicators of the study are summarised in Table 3.

Table 3: Broad indicators of the study for the period 2001/02

INDICATOR	The 8 DHBs	National total	% of total
CATCHMENT POPULATION	2,143, 527	3.9 million	54.96%
DHB RESOURCES (in millions)			
Expenditure – Total (incl A&D)	\$163.1	\$496.5	32.85%
Expenditure – In-Scope services	\$103.2	\$460.1	22.43%
ADULT DHB SERVICES*			
Expenditure – total in-scope	\$91.9	\$396.7	23.17%
Inpatient beds	599	1158	54.55%
Community FTEs	631	2690	34.16%
CHILD & YOUTH DHB SERVICES*			
Expenditure – total in-scope	\$11.4	\$63.7	17.90%
Inpatient beds	27	60	45.00%
Community FTEs	169	582	29.04%

* Excludes A&D and all NGO services

1.5.4 Service/team profile

Table 4: Services included in the study by team type

Team Type	Number of teams/wards
Adult	58
Child and youth (excluding youth specialty and early intervention which came under 'adult')	11
Kaupapa Māori	7
Pacific	2
Services for the elderly	8
Forensics	17
TOTAL	103

NB: Whilst it may appear at first glance that forensic services are over-represented in the study and consequently may have unduly influenced the final casemix classification, in reality the number of consumer episodes collected by forensic teams was small compared to the overall sample and did not significantly influence the case weights (see section 10.7 of this report).

1.5.5 Site selection

Two key criteria were used in selecting the study sites.

First, the sample needed to include sufficient observations to allow the MH-CASC casemix classification to be statistically tested in the New Zealand context. Estimates of the sampling requirements were based on the assumption that the mix of cases seen by New Zealand mental health services was comparable to Australia. Extrapolation of available New Zealand data then indicated that a study period of six months would produce sufficient episodes for all episode types except Adult Ongoing Inpatient Episodes and Child & Youth Inpatient Episodes.

Second, although the data collection approach was very simple in concept, there were several aspects that made the study complex to administer and very demanding on participating sites. Consequently, the eight DHB sites were selected on the basis of the following five criteria:

1. The degree to which they were representative of New Zealand mental health services;

2. The extent to which they provided a comprehensive range of services;
3. Their combined capacity to provide a sufficient volume and mix of ‘consumer cases’;
4. The suitability of information infrastructure to collect the required clinical data, track service utilisation at the individual consumer level and assign costs; and
5. The readiness of the organisations to absorb the demands arising from a casemix study.

Canterbury DHB was originally included in the study but withdrew its involvement in December 2001 as a result of site issues which precluded the necessary level of staff support for the study. Lakes DHB was not originally selected to be a participating site but expressed such a strong interest in the aims and objectives of the study that it was subsequently included.

1.5.6 Data that was collected

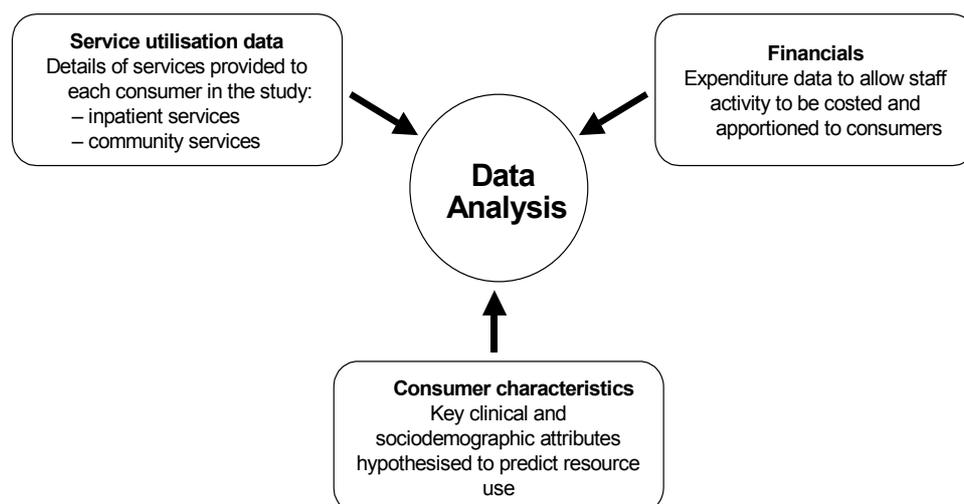
Three ‘data blocks’ were collected for the study that served two purposes. First, they allowed costs to be accurately assigned to each episode of care that occurred during the study period. Second, data collected on consumer characteristics was linked to the cost data to determine which characteristics predicted differential resource use.

The three ‘data blocks’ were:

- Staff activity data, particularly identifying time and services which could be attributed to individual consumers;
- Consumer characteristics data, covering key clinical and socio-demographic attributes hypothesised to influence resource use; and
- Financial data from the DHB service’s chart of accounts.

These three ‘data blocks’ are summarised in Figure 3.

Figure 3: Three major ‘data blocks’ captured by the study



2. Key Study Design Concepts

Casemix classification research is inevitably complex. This stems largely from the inherent complexity of the health care system itself, and is particularly the case for mental health. Each year the mental health system provides services across the traditional inpatient/community and acute/non-acute boundaries to thousands of consumers, undertakes millions of processes and produces a complex array of outcomes. The sector is also at the interface between the acute care, residential care, disability and housing sectors and requires ways of relating its work to activities in those other sectors.

Tools for measurement of the mental health services need to reflect the complexity of the system being measured. There is little sense in simplifying the process and outcomes of the sector so much that the measuring tool is no longer relevant to the real world of mental health or to the work of other sectors. This is particularly relevant in the design of a casemix system.

This chapter describes the main concepts used in the study to address the complexity of mental health care. It discusses:

- What are the ‘products’ of mental health services?
- How were the episodes defined?
- What type of episodes were recognised? *and*
- What principles acted as a guide for data collection?

2.1 Defining the ‘products’ of mental health services

Defining the products of mental health services is a first step in designing any study that requires costs to be assigned to activities. Current purchasing for mental health services in New Zealand ‘buys’ inputs (beds, staff) and monitors the performance of these by intermediate products (bed days and contacts). This approach is inconsistent with the mainstream health system where indicators are usually built around final health care products.

Eagar (1995) describes the health system as having two distinct products:

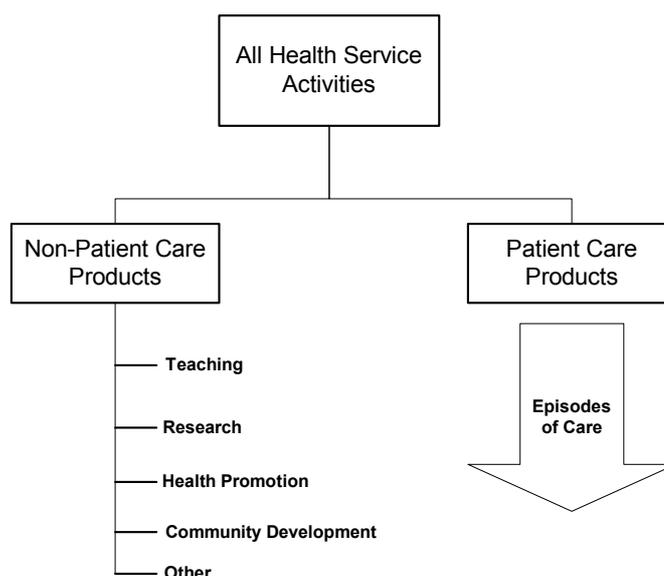
1. The primary product is consumer care, provided in a range of settings, to people with many different health problems that require different treatment services.
2. In addition, health services produce a range of ‘non-consumer care’ outputs, or activities that do not involve an identified consumer for whom the health service accepts clinical responsibility. These include, for example, teaching, research, community development and health promotion services.

Figure 4 shows a high-level map of health service products.

Consumer care products were the central focus of the CAOS study. It was concerned primarily with finding a method to describe these products in ways that could allow for the differences between the performances of health care agencies to be better understood in terms of differences in caseload complexity.

However, in pursuing this objective, it was essential that activities and costs associated with non-consumer care products not be confused with consumer care activities. For example, it would have been unreasonable to assign all costs of an agency that spent 50% of its resources on teaching and 50% on treating consumers to consumer care products because this would have led to a conclusion that the agency was inefficient in relation to agencies that delivered 100% consumer care.

Figure 4: Products of the health care system



The study dealt with this issue by sampling information from all staff in the eight participating DHB sites about the extent to which their time was devoted to each of the following eight activities:

- Teaching and training
- Research
- Community development
- Mental health awareness and education
- Service development
- Professional development
- Cultural activities
- Unregistered consumers

This gave us an indication of the overall investment by New Zealand mental health services in each of the activities and, most importantly, allowed the associated costs at each DHB site to be excluded from the costing of consumer care products.

2.2 Defining episodes – the issues

The shape of casemix classifications depends to a critical extent on views taken regarding the start and end points of the health care activity that is to be defined as the ‘consumer care product’. In simple terms, the question is: *what is the unit of counting that will be used to measure and thus classify consumer care activity in mental health services?*

The concept of ‘*episode of care*’ is used widely throughout the health system to describe consumer care products, where episode refers to a period of care with a discrete start and end point. Most work on defining episodes has been tied to acute inpatient settings, where the principle is relatively simple – one episode per consumer at any one time, with the episode beginning at admission and ending at discharge.

Significant problems arise when translating this concept to mental health services because no concept of episode has been agreed to quantify community services and many consumers undergo care over

extended periods. Additionally, multiple agencies may be involved in providing care during a particular period, with each agency regarding their intervention as a discrete episode.

Resolving the issue requires a distinction between *episodes of illness*, *episodes of care* and *service episodes*.

An *episode of illness* can be defined as the period between the onset of a health problem to its resolution; that is, until it has been determined that the symptoms have been significantly resolved or that the problem cannot be alleviated. In either case, the episode of illness is considered to end when no further health care is provided.

An episode of illness might contain one or more *episodes of care*. The episode of care may be briefly defined as the whole or part of an episode of illness during which there is contact between a consumer and a health care provider or team of providers, is delivered in one setting and where there is no major change in the goal of intervention.

The distinction between episodes of illness and care is imprecise. This is largely a consequence of the fact that episodes of care may overlap, as in the case where more than one distinct health care problem is addressed at the same time. For example, a consumer may be admitted for treatment of a mental health problem and it is discovered that she also has an infection that needs treatment during the stay. Further, episodes of care can be nested. For example, a consumer being provided with ongoing care in the community for a chronic disorder might also require hospitalisation at a particular point in time. It is extremely difficult to identify and discriminate between episodes of illness and care. However, the difficulties are not resolved by avoiding the distinction, because they reflect the underlying complexity of health and health care.

A further complication is that an episode of care might in turn involve one or more *service episodes*, where each service episode refers to the involvement of a particular team within an agency. This situation is common in mental health care; for example where a consumer is simultaneously under the care of a community mental health team and a separate day program. Typically, the consumer is registered at both centres and each service or team separately records contacts.

At a lower level, each service episode of care may consist of one or more days of care, each in turn may consist of one or more treatment events or occasions of service. Historically, community mental health services have collected data at the level of the occasion of service whilst inpatient mental health services have collected data at the level of the episode of care. There is no inherent logic in this historical approach.

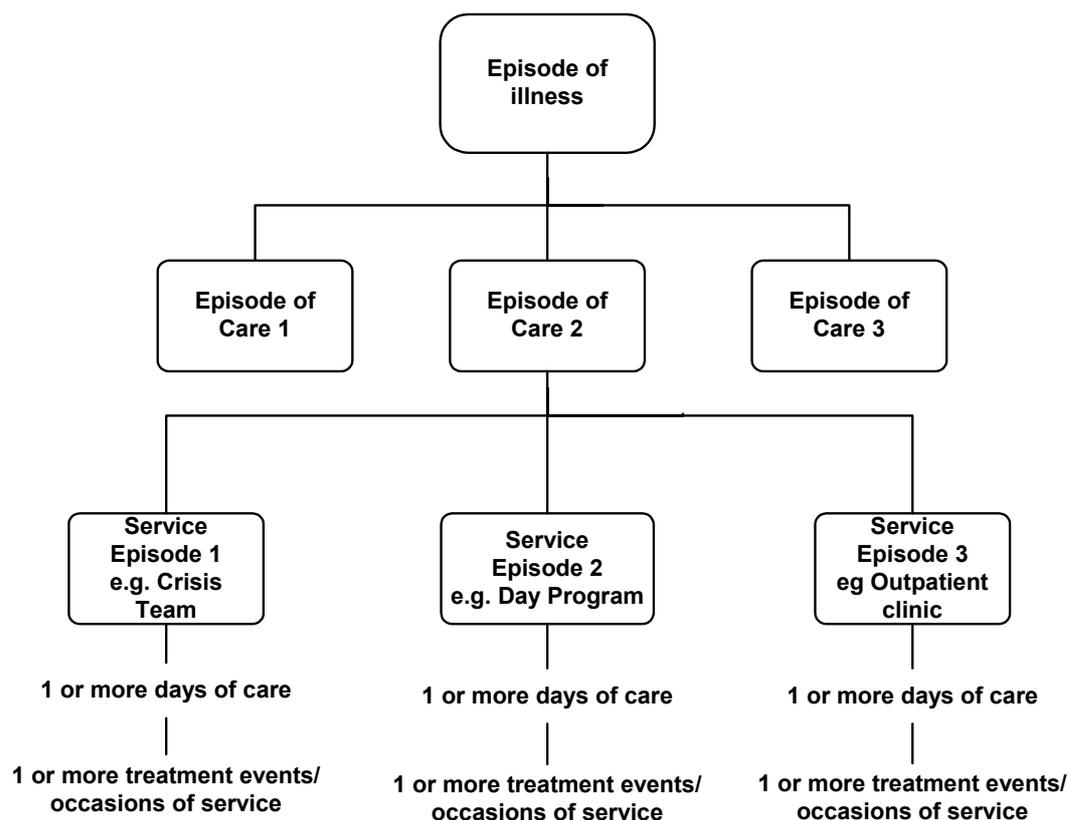
The hierarchical relationship between episodes of illness, episodes of care and service episodes is summarised in Figure 6.

The critical issue is deciding at what level to count mental health episodes for the purpose of defining consumer care products that have utility as a management and funding tool. Four alternative approaches are considered below.

The first is to define the episode as the episode of illness. This is not a practical option because:

- Episodes that continue over several years would not be counted until the episode had ended.
- The needs of many consumers change over the course of the illness, requiring different clinical providers and involving periods of inpatient care interspersed within ongoing community treatment. This causes difficulty in terms of definition of roles and responsibilities and problems in using the information to inform funding decisions.
- Outcomes would not be measured until the end of the episode thus making them difficult to link to the interventions received.

Figure 6: The Episode Hierarchy - Optional ways of counting health care



- The needs of many consumers change over the course of the illness, requiring different clinical providers and involving periods of inpatient care interspersed within ongoing community treatment. This causes difficulty in terms of definition of roles and responsibilities and problems in using the information to inform funding decisions.
- Outcomes would not be measured until the end of the episode thus making them difficult to link to the interventions received.

The second option is at the other end of the scale. Each episode of care consists of one or more days of care, with each day consisting of one or more occasions of service. The episode might therefore be defined by these individual events – for example, to count bed days as the episode in inpatient care and occasions of service as the community episodes. There are significant disadvantages with this approach.

- It is not consistent with mainstream health care approaches to inpatient episodes.
- While occasions of service are the traditional method for quantifying community services, it is widely discredited as a means of describing the volume and type of care provided to an individual consumer.
- Counting such ‘micro units’ provides a weak base for measuring the efficiency and outcomes of care as it misses the underlying fact that such events are components of overall care community care packages.

A third option is to regard the episode of care as equivalent to the service episode. Under this approach, the episode would extend for the duration of contact between the individual team and the consumer, regardless of whether other teams within the same organisation have also registered service episodes for the consumer. The approach has similar problems to those outlined above for episodes of illness because the majority of consumers treated in the community receive care from a particular

service over an extended time span. It has the additional problem of double counting events – one episode for each team. While this makes sense at the provider level, as a method for counting episodes it is usually untenable from the funder’s perspective.

If episodes are the purchasing units, episodes should be defined and counted at the person level, with each consumer having only one episode of care at any one time.

A fourth option is to define clinically meaningful ‘episodes of care’ where the start and finish reflect the beginning and end of treatment for discrete conditions. This concept of episode follows the notion of ‘phase of treatment’, in which the consumer receives a particular type of care matched to their current needs. During an episode, the exact type and form of service provision is guided by a principal clinical intent or ‘goal of care’; the episode ends when the goal of care changes. For example, an episode of acute care might occur when a person is treated by a community crisis team, and be replaced by a new episode of rehabilitation care when the consumer’s needs change.

As a concept, this approach is usually favoured by clinicians but is not practical from a casemix classification perspective because:

- agreed definitions for the relevant concepts do not exist;
- the boundaries between the end of one episode and the beginning of another are not clear, leading to inconsistent reporting; and
- it would be administratively complex to manage, imposing a heavy data collection burden on providers.

All of the above options were explored in the Australian MH-CASC project. The solution adopted followed a mixed approach, and defined four episode types which involve distinctions:

- between inpatient and community episodes because they represent fundamentally different health care products; and
- between ‘completed’ and ‘ongoing’ episodes, to separate consumers who have discrete, short-term treatment from those in longer-term care.

Completed Episodes are defined as those with a case opening and a case closure within 3 months. For Ongoing Episodes, an ‘episode of care’ is defined as a three month period of care. At the end of each three-month period, the person is reassessed. Reassessment may result in the person being assigned to their previous casemix class, or to a new one if their condition changed during the three month time period.

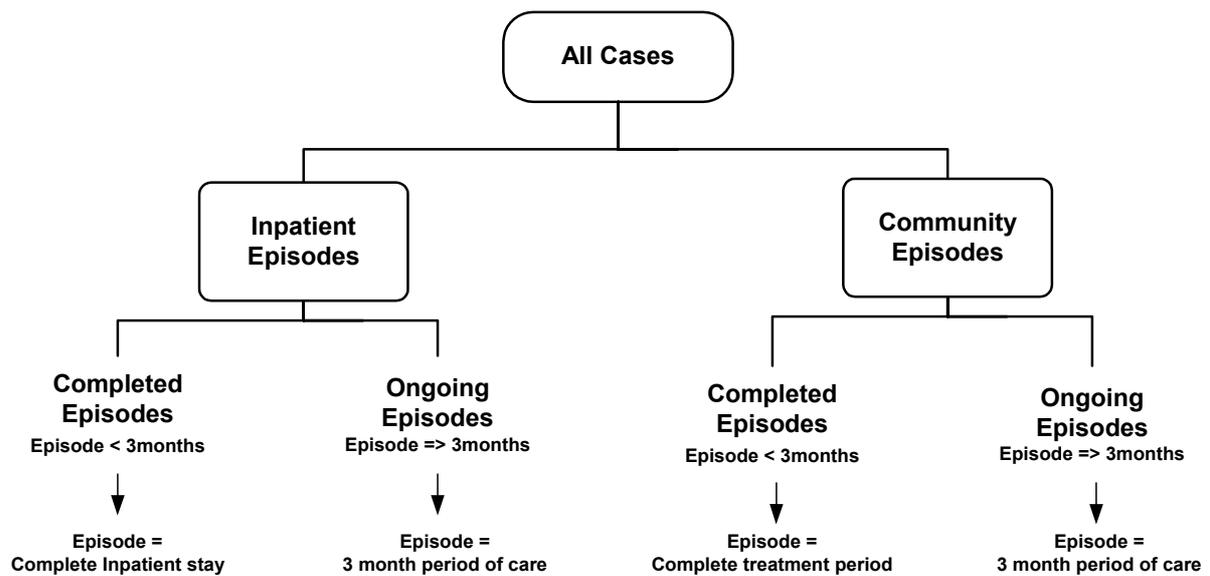
The episode model used in the MH-CASC classification is shown in Figure 7. The model represents a practical approach to a problem for which there is no perfect solution and served as the basis for defining episodes in the current study.

2.3 Defining episodes and episode types – the study approach

The MH-CASC approach provided the foundation for the study and resolved the basic ‘unit of counting’ that was used, both to guide data collection and data analysis. For data collection in particular, the definition of an episode of care needed to be simple and reliable so that clinicians could readily understand what was expected of them when an episode began or ended.

To achieve this, all consumers seen by participating sites were registered to an ‘episode of care’. *For the purposes of the study, an episode of care was defined as a period of contact between a consumer and a provider or team of providers that occurred within the one treatment setting.*

Figure 7: Episode types used in Australian MH-CASC classification



The study episode model distinguished between several episodes types. Broadly, the model defined these on the basis of:

- *Treatment setting* – the model distinguished between two types of treatment settings - inpatient and community - and defined the care provided to an individual within each setting as separate episodes. When a consumer was transferred between settings, the previous episode ended and a new episode began.
- *Period of care* – within both inpatient and community settings, the model distinguished between completed and ongoing episodes. Completed episodes were defined as those that started and ended within a 90-day period. Where a consumer was treated within the same setting for a period greater than 90 days, a new episode was deemed to have commenced and a clinical review required.

Defining episodes by these two parameters set the broad framework and logically led to a consideration of a further three issues:

- How to deal with ‘assessment only’ episodes where the person was only seen for assessment and then referred elsewhere or was deemed not to require services.
- How to deal with the different patterns of care that were apparent in community mental health services, where the agency was the only service provider for the consumer or perhaps shared service provision with another provider through shared care or consultation-liaison modalities.
- How to define a range of settings that did not ‘neatly’ fall within the inpatient-community distinction.

2.3.1 ‘Assessment only’ episodes

Where a health care agency saw a person only for assessment and then referred them on, or determined that no services were required, had this person reached the threshold for registration as a mental health consumer, in which case would they logically have been included in a casemix classification? Or, alternately, should special provision have been made for these ‘assessment only’ episodes?

The Australian study made no separate provision for ‘assessment only’ episodes, but required clinicians to record time spent on ‘unregistered consumers’, a category mainly comprising assessment

and referral-type work. Analysis of the data set showed that 'assessment only' work constituted a significant proportion of the work of many community services. Related analysis suggested that 'assessment only' cases may comprise up to 20% of individuals seen by the 'average' community mental health team, and up to 40% for some teams such as crisis services.

Clearly, there was a need to distinguish these cases from those consumers who were assessed and accepted for treatment and care; to do otherwise would have confounded the results by confusing individuals who received 'partial services' from those who received full treatment services.

The episode model used in the study recognised this by including a separate episode type for 'assessment only' cases. For the study purposes, 'Assessment only' episodes were defined as:

... where the person was seen on a face to face basis for a maximum of two occasions only¹ for assessment (services delivered 'on behalf' of the consumer are not counted as face to face contacts but may form part of the assessment process) and the outcome of the assessment was:

- *The person was admitted to a psychiatric inpatient unit;*
OR
- *No further intervention by this health care agency (DHB) was planned;*
OR
- *For child and youth services only, the person was placed on a waiting list and no further appointment was scheduled within the next 3 months.*

2.3.2 Shared care and consultation-liaison episodes

Models of practice differ across and within New Zealand mental health services. They include:

- *Direct service models* in which a service is the primary mental health provider for the consumer and delivers care in the inpatient setting, the community setting or both.
- *Shared care models* in which the mental health service works with other care providers (usually the consumer's General Practitioner) and the care is shared between the various agencies or providers.
- *Consultation/liaison models* in which the consumer remains under the clinical care of another provider (typically a general practitioner in the community setting, or a specialist physician in a general hospital setting) and a specialist mental health provider provides consultation and liaison services such as a 'second opinion' or advice on a particular problem such as medication management or psychological treatment. Like Shared Care, in consultation/liaison models a provider other than the mental health service is the primary provider of the mental health care.

Recognition of these various models is fundamental to understanding differences in the cost, quality and outcomes of different services. Both shared care and consultation/liaison models had significant capacity to confound the casemix. Consumers with similar levels of need would have appeared to be receiving different levels of service depending on whether they are participating in a shared care scheme. Such understanding was also required for the successful introduction of output-based funding models. For example, if a hospital-based mental health service provides both direct services and a consultation/liaison service, then it is necessary to resolve how to fund not only the consumers admitted under the care of the mental health service but also the consumers seen for consultation/liaison.

¹ It was recognised that some teams may use a standard assessment approach of 3 sessions, or, that in some instances, court assessments required more than 2 face-to-face contacts. While it was important to adopt a consistent approach, the highest priority was to identify those episodes where only assessment (and no treatment or care) were provided. Thus, if an assessment for a court report took 3 sessions, it was best that it was recorded as 'Assessment Only' rather than 'Treatment and Care'. This meant that agencies used some discretion in applying the above guideline.

The study episode model captured this complexity by distinguishing direct care episodes from shared care and consultation-liaison episodes.

2.3.3 Interpreting treatment setting definitions

The final issue arising from the episode definition concerned how to categorise those treatment settings that were not easily described as ‘inpatient’ or ‘community’. For example:

- What was the episode type when a forensic service was providing treatment to a prisoner in a correctional facility?
- Should a consumer admitted to a renal dialysis unit in a general hospital who is receiving consultation liaison services from the psychiatric inpatient unit staff be regarded as having an inpatient episode? If so, how would these episodes have been distinguished from those where the individual was an actual inpatient of the psychiatric unit?
- What sort of episode was occurring when a consumer living in the community regularly attended an inpatient day program and was admitted for same-day care?
- What was the episode type where a community mental health team was treating a consumer living in a residential facility managed by a non-government provider?

These situations presented challenges for the model but could not be dismissed because they are reasonably common in modern day mental health practice. A practical solution was required that gave clarity to the practitioner about the study requirements as well as scope to distinguish the different treatment settings during the analysis stage of the project.

The approach taken to each of the above scenarios is summarised in Table 5. The principle was a simple one – *apart from people admitted as inpatients formally to a psychiatric unit where a bed was allocated for the consumer with an expectation that he/she would stay overnight, all other episodes were classified as community episodes.*

Table 5: Episode types for various scenarios

Scenario	What type of episode?
Prisoners treated in correctional facilities	Community episode
Inpatients of general medical units seen on a consultation-liaison basis	Community episode
Consumers living in the community treated by inpatient day programs	Community episode
Consumers living in NGO residential facility treated by a community mental health team	Community episode

2.3.4 The study episode model

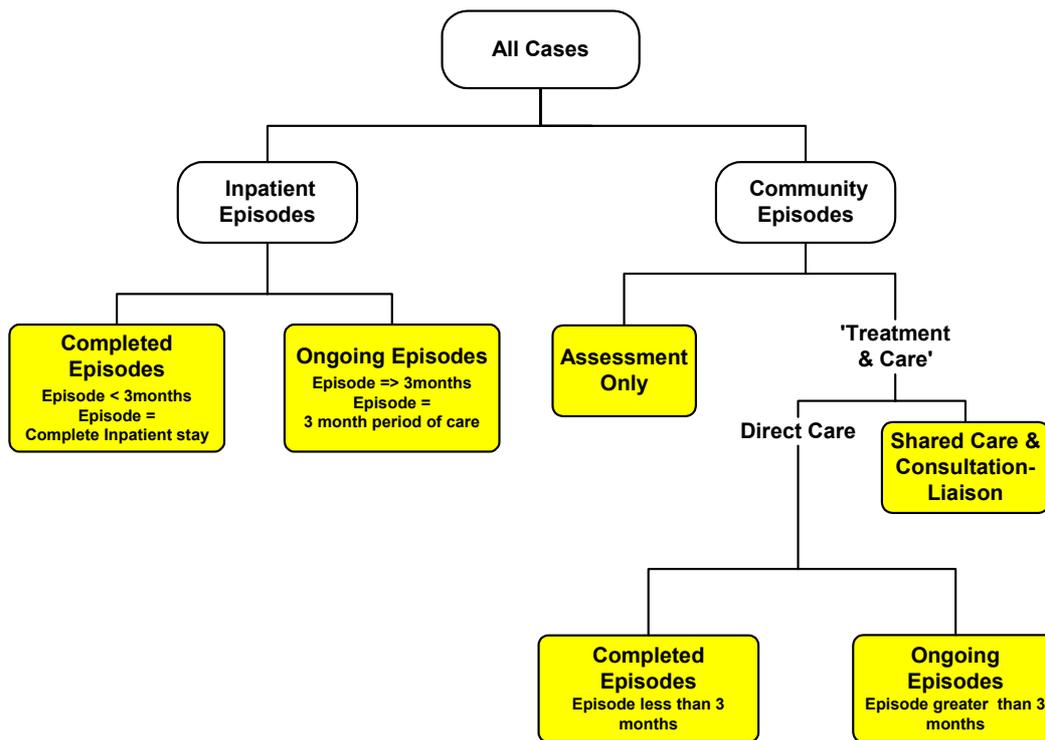
Putting all this together into a study framework implied that a more sophisticated model of episodes was required than that used in the Australian MH-CASC study. This was necessary to recognise the reality of current mental health practices in New Zealand.

A summary of the model that underpins the study is shown in Figure 9.

Two principles were used to govern the collection of episode data during the study.

- While an individual may have had multiple episodes of care over the course of the study, the person could only be registered as having one episode at any one time.
- Each episode type had an associated dataset. While the episode types shared a number of data elements, all data was linked to a specific episode.

Figure 9: Episode of Care model



The final section of this chapter expands on how these principles were translated.

2.4 Episodes govern the data collection cycle

All consumers seen by participating sites were registered in an ‘episode of care’ using the model shown in Figure 9 above. For each episode, a full set of data was collected to enable analysis of how specific clinical attributes of mental health consumers influence overall episode costs.

2.4.1 Data collection triggered by ‘episode of care events’

The broad rule was that collection of clinical data was required at both *episode start* and *episode end*. In many cases, the beginning and end of episodes was marked by some objective event such as discharge from hospital or completion of community treatment. However, because episodes were also deemed to have ended when a consumer had received 90 days of continuous care within the same treatment setting, the study protocol defined the following 3 critical events as the occasions for data collection to occur.

- *Episode Start*

This referred to the beginning of an inpatient or community episode of care. For the purposes of the study, episodes started for a number of reasons. Regardless of the reason, the commencement of a new episode acted as a ‘trigger’ for a specific set of data to be collected.

- *Episode End*

This referred to the closure of an inpatient or community episode of care. As per Episode Start, episodes may have ended for a variety of reasons. Regardless of the reason, the end of an episode acted as a ‘trigger’ for a specific set of clinical data to be collected.

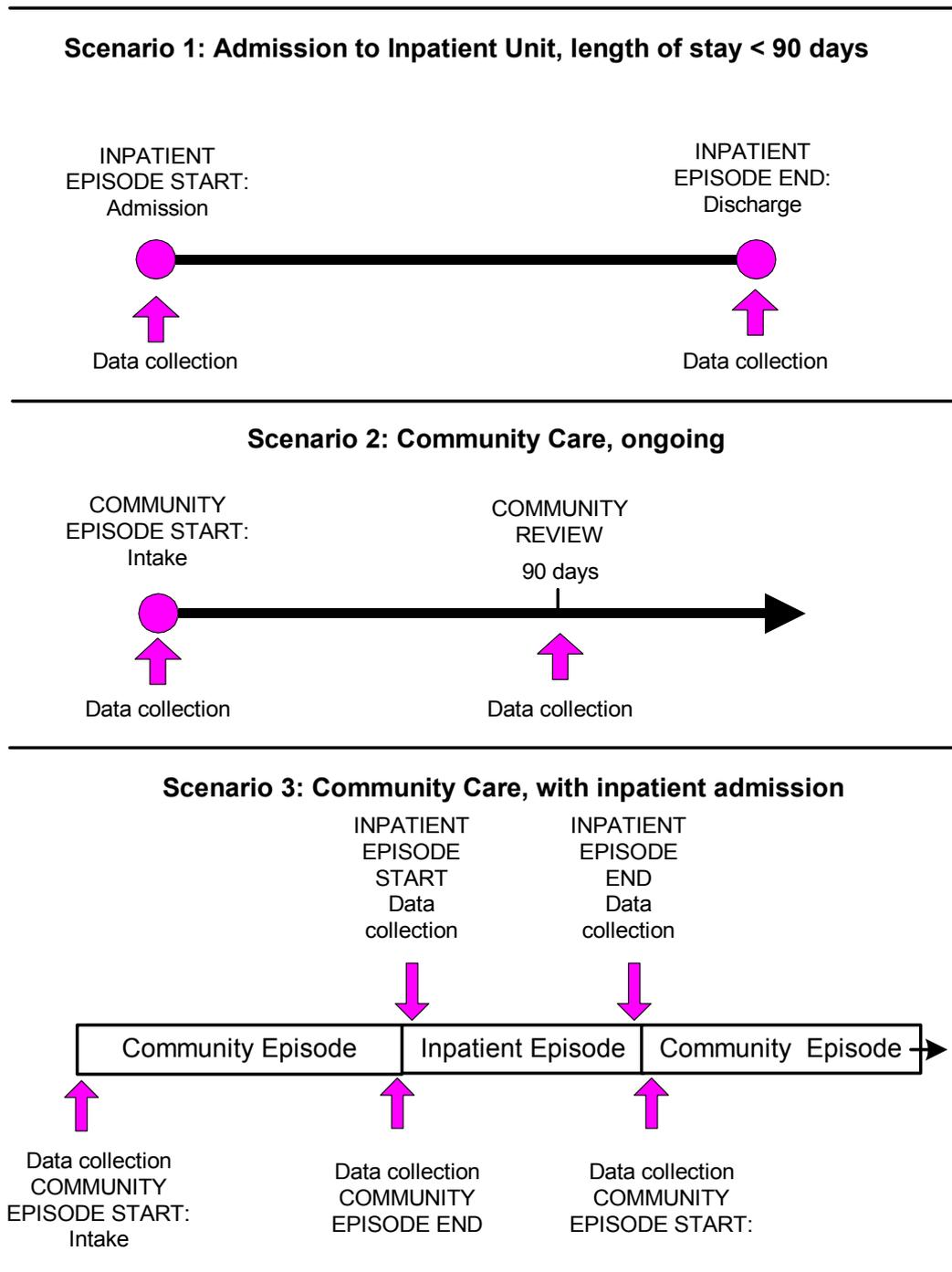
- *3-month review*

For the purposes of data collection, a 90-day review event was incorporated into the study design as a marker to identify ongoing episodes. In reality, it signalled two events - the end of one episode and

the beginning of another. That is, it was both a Reason for Episode End and a Reason for Episode Start.

A diagrammatic summary of the episode data collection cycle under a number of scenarios is shown in Figure 10.

Figure 10: Data collection requirements under three episode scenarios



2.4.2 Specific dataset attached to episode events

Episode Start, Episode End and 3-month review events each had an associated data set, to be collected by the clinical staff member who was primarily responsible for the person's care. The data set comprised of three categories of information:

- *Consumer identifiers and sociodemographics* – a small number of items were collected to identify consumers and to describe their sociodemographic characteristics.
- *Episode details* – these included items to identify episode type, start and end dates, and a number of data items that described the consumer's situation during the episode and type of care provided. These represented attributes of the concept *Episode*. The specific data set to be collected is dependent on Episode type.
- *Clinical ratings* – these comprised of structured, multi-item rating scales that were administered by clinicians at the three episode events. The specific scales collected were dependent on the two factors: Episode Type and Episode Event (start, end, 3-month review).

Chapter 3 provides an overview of the dataset and the specific data collection requirements.

3. Overview of Dataset and Data Collection Protocol

Decisions about which data items to collect took into account three requirements. Firstly, the data needed to include measures of those clinical attributes that were believed to influence resource use. These items represented the ‘independent variables’ that were tested in terms of their capacity to predict resource utilisation. Items that had a predictive relationship to resource use, referred to as ‘patient cost drivers’, were used in the analysis to construct the classes within the casemix classification system.

Secondly, the data collection needed to include measures that served as indicators of individual consumer outcomes. These were necessary to meet the secondary objectives of the study and will be subjected to a supplementary analysis.

Thirdly, the data collected on consumers needed to include a range of socio-demographic and related information sufficient to allow the study sample to be described and compared with normative data collected by New Zealand mental health services.

Table 6 summarises the core consumer measures collected in this study. Details regarding the measures used in the study are provided in the National Study Manual (2001).

Table 6 : Overview of core consumer dataset

Identifiers	Socio-demographic details	Clinical details	Service details
<ul style="list-style-type: none"> • Consumer NHI (encrypted) • DHB HCAID • Ward/team code • Staff labour category 	<ul style="list-style-type: none"> • Date of birth • Sex • Ethnicity • Area of usual residence 	<ul style="list-style-type: none"> • Principle psychiatric diagnosis • Additional psychiatric diagnosis • Ratings of clinical severity • Level of functioning (LSP-16) • Focus of care • Legal status • Criminal Justice Indicator (forensic services only) 	<ul style="list-style-type: none"> • Episode type • Episode start date • Episode end date • Reason for episode start • Reason for episode end
	<p><i>Plus these items for child and adolescent services only</i></p> <ul style="list-style-type: none"> • Living with • Guardianship • Family court involvement • Juvenile Justice Indicator 	<p><i>Plus for child and adolescent services only</i></p> <ul style="list-style-type: none"> • Factors influencing health status (FIHS) 	

Much of the data collected was in fact determined by the study’s primary goal of testing the MH-CASC classification in the New Zealand environment. This required that all clinical measures used in the MH-CASC classification (1998) were also collected in the New Zealand study. However, a small number of additional measures were also included to test their value in improving the power of the classification to predict resource use.

The consumer attribute dataset comprised core attributes that were collected on all consumers in the study. In addition a number of special items were collected for consumers over the age of 65 years and for consumers treated by child and adolescent mental health services. The specific instruments used to measure severity and levels of functioning are listed in Table 7.

Table 7: Clinical rating instruments for measuring severity and level of functioning

Consumer Population	Clinical ratings of severity	Levels of functioning
Adults	Health of the Nation Outcome Scales (HoNOS)	Life Skills Profile (LSP-16)
Consumers over the age of 65 years	Health of the Nation Outcome Scales for consumers over the age of 65 (HoNOS 65+)	Resource Utilisation Group Activities of Daily Living (RUG-ADL)
Children and adolescents	Health of the Nation Outcome Scales for Children and Adolescents (HoNOSCA)	Children's Global Assessment Scale (CGAS)

While a number of the measures used in the study were collected in routine mental health information data systems (for the purposes of MHINC), some were not available from local systems and required special collection.

3.1 The data collection protocol

Collection of the clinical data will occur at standard points during each episode of care. The 'data collection protocol' underpinning the study provided the guide regarding which measures were collected at specific points in the care cycle. It was a critical aspect of the overall project and took account of two key aspects of the study design – the concept of episodes of care, and the dual outcomes and casemix objectives of the project.

3.1.1 Episodes of care trigger the data collection cycle

As a full set of measures was required for each episode of care, the definition of episodes drove the cycle of data collection for the clinical data, particularly the points that defined the start and end of an episode. The previous chapter outlined the episode concepts upon which the study was based.

To take these factors into account, three critical points were defined in the data collection cycle for each episode. A specific set of data was required at each of the three points.

- **Episode Start** – This referred to the beginning of an inpatient or community episode of care. For the purposes of the study, episodes started for a number of reasons. These included, for example, a new referral to community care, admission to an inpatient unit, transfer of care from an inpatient unit to a community team and so forth. Regardless of the reason, the commencement of a new episode acted as a 'trigger' for a specific set of clinical data to be collected. In general, the information collected at Episode Start included the basic socio-demographic data on the consumer, details about the episode and clinical ratings.
- **Episode End** – This referred to the closure of an inpatient or community episode of care. As per *Episode Start*, episodes ended for a variety of reasons such as discharge from an inpatient unit, case closure of a consumer's community care, admission to hospital of a consumer previously under community care. Regardless of the reason, the end of an episode 'triggered' the collection of a specific set of clinical data. In general, the information collected at *Episode End* primarily comprised the clinical ratings.

- **90-day review** – As discussed in Chapter 2, ongoing episodes of care were divided into discrete 90-day periods with each period representing a new episode. For the purposes of the study, the 90-day marker within an ongoing episode of care therefore signalled two discrete events – the end of one episode and the beginning of another – that is, it is both a ‘Reason for Episode End’ and a ‘Reason for Episode Start’. To prevent duplication of data collection effort and to remove any appearance that the study protocol was segmenting continuing streams for individual consumers, the concept of a ‘90-day review’ collection point was incorporated in the study data collection protocol. That is, the 90-day review incorporated key elements of the information required for both *Episode Start* and *Episode End*.

3.1.2 Data protocol to meet casemix and outcomes objectives

Design of the protocol took into consideration both the casemix development and outcomes evaluation purposes of the study. These are not identical. Simply put, the study casemix requirements needed key data on consumers to be collected only once during each episode to allow the episode to be adequately described and classified. From the casemix perspective, the only issue was to ensure that the information was collected at the most appropriate point within the overall episode of care. For example, assessment on the HoNOS at *Episode Start* would suffice for casemix purposes because it is the best measure of the level of severity of the condition presented by the consumer to the treatment system.

In comparison, measurement of consumer outcomes by definition presumes a comparison over time and requires data to be collected on at least two occasions in order to allow assessment of change in the consumer’s health status. Thus, taking the same example of the HoNOS, a minimal requirement would be to collect the HoNOS at *Episode Start* and *Episode End*.

The study data collection protocol took these issues into account. It required that:

- clinical measures that were used for outcomes evaluation and casemix purposes be collected at both the start and end of episodes to allow change in the consumers clinical status to be assessed;
- items required only for casemix purposes were collected at points which were consistent with the MH-CASC classification to allow the classification to be properly tested in the New Zealand environment. In general, the decision about whether to collect these at episode start or episode end was based on the collection occasion that best described the consumer during the overall episode of care; and
- data items that were required solely for descriptive purposes (e.g., domicile, sex) were collected at points that were consistent with the practices established under MHINC. In general, these were collected at the start of each episode of care.

4. Clinical Staff Activity Data

Staff activity information is one of the three key building blocks for developing a mental health classification system. Information about staff activities was needed for two purposes – to attach service costs to particular consumer groups across all treatment settings; and to provide a basis for describing patterns of care.

To achieve these goals, all community mental health clinical service delivery staff within the participating sites were required to collect data on a daily basis about the types of activities they were engaged in, the time taken for each activity, and where relevant, the identity of the consumer(s) who received the services.

Inpatient mental health nurses also collected a proxy measure of resource use for each consumer for each shift per day, known as the Inpatient Nursing Resource Allocation Tool (RAT).

In addition, data on non consumer-attributable activities such as teaching and training, research etc, and travel time, were collected via survey across both inpatient and community settings.

This chapter describes who was required to collect staff activity data, the types of activities that were recorded and the method by which the data were collected.

4.1 Community staff activity

The collection of consumer attributable staff activity information by mental health clinicians for reporting to the Mental Health Information National Collection (MHINC) has been in place since 1 July 2000. To avoid duplication of collection systems, MHINC data formed the basis of staff activity information for this study.

Items not currently recorded by MHINC but required for classification purposes (e.g. contact duration and the labour category of an individual clinician) were added to existing data collections, either on existing forms or within existing systems. This data was reported to the National Project Team separately from MHINC but in a similar format in a manner that ensured that the each DHB's involvement in the study was not in conflict with MHINC reporting and did not compromise the national MHINC database.

A process of consolidating MHINC and Classification and Outcomes Study (CAOS) data was established between the national project team and the New Zealand Health Information Service (NZHIS). This allowed NZHIS to match and encrypt all activity data submitted by participating sites and consolidate it into one file for submission to the national team without placing this additional burden on participating sites.²

4.2 Data elements collected by community staff

Six core data elements were reported for each individual consumer attributable activity or service provided by a community mental health clinician, as below.

1. *Team Code* – refers to the team code of the clinician providing the service.
2. *Date of Contact* – the date the service was provided to the consumer.
3. *Service Type* – describes the nature of the service provided (See Appendix 2).
4. *Contact Duration* – refers to the total time spent with a consumer or providing services on behalf of the consumer (excluding travel time).

² The national project team gratefully acknowledges the role of the NZHIS Project Team in this process and its contribution to the overall success of the study. It is hoped that through the NZ-CAOS study MHINC data integrity will have been improved, particularly in the areas of ethnicity and diagnosis collection, both of which were a focus of the clinical staff training provided prior to the commencement of data collection.

5. *Labour Category* – refers to the labour category of the staff member providing the service (See Appendix 3).
6. *Service Setting* – refers to the location where the services are provided e.g. community or inpatient setting, home visit or GP surgery etc (See Table 10).

4.3 What are consumer-attributable activities?

Consumer attributable activities were defined as those for which the time and associated costs could be attributed to a specific consumer. Activities were said to be ‘consumer attributable’ whether the consumer was present or not.

Table 8 provides definitions of the various types of consumer attributable activities that were used in the study.

Table 8 : Examples of consumer attributable staff activities (see National Study Manual: 2001).

<p>Individual Consumer Care Contacts</p> <p>Includes all services delivered to consumers on a 1:1 basis, e.g. individual treatment sessions, medication reviews, phone contact, assessment, individual consumer counselling or escorting, court appearances or sessions with the family or carers. The service is being provided directly and exclusively to the consumer. The consumer may be seen at an outpatient clinic, in the community or in his or her own environment, e.g. home visit by a crisis team, assessment of consumer in homeless persons’ shelter, visit to aged consumer in nursing home or visit to child at school. Travel time associated with the visit should not be included.</p>
<p>Group-based Care Contacts</p> <p>These activities include all services provided to a group of consumers, e.g. centre or ward-based consumer group discussions, other structured or unstructured activities, occupational therapy in activity centre, shopping excursions and other outings. This includes all day programmes. Where an inpatient attends a community day programme, the inpatient attendance should be recorded.</p>
<p>Services on Behalf of a Consumer</p> <p>Refers to time spent on services which are related to an individual consumer, but which are not provided directly to the consumer, e.g. making case or nursing notes, preparing a treatment plan or referral documentation, Mental Health Tribunal preparations, Mental Health Act administration. Travel time should not be included.</p>
<p>Consultation Liaison Contacts</p> <p>Refers to services provided to another mental or general health service provider in relation to a consumer of that provider. The characteristic of consultation-liaison services is to provide specialist mental health advice on diagnosis and/or management issues in relation to the consumer. The consumer may or may not be seen by the mental health worker. Travel time should not be included.</p>

4.4 Who collected community activity data?

All community staff involved in the direct care of consumers participated in the staff activity data collection. Labour categories included nursing staff, medical staff and allied health professionals, and other personal care staff who provide services to consumers in both inpatient and non-inpatient settings. Allied health services disciplines included, but was not limited to, psychology, social work, occupational therapy, speech pathology and physiotherapy. Cultural support workers, chaplains and consumer advisors were also required to collect staff time data when involved in the direct care of consumers. All staff were required to record their activity whether they were involved in group sessions or individual contact with consumers.

Clinical staff were required to identify to which labour category they belong from the labour categories as listed in the DHB Common Chart of Accounts.³ Site Coordinators were responsible for

³ DHB Common Chart of Accounts, Version 4.1, May 2001

making these codes accessible to clinicians and/or having this data mapped in local data collection systems.

Table 9 shows the distribution of activity hours recorded by labour category aggregated to groups of allied health, medical and nursing. This data shows that allied health and nursing activity hours together accounted for approximately 88% of all consumer attributable community activity hours recorded over the six-month period.

Table 9: Distribution of activity hours recorded by labour category group

Staff Group	MHINC Codes (Hours)		NZ-CAOS Additional Codes (Hours)	Total (All Hours)
	Individual Contacts	Group Contacts		
Allied Health	60,651	14,335	22,927	97,913
Medical	20,663	79	5,576	26,318
Nursing	57,627	19,066	17,464	94,157
Unknown *	667	18	516	1,201
TOTAL	139,608	33,498	46,483	219,589

* Note: The 'unknown' category represents those records where the labour category could not be identified at one site.

4.5 How community staff data was collected

While the consumer attributable activity categories were consistent across study sites, the format of the collection varied from site to site. For example, some sites used manual forms or batch entry of data by centralised administrative staff, where others required clinicians to enter data directly to a computerised system.

The minimum requirement for data collection was that the amount of staff time spent on individual consumers had to be recorded comprehensively – without it the relative cost of each consumer, and ultimately the different consumer classes, could not be calculated.

Each consumer attributable activity was mapped to an existing MHINC activity code or to one of the five additional activity codes required by NZ-CAOS. These additional items were added to collection forms or systems for the purposes of the study and in some cases may have required clinicians to record time spent on activities that were not previously collected. The additional items are discussed further below.

A supplementary CAOS file specification was developed to assist sites in formatting this additional data for submission via NZHIS to the national project team.

4.6 Data items supplementary to the MHINC dataset

The MHINC documentation published by the NZHIS includes the MHINC dataset⁴ and business rules which were supplemented for the purposes of NZ-CAOS. The following tables indicate the data items that were collected for NZ-CAOS in addition to those collected for the purposes of MHINC.

4.6.1 Addition to MHINC service settings

In order to differentiate between services provided to consumers in a general medical setting and those provided in an Emergency Department, the NZHIS agreed to the addition of 'ED' to the MHINC service settings.

Table 10 shows the current MHINC service settings and definitions used in this study.

⁴ <http://www.nzhis.govt.nz/documentation/index.html>

Table 10: MHINC service setting codes and definitions (NZHIS:2002)

Service setting code	Service setting description	Service setting definition
CM	Community	Service provided to a client in a non-hospital setting which is not specifically covered by any of the other definitions.
CO	Non-Māori cultural setting	Services provided in a cultural setting, which is not Kaupapa Māori.
CT	Court	Services provided in a Court, including when the court is held at the healthcare agency.
DM	Domiciliary	Services provided to a client in their own home or place of residence. Services provided in mental health residential settings are deemed to be community not domiciliary.
DP	Day patient setting	Services provided in a psychiatric day hospital.
ED	Emergency Department	Services provided in a hospital based Emergency Department. Note: This code should be used to differentiate those consultation liaison activities which take place in a general medical setting.
IP	Inpatient	Services provided in a hospital psychiatric inpatient setting. Note: This code should be used only for psychiatric inpatient settings, consumers seen in a general medical ward will map to NP.
MC	Māori cultural setting	Services provided in a setting working under Kaupapa Māori.
NP	Non-psychiatric	Services provided in a hospital setting that is not specifically intended for psychiatric treatment. Note: For the purposes of NZ-CAOS this code should be used for Consultation Liaison activities which take place in a non-psychiatric inpatient setting. Emergency Department maps to ED.
OP	Outpatient	Services provided in a hospital psychiatric setting that is not inpatient or day hospital.
PR	Prison	Services provided in a prison, including police cells. Note: This code should be used in all cases where a patient is seen in a prison setting.

The percentage distribution of service settings in the six-months' study data is shown in Table 11.

Community Teams contributed 58% of the total community settings recorded, with another 18% coming from Child & Youth Teams. Community teams also contributed 76% to the domiciliary setting total, with a further 9% from Kaupapa Māori Teams and 7% from Psychogeriatric teams.

Kaupapa Māori Teams delivered 33% of services in a Māori Cultural Setting, 25% in an outpatient setting, 29% of services in the home, with only 11% in a community setting. In contrast, 46% of Pacific Island contacts were in the community, while another 35% were in the home and 12% in an outpatient setting.

Table 11: Distribution of service settings for community activity data

Service Setting	% of total records	No. of records
Community	36.40%	114,454
Domiciliary	27.52%	86,525
Outpatient	24.27%	76,313
Māori Cultural Setting	2.95%	9,272
Inpatient	2.27%	7,172
Prison	2.07%	6,501
Court	1.64%	5,170
Day Patient Setting	1.08%	3,406
Non-psychiatric setting	0.90%	2,830
Phone Contact	0.85%	2,673
Emergency Department	0.05%	162
Non-Māori Cultural Setting	0.01%	20
General Practitioner	0.00%	9
Total	100%	314,462

4.6.2 Collection of consumer attributable time for consumers who did not attend

In order to identify all community staff clinical time attributable to consumers, participating sites agreed that it was necessary to collect time lost when a consumer did not attend or was not home for an appointment. ‘Did not attend’ or ‘not home’ activities were defined as those that occurred when a consumer called to cancel an appointment within 24 hours of the appointment time; did not attend for an appointment without notice or was not home for a pre-scheduled appointment.

All ‘did not attend/not home’ activities were assigned 15 minutes of the clinician’s time regardless of the length of the appointment or visit scheduled. These activities were reported for the study but are not collected under standard MHINC reporting rules.

4.6.3 Collection of ‘Services on behalf of a Consumer’

The MHINC data dictionary definition for ‘care coordination contacts’ (T08) identifies this type of contact as “*Significant contact between mental health professionals and other agencies/ persons relating to the care of a client, to ensure continuity of service provision, where the mental health service is the lead agency. Client generally not present*”.

This definition does not include some services provided on behalf of a consumer, for example, making case or nursing notes etc. For the purposes of MHINC these activities are assumed to occur as part of the face-to-face contact and are not recorded separately. This may often be the case, but participating sites agreed that services on behalf of a consumer might also occur without a face-to-face contact.

For the purposes of NZ-CAOS these services were reported as follows.

1. Care Coordination (T08) contacts were reported to MHINC according to the NZHIS definition in the usual way;

2. Where services on behalf of a consumer occurred as part of a face-to-face contact, time spent on the ‘Services on behalf’ component were recorded as part of the face-to-face contact time and reported to MHINC in the usual way.
3. Where Services on behalf of a consumer occurred separately from face-to-face contacts, these services were reported to NZ-CAOS as per the supplementary code assigned in Table 13. Activities with this new code were not reported to MHINC.

4.6.4 Consultation liaison services

Consultation liaison services are not separately identified in MHINC but are reported under the individual consumer care service codes. All consultation liaison services were recorded as consumer attributable activities for the purposes of NZ-CAOS and reported to MHINC in the usual way. These services are separated from direct care services via the Model of Care identified at the start of a Community Episode.⁵

Consultation Liaison Services were defined as: *“Time spent providing services either to inpatients in non-psychiatric inpatient units, or services provided by one mental health service to another (e.g. forensic)”*.

Of the 989 shared care episodes registered in the study period, representing around 5% of all episodes, 271 (27%) of these were consultation liaison episodes. Table 12 shows the numbers and total contact time recorded for consultation liaison episodes.

Table 12: Consultation liaison episode numbers and total contact time

Consultation Liaison Type	Number of episodes	Average number of contact days	Average contact time per episode (mins)
Medical Inpatient	69	5.4	302.3
Another mental health provider	81	5.5	418.6
Another non-mental health provider	121	5.8	475.9
Total	271	5.6	392.5

4.6.5 Multi staff contacts

MHINC guidelines allow for reporting services provided to a client by more than one clinician only if the clinicians are from different teams or services are provided at different times. However, if two or more clinicians from the same team provide services to a client at the same time then MHINC requires only one contact record.

In order for the NZ-CAOS study to identify all consumer attributable time each staff person on duty each day was responsible for accounting for their own time. Therefore, if two clinicians provided services to a consumer together, each recorded the time they spent with the consumer.

To avoid conflict with MHINC, a new service code was added to the NZ-CAOS collection. The primary clinician reported using the appropriate MHINC service code in the usual way. Where no primary clinician was identified, agreement was sought at each site as to which clinician recorded the MHINC code and which recorded the supplementary code(s) for provision to NZ-CAOS.

The new code and its definition for NZ-CAOS are detailed in Table 13.

⁵ For further information on ‘Model of Care’ see Chapter 2.

Table 13: NZ-CAOS service codes

Service code	Service description	Service definition
C50	Did Not Attend/ Not Home	Scheduled activity did not occur either because the consumer did not attend or was not home. A standard duration of 15 minutes should be recorded regardless of the length of the activity scheduled.
C51	Services on Behalf	Time spent on services which are related to an individual consumer, but which are not provided directly to the consumer, e.g. making case or nursing notes, preparing a treatment plan or referral documentation, Mental Health Tribunal preparations, Mental Health Act administration. Travel time should not be included.
C52	Māori cultural activity	Application of Māori Models of practice, traditional and contemporary, which recognises the value of culture to the healing process including whakawhānau and increased access to te ao Māori, incorporating but not limited to: purakau; mau rakau; waiata; te reo; raranga; karakia; whakapapa; mirimiri; and rongoa. <i>Note: This would also include services provided by tohunga, kaumatua, kuia, Māori staff and Māori cultural advisors</i>
C53	Multi-staff contact/ Group and Day Programme – secondary clinician(s)	Time spent providing services to a consumer where more than one clinician is involved in the provision of the same service. <i>Note: The primary clinician should report in the usual way to MHINC, with the secondary, and any further clinicians involved, reporting this “C” code only.</i>
C54	Pacific cultural activity	Activity involving Pacific Consumers which relates to the application of traditional and contemporary pacific cultural practices, processes and models of assessment, treatment and healing with appropriate and increased access to pacific families, communities and services.

4.6.6 NZ-CAOS Service Codes

In order to differentiate between MHINC ‘T’ service codes and codes assigned for the purposes of NZ-CAOS, activity codes for NZ-CAOS were prefixed with a ‘C’. Table 13 shows the additional NZ-CAOS service codes and definitions. The distribution of contact time for these additional ‘C’ code activities in proportion to all contact time is summarised in Table 14.

These figures suggest that a significant amount of consumer attributable activity is not currently collected by MHINC. The data collected during the NZ-CAOS study may lead to modifications to current collections to allow mental health services and clinicians to better understand resource use in community settings.⁶

⁶ At the time of writing, the NZHIS Working Party focussed on developing and improving the MHINC dataset are considering the inclusion of a Māori Cultural Activity code in standard MHINC collections.

Table 14 : Distribution of NZ-CAOS ‘C’ code activities (hours)

Health Agency	C50- Did Not Attend	C51- Services on Behalf	C52 – Māori Cultural Activity	C53 – Multi Staff Contact	C54 – Pacific Cultural Activity	Total C Code Hours	Total all activity hours	C Code % of all activity hours recorded
A	933	7,603	0	1,357	0	9,893	61,519	16.1%
B	205	573	270	241	8	1,297	13,890	9.3%
C	181	0	0	1,257	0	1,438	6,526	22.0%
D	10	799	17	198	0	1,023	6,870	14.9%
E	602	10,506	634	2,360	45	14,147	40,176	35.2%
F	212	1166	0	0	0	1,378	10,295	13.4%
G	260	18	3	3,371	0	3,652	22,086	16.5%
H	914	5,809	284	4,829	1,819	13,656	58,226	23.5%
TOTAL	3,315	26,474	1208	13,613	1,873	46,482	219,589	21.2%

4.6.7 Group and day programme contacts

Group and Day programme contacts presented the NZ-CAOS collection with similar conflicts with MHINC rules as multi-staff contacts, where more than one clinician may be involved in the provision of services for the group or day programme. MHINC service codes for all group or day programmes were used (see Appendix 2), with secondary or supplementary clinicians reporting the NZ-CAOS C53 code as detailed in Table 13.

Day and group programme staff were also required to provide data on the number of inpatients attending throughout the course of the study to ensure that the proportion of costs attributable to these consumers could be isolated and excluded from costs assigned to community-based consumers. However, no day or group programme contacts for inpatients were received by the project team throughout the course of the data collection period. Chapter 7 provides details on how day programme activities were handled in the costing process.

4.7 Guidelines for community staff activity recording

Study-specific guidelines were developed to assist community staff with activity recording. In summary:

- staff were not required to record details of every activity undertaken during each shift or working day;
- for each particular shift or period on duty, only consumer attributable activities needed to be recorded and therefore time reported may account for only part of the working day; and
- Time spent in meetings, or general administrative duties were not required.

The balance of time worked but not reported to NZ-CAOS was classified as ‘General Clinical Time’ and apportioned across all consumers during the costing process.

⁷ At the time of writing, the NZHIS Working Party focussed on developing and improving the MHINC dataset are considering the inclusion of a Māori Cultural Activity code in standard MHINC collections.

The main guidelines developed to assist staff are listed in Table 15.

Table 15 : Main activity recording guidelines for community staff as provided in Study Manual

1	The main decision for clinicians is when to record time against a specific consumer. As a general rule, time should be recorded when special attention is given to the consumer, either in the form of direct contact time, or indirect services (Services on Behalf) such as case planning or contact with other agencies about the consumer.
2	Time spent on a consumer who is on leave from an inpatient unit should be recorded in the same way as other community or outpatient contacts.
3	During an on-call period, any consumer attributable time spent on non-inpatients should be collected and attributed to the specific consumer(s) concerned.
4	Any community staff time spent on inpatients should be collected and reported.
5	For brief contact with individual consumers, it is not expected that clinicians record times of less than five minutes spent with a given consumer. However, if a staff member spends brief periods with a consumer many times throughout the day, he/she should “gather up” these periods at the end of duty and estimate total time spent with that consumer.
6	Maximum time limits should be removed where possible so clinician time can be recorded accurately.
7	Time spent on group-based activities should be apportioned across all consumers in the group. So, for example, if a clinician spends an hour running a group activity with 10 consumers, each consumer would be allocated six minutes.
8	If two clinicians see a consumer together, each should record the time they spent with the consumer. Each staff person on duty each day is responsible for accounting for his or her own time.
9	Travel time associated with any of the above activity should be excluded in the estimate of time for each activity. This applies to all consumer attributable activity categories. Travel time will be surveyed separately over two separate one-week periods and will be treated as general clinical time at analysis.

4.8 Inpatient staff activity recording

As discussed above, a fundamental requirement of the NZ-CAOS Study was to accurately assign costs for each episode of care. As the majority of mental health costs are invested in clinical staff time, the key to consumer costing is to allocate staff costs to consumers in a way that reflects the different level of services provided.

In current MHINC collections for inpatient data there is no item that identifies the level of resource use by individual consumers.

The Australian study imposed a considerable data collection burden on the 4,500 clinical staff involved in the project by requiring inpatient staff to record the time they spent with consumers in detailed daily diaries. This was considered tolerable because the study extended only over a three-month period but was not considered viable in the New Zealand study because of the six months study period required to obtain a sufficient sample for analysis. A methodology therefore had to be developed for the purposes of the NZ-CAOS study to collect data in this format.

4.8.1 The Resource Allocation Tool (RAT)

Initial planning involved the development of a tool that rated each consumer on a daily basis according to his or her level of resource use. The idea was a simple one – consumers given higher ratings would be allocated proportionately higher amount of costs during the data analysis phase of the study. As this type of tool was not available ‘off-the-shelf’ a sub-project was undertaken to develop an instrument that was sufficiently robust for daily use when the study began.

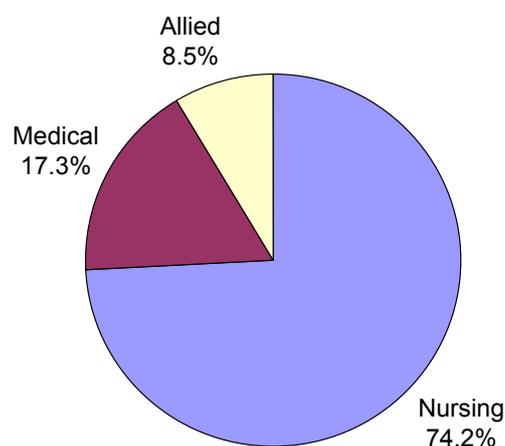
The proposed tool – referred to as the ‘Resource Allocation Tool’ (RAT), required nursing staff to give a retrospective estimate of total nursing time for each consumer at the end of each eight-hour

shift.⁸ As part of the instrument's development, trial studies were conducted in which, alongside the RAT ratings, all nursing staff involved with the ward were requested to maintain activity logs on the amount of actual time spent with each consumer. This provided a basis to test the extent to which RAT ratings accurately predicted 'real time' and allowed further refinement before the main study began on 1 February 2002. The findings of several pilots were presented to the National CAOS Reference Group on 13 December 2001 who endorsed the use of the RAT tool in the NZ-CAOS study⁹.

At a minimum, the planned approach of using such a tool provided a means to allocate nursing salary costs to individual inpatients in proportion to their different levels of service use. It represented a reasonable compromise between precision and practicality.

To mitigate the risk of different disciplines' data being inadvertently mixed together a decision was made by the national project team in conjunction with participating sites to focus data collection efforts on the larger nursing group only. This decision was supported by the relative significance of medical, nursing and allied health costs in overall inpatient care as summarised in Figure 11.

Figure 11: Relative contribution of clinical staffing categories to NZ-CAOS inpatient episode costs



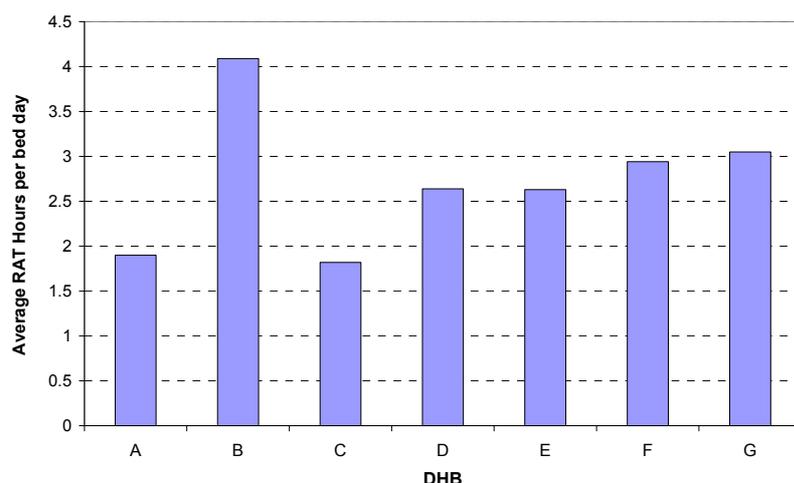
While data collected via the RAT was of a good standard at the majority of the participating sites, the standard of collection at one DHB was poor. Nursing costs for this DHB were therefore apportioned on the basis of bed days (as occurred with all medical and allied staff costs).

Figure 12 shows the average nursing hours per day for the 7 remaining DHBs.

⁸ 'Total nursing time' included all of the labour category account codes listed under the Nursing Personnel category in the DHB Common Chart of Accounts (2001). This category includes health service assistants.

⁹ See 'Study Resource Manual' for a fuller account of the development of the Resource Allocation Tool.

Figure 12 : Nursing RAT Hours per day by DHB



4.8.2 Inpatient leave data

In addition to the inpatient data reported nationally to MHINC, which identifies admitting and discharging wards and transfers between inpatient services, the NZ-CAOS study required details on the periods when consumers in an inpatient ward were absent on leave. This was required to ensure costs were not attributed to those consumers for days when they were not receiving any inpatient services.

To capture this data DHBs were required to report leave details in the supplementary CAOS file sent to NZHIS for the 6-month period of the study. This data was then matched with inpatient data reported via MHINC and consolidated in the file submitted by NZHIS to the National Project Team. Together with episode data and RAT data, inpatient leave data reported to the study assisted in the development of a process for identifying whether a consumer was receiving services from staff in an inpatient setting on a given date. Whilst some significant clean up was required in this larger set of data, the leave data facilitated more accurate costing.

4.9 Other activities recorded

In addition to ‘consumer attributable’ activities, several additional activities were recorded by both inpatient and community clinical staff on a range of activities defined by the study as ‘non consumer attributable’.

This data was not recorded separately via MHINC during the 6-month study period but was derived from a one-week collection survey that took place during the month of June 2002. This followed an earlier survey, conducted February 2002, which did not achieve a satisfactory level of compliance required for use in the final dataset.

4.9.1 Non Consumer Attributable Activities

Non consumer-attributable activities were defined as those activities for which the costs would not be allocated to consumers registered in the study. Seven activities in this category were initially identified and collected via the survey approach. Definitions for each of the activity categories are provided in Figure 18.

Time spent in preparation for any of the non consumer attributable activities, i.e. time spent in preparation for training sessions, was included in the total time spent on that activity.

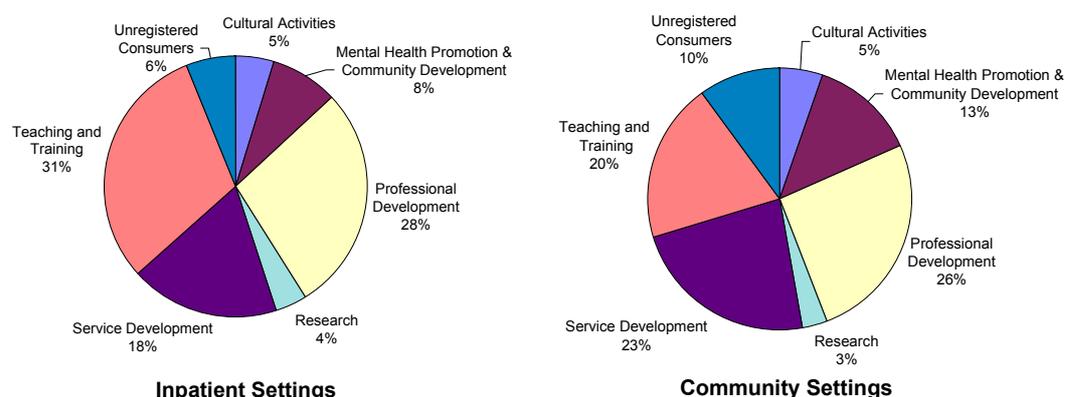
Table 16 : Non consumer-attributable staff activities as defined in the one week survey

<p>1. Teaching and Training</p> <p>All time associated with attending recognised accredited courses leading towards a formal qualification.</p> <p>Time associated with preparation and delivery of formal lectures and seminars was included. All meeting and travelling time associated with teaching and training should be included. All time spent supervising and training students.</p>
<p>2. Research</p> <p>All activities undertaken by staff in relation to a discretely funded formal research project, where the activity can be clearly distinguished from the provision of day-to-day clinical care. All meeting and travelling time associated with research should be included.</p>
<p>3. Community Development</p> <p>Refers to activities that aim to promote community action and knowledge about mental health issues, including the provision of information/assistance to other agencies in relation to service and programme development; and general community education and health promotion activities, such as Mental Health Awareness week. Travel time should be included.</p>
<p>4. Mental Health Awareness and Education</p> <p>Mental Health Promotion activities designed to promote good mental health and wellness as opposed to giving people information about mental illness (e.g. targeted youth-depression awareness programmes).</p>
<p>5. Service Development</p> <p>Team/service planning and quality assurance activities.</p>
<p>6. Professional Development</p> <p>Supervision, non-accredited training and education.</p>
<p>7. Cultural Activities</p> <p>Involvement in cultural activities such as powhiri for welcoming staff, etc.</p>
<p>8. Non registered consumers</p> <p>Time spent over the phone dealing with general enquiries regarding consumer access to services or offering advice to other providers about a consumer that does not warrant opening a file. This activity should not be confused with CL services or 'assessment only' services where staff activity can be attributed to an individual consumer and is recorded against a NHI.</p>

Figure 13 shows the distributions of non consumer-attributable activities across inpatient and community settings.

Subsequent to the collection of the survey data a decision was made by the national team to include the time recorded against three of the activity categories (service development, professional development and cultural activities) under General time (G) as it was considered that these activities were either closely aligned with supervision and administration associated with G time and/or had a direct impact on the delivery of good clinical practice and thus should be included in consumer costing. These accounted for 55% (community) and 51% (inpatient) of the total non consumer-attributable time collected over the one week period used in the final dataset.

Figure 13: Distribution of non consumer- attributable time for clinical staff in inpatient and community settings



4.9.2 Travel time – clinical and non-clinical travel time

Clinical or consumer related travel time was not recorded as a portion of the time for each individual activity, but was collected separately in the June 2002 survey. The objective for the costs of clinical travel to be separately estimated for each team within each site and to exclude this from the costs assigned to individual consumers. Table 17 describes the differences in consumer related travel time between sites as a percentage of total hours worked in each setting.

Table 17: Travel time by setting as a percentage of total hours worked

DHB site	Inpatient	Community
1	0.0	2.1
2	0.6	5.1
3	1.1	4.6
4	1.5	6.7
5	2.2	7.8
6	4.4	9.4
7	5.6	8.8
8	5.9	8.1

Travel time related to the seven non consumer-attributable activities was included in the total time recorded for each activity and not separately identified. All other travel time was deemed to be included in ‘General clinical time’.

4.9.3 General clinical time

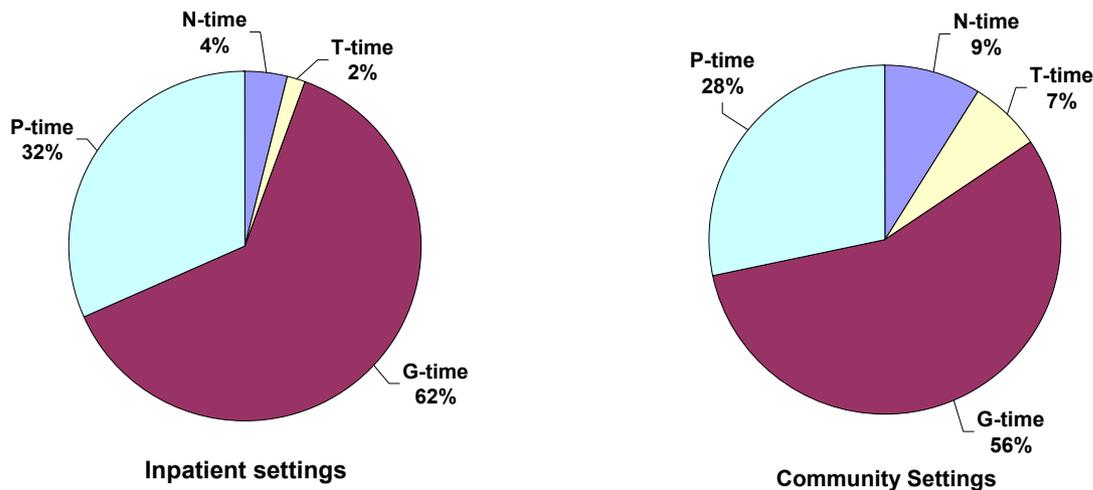
As noted earlier, activities included under the category ‘General Time’ were not recorded separately in the study. Instead, total time spent on these activities was deemed as the residual of total paid hours for each clinical labour class within each team after accounting or consumer attributable activities, clinical travel and the final set of activities included under consumer attributable’ time. ‘General Clinical Time’ can be regarded as covering a range of activities including time spent organising rosters, planning or quality assurance meetings, general staff meetings and so forth. By definition, the time (and associated costs) of these activities could not be linked to one or more specific consumers, but because the activity was an integral part of clinical service delivery, costs were apportioned across all individuals accommodated in or attending a specific mental health setting. Further details on

General clinical time and how costs were distributed to individual consumers is provided in Chapter 7.

4.10 Distribution of inpatient and community staff time

Figure 14 summarises the final distribution of the major staff activity categories in both inpatient and community settings.

Figure 14: Summary profile of distribution of clinical staff time in inpatient and community settings¹⁰



NB: It is important when reviewing these findings to note that we observed a number of problems with data quality that impact on the final percentages shown above, particularly the percentages for P-time. Chapter eight of this report details the extensive data validations performed on the data before the analysis and class finding work began. Regardless of the future application of the findings from the study it is clear that further work is required to improve the accuracy of the current national mental health information collection in New Zealand. Specifically some of the problems with missing data included:

- 7.7% of time recorded on RAT could not be assigned to a registered inpatient episode, most likely caused by the episode not being registered to the study.
- 22.4% of time recorded on MHINC could not be assigned to any registered episode (inpatient or community), again most likely caused by the episode not being registered to the study.
- There was a total of 19,436 consumers recorded via MHINC as receiving one or more staff contacts in the community, of which 7,293 consumer (37.5%) were not registered to the study. Thus this 37.5% of unregistered consumers received the 22.4% of MHINC community contact time.
- 8.1% of consumers registered to the study received no staff time.

¹⁰ Percentages for inpatient settings are based only on reported nursing time because P time was not recorded for the other clinical labour categories. Percentages for community settings exclude day programmes which, although minor in their overall contribution, distort the estimates due to over-reporting of P time.

5. Other Service Utilisation Data

While it is understood that the major cost of mental health services is staff time, mental health consumers require a range of other services that need to be considered in the analysis of costs. For example, the costs of direct services, such as drugs and pathology, and indirect services, such as the provision of meals and cleaning within inpatient units, all need to be accounted for when building an overall picture of the different patterns of service use.

The NZ-CAOS approach was that it was neither practical nor productive to attempt to measure every element of service use, but to focus instead on those services used in variable amounts by consumers where differences are likely to be significant in the development of a mental health classification system. For example, only some types of consumers require particular types of expensive drugs and recording of the use of drugs is likely to impact on the final cost per service for that consumer type.

This Chapter details the supplementary collection of other service utilisation data in addition to staff time, specifically:

- Pharmacy services;
- Imaging and Pathology services; and
- Electro-convulsive Therapy (ECT).

5.1 Pharmacy services

While it would have been desirable that the full range of pharmacy costs be collected, there were several practical limitations that restricted the options available to the study.

5.1.1 Community-based services

For community-based mental health services, the most significant pharmacy services in terms of costs are those provided by Pharmac and were therefore out-of-scope for the study. Consumer-level data were not collected for these services. Any marginal pharmaceutical costs included in the mental health funding arrangements for community services (such as depo drugs) were however reported by the participating DHBs and apportioned across all community consumers on the basis of occasions of service.

5.1.2 Inpatient services

For inpatient mental health pharmacy services, sites originally agreed to report the costs of the top 10 high cost drugs (based on total cost following the Pharmac listing) to the individual consumer level for the period of the study. However, during the first month of actual data collection it became clear that some several drugs in the 'top 10' category were low unit cost, high volume because they were prescribed to many consumers. As this would not have assisted in the differentiation of inpatients (nor did a marginal total cost of \$1.50 per day per inpatient warrant the effort of collection), the Pharmac 'top 10' list was modified on the basis that the threshold for collection should be approximately \$4.00 or more per day per inpatient.

The revised list of high cost drugs contained only six drugs, as shown in Table 18. Costs for these 'top 6' psychotropics were recorded by only six of the participating DHB sites. This was due to issues at a local level for two of the sites which restricted their ability to collect and report the detailed data as required (i.e. at an individual consumer level by date, drug description, cost and responsibility centre code). A total of 33,486 pharmacy records were received from the six remaining sites over the course of the study period, the costs of which totalled approximately \$1,185,000. The 'top 6' drugs listed account for 99% of these costs. Each drug and its dollar share of total drug costs are shown in Table 18. All other inpatient pharmaceutical costs were apportioned across all consumers on the basis of bed days.

Table 18: Top six high cost drugs for inpatient services

Chemical Name	% of total 'top 6' costs
Carbamazepine	0.5%
Clozapine	36.4%
Olanzapine	48.6%
Quetiapine	4.3%
Risperidone	9.8%
Zuclopenthixol acuphase	0.4%
Total	100%

Details on the distribution of pharmacy costs are outlined in Chapter 7.

5.2 Imaging and Pathology services

Reviews of site capacity indicated that all eight sites could report imaging and pathology services provided at the individual consumer level. However, as consumers in community based services use only low volumes of these services, and with the decreased capacity of community services to collect such data, these services were deemed out-of-scope for the purposes of the study.

Costing imaging and pathology service use at an individual level for inpatient services was considered possible, as well as being material to do so. Costs were provided by all eight sites at individual consumer level, including date, procedure description, cost and responsibility centre code. Table 19 details the imaging and pathology services included in this category.

In total, 59,433 records were received over the 6-month study period, totalling \$516,000 in mental health expenditure.

Table 19: Imaging and pathology services reported for inpatient consumers

Imaging Services	Pathology Services
Nuclear medicine	Anatomical pathology
Ultrasound	Biochemistry/clinical pharmacology
Computerised tomography scanning	Cytogenetics
Magnetic resonance imaging	Immunology
General radiology	Haematology
Radiotherapy	Microbiology

Imaging and pathology service costs were only considered in-scope if the costs of such services were met from within the budget of the participating sites. All costs of services met by another agency were deemed out-of-scope.

To prevent double counting of costs, total payments made to external agencies for imaging and pathology services were identified in the cost files submitted by the eight DHBs and isolated from the costing process. This step was taken because costs at the individual consumer level were reported separately in the service utilisation data provided by the sites.

5.3 ECT treatments

Although only administered to a minority of consumers, Electro-convulsive Therapy (ECT) has significant costs associated with its use. In general, it is administered only to inpatient consumers, although services are able to offer ECT treatments for community consumers admitted to inpatient units on a same-day basis.

All eight participating sites agreed to collect and report data on utilisation of ECT at an individual consumer level, including date, responsibility centre and cost (including both staff costs and overheads). Many sites provided unit costs based on an average for their individual site.

Over the 6-month data collection period, 485 ECT treatments were provided to 72 unique consumers with expenditure totalling \$149,000.

6. Ethics and Privacy Issues

Several steps were taken by the National Project Team to ensure that the study met national privacy and ethics guidelines. To address all key considerations, it was necessary to define arrangements that guaranteed the protection of private and confidential information:

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

This section outlines the mechanisms put in place for privacy protection and the process undertaken to gain ethics approval for the work to proceed.

6.1 Protection of consumer privacy

Arrangements to safeguard consumer privacy were outlined in the form of a Privacy Protocol prepared by the National Project Team (see National Study Manual:2001). This was designed on the basis of the MH-CASC privacy protocol and ensured that the project complied with the standards for the collection, storage and use of personal information as set down in the NZ Health Information Privacy Code (1994).

The essence of the arrangements to safeguard personal information obtained during the study was that data would not leave DHB sites in a form whereby consumers were identifiable to the National Project Team, either by name or by National Health Index number (NHI).

The Privacy Protocol also stipulated arrangements for three additional elements – the flow of data between parties, the provision of information about the project to consumers and the need for specific data protection agreements with individual DHB sites.

6.1.1 *The flow of data between parties*

Although identifying details for both staff and consumers were recorded locally for the purpose of initial checking of data integrity and reconciliation, these identifiers were removed prior to dispatch of the information to the NZ-CAOS and were therefore not identifiable to the National Project Team. This enabled protection of the confidentiality of both staff and consumers and was in line with agreed privacy protocols.

All consumer data identified by National Health Index number (NHI) collected and submitted for the study were encrypted using an algorithm specifically developed by the NZHIS for use in the CAOS study. Encrypting the unique NHI number ensured that no individual consumer could be identified by the National Project Team.

Monthly service utilisation data in the form of MHINC and CAOS data extracts from local DHB systems were submitted to the National Project Team via the NZHIS. NZHIS consolidated the data files and used the unique CAOS encryption algorithm to encrypt the patient identifier field 'NHI' before forwarding the data to the National Project Team. All files were submitted on CD, password protected and sent via courier.

Monthly inpatient resource utilisation data were submitted direct from DHBs to the National Project Team. Each site had access to the encryption algorithm developed by NZHIS. Encrypted data was saved to CD and submitted via courier.

In addition to the encryption algorithm, a decryption process was developed for use by DHBs to decrypt data quality reports submitted to them by the National Project Team. This 'decryption'

process allowed Site Coordinators to identify errors in consumer records, correct and resubmit them back to the National Project Team in encrypted format.

At no time did the National Project Team have access to either the encryption algorithm or the decryption process used at DHB sites.

A further measure of security was added to the final consolidated dataset post analysis and before the dataset was distributed either to participating DHBs or to the NZHIS for storage. This measure was to recode the encrypted NHI field so that decryption or mapping back to individual consumers would no longer be possible at the DHB or NZHIS level. In addition, all 'date of birth' fields were reformatted to 'age' fields to further protect consumer privacy.

6.1.2 The provision of information about the project to consumers

Individual informed consent was not collected from consumers for this study for the following reasons:

- all consumer related information was already being collected by staff and the study did not require the collection of any new clinical information;
- any consumer related information was encrypted by the DHB sites before being transferred to the National Project Team;
- the final consolidated dataset only holds de-linked consumer information;
- all published data is in an aggregated format.

However, it was a condition of the ethics approval for the study that every consumer be given a copy of a consumer information pamphlet at the first point of contact with the service. This pamphlet was specifically designed to provide details about the project and included details regarding the consumers right to opt-off the study. A total of 192 consumers subsequently elected to opt-off the study and consequently no details regarding their care were provided to the National Project Team for analysis purposes.

The information pamphlet was based on the earlier Australian study but was redesigned for use in the New Zealand mental health environment. Copies are included in the National Study Manual (2001) as Resources 11 and 12.

6.1.3 Data protection agreements with DHB sites

Data Protection Agreements were signed between the HRC and the individual sites requiring all participants to be aware and comply with the privacy protections governing the project.

6.2 Protection of staff and agency confidentiality

Throughout the development of the methodology, the project team guaranteed that the National Project Team would return no information regarding an individual staff member obtained in the course of this study to management, or any other party. This was necessary to ensure that information was used for the purposes for which it was collected – that is, to inform about the types of services received by consumers, not to monitor an individual staff member's performance.

Similarly, the National Project Team assured all participating organisations that it would maintain absolute confidentiality of data. As such, no data was presented in a way that would breach this undertaking. Where specific organisation results were reported, it was undertaken in a way that did not identify the organisation concerned.

To strengthen these undertakings, these guarantees were specifically included in the Data Protection Agreements signed with individual sites. The only exception to this agreement was in the case of the

final consolidated dataset where all DHB sites agreed to retain their site identifier in the dataset to allow ongoing analysis and benchmarking work to be undertaken amongst sites.

6.3 Ethics Committee approvals

The Auckland Ethics Committee 'Y' approved the project methodology in December 2001 on behalf of all five regional ethics committees affected by the study.

6.4 Storage and security of final consolidated dataset

At the end of the study, all participating sites were given a copy of the final consolidated dataset. This dataset included all information submitted by all eight participating sites and, as per comments made in 6.2 of this chapter, written approval was therefore gained from each DHB site to allow for the retention of all DHB identifiers. However, as previously stated, in order to preserve the privacy of individual consumers all NHIs were de-linked so that any third party using the dataset could not identify any individual consumer's data.

A copy of the final consolidated dataset was also transferred to the New Zealand Health Information Service (NZHIS). Access to this national copy is via the usual NZHIS application process and approval is dependant on both HRC and NZHIS sign-off as outlined in a Memorandum of Understanding signed by the eight DHB sites, the NZHIS and the HRC.

The provisions made for the protection of the dataset in the Memorandum of Understanding have also received the support of the CAOS Māori Monitoring and Review Group.

7. Costing Methodology

The study approach to costing involved a two-stage process.

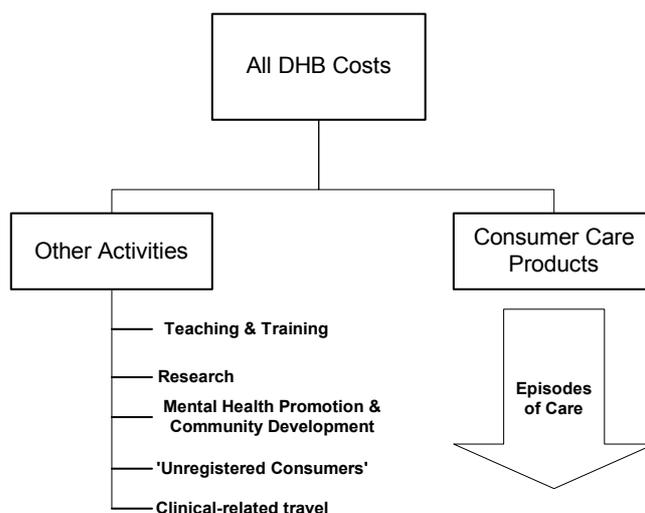
- *Preparation of financial data* – each DHB was responsible for preparing its financial data in a consistent manner according to agreed principles.
- *'Patient-level costing'* – the distribution of costs to individual consumers was performed at the national level according to principles agreed between the National Project team and participating sites.

A Costing Group made up of costing representatives from each participating District Health Board site met throughout 2001 to decide on the costing principles and methodology to be used for the study. These costing representatives were also responsible for implementing the common costing design principles within the study and for supplying the national project team with the necessary costing data in an agreed format.¹¹

This chapter outlines the approach used and how the staff activity, service utilisation and cost data were processed to produce final costing products. Comments regarding those additional issues with validating the costing data are included in section 8.6 of this report.

7.1 Costing Products

Figure 15: Overview of the distribution of DHB costs to Consumer Care and Other activities



The objective of the costing process was to distribute costs to two categories of ‘products’, as summarised in Figure 15.

- **Consumer care products** – costs were assigned to each individual treatment event that were then ‘rolled up’ to consumer care days and then finally aggregated to ‘episodes’ required for classification development. The basic output of the costing process was the ‘costed patient care day’ where each day represents a date on which one or more services was provided to an individual consumer.

¹¹ The national team acknowledge David Ireland (costing representative for Waikato DHB) in his role as chairperson of the CAOS Costing Group for his advice to the team throughout the study on matters related to DHB costing

For inpatient episodes, the costed patient care day represents the sum of costs for each day of inpatient stay (including community costs for community contacts).

For Community episodes, the costed patient care day represents the total costs associated with all occasions of service (individual contacts) provided to the consumer on the particular day.

- **Non-consumer care products** including:
 - Teaching and training
 - Research
 - Mental health promotion & community development
 - Unregistered consumers

7.2 Preparation of financial data

7.2.1 Source data provided by DHB sites

In order to achieve consistency District Health Board sites developed a common approach to the preparation of local financial data that reflected current national standards (e.g. the allocation statistics used in the HHS Common Costings Standards (1999) and the account coding structure specified in the DHB Common Chart of Accounts (2001), henceforth referred to as CCOA. The common approach to the preparation of financial data comprised the following elements:

- Each DHB's patient care cost centres (RCs) were reviewed and, where necessary, modified to reflect the local service delivery functional units as accurately as possible. The goal was to achieve one-to-one mapping between RCs and the service delivery team structure reported to MHINC. It was considered critical to separate the costs of teams where service delivery programmes were known to differ in unit costs. In particular, each DHB was required to ensure that the costs of inpatient units were reported separately from community teams.
- A consistent line structure was used for reporting costs within each patient care RC, based on the CCOA account codes. Sites that had not yet implemented the CCOA national standards agreed to map their account codes to those used in the standards.
- All corporate and mental health-specific overheads were reported and apportioned to relevant patient care cost centres using consistent allocation statistics based on the standards outlined in the HHS Common Costings document.
- All costs were reported on an accrual basis to reflect the true level of activity for each reporting period. For example, if backpay was made in a particular month, this was accrued to the relevant month in which costs were incurred, or excluded from costs if it related to pay periods that fell outside the study boundaries.
- Depreciation was included in all DHB costs and apportioned to the relevant patient care cost centres according to the national standards.
- Specific financial items agreed to be out of scope for the study were identified and excluded from the cost data submitted by sites. In general, these comprised both capital and revenue (to ensure that costing reflected gross recurrent expenditure), redundancy payments and payments made to other agencies where these related to subcontracted services (e.g. capitated payments to GPs; payments to non government agencies for crisis respite). In relation to the latter group, the principle was that services (and associated costs) were considered to be 'in-scope' were those services were directly provided by the specialist mental health services of the participating DHBs.
- All costs of mental health services directly managed by the DHB but 'out of scope' for the current study (e.g. drug and alcohol services) were included in the data reported by sites but separately identified to allow broad descriptive statistics to be compiled.
- All 'abnormal costs' were identified to allow these to be reviewed subsequently in terms of their possible exclusion from patient costing (see section 0 below).

Early in the study planning, it was envisaged that each DHB would conduct full episode costing and then submit the fully costed episodes to the national team for class finding analysis. However this option proved to be untenable due to under-developed costing systems and limited resources available at each site to do the actual costing. For these reasons the national team agreed to conduct episode costing using source data submitted by sites and prepared according to above principles. To achieve this, all DHB sites provided the national project team with the relevant cost and related files on a per month basis, as summarised in Table 20.

Table 20: Costs and related files submitted by DHBs¹²

Monthly File	Description
Financial data for Patient Care RCs – ‘In Scope’ teams	All costs directly associated with each patient care RC, reported according to the CCOA account codes.
Mental health overheads	Defined as <i>“the costs of administration and other support services (such as program management, admissions, reception office, medical records etc) at the mental Health program level. Generally these are resources that are specifically dedicated to the mental health program, are under the direct management control of the program and are funded by the program.”</i>
Corporate overheads	Defined as <i>“the cost of administration and other support services provided at DHB level. Such services include clinical governance and administration, public relations, information systems, personnel, finance and accounting functions. These services are generally provided from a central pool of resources managed at the corporate level for all programs/business units of the DHB.”</i>
Financial data for ‘Out of Scope’ teams	All costs directly associated with each out of scope team, including apportioned overheads.
Additional service utilisation and costs	Other consumer service utilisation files (pharmacy, ECT, imaging/pathology) including the individual costs of these services (see chapter 6 for further detail).
Paid productive hours by RC by month	Provided by each DHB to allow basic quality checks to be performed on cost data and to build PGNT ratios for clinical labour classes in each patient care cost centre.

7.2.2 Treatment of abnormal costs

Abnormal costs were those items that occurred in the six-month study period that were significant as a proportion of total costs for the particular RC and/or likely to impact on service delivery outputs for the RC or derived unit costs. Table 21 lists the items agreed by the study Costing Group to be identified as abnormal.

As noted above, these items were identified by sites in their final financial files and for the purposes of the study were treated as nil expenditure to control for their potential to distort episode costs.

¹² Sites varied considerably in the extent to which overhead costs were reported under Patient Care RCs or whether these were included in the two overhead files. However, the variable reporting had no impact because all items reported in the mental health and corporate overheads files were coded by each DHB as ‘belonging’ to one or more patient care RCs.

Table 21: Abnormal cost items

Abnormal item	Description
Packages-of-care	This is where 'wrap-around' services are provided to consumers. Staff activity cannot be identified at the individual consumer level so separate RCs were created by sites to differentiate this type of service delivery programme from the others.
Team establishment costs	New units or teams in the establishment phase where there is no consumer attributable activity.
Maternity payments	Payments made to staff on maternity leave
Recruitment	Costs involved in the recruitment of staff from overseas.
CME etc	Continuing Medical Education credits, relocation (within NZ), gratuities, long service leave, paternal leave, vacancies.
Koha	Any koha payments made by teams/units

Note: definitions based on the DHB Common Chart of Accounts

7.2.3 Refining DHB cost centre structures to match activity data

Adjustments were required to correct misalignments between time reported by clinical staff and salary and wage-related costs at the patient RC level. This step in the preparation of DHB source data was necessary for the majority of the eight sites.

To determine the extent of misalignment between reported time and salary and wage-related costs, average hourly rates were computed for the labour classes within each of the patient care cost centres for all sites. Misalignments primarily affected community teams and were caused by two main factors. First, for some DHBs the costs allocated to specific patient care cost centres did not accurately reflect staff activity patterns. This typically arose when the allocation by site finance personnel of salary and wages to cost centres was based on inaccurate assumptions about how and where staff spent their working days. For example, all salary costs for community-based medical staff at a particular site may have been reported under Team A but, based on MHINC data, medical staff only reported clinical activity under Team B. Misalignment of this type was the most common factor that necessitated cost centre reorganisation.

The second reason for clinical labour costs salary and wage-related costs not reconciling with activity data was under-reporting of activities by staff within a particular labour class or local team.

To reduce the impact of the misalignment between costs and reported staff activity, data for the relevant cost centres were merged. Thus, in the example above, all cost and activity data for Teams A and B were amalgamated to a new 'virtual' team A+B. The impact of this step varied according to the degree of misalignment. While minor for most affected sites, for some, extensive reassignment of costs between cost centres was required.

7.2.4 Mapping of CCOA account codes to CAOS final cost components

A total of 326 CCOA account codes were used by the sites to report their costs. While the Common Chart of Accounts structure provided a useful framework to ensure consistency between sites in the preparation and reporting of costs, it was not considered suitable for defining cost components to be used for patient costing. An alternative structure was therefore designed which, while similar to the framework of the CCOA, had the following advantages:

- It allowed clinical labour costs classified separately as Outsourced Services to be aggregated with relevant labour codes under the CCOA Personnel grouping

- It brought together all pharmaceutical and diagnostic services into discrete cost buckets that within the CCOA structure are distributed across all the separate categories of Outsourced Services and Clinical Supplies.
- It combined other like-with-like cost categories that remain separated within the CCOA structure (e.g. hotel and related costs).

To achieve this all costs reported by the DHB sites under the CCOA Account codes were mapped to a set of 61 initial components (referred to as CAOS L3) which were then further aggregated to 13 higher level ‘in scope’ groups which represented the study cost components (Figure 16).

Figure 16: Mapping of DHB costs to CAOS final cost components

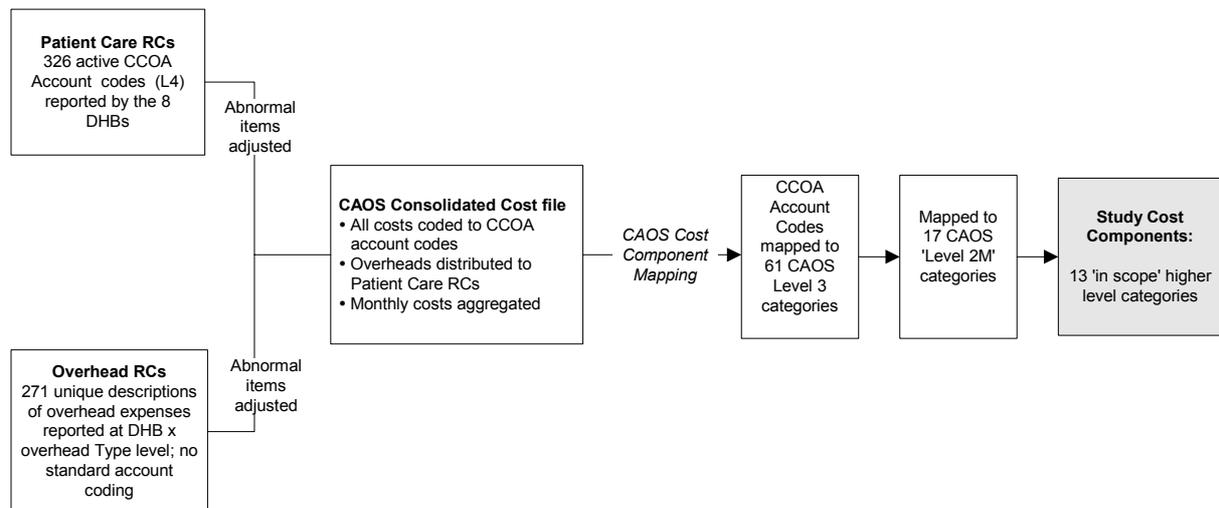


Table 22 summarises the cost components used to organise all costs and the contribution of each to total ‘in scope’ costs reported by the DHB sites.

Table 22: CAOS final cost components within each patient care RC as a percentage of total ‘in scope’ costs

Cost Component Code and Description	% Total costs
<i>Clinical services - Direct Care staff</i> ¹³	
CL2N Nursing Services	33.83%
CL2M Medical services	13.79%
CL2A Allied Health Services	11.44%
CL2U Other labour class ¹⁴	0.04%
<i>Clinical services - Other</i>	
CL215 Clinical Supplies	1.75%
CL218 Pharmaceuticals (Top 6 Psych)	1.14%
CL220 Imaging & Pathology (Patient attributable)	0.49%
CL210 Allied Health Services - Clinical Support Services	0.49%
CL219 ECT (Electroconvulsive Therapy)	0.14%
<i>All other costs (Infrastructure, Admin & Support etc)</i>	
CL213 Management/Administration	21.82%
CL216 Infrastructure & Non-Clinical Supplies (exc Hotel, Cleaning & Laundry)	10.82%
CL211 Support Services - Hotel, Laundry & Cleaning	2.37%
CL212 Support Services - Other	1.87%
Total reported (\$103.2M)	100.00%

7.2.5 Core and non-core costs

While all costs included in the study final cost components were distributed in the costing process, a small proportion were deemed to be ‘non core’ and excluded in the development of the casemix classification. A summary of the process is provided in Figure 17.

In general, costs were deemed to be non-core for pragmatic reasons rather than based on first principles. Table 23 summarises the core-non core status of each of the 13 final cost components and includes a rationale for all non-core items.

¹³ For community services, costing and service utilisation data were collected at the detailed level of all individual labour categories specified in the DHB Common Chart of Accounts. However misalignments between DHB cost data provided by local site costing representatives and activity data as reported by clinical staff necessitated a roll-up of the time (and associated costs) of these labour categories to the three higher level labour categories of medical, nursing and allied health staff for each team/RC.

¹⁴ The Unknown Labour Class was created to accommodate a small number of staff at one site who reported MHINC Community Contacts using an invalid labour category code.

Figure 17: Separation of core and non-core costs

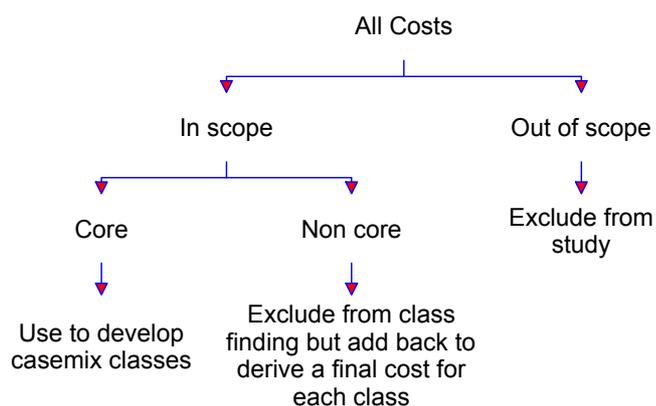


Table 23: Core-non core status of CAOS final cost components by episode type

Cost Component	Inpatient Episodes	Community Episodes
Clinical services - Direct Care staff		
CL2N Nursing Services	Core	Core
CL2M Medical services	Core	Core
CL2A Allied Health Services	Core	Core
CL2U Other labour class (Unknown CCH)	Not applicable	Core
Clinical services - Other		
CL215 Clinical Supplies	Core	Core
CL218 Pharmaceuticals (Top 6 Psych)	Non Core: <i>Not reliably collected by all sites</i>	Out of scope: <i>Not collected during study, costs paid by PHARMAC</i>
CL220 Imaging & Pathology (Patient attributable)	Core	Out of scope: <i>Not collected during study</i>
CL210 Allied Health Services - Clinical Support Services	Core	Core
CL219 ECT (Electroconvulsive Therapy)	Core	Core
All other costs (Infrastructure, Admin & Support etc)		
CL213 Management/Administration	Core	Core
CL216 Infrastructure & Non-Clinical Supplies (exc Hotel, Cleaning & Laundry)	Core	Core
CL211 Support Services - Hotel, Laundry & Cleaning	Core	Core
CL212 Support Services - Other	Core	Core

7.3 Distributing costs to consumer care and other activities

A complex set of allocation rules were developed to distribute the various costs reported by the DHB sites to consumers registered to the study and non-consumer activities. The remaining sections of this chapter describe the approach used for the various cost components and the rules applied in costing.

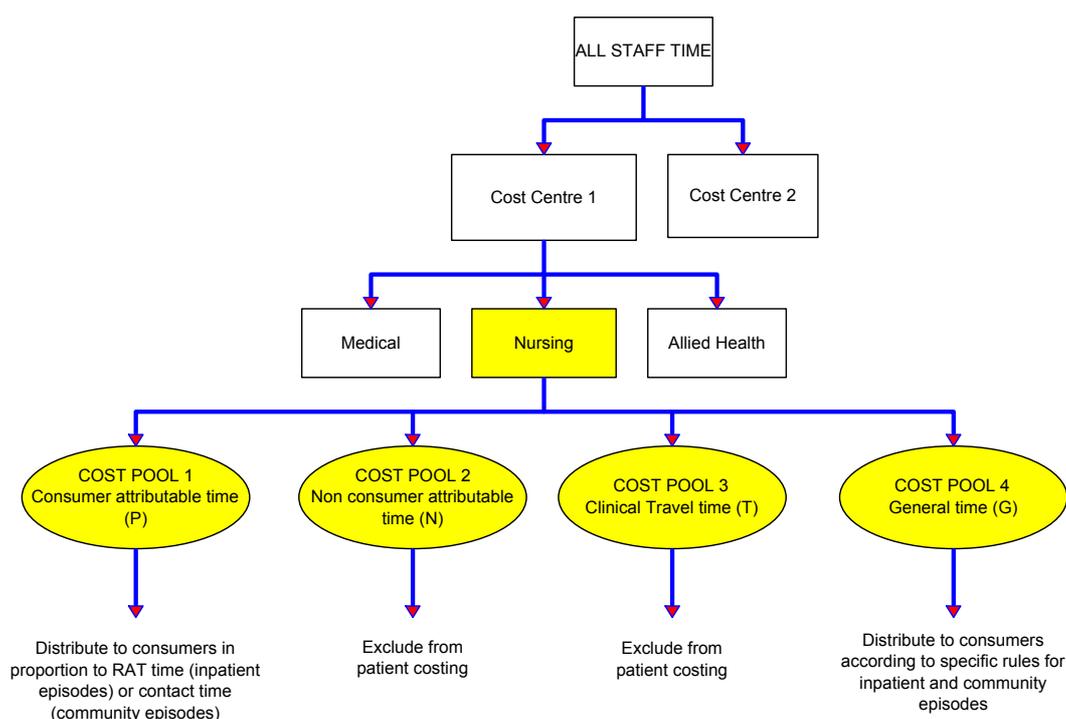
7.3.1 Allocating the costs of clinical labour

Distribution of salary and wage-related expenditure for clinical labour staff was driven by a series of allocation statistics based directly on the staff activity patterns reported by the labour classes within each patient care cost centre, the type of episode to which the costs were being assigned and whether the patient care cost centre was an inpatient or a community service.

7.3.2 Creation of P, G, N and T 'cost pools'

As a first step, for each labour class four 'cost pools' were created based on activity patterns reported over the six-month study period (Figure 18).

Figure 18: Division of clinical labour costs into four 'cost pools'



1. Consumer attributable time (P)

Consumer attributable time (P) comprised the sum of all staff time reported on consumer care events.

- For *community teams* this included all activities reported by staff that mapped to an appropriate MHINC service code or to the supplementary 'C' codes that were developed specifically for use in the study.
- For *inpatient teams*, this applied to nursing staff only and included consumer attributable time reported via the Resource Allocation Tool (RAT, see section 4.8.1).

A component of total salary and wage-related costs for each labour class was allocated to a 'consumer attributable cost pool', in proportion to total time reported on these activities.

2. Non-consumer attributable activities (N)

Non-consumer attributable time (N) was defined as the sum of all time reported on a subset of specific activities collected via a one-week staff survey conducted during the study.

Details of the surveys are provided in Chapter 4. Their original design was based on advice from the Clinical Working Group that identified seven activities that were regarded as not directly related to the provision of clinical care but which formed a legitimate part of any mental health service. The activities included: teaching and training, research, mental health promotion and community development, service development, professional development, cultural activities and unregistered consumers. The principle underlying this approach was that the costs associated with such activities should be identified and isolated from the clinical costing process.

Subsequent to the collection of the survey data a decision was made by the national team to include the time recorded against three of these categories (service development, professional development and cultural activities) under General time (G) as it was considered that these activities were either closely aligned with supervision and administration associated with G time and/or had a direct impact on the delivery of good clinical practice. In the case of 'cultural activities,' advice was received from the Māori Monitoring and Review Group that this category should not be identified under N-time due to the inextricable connection between cultural expression and clinical practice.

Consequently, N-time was defined as the sum of all time reported on the following four activities: teaching and training, research, mental health promotion and community development, and unregistered consumers.

3. Clinical travel time (T)

Clinical travel time (T) was defined as the sum of time spent on travel directly related to the delivery of services to mental health consumers. Any other travel was recorded as part of the N-time categories. As with N time, total T time was estimated on the basis of the results received from a one-week staff time survey. The rationale for separating out the time and costs associated with clinical travel was to prevent geographic factors confounding episode costs.

4. General time (G)

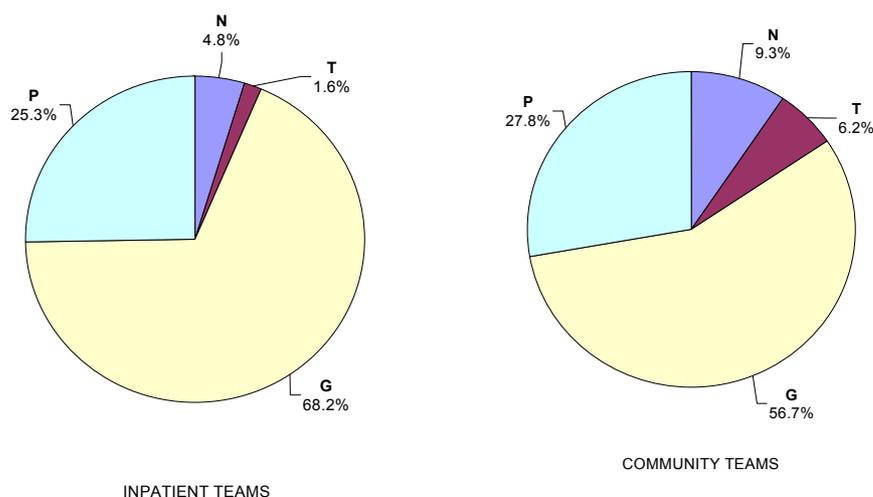
General time (G) represented the sum of the residual total time worked that was not accounted for by P, N or T time. General time incorporated a range of clinical (ward rounds, team reviews, supervision etc) and non-clinical activities (administration etc) but should not be interpreted as being unrelated to consumer care. Rather it is time that could not be specifically attributed to an individual consumer, or to clinical travel (T) or to any of the four non-consumer attributable activities (N).

Figure 19 provides summary details of the proportion of total clinical labour costs assigned to the P, G, N and T pools for inpatient and community-based teams.

7.3.1.2. Allocation of P and G cost pools to consumer care events

As noted above, for all RCs the costs of N and T time were excluded from consumer costing (along with a share of infrastructure and overhead costs, see section 7.3.3 below). This was not intended to negate the contributions of these activities in mental health service delivery but instead, to ensure that the costs of these activities were not confused with the costs of providing care to consumers. In the case of clinical travel, the intention was to isolate the associated costs in order to prevent the physical location of consumers under care being confounded with cost differences due to casemix.

Figure 19: Percentage of clinical labour costs in the four cost pools



The allocation of ‘P costs’ and ‘G costs’ to consumers was driven by individual consumer service utilisation but followed different principles and varied according to labour category and treatment setting in which the clinical staff were employed. In general:

- **P costs for all clinical staff in community teams** were allocated in proportion to total contact time reported for the individual consumer by staff of the particular clinical labour class. As the MHINC system allows contact time with inpatients to be reported by community teams, a share of the costs of the community-based clinical workforce at most sites was allocated to inpatient episodes, again in proportion to total contact time.

The only exception to this approach was in the case of day programmes, where multiple staff recorded contact time based on hours of attendance for all consumers rather than apportioning their time across all consumer participants. Given the potential to artificially inflate the costs of these attendances, a decision was made to distribute P costs for clinical staff employed by day programmes in proportion to the total number of contact days reported within the RC (regardless of labour class).

- **G costs for all for all clinical staff in community teams** were allocated to individual consumers in proportion to total contact days recorded for the consumer by the team, regardless of labour class.
- **P costs for nursing staff within inpatient teams** were distributed only to consumers within inpatient episodes and in proportion to total RAT time recorded per day for each ward. Details on the RAT are presented in section 4.8.1. The only exception to this approach was in the case of one DHB where all nursing costs were allocated in proportion to bed days (excluding leave days), due to inadequate quality of the local RAT data.
- **P costs for medical and allied health staff within inpatient teams** were effectively set at zero, as the study did not require those staff to report on individual consumer attributable time. The exception occurred for one team at one site only, where Allied Health staff opted to record patient attributable time on a daily basis using a modified version of the RAT tool. This staff groups P costs were allocated to individual consumers in proportion to RAT recorded time.
- **G costs for all clinical staff within inpatient teams** were distributed in proportion to bed days, excluding leave days.

Table 24 summarises the cost drivers used in allocating clinical labour costs to individual consumers.

Table 24: Cost drivers used to allocate P and G costs to consumers

COST POOL	INPATIENT RCS	COMMUNITY RCS	
		Day Programs	All other RCS
Medical and Allied Health – P time costs	Not relevant except for one specific team as noted above, P% for all direct care allied health and medical staff within inpatient RCS was set to 0.	Distribute in proportion to total contact days reported within the RC (regardless of labour class)	Distributed in proportion to reported contact time for the specific labour class.
Medical and Allied Health Costs – G time costs	Distributed in proportion to bed days (excluding leave days)	Distributed in proportion to total contact days reported within the RC (regardless of labour class)	Distributed in proportion to total contact days reported within the RC (regardless of labour class). ^{15, 16}
Nursing – P time costs	Distributed in proportion to total RAT time recorded per day for the relevant team (RC), with the exception of one DHB as noted above.	Distributed in proportion to total contact days reported within the RC (regardless of labour class).	Distributed in proportion to reported contact time for the specific labour class.
Nursing – G time costs	Distributed in proportion to occupied bed days spent by the patient within the specific RC (excluding leave days).	Distributed in proportion to total contact days reported within the RC (regardless of labour class).	Distributed in proportion to total contact days reported within the RC (regardless of labour class).

7.3.2 Distributing the cost of Additional Services

Costs associated with the three Additional Service Use categories were allocated to individual consumers in proportion to actual service use, within the limits of the rules for core and non-core costs (see section 0). Details of each service and its costs were recorded directly, making this process relatively straightforward, as summarised in Table 25

Table 25: Allocation of Cost drivers used to allocate P and G costs to consumers

	Inpatient Episodes	Community Episodes
Additional service utilisation - Pharmacy	Non core cost – costs not distributed, available for modeling post class finding.	Out of scope – not recorded
Additional service utilisation - ECT	Allocated on basis of actual service use and costs recorded at individual consumer level.	Allocated on basis of actual service use and costs recorded at individual consumer level.
Additional service utilisation – Imaging/ Pathol (patient attributable)	Allocated on basis of actual service use and costs recorded at individual consumer level.	Out of scope – not recorded

¹⁵ The alternative statistic used in MH-CASC was *provider contact days*, where one provider contact day was counted for each day on which a contact was provided to the patient by a *representative of the specific labour class* with an upper limit of one contact day per patient per date. This is not adopted in the current study due to the lower level of patient-attributable reporting and the significant number of labour groups within community teams with high G%. Use of the provider contact days statistic would have resulted in only a small number of consumers receiving substantial cost shares from the G cost pool.

¹⁶ 'Total contact days reported within the RC' was calculated as follows: Count one day for any date on which the consumer was seen by any staff member reporting under that Team/RC code, with an upper limit of one contact day per date per patient for each RC. Thus, only one contact day would be counted on a given date for a patient for whom two or more contacts were recorded by different staff from that team on the same day.

7.3.3 Distribution of other costs

The remaining costs to be allocated to consumers comprised 5 of the 13 study cost components, and included:

- *Infrastructure, Administration and Support* – representing approximately 37% of total costs reported by the DHB sites, the cost drivers selected for the distribution of these components has a significant impact on episode costs.
- *Clinical Supplies* – this represented a relatively minor item (1.8%) mainly comprising general pharmaceuticals (non psychiatric), instruments/equipment and treatment disposables.

Treatment of *Infrastructure, Administration and Support* followed a two step process. First, a share of total costs within each cost centre was apportioned to non-consumer attributable activities on the rationale that these activities, like all other mental health services provided by the DHB, attracted administrative and infrastructure support. The percentage allocated within each cost centre was calculated on the basis of N costs as a proportion of total costs e.g. if N represented 4% of costs, 4% of Infrastructure, Administration and Support costs were set aside to add to the estimated N costs and isolated from the patient costing process.

The remainder of the *Infrastructure, Administration and Support* costs within each RC were allocated on the same basis as G costs as follows:

- *For community-based teams* – costs were distributed to individual consumers in proportion to total contact days reported within the RC (regardless of labour class).
- *For inpatient-based teams* – costs were distributed to individual consumers in proportion to bed days.

Clinical Supplies were similarly distributed – in proportion to total contact days for community RCs and bed days for inpatient RCs.

7.4 Costing software

The costing process required the use of a tool that could allocate costs to the individual treatment event and aggregate to the 'costed consumer care day'. In essence this required a tool which could cost at the patient by day by clinical service level, that is, clinical costing - rather than cost at an aggregate or class level.

The software tool used to produce the results was ComboCC, the Clinical Costing tool in the Combo series of Visasys costing packages that also includes ComboCM (Costing Modelling) and ComboPC (Patient Costing). Visasys assisted the study team to interface the CAOS database to ComboCC and to generate summary costing reports and the detailed cost tables required for subsequent analysis.

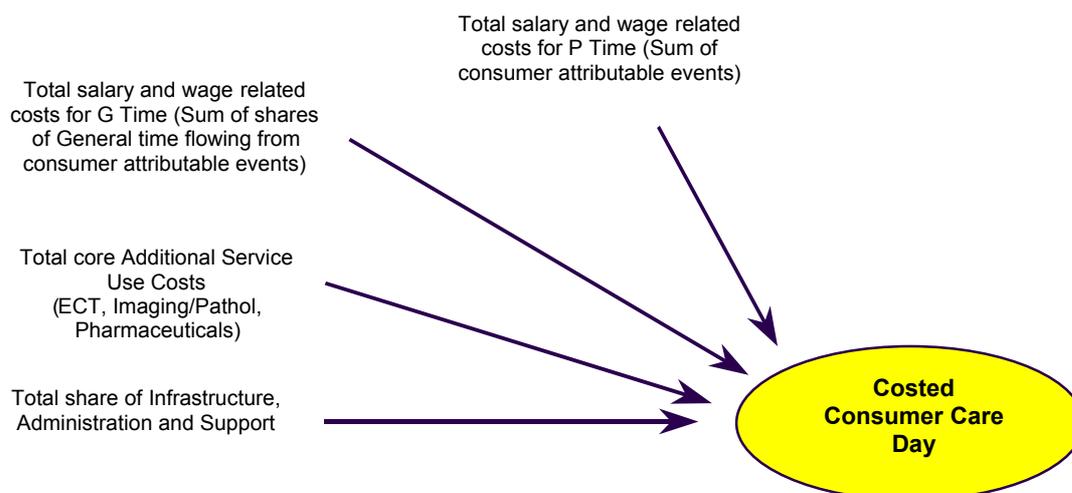
7.5 The 'costed consumer care day'

The outcome of the costing process provided an aggregate cost for each 'consumer care day', defined as a day on which a consumer had one or more contacts with one or more clinical staff members or was a resident within an inpatient ward.

Each consumer care day represented the total of all costs assigned to individual patient care events, summed at the date level, as shown in simplified form in Figure 20.

Approximately 310,000 consumer care days were costed in the study. These formed the building blocks for subsequent episode costing.

Figure 20: Cost components of the ‘consumer care day’



7.6 Summary profile of cost drivers

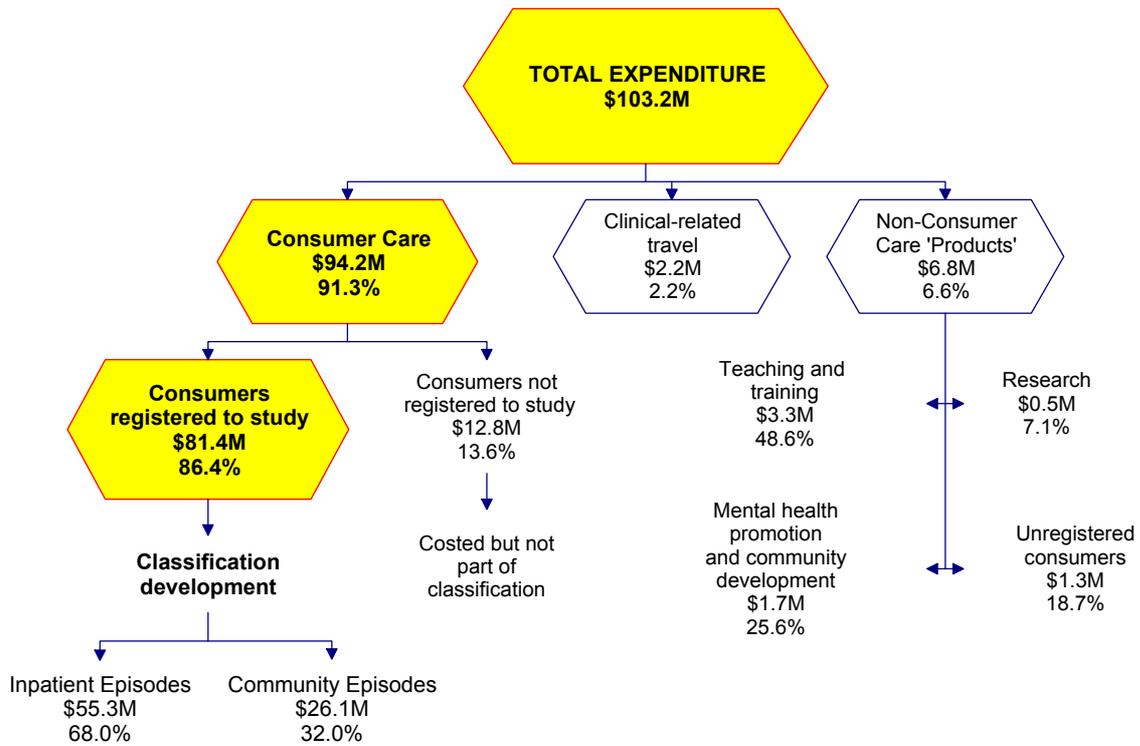
Table 26 presents the relative contribution of all cost drivers to episode costs achieved at the completion of the costing process. It shows that for both inpatient and community episode types the number of ‘treatment days’ was the main driver of episode costs.

Table 26: Contribution of cost drivers to episode costs

	Inpatient Episodes	Community Episodes	All Episodes
Consumer attributable time			
RAT - Inpatient Nursing	14.2%	0.0%	9.9%
RAT - Inpatient Allied Health	0.3%	0.0%	0.2%
Community team contact time	0.7%	19.2%	6.6%
Treatment days			
Bed days	78.6%	0.0%	53.3%
Community contact days	3.1%	80.7%	27.8%
Additional services			
ECT	0.2%	0.0%	0.2%
Imaging/Pathology	0.9%	0.0%	0.6%
Pharmacy (Top 6 Psych)	2.0%	0.0%	1.4%
Total	100.0%	100.0%	100.0%

Figure 21 shows the results of the costing process and how the total DHB costs were distributed across the final products for the study.

Figure 21: Summary of final distribution of in scope costs



8. Database Development and Quality

The CAOS analysis dataset was built incrementally from the various data sources provided by the participating DHB sites over the 6-month data collection period. There were five individual datasets as follows:

1. consumer, episode and clinical ratings;
2. inpatient nursing RAT;
3. community staff activity;
4. additional service use data (pharmacy, ECT, imaging & pathology); and
5. DHB financial data.

In addition, data collected during a one-week survey on the amount of time clinical staff spent on non consumer-attributable activities and consumer-related travel was included to complete the final dataset. Details on these two activities are included in chapter 4.

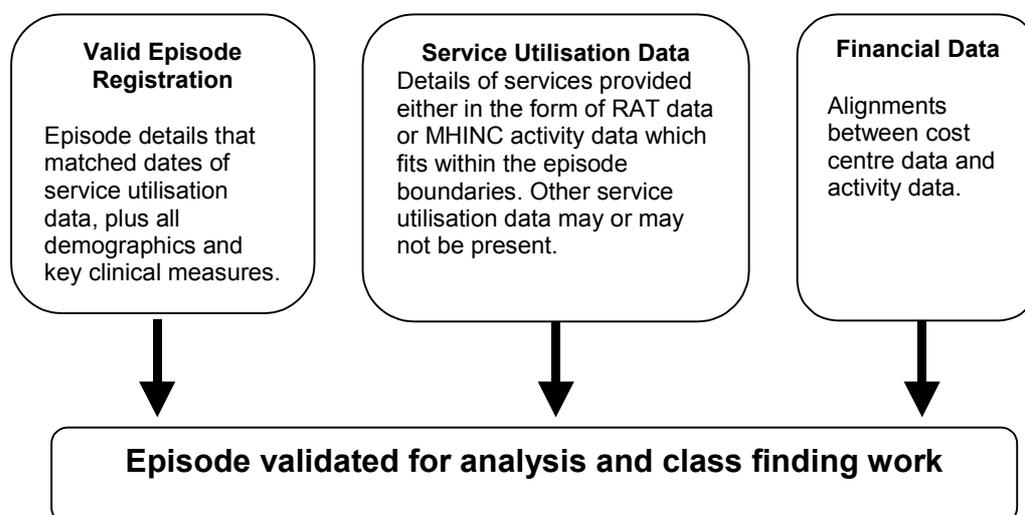
During the study period, participating DHB sites received data quality and exception reports identifying erroneous or incongruous data that allowed them to identify and rectify issues in subsequent data submissions thereby improving the quality of the final dataset.

Significant data clean up was required on all datasets. Work began at the end of the data collection period (31st July 2002) and continued for a further 6 months until all data were adequately prepared for analysis and class findings. Data clean-up was hampered somewhat by the late delivery of files, particularly costing data. The detail and format of the costing data required was not always readily available within current DHB financial systems and its collection placed an additional burden on finance staff.

Validation of each individual data set was required before the data could be linked to form 'episodes'. Once the episode data was linked to activity data, further checks and validations were completed. Figure 22 presents an overview of the building blocks used to create episode records and the main checks applied to each.

This chapter details the extensive data validations performed on the data before the analysis and class finding began and includes edits, where these were required, to ensure that each component met data quality standards.

Figure 22: Episode record building blocks



8.1 Validation of consumer data

Consumer demographic data was submitted to the study in two forms:

- Consumer details as recorded in DHB local systems and reported to MHINC
- Consumer details as recorded specifically for the NZ-CAOS study

Validations were performed during the course of the data collection period to identify any mismatches between the two datasets (e.g. on 'date of birth' or 'sex') and where possible these were resolved by sites and data resubmitted to NZ-CAOS. The NZ-CAOS consumer dataset (in the form of the 'Person' table) was the main dataset used for consumer demographic data in analysis.

Specific focus was made on the collection of ethnicity data, as although the MHINC data contained up to three ethnic groups for each consumer, there was no consistent approach amongst sites in the methodology used for collecting ethnicity data for MHINC. MHINC ethnicity data was also known to contain a high number of 'unspecified' ethnicities. It was therefore considered necessary to capture ethnicity data separately for NZ-CAOS to ensure the most accurate and up-to-date ethnicity data would be available for analysis. To support this decision a module was introduced as part of the national training package that instructed clinical staff to ask all consumers/tangata whai ora to self-identify their 'ethnicity' for the purposes of the CAOS project.

In contrast to MHINC, only one ethnic group was collected on CAOS registration forms. Where ethnicity was missing in the final CAOS dataset, MHINC data was substituted using the 1st, 2nd then 3rd ethnic group as was required. Substitution by this method was required for only 1% of all consumers in the final analysis dataset. The decision by CAOS to combine data received from both DHB sites and the NZHIS in order to ensure a high completion rate means that the prioritization algorithm used by NZHIS was not applied to all the data. Any other researchers using the dataset should consider using only that data supplied to the study by NZHIS when making comparisons with general population statistics as both Statistics New Zealand and NZHIS use the same prioritisation algorithm.

Consumer domicile data reported via the MHINC data collection was also used in the analysis to identify the deprivation index levels for the various ethnic populations (as can be seen in Chapter 9). It must also be borne in mind that in some instances DHBs advised that consumer domicile data had not been maintained and updated.

8.2 Staff activity data validation

Two forms of staff activity data were collected during the study period. Inpatient nursing resource time was collected using the Resource Allocation Tool (RAT), and community staff activity was collected using existing MHINC contact data (national mental health information collected by the New Zealand Health Information Service) with some additional fields specific to the CAOS study (referred to as C-codes).

Approximately 877,000 staff activity data records - MHINC community contacts and inpatient RATs - were submitted to the study by participating sites over the 6 month period. A series of data integrity tests and edits were applied to ensure quality of the information and to correct errors, where they could be identified, before this data was linked to the remaining datasets.

8.2.1 Inpatient Resource Allocation Tool (RAT)

A total number of 316,016 RAT records were entered to the database over the 6-month period. Of these, a small number showed an implausible amount of consumer attributable time per day. For example, 602 consumer days (0.6%) had more than 24 hours of consumer attributable time per day and 1246 records (1.1%) had more than 18 hours of consumer attributable time per day.

Several options were considered in how to handle these records:

- leave unedited;
- trim excessive time;
- trim excessive bed day costs; or
- trim excessive episode costs.

The decision was made to leave these records unedited, as there was no way to check whether or not the time recorded was valid. For example, it is conceivable that in those cases where a consumer was at serious risk of self-harm that they might receive 48 hours of direct nursing time within a 24-hour time period.

8.2.2 Inpatient activity – identifying inpatient days

Inpatient activity data was collected via MHINC for each inpatient ward participating in the study. Specific data on inpatient leave was also requested by the study in addition to the standard MHINC inpatient data collection. MHINC data provided admission and discharge dates and some information as to the transfer of consumers between inpatient services, but no information as to consumer transfers between wards.

The RAT was used primarily to capture inpatient nursing resource but an added benefit of the RAT was its power in identifying which unique ward a consumer was receiving services in on each particular shift and on each particular day. This information was vital in the creation of a table of ‘inpatient days’ that was required for costing purposes.

There were significant mismatches, however, amongst the three tables that identified inpatient days (*Episodes*, *MHINC inpatient episodes* and *RAT*). For example, 24% of RAT records recorded consumer attributable time = 0 mins. These may have been interpreted as indicating that either the consumer was absent on the shift (on leave) or that he/she genuinely received no consumer attributable time. When aggregated at the date level, this showed that 7% of RAT consumer days had zero sum consumer attributable time over the three shifts, implying that the consumer was on leave. However, when dates were compared with the ‘official’ record of leave (*MHINC leave details*) there was poor concordance.

Similarly, a significant number of inpatient days recorded on RAT did not ‘belong’ to any inpatient episode recorded on the *Episodes* table (and, in some cases, ‘belonged’ to a community episode). The reverse was also true but to a lesser extent – inpatient episodes were recorded on *Episodes* that had no RAT records for any single day of the registered episode.

A related issue concerned those consumers who, according to the RAT records, were in more than one ward on any particular day (i.e. had RAT minutes >0 from more than 1 inpatient team). While this reflects the reality of inter-ward transfers, it created problems in terms of the allocation of overheads, infrastructure costs and ‘General Time’ costs for nursing staff, which represent approximately 70% of the total costs of inpatient episodes.

The following approach was adopted which drew on all three data sources to identify leave days falling within the boundaries of inpatient episodes registered on the *Episodes* table:

- Leave was only deemed to have occurred where RAT minutes = 0 and the MHINC Leave record indicated the consumer was on leave. (Total leave days by this approach represent approximately 3.4% of CAOS inpatient episode days.)
- Overhead and infrastructure costs were to be allocated to all inpatient days deemed ‘non leave’, regardless of RAT time.

8.2.3 Community activity data

Community activity data were received in the form of MHINC and CAOS contact records that had been pre-processed and encrypted by the NZHIS. Consequently, many of the standard MHINC data

elements in each record had already been validated to ensure DHB, team code and service types etc were valid codes. Only those CAOS specific data elements - contact duration and labour category - had to be validated.

Of the approximately 561,000 activity records received via MHINC, a number were culled from the final activity dataset for one or more of the following reasons:

- activity dates were outside the study period
- community activity had been recorded by an inpatient team
- an in-scope team was subsequently set to out-of scope

Activity records were further reduced with 49,140 contact hours (or 22.4% of the total hours reported) being excluded from the final dataset because there was either:

- no episode recorded for the consumer; or
- the activity reported fell outside the episode boundaries.

In-scope teams set to out-of-scope:

Four 'in-scope' community teams were subsequently set to 'out-of-scope' after an assessment was made of the amount of MHINC time reported by these teams for the six-month period of the study. In each case the very low amount of staff activity meant that the cost of any consumer contact by these teams was disproportionately high and had the potential to confound the overall episode costs. For this reason they were excluded from the study.

Editing contact duration

Contact duration data were examined for exceptionally high or low time values. Exceptionally high values were considered as those greater than 720 minutes (equivalent to a 12 hour shift). Values above this were trimmed to 720 minutes irrespective of service code. At the lower end, values of 0 or 1 minute contact duration were interpreted as data entry errors as most sites used electronic systems to collect activity data. Contact duration recorded as 0 minutes were converted to 10 minutes and durations of 1 minute were converted to 1 hour. These modifications were made after consultation with the affected sites and in relation to the reported service codes.

The final check on contact duration was to ensure that all records coded as 'did not attend' had a standard contact duration of 15 minutes as per the study methodology. Those that did not comply were modified to 15 minutes.

Remapping of labour category codes

To ensure that the time reported could accurately be converted to cost activity data, cost centre and labour category data were aligned with the monthly payroll data. Inaccuracies were found in the labour category reported within the activity data as well as inaccuracies in the way that payroll data had been reported. Some remapping of labour category codes on activity records was therefore required to ensure alignment between costs and activity.

In some instances remapping was not an option, for example those activity records with an invalid labour category code of '0000'. These records accounted for 1,200 contact hours and could not be resolved by either the National Project Team or the site involved. In order to retain the records, costs were deemed for each of the contacts and costing buckets created to allow them to be included in the costing process¹⁸.

¹⁸ For further details on the costing process for these records see Section 8.6.2.

Group and Day Programme Contacts

It was agreed with sites that day programme costs were to be apportioned on the basis of total time of attendance. This required that the group or day programme centre simply record one contact plus the attendance duration for each consumer attending the programme each day. Thus, day programme staff could be exempted from the requirement to record exact contact time per individual consumer attending the programme or group.

In practice this methodology was flawed as not all group and day programme contacts were reported consistently either within sites or across sites. In some instances, day programme contacts were reported as 'groups' and groups reported as 'day programme' attendances. Also, in some cases multi-staff contacts were recorded, and in others they were not.

This presented the National Project Team with a conflict in terms of how to best cost these contacts. As a resolution, bona-fide day programme teams were identified and separated from group programmes. It was decided that day programme costs would be distributed based on the total number of contact days per consumer and not the total contact time.

While this method was a good compromise for day programmes it could not be applied to group contacts where the groups themselves were not separately defined or receiving a separate share of the teams' costs.

A decision was therefore made to allow the contact duration for group contacts to remain unedited and to compete with all other service use for time (and costs) for the consumer concerned. It is our belief that while the process for recording group contacts was inconsistent across sites and within sites; it was at a minimum consistent within each team.

8.3 Validation of episode and clinical ratings data

8.3.1 Validation of episode details

Over the 6-month data collection period a total of 20,946 episodes were submitted to the study by the 8 participating sites.

Two methods of collecting episode details (and associated clinical ratings) were used:

- Three sites opted to modify their existing software to enable collection of the data elements required by the study. This data was then imported to an Access database specifically designed and built for the study (the 'CAOS Software').
- The remaining 5 sites collected episode details on CAOS Forms and then manually entered this data to the CAOS software.

The CAOS software had built-in checks and controls to ensure logical sequence of form entry and minimise data entry errors as much as possible. Despite these safeguards, there were many instances where one episode had not been ended before a second episode was started. This caused anomalies where, for example, a consumer appeared simultaneously in hospital and in the community, or was registered twice for the same episode. Considerable time and effort was spent on reconciling overlapping and embedded episodes, relying largely on careful inspection of staff activity data to corroborate the episode data presented.

In addition to the MHINC community contact data received from sites via NZHIS, over 180,000 additional MHINC records were also received. This additional data allowed validation on various components of the CAOS episode dataset where the data may have been missing or where details in 2 episodes for one consumer were mismatched. The tables included:

- Diagnosis details
- Legal status details
- Discharge details
- Inpatient leave details

As described in Table 27 a series of edits was implemented to align the required episode components.

Table 27: Summary of edits to episode records

PROBLEM	SOLUTION	RATIONALE
Overlapping community episodes – 1 st episode ended and 2 nd episode started on same date due to 3 month review	The new episode starts on the date of review, 1 st episode end date modified one day earlier.	Activity recorded on the date of the review is included in the 2 nd episode. In some instances this is the only activity recorded for that episode.
Overlapping episodes – change of setting, inpatient-community-inpatient or vice versa on same day.	Community episodes trimmed to give inpatient episode days preference.	Higher costs associated with inpatient days.
Embedded episodes (episode starts before a previous episode has been ended)	Community episodes ended prior to inpatient episode start based on RAT data.	One episode only allowed at any one time.
Community episodes with blank end date.	End dates modified based on one or more of the following: last MHINC activity date; or where community activity existed into July 2002 end date was set to study end (31 July 2002) and end reason modified to “Episode Ongoing, Study End”; or MHINC discharge details used in some instances.	All episodes have start and end dates.
Community activity exists within study period prior to episode start date.	Episode start date modified up to 14 days in the past based on MHINC activity data and service code.	All costs included in episode.
Episodes with no community MHINC activity data or no RAT.	Episode deleted where no activity at all for the study period or no activity within the episode period. Total deleted: 1,352.	No activity to cost.
Inpatient episode with no end date.	Modified using last RAT entry date together with discharge details provided to MHINC.	All episodes have start and end dates
Episode ends missing ‘Diagnosis’, ‘Legal Status’ and/or ‘Focus of Care’.	Where a previous episode existed with valid entries and the episode missing the data was the result of an episode review, the missing fields were substituted from the first episode.	The collection of all consumer attributes hypothesised to drive resource utilisation was necessary to allow class finding.
Episodes missing ‘Diagnosis’ where a previous episode with valid diagnosis is not found.	If a principal or provisional diagnosis existed within MHINC data for a date within 28 days either side of episode end date, this diagnosis was used as ‘principal diagnosis’. Where	Diagnosis was one of the consumer attributes hypothesised to drive resource utilisation and was therefore necessary for class finding.

PROBLEM	SOLUTION	RATIONALE
	more than one diagnosis type existed, principal diagnosis took precedence.	
Episodes missing 'Legal Status' where a previous episode with valid legal status is not found.	If a valid legal status existed in MHINC data within the episode period, this was used as 'legal status'. If more than one legal status existed within the period, one involuntary and the other voluntary, then the legal status was set to 'involuntary'.	Legal Status was one of the consumer attributes hypothesised to drive resource utilisation and was therefore necessary for class finding
Episodes which start or end outside the study period.	Deleted.	Out of scope.
Episodes with an End Reason of 'Review' and an End Date of 31/07/2002.	End Reason modified to 'Episode Ongoing, Study End'	Assumes data entry error.
Episodes listed as Assessment Only, with an End Reason of 'Episode Ongoing, Study End' and a blank end date.	End Date set to equal Start Date and End Reason modified to identify the episode as assessment only.	Assessment Only episodes limited to 2 community treatment contacts.
RAT minutes recorded for dates outside inpatient episode boundaries	Episode end dates modified to include days where inpatient RAT data recorded.	It was assumed that in those cases where nursing staff had specifically recorded staff time against the names of individual consumers then it was likely that they were present on the ward.
'Assessment Only' episodes with > 2 community treatment days.	Episodes initially identified as Assessment Only with more than 2 treatment days reassigned as 'Direct Care'.	As per study design rule where an assessment only episode could not exceed 2 treatment contacts.

After all the validations on only the episode data had been completed, 19,239 episodes (approximately 92% of all episodes submitted) remained in the dataset for the purposes of analysis and class findings. Of those episodes deleted, 6% were deleted because no activity (either inpatient RAT or community MHINC) was reported for those episodes.

Conversely, as discussed above, 22.4% of all community contact hours reported were excluded from the final analysis because no episode registration had been completed or activity still fell outside episode boundaries after the above edits had been performed.

8.3.2 Validation of clinical measures

Validation of clinical measures were carried out to ensure only those clinical ratings that were considered complete were included in the development of the classification. Validations carried out were in line with the NZ-CAOS study methodology and were applied to the following clinical measures:

- HoNOS/HoNOS65+
- HoNOSCA
- LSP-16
- RUG-ADL
- CGAS
- FIHS
- Other Child & Youth Measures

All clinical measures were validated in much the same way. For instance, where the HoNOS/HoNOS65+ summary subscales scores were missing more than one individual item, the

rating was excluded from analysis of that specific subscale. An example of this is the HoNOS behaviour subscale score that is based on the sum of HoNOS items 01, 02 and 03. Items that were coded as 'not known/not applicable' or 'missing' were excluded from the calculation and treated as being reported as '0'. If more than one component item was excluded, the subscale score was deemed to be invalid and the measure was excluded from that specific class finding analysis.

Where individual HoNOS items were valid, ie not reported as 'not known/not applicable' or 'missing', these items were included in analysis even though the whole set of HoNOS items may not have been collected for the consumer concerned.

The same validation methodology was true for other measures where total or subscale scores are calculated. This allowed maximum use of the clinical dataset collected for inclusion in class findings.

8.4 Validation of non consumer-attributable data and consumer-related travel data

Non consumer-attributable time and consumer-related travel time data were both collected via a one-week survey in June 2002. The data was submitted on paper forms and entered into a purpose-built central database. To ensure these two data elements were measured accurately in terms of what proportion of the working week they each represented, the total number of hours worked for the survey week was also collected.

Compliance with the survey completion was measured by the number of returns against the number of paid FTEs in each labour category and team as reported by DHBs for the month of June 2002. Compliance ranged from 0% to over 100%. In some cases incorrect compliance figures were, caused for example by an incorrect labour category code or team code being recorded, thereby raising the compliance of one 'group' while reducing that of another. Compliance reports were submitted to each DHB for review and edits were made to incorrect labour category codes where these could be identified.

After these edits were completed, a labour category within a particular team and DHB was said to be compliant where a minimum of 60% of the paid FTEs in that labour category and team had completed a survey. For those records that achieved compliance of 60% and above, it was assumed that the responses received from staff in that labour category in that team represented all staff in that labour category from that team. Of all records received, 51% achieved the compliance threshold.

Where the minimum compliance threshold was not achieved, a methodology for substitution was developed in consultation with all DHBs in order to ensure that each combination of labour category, team and DHB had a valid percentage of time allocated to non-consumer attributable time (N) and to consumer-related travel time (T)¹⁹.

Substitution options for non-compliant labour category/team combinations were developed and agreed with DHBs. The following methods of substitution were adopted, shown here in order of preference:

1. Substitution of the average N% and T% for the respective labour category from a similar team type within the specific DHB.
2. Substitution of the average N% and T% for the respective labour category from data supplied by similar team types across all DHBs.
3. Substitution of the average N% and T% for the respective labour category across all DHBs regardless of team type but divided into community and inpatient setting.
4. Substitution of the average N% and T% for the respective labour category across all DHBs, regardless of team type or setting.

¹⁹ All N and T costs are excluded from consumer costing, along with the share of infrastructure and overhead costs allocated to N activities. Both were required to identify the 'General Time' (G) component remaining after consumer-related time (P) had been identified through staff activity data (See Chapter 7).

5. Finally, the option was also available to substitute data for a specific team code which had achieved the threshold compliance.

When using ‘averages,’ only data from those teams that exceeded the minimum threshold requirement were included. For smaller sized labour category records (ie; less than 4 FTEs) it was elected to use the information returned by staff within that labour category as being representative of the entire labour category for that team rather than making substitutions on the basis of information supplied by the same labour category in other teams.

Individual substitutions were made on a case-by-case basis, the decision made being affected by the overall compliance of the team and DHB, and by the sample size of each substitution option. For example, if option one had a sample size of 2 records and option two had 12 records, option two was chosen. Table 28 and Table 29 show the distribution of the above 5 substitution categories in the final dataset.

Some records that achieved the compliance threshold exceeded the credible threshold for the treatment setting (15% for community settings, 10% for inpatient settings). In these instances, 13.5% of all records, substitution methods as described above were applied to ‘trim’ exceptional values.

Table 28: Distribution of substitutions by labour category

Labour Category	Substitution Method					Compliant
	1	2	3	4	5	
Allied Health	0%	3.4%	31.5%	23.6%	0%	41.6%
Medical	0%	0%	35.8%	42%	0%	22.2%
Nursing	0%	1%	31%	14.4%	0%	53.3%

Table 29: Distribution of substitutions by team type

Team Type	Substitution Method				Compliant
	2	3	4	5	
Inpatient Team	0%	48.2%	30.4%	0%	21.4%
Community Team	5.7%	34.3%	17.1%	0%	42.9%
Child & Adolescent Team	0%	24.0%	24.0%	0%	52.0%
Forensic Team	0%	48.8%	0%	0%	51.2%
Kaupapa Māori Team	0%	23.1%	69.2%	0%	7.7%
Pacific Island Team	0%	0%	100%	0%	0.00%
Community Skills Enhancement	0%	0%	0%	0%	100%
Intellectual Disability Dual Diagnosis Team	0%	0%	100%	0%	0.00%
Psychogeriatric Team	0%	19.0%	19.0%	0%	61.9%
Youth Specialty Team	0%	0%	66.7%	0%	33.3%
Maternal Mental Health Team	0%	16.7%	33.3%	0%	50.0%
Eating Disorder Team	0%	0%	66.7%	0%	33.3%
Needs Assessment & Service Coordination Team	0%	0%	50.0%	0%	50.0%
Specialist Psychotherapy Team	0%	0%	33.3%	0%	66.7%

8.5 Validation of other service utilisation data

Pharmacy, ECT, Imaging and Pathology data submitted amounted to 93,404 records that required only minimal validation. Records belonging to consumers who were not in in-scope teams or who had no episode registered were excluded from analysis. Dates were checked to ensure all services were provided within the study period and a final check was made to ensure each record had valid data elements. This ensured, for example, that all pharmacy records were submitted only for the top 6 high cost drugs as per the study methodology.

8.6 Validating costing data

Financial data required for costing was the final set of data submitted to NZ-CAOS. Validation and realignment of this data took significant time and resource as each sites' data presented the National Project Team with a different set of issues to resolve.

Many issues were only identified once the final dataset was complete and in some cases required review of previous analyses and edits.

8.6.1 Issues with inpatient costing:

1. Conflicts between RAT, Episodes and MHINC – Inpatient Episodes required the development of a methodology for identifying inpatient days to allow overhead and infrastructure costs to be accurately allocated. (This led to the creation of the *EpiDays* table).

2. Consumers who, according to RAT, were in more than one ward on any particular day caused problems in how to allocate overhead, infrastructure and 'General time' nursing staff costs. This was resolved by allocating nursing P costs on the basis of RAT time, regardless of the number of wards, and confining the allocation of all other costs to the ward with the highest RAT minutes only.
3. Low compliance with RAT at one site led to the RAT being removed as a cost driver and all inpatient costs for that site allocated on the basis of bed days.
4. Allocation of inpatient costs where RAT time was recorded on a date when the consumer is not within an inpatient episode was resolved as follows:
 - *Where the consumer was in a community episode* – nursing P costs were allocated on the basis of RAT time;
 - *Where the consumer was not in any episode* – costs were allocated as per a standard inpatient day (these costs were excluded from class findings).
5. Allocation of inpatient allied health P costs for one site (where allied health, as well as nursing staff collected RAT in an inpatient unit) were allocated on the basis of reported RAT time.

8.6.2 Issues with community costing

1. A significant number (22.4% of all contacts) did not 'belong' to a community episode; 60% of these because no episode had been recorded, with the remainder falling outside the boundaries of existing episodes. This was resolved by assigning costs to all community contacts and then later excluding those 'episode-less' costs from the casemix classification analysis.
2. Day programmes created special problems because the contact minutes recorded by some teams significantly inflated service utilisation estimates and would have resulted in those individual consumers receiving excessive episode costs. It was resolved to allocate clinical labour costs for day programmes on the basis of 'total contact days' rather than consumer attributable time. Day programme teams were therefore identified as a separate type of community setting on the 'teams' reference table.
3. A number of community contact records from one site were reported with an invalid labour category of '0000'. Where possible these were assigned a valid code, but 1,600 contacts remained across a range of team codes with no valid labour category and accounting for 1,200 contact hours for that site. To resolve this issue a special code for labour category '0000' was added to the costing reference tables and new cost buckets created for this labour category. An average cost was calculated using the total hours and average hourly labour costs for each team involved. This was viewed as a better option than excluding these records' contact time completely.

9. Results: profile of consumers and episodes

9.1 The consumer cohort

This study is the first time that mental health information on consumer attributes, service delivery inputs and service costs have been integrated into one dataset in New Zealand and consequently the potential power of the final consolidated database to inform future service improvements is significant. However there are a few issues to bear in mind when considering the findings.

It must be remembered that the findings represents a sample of the *treated population* only and that incidence and prevalence figures cannot be extrapolated from these findings and applied to the general population. The current epidemiology study (also being undertaken under the Mental Health Research and Development Strategy) will give us much better information about the mental health of the general population and will offer a benchmark with which to review the findings regarding the CAOS consumer cohort. This issue is of particular relevance to Māori and Pacific peoples where there are differences in the age structure compared to the general population that are not reflected in the CAOS analysis and which have the potential to confound the findings.

It is also important to treat the findings with caution and not to over-interpret them in lieu of possessing other good mental health data with which to inform service development. If anything the findings from this study have raised as many questions as answers and provide other researchers with a platform from which to interrogate the data further (see appendix one for suggested research topics). For this reason the results should be seen as indicative rather than definitive until such time as corroborative research is undertaken.

We have taken particular care to document the problems we observed with data quality and want to emphasise that, whilst these problems affected the overall size of the sample, they did not affect the final 'representativeness' of the sample as sufficient volumes of consumer episodes were observed in the majority of classes with only a few exceptions (eg; child and youth inpatient episodes).

All three data building blocks were affected in one way or another to varying degrees at each DHB site. Broadly the problems fall under four main headings:

- Consumer episodes without accompanying staff time.
- Staff time without accompanying consumer episodes.
- Consumer episodes that had staff time but had incomplete ratings.
- Incorrect labour categories.

The issues with data quality give further cause for the sector to proceed with some degree of caution when interpreting the findings. This study has few precedents internationally and one of the reasons for this is that casemix classification development is very difficult to do. NZ-CAOS had a year to assist DHB sites to ready themselves for the demands associated with data collection for this study and as a result has gathered the best available information that could possibly be reported by clinical staff already coping with the demands of working in busy specialist mental health services. With the above caveats in mind, let us consider what we found.

9.1.1 Consumers by District Health Board

In total, 19,239 episodes of care were captured over the 6-month study period. These episodes were provided to a total of 12,576 individual consumers. Table 30 shows that the majority of consumers received care at only one DHB throughout the study period. But 2.3% of consumers received care at more than one DHB.

Table 30: Number of DHBs providing treatment to consumers in NZ-CAOS

Number of DHBs	Number of consumers	% of consumers
1	12290	97.7%
2	273	2.2%
3	11	0.1%
4	2	0.0%
Total	12576	100.0%

Table 31 shows the number of episodes per consumer at each District Health Board (DHB). As some consumers received care at more than one DHB, they are counted more than once in this table.

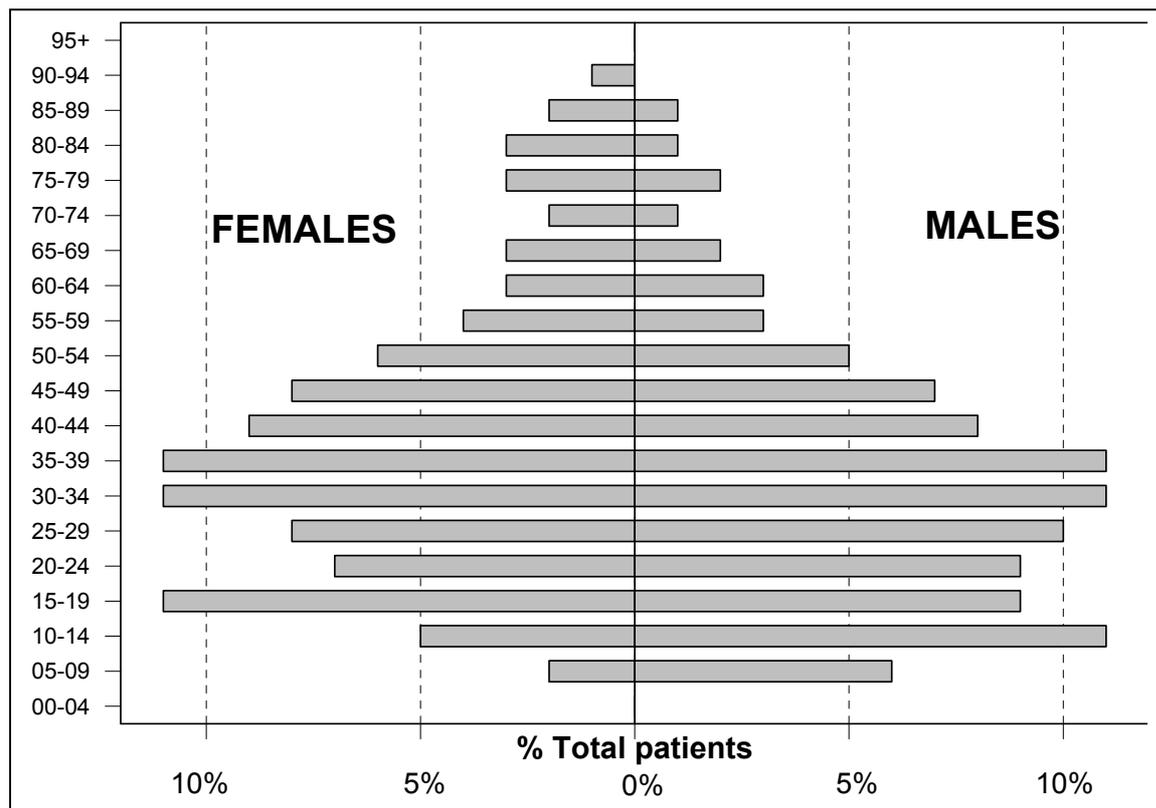
Table 31: Number of consumers by DHBs in NZ-CAOS

District Health Board code and name		Number of consumers	% of consumers
1022	Auckland Healthcare	3623	28.1
4131	Healthcare Otago	2322	18.0
3091	Capital Coast Health	2088	16.2
2031	Health Waikato	1213	9.4
1011	Northland Health	1146	8.9
1023	South Auckland Health	860	6.7
2042	Lakeland Health	849	6.6
1021	Waitemata Health	776	6.0
Total episodes		12877	100.0%

9.1.2 Age and sex profile

Males and females were represented in roughly equal numbers, with a male:female ratio of 53:47. The consumer sample covered all age groups, although adults in the age range 20-50 comprise 55% of the sample (Figure 23). Males outnumbered females within the group of child and adolescent consumers (age 0-19 years; 26% of all males v 19% of all females), but the reverse was true for consumers aged over 65 years (7% of all males v 14% of all females). Overall male consumers were significantly younger than female consumers (33.6 years v 39.6 years respectively).

Figure 23: Age and sex distribution of the NZ-CAOS consumer sample



9.1.3 Ethnicity profile

The majority of consumers identified themselves as NZ European / Pakeha (62%), approximately 20% as Māori and approximately 5% as Pacific Islander. Information regarding ethnicity was extracted from the study specific Person table. In the rare event that ethnic information was missing for persons on that table, information was deemed from the MHINC – Person table where the first ethnic group was taken, and where that was missing the second and third fields were taken. This occurred in less than 1% of all cases. Detailed and grouped levels classifications of ethnicity are shown in Table 32 and Table 33.

Table 32: Ethnic group of the NZ-CAOS consumer sample – detailed

	Number	Percentage
NZ European / Pakeha	7789	61.9%
Māori	2461	19.6%
Other European	587	4.7%
Other	301	2.4%
Samoan	261	2.1%
European not further defined	194	1.5%
Indian	138	1.1%
Not stated/Missing	128	1.0%
Chinese	119	0.9%
Cook Island Māori	113	0.9%
Other Asian	90	0.7%
Tongan	77	0.6%
Niuean	70	0.6%
Middle Eastern	61	0.5%
African	40	0.3%
Fijian	27	0.2%
Other Pacific	27	0.2%
South East Asian	23	0.2%
Pacific Island not further defined	21	0.2%
Asian not further defined	21	0.2%
Tokelauan	16	0.1%
Latin American / Hispanic	12	0.1%
All	12576	100.0%

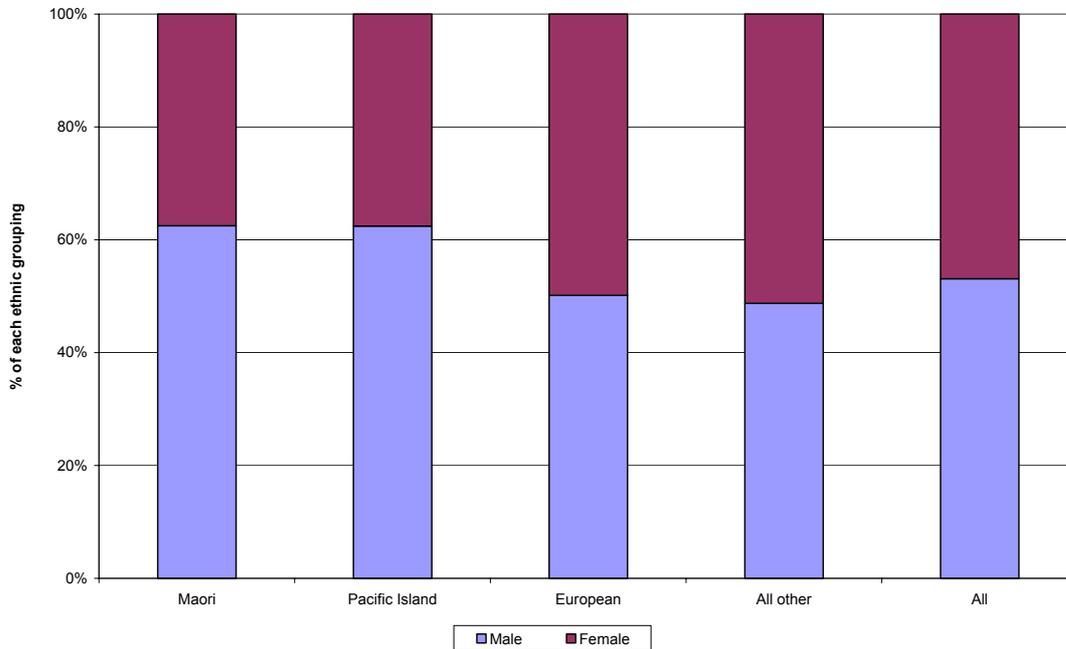
As per previous statements about the collection of ‘ethnicity’ the CAOS dataset combined data from both CAOS and MHINC collections to reduce the number of ‘not stated/missing’ ethnicity. This decision means that the prioritization algorithm used by NZHIS was not applied to all the data. Any other researchers using the dataset should consider using only that data supplied to the study by NZHIS when making comparisons with general population statistics as both Statistics NZ and NZHIS use the same prioritisation algorithm.

Table 33: Ethnic group of the NZ-CAOS consumer sample – higher groups

	Number	Percentage
NZ European / Pakeha	8570	68.8%
Māori	2461	19.8%
All others	805	6.5%
Pacific Island	612	4.9%
All	12448	100.0%

Further analysis of major ethnic grouping by sex showed that there was a higher proportion of males in the Māori & Pacific Island groups relative to the European and All Other groups in the study (Figure 24). Episodes with missing data were excluded.

Figure 24: Major ethnic groupings and sex proportions for NZ-CAOS consumer sample



9.1.4 Profile of socioeconomic status

Figure 25 shows the distribution of consumers across the NZ CAU Index of Deprivation. This measure is an index of social deprivation derived from small geographic area NZ census data. A 'decile' represents 10% of the total NZ population. People in the '1st decile' live in areas that have the lowest rate of social deprivation. People in the 10th or 'top decile' live in areas that have the highest rate of social deprivation. If NZ-CAOS consumers represented the NZ population as a whole, 10% would be in each decile. As this figure shows, this is clearly not the case. The higher the level of social deprivation, the higher the proportion of NZ-CAOS consumers in the decile. In total, 40% of consumers are in deciles 1 to 5 (deciles with below average levels of deprivation) and 60% in deciles 6 to 10 (deciles with above average levels of deprivation).

Figure 25: Index of deprivation profile of NZ-CAOS consumers

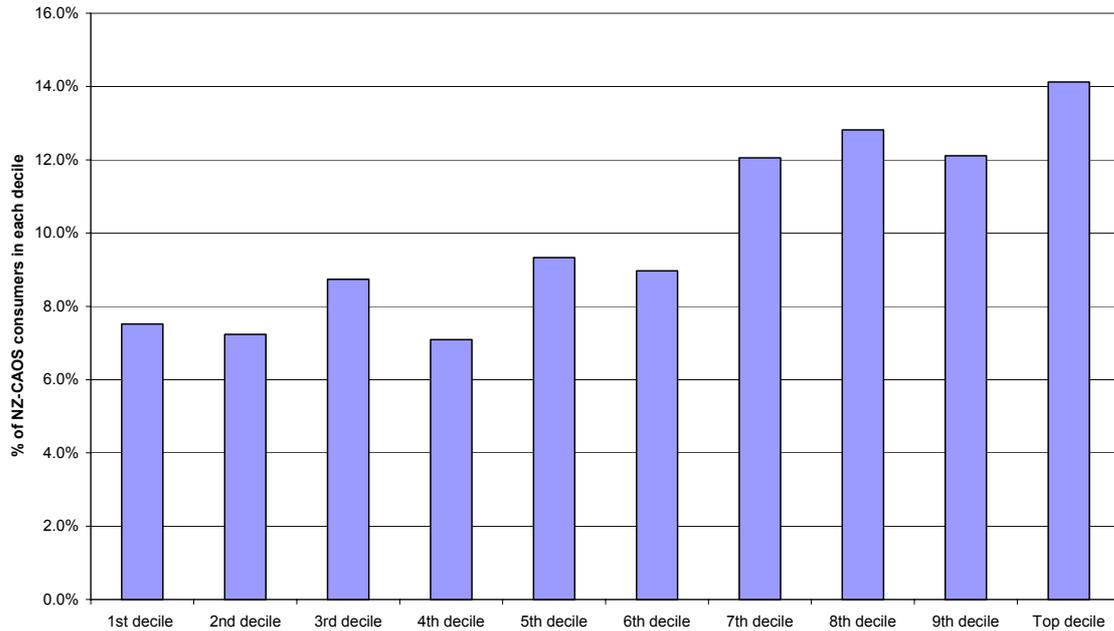
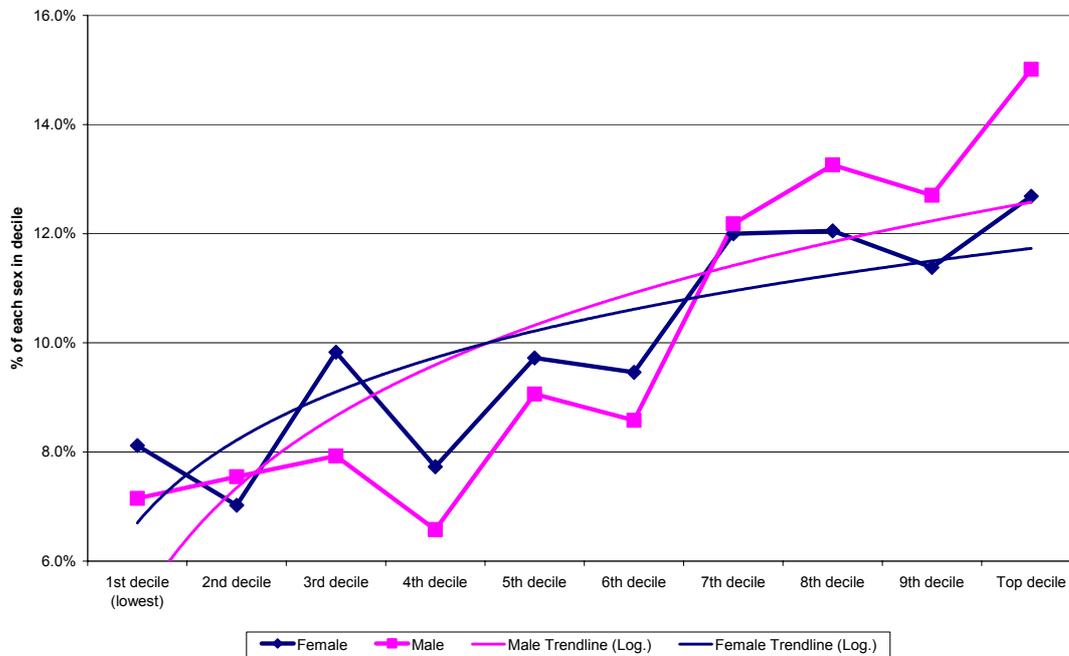


Figure 26 shows the distribution of the NZ CAU Index of deprivation by sex. Both sexes are over-represented in the deciles representing higher deprivation. Overall, the trendlines in this figure indicate that males are more likely than females to live in areas of higher social deprivation.

Figure 26: Index of deprivation deciles by sex for the NZ-CAOS consumer sample



Further analysis of the deprivation index showed that males were over-represented in the top 30% of areas characterised by disadvantage. Females were over-represented in the least disadvantaged area as well as those identified at deciles 3 & 4.

Analysis to date has considered univariate and bivariate distributions only. Two further sets of multivariate analyses were undertaken on these four sociodemographic variables to more completely characterise the consumers in the study: (i) comparisons of age, sex and ethnic grouping profiles, and; (ii) comparison of age, sex and CAU deprivation profiles. These are presented in the following figures.

Figure 27 shows a higher proportion of European males aged 5 to 14 years, relative to Māori and Pacific Islander groups; this trend is reversed for those aged 20 to 39 years. There is a higher proportion of European males aged 40 years or more relative to the Māori and Pacific Island groups.

Figure 27: Ethnicity and age proportions for NZ-CAOS consumer sample - Males

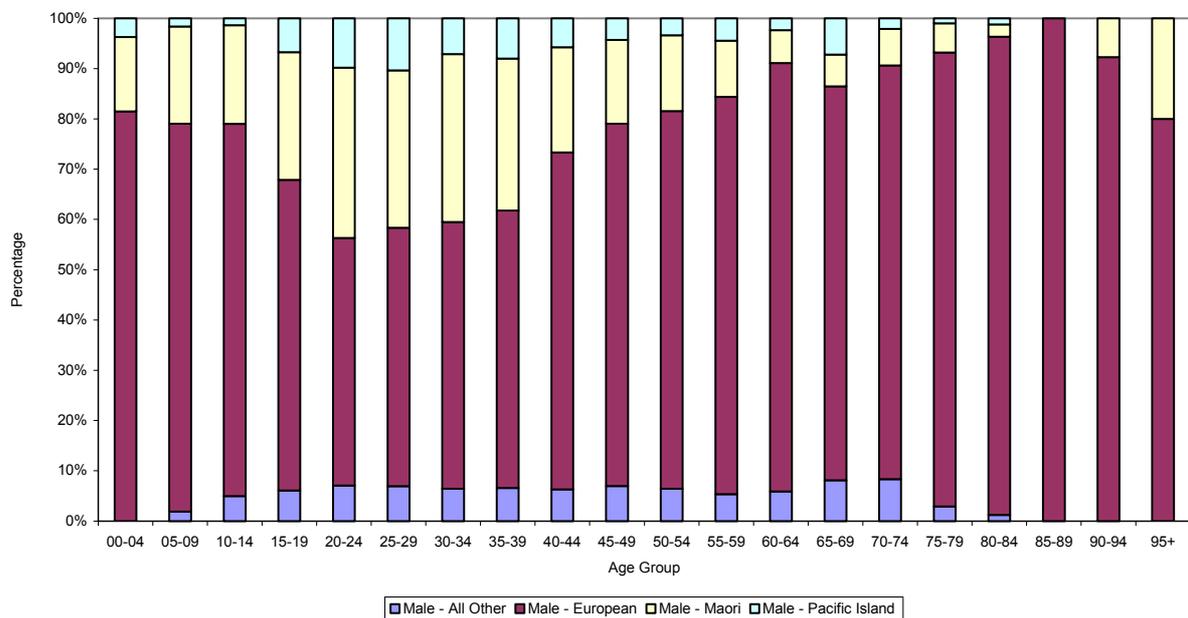


Figure 28 presents the corresponding analysis for female consumers where similar patterns of age and ethnic grouping effects can be seen. As previously stated, these figures reflect the characteristics of the *treated population* and no adjustments have been made to reflect the different age structures of the general Māori and Pacific population.

Figure 28: Ethnicity and age proportions for NZ-CAOS consumer sample - Females

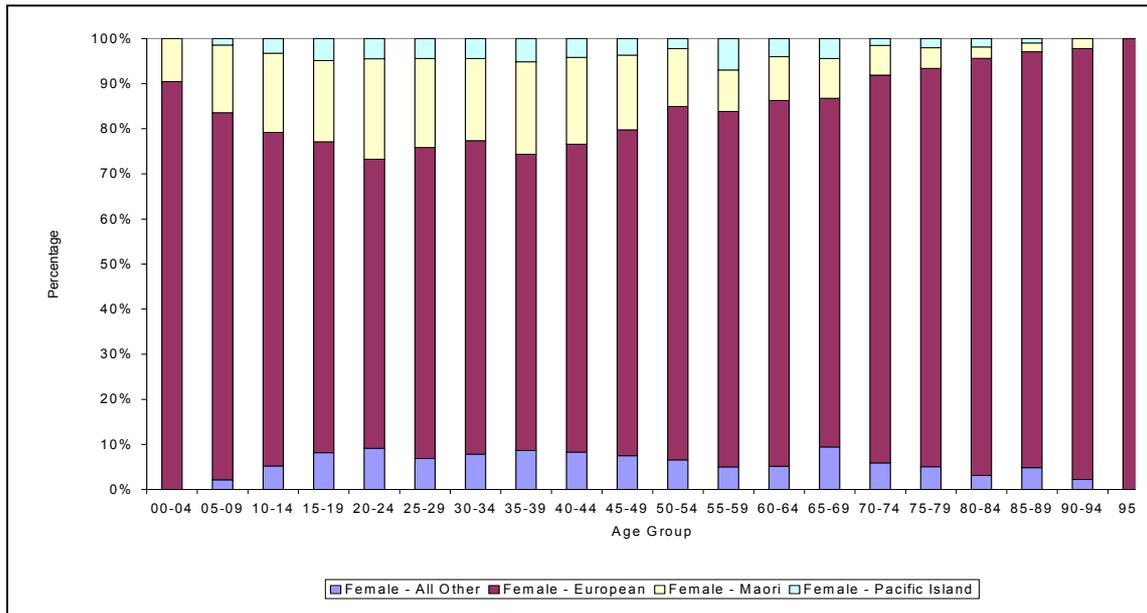
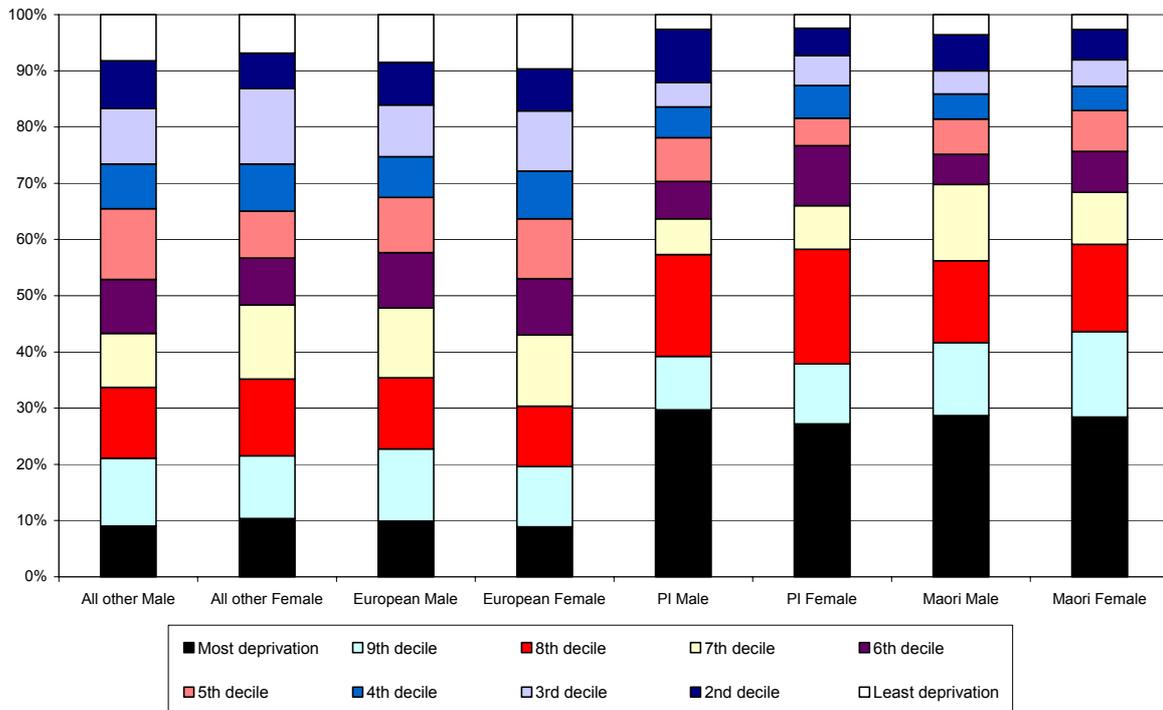


Figure 29 shows the deprivation profile by sex and ethnicity. European males and females have deprivation profiles that are close to, but worse than, the population of NZ as a whole. Among the European consumers, female consumers have lower levels of deprivation than male consumers.

Figure 29: Ethnicity and deprivation of NZ-CAOS consumers



The profile for Māori and Pacific Island consumers is significantly different for both sexes. About 30% of Māori and Pacific Island consumers (both males and females) fall into the most deprived decile. 77% of Pacific Island women fall in deciles 6 to 50 (compared to 50% for the NZ population as a whole). The comparable figures for other groups are 76% for Māori women, 75% for Māori men, 70% for Pacific Island men, 58% for European men and 53% for European women.

As previously stated these figures reflect the characteristics of the *treated population* only and no analysis has been undertaken regarding comparisons with the general population.

9.2 Episode profile

The last section reported on the profile of the 12,576 individual consumers in the study. This section profiles their mental health episodes of care.

9.2.1 Episodes by District Health Board

In total, 19,239 episodes of care were provided during the study period. Table 34 shows the number and percentage of episodes at each District Health Board (DHB). Over a quarter of episodes were provided by Auckland Healthcare, with a further 20% provided by Healthcare Otago and 15% by Capital Coast. The other five DHBs contributed the remaining one third of episodes.

Table 34: Episodes of care by District Health Board

District Health Board code and name		Number of episodes	% of episodes
1022	Auckland DHB	5367	27.9%
4131	Otago DHB	3919	20.4%
3091	Capital & Coast DHB	2876	14.9%
1011	Northland DHB	1801	9.4%
2031	Waikato DHB	1667	8.7%
2042	Lakes DHB	1394	7.2%
1023	Counties-Manukau DHB	1157	6.0%
1021	Waitemata DHB	1058	5.5%
Total episodes		19239	100.0%

NB: When reviewing these figures it is important to remember that Waikato, Counties-Manukau and Waitemata DHBs all contributed some services only to the study and consequently the episode figures are not reflective of actual activity for all services at all eight DHB sites.

9.2.3 Episode types

Table 35 shows the pattern of episodes in the study. 12,576 individual consumers received care during the study period. Of these consumers, 6,954 (55%) had only one episode during the study period. A further 39% had two episodes.

Of the 6,954 consumers who had only one episode, about two thirds had adult community episodes and a quarter had child and youth community episodes (see Table 36). Only 10% of single episodes were inpatient episodes. For the 4,908 consumers who had 2 separate episodes of care (9,816 episodes in total for these 4,908 consumers), the pattern was repeated with the majority of episodes being adult community episodes. Only 230 (1.8%) consumers had more than 3 episodes of care during the study period. Between them, these 230 consumers had a total of 1,017 episodes.

Table 35: Number of Episodes by Type of Episode

Number of episodes per consumer	Number of consumers	% of consumers	Total number of episodes	% of episodes
1	6954	55.3%	6954	36.1%
2	4908	39.0%	9816	51.0%
3	484	3.8%	1452	7.5%
4	167	1.3%	668	3.5%
5	43	0.3%	215	1.1%
6	12	0.1%	72	0.4%
7	6	0.0%	42	0.2%
10	2	0.0%	20	0.1%
All	12576	100.0%	19239	100.0%

Table 36: Number of Episodes by Type of Episode

Number of episodes per consumer	Adult inpatient	Adult community	Child and Youth inpatient	Child and Youth community	Total number of episodes
1	693	4611	36	1614	6954
2	1093	6983	30	1710	9816
3	541	869	21	21	1452
4	261	389	5	13	668
5	98	113	1	3	215
6	41	31			72
7	17	25			42
10	11	9			20
All	2755	13030	93	3361	19239

In total, the 12,576 consumers in the study underwent 19,239 episodes of care and received a total of 108,703 in-patient treatment days and 152,310 community treatment days (days on which a service to the consumer was recorded). The distribution of episodes across the broad episode types is summarised in Figure 30 and the distribution of consumer care days across the broad episode types is summarised in Figure 31.

Figure 30: Number of episodes by episode type

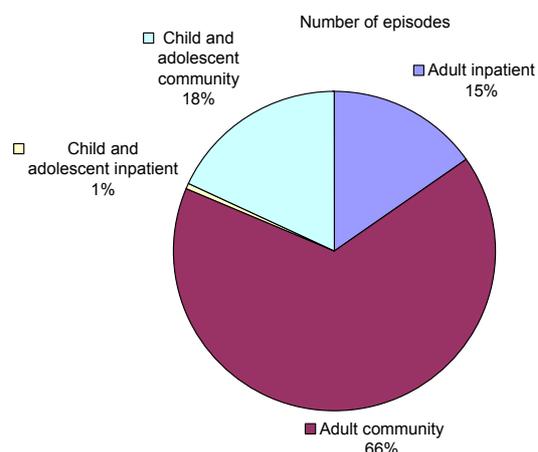
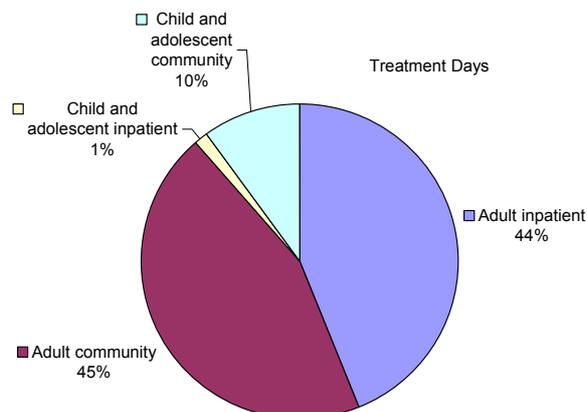


Figure 31: Number of consumer care days by episode type



9.2.4 Episode types by program class and sector

For the NZ-CAOS study, several different ‘episode of care’ types were distinguished and the frequency of these is shown in Table 37. It can be seen that community episodes were the most common across both program classes (adult and child / youth), accounting for 83% of episodes recorded by general adult services and 97% of episodes recorded by specialist child / youth services. Within the community setting episode types, further differentiation was made with respect to three episodes of care sub-types. Assessment Only episodes accounted for 8% and 3% of adult and child / youth episodes respectively; Shared Community Care 6% and 3% adult and child / youth episodes respectively, with the majority of community episodes classified as Direct Care.

Table 37: Episode of Care by Treatment Setting and Sector

Episode of Care Type	Speciality					
	Adult		Child and Youth		Total	
	number	%	number	%	number	%
Inpatient	2755	17.5%	93	2.7%	2848	14.8%
Assessment Only (community)	1318	8.3%	102	3.0%	1420	7.4%
Shared Community Care	897	5.7%	92	2.7%	989	5.1%
Direct Community Care	10815	68.5%	3167	91.7%	13982	72.7%
Total	15785	100.0%	3454	100.0%	19239	100.0%

9.2.5 Episodes of care and ethnicity

Episode of care types and speciality were further examined in terms of their distribution across the broad ethnic groupings. Results for adults are presented in Figure 32 and Table 38 and results for children and youth in Figure 33 and Table 39.

Figure 32 shows the mix of adult episodes as a percentage for each ethnic group while Table 38 shows the mix of ethnic groups within each episode type. For Adult Episodes, there is a higher proportion of Māori and Pacific Island consumers, relative to other ethnic groups, in the distribution of inpatient episodes. A small proportion of these groups had Direct Community Care episodes, especially compared to European consumers. Episodes with missing ethnicity data are excluded.

Figure 32: Episodes of care by type and ethnic group – Adult Episodes

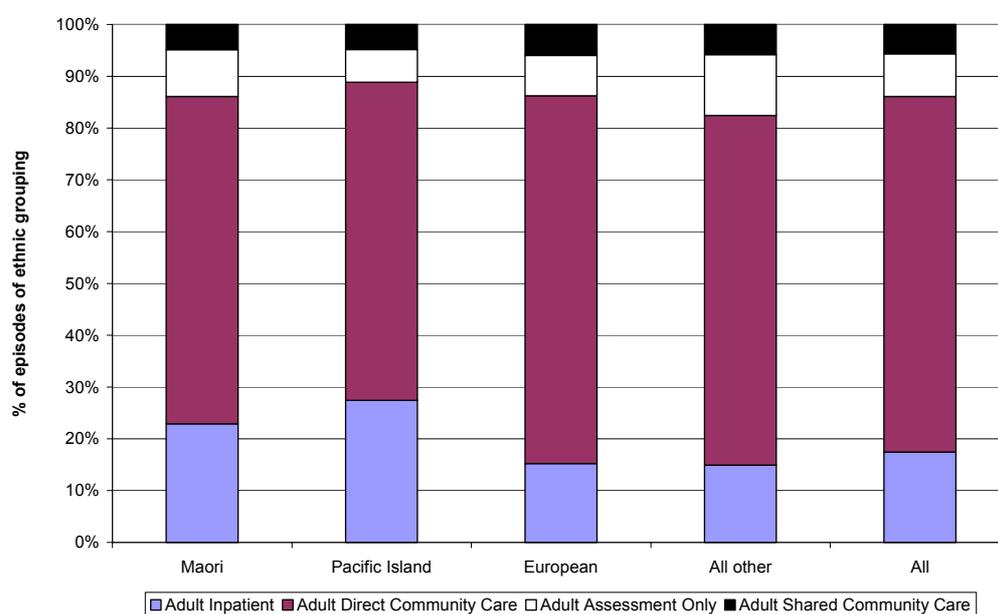


Table 38: Episodes of care by type and ethnic group – Adult Episodes

Episode of Care Type	Ethnic Group				
	1 Māori	2 Pacific Island	3 European	4 All Other	All
Inpatient	27.2%	8.9%	58.5%	5.3%	100.0%
Direct Community Care	19.1%	5.1%	69.6%	6.2%	100.0%
Assessment Only	22.8%	4.3%	63.9%	8.9%	100.0%
Shared Community Care	17.8%	4.9%	70.9%	6.4%	100.0%
All episodes	19.4%	5.0%	69.1%	6.5%	100.0%

Figure 33 shows the mix of child and youth episodes as a percentage for each ethnic group while Table 39 shows the mix of ethnic groups within each episode type. For Child / Youth Episodes, there were a higher proportion of Māori and Pacific Island consumers in the distribution of Assessment Only episodes, especially relative to European consumers and a smaller proportion who had Direct Community Care episodes. Again, episodes with missing ethnicity data are excluded.

Figure 33: Episodes of care by speciality and ethnic group –Child / Youth Episodes

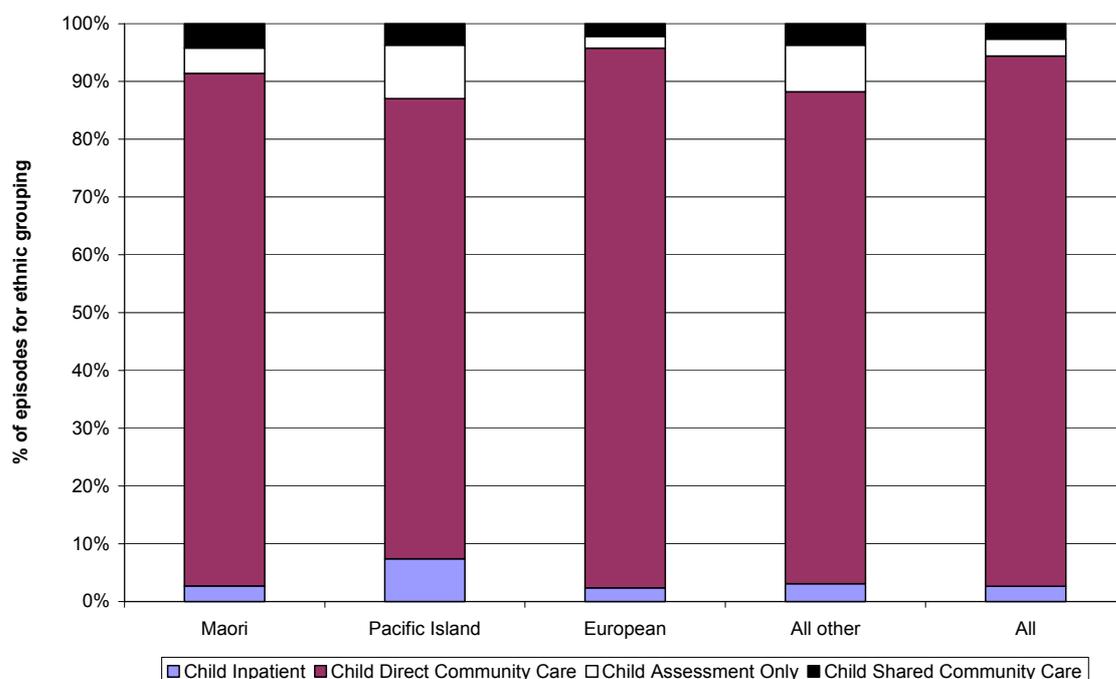


Table 39: Episodes of care by type and ethnic group – Child and Youth Episodes

Episode of Care Type	Ethnic Group				
	1 Māori	2 Pacific Island	3 European	4 All Other	All
Inpatient	17.8%	8.9%	67.8%	5.6%	100.0%
Direct Community Care	16.8%	2.7%	76.1%	4.4%	100.0%
Assessment Only	25.7%	9.9%	51.5%	12.9%	100.0%
Shared Community Care	27.5%	4.4%	61.5%	6.6%	100.0%
All episodes	17.3%	3.0%	75.0%	4.7%	100.0%

NB: The Māori Monitoring and Review Group commented that the figures for Māori child and youth episodes might not reflect the actual demand for services as Māori do not tend to access specialist child and youth services as much as their European counterparts.

9.2.6 Episodes of care by diagnosis

Episode of care types and speciality were further examined in terms of their distribution across broad diagnostic groupings, a classification developed for the Australian MH-CASC study. Results for adults are presented in Table 40 and Table 41 presents the same information for child and youth episodes. Assessment only episodes are excluded. In this and the subsequent table, the data are sorted in order of volume.

Table 40: Episodes of care by diagnosis – Adults

	Inpatient		Shared Community Care		Direct Community Care		All	
	No	%	No	%	No	%	No	%
3 Schizophrenia, Paranoia and Acute Psychotic Disorders	1328	48.2%	222	24.7%	3468	32.1%	5018	34.7%
4 Mood Disorders	783	28.4%	248	27.6%	3129	28.9%	4160	28.8%
16 Other/missing	197	7.2%	257	28.7%	2328	21.5%	2782	19.2%
11 Personality Disorders	124	4.5%	27	3.0%	344	3.2%	495	3.4%
5 Anxiety Disorders	29	1.1%	25	2.8%	430	4.0%	484	3.3%
1 Organic Disorders	106	3.8%	33	3.7%	299	2.8%	438	3.0%
7 Stress and Adjustment Disorders	53	1.9%	25	2.8%	360	3.3%	438	3.0%
2 Substance Abuse Disorders	75	2.7%	11	1.2%	182	1.7%	268	1.9%
9 Eating Disorders	9	0.3%	35	3.9%	82	0.8%	126	0.9%
6 Obsessive Compulsive Disorders	11	0.4%	2	0.2%	59	0.5%	72	0.5%
13 Mental Retardation	23	0.8%	7	0.8%	20	0.2%	50	0.3%
10 Behavioural Syndromes Associated with Physiological Disturba	3	0.1%		0.0%	40	0.4%	43	0.3%
14 Disorders of Psychological Development	6	0.2%	1	0.1%	26	0.2%	33	0.2%
15 Disorders of Childhood and Adolescence	1	0.0%	1	0.1%	25	0.2%	27	0.2%
8 Somatoform Disorders	3	0.1%	3	0.3%	13	0.1%	19	0.1%
12 Sexual Disorders	4	0.1%		0.0%	10	0.1%	14	0.1%
Grand Total	2755	100.0%	897	100.0%	10815	100.0%	14467	100.0%

For Adult episodes of care, overall profile is summarised in Figure 34. The most common diagnosis was schizophrenia and related psychotic disorders (approximately 35% of all adult episodes), followed by mood disorders (29%), with another 19% of episodes having either diagnoses that were outside the ‘mental health’ range or were not recorded. Diagnoses of schizophrenia and mood disorders accounted for approximately 77% of inpatient episodes compared with 61% of Direct Community Care episodes.

Figure 34: Episodes of care by percentage diagnosis – Adults

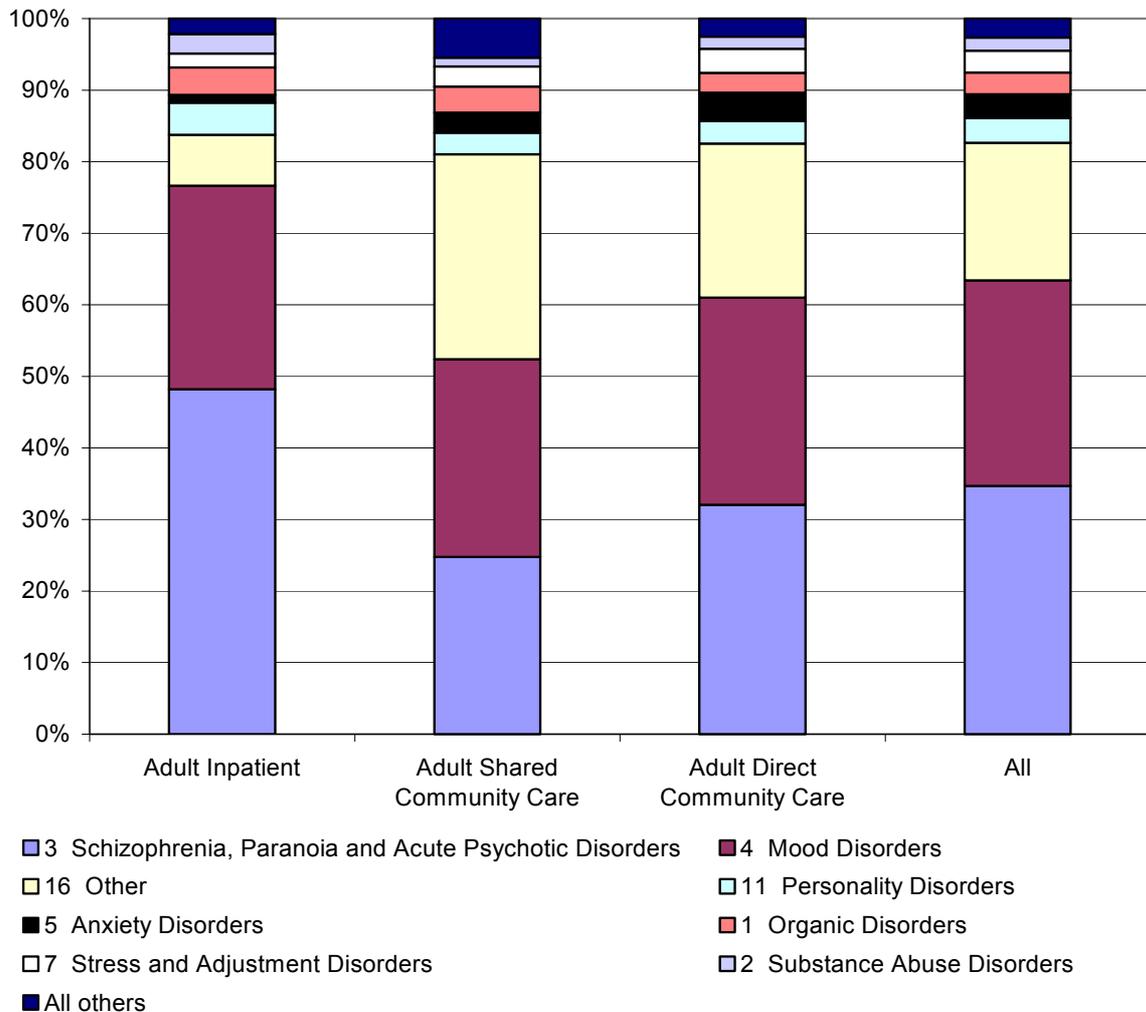
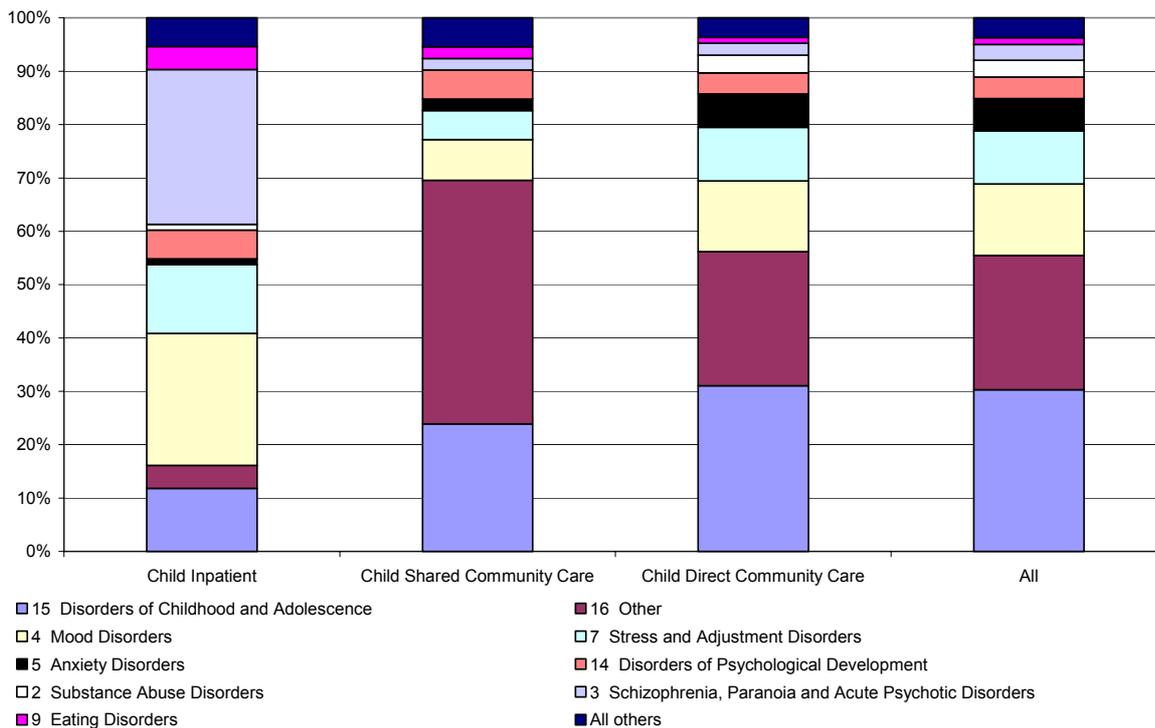


Table 41: Episodes of care by diagnosis – Child / Youth

	Inpatient		Shared Community Care		Direct Community Care		All	
	No	%	No	%	No	%	No	%
15 Disorders of Childhood and Adolescence	11	11.8%	22	23.9%	983	31.0%	1016	30.3%
16 Other	4	4.3%	42	45.7%	797	25.2%	843	25.1%
4 Mood Disorders	23	24.7%	7	7.6%	420	13.3%	450	13.4%
7 Stress and Adjustment Disorders	12	12.9%	5	5.4%	317	10.0%	334	10.0%
5 Anxiety Disorders	1	1.1%	2	2.2%	199	6.3%	202	6.0%
14 Disorders of Psychological Development	5	5.4%	5	5.4%	125	3.9%	135	4.0%
2 Substance Abuse Disorders	1	1.1%		0.0%	104	3.3%	105	3.1%
3 Schizophrenia, Paranoia and Acute Psychotic Disorders	27	29.0%	2	2.2%	71	2.2%	100	3.0%
13 Mental Retardation		0.0%	1	1.1%	54	1.7%	55	1.6%
9 Eating Disorders	4	4.3%	2	2.2%	35	1.1%	41	1.2%
6 Obsessive Compulsive Disorders		0.0%	2	2.2%	34	1.1%	36	1.1%
11 Personality Disorders	2	2.2%		0.0%	15	0.5%	17	0.5%
1 Organic Disorders	2	2.2%	2	2.2%	5	0.2%	9	0.3%
8 Somatoform Disorders	1	1.1%		0.0%	7	0.2%	8	0.2%
10 Behavioural Syndromes Associated with Physiological Disturba		0.0%		0.0%	1	0.0%	1	0.0%
12 Sexual Disorders		0.0%		0.0%		0.0%	0	0.0%
Grand Total	93	100.0%	92	100.0%	3167	100.0%	3352	100.0%

Figure 35: Episodes of care by percentage diagnosis – Child and Youth



For Child / Youth episodes of care, the overall profile is summarised in Figure 35. The distribution of diagnosis was relatively more heterogeneous with the most common diagnostic group, ‘Disorders of Childhood and Adolescence’ accounting for 30%, ‘Mood disorders’ accounting for a further 13% and ‘Stress and adjustment disorders’, a further 10%. Diagnoses either outside the ‘mental health’ range or not recorded accounted for approximately 25% of all Child / Youth episodes. There were proportionally more diagnoses of schizophrenia and mood disorder in inpatient episodes and proportionally more disorders of childhood and adolescence in Direct Community Care episodes.

9.2.7 Diagnosis by ethnicity

This section reports on the diagnostic profile of consumers in the study. As with the clinical ratings that are reported in Section 0, the results reported here are affected by a range of factors including the accuracy of the diagnosis recorded for the consumer and the cultural competency of mainstream clinical staff. For this reason it is important to review the findings from the perspective that they raise interesting questions that are worthy of further investigation. It is possible that they might also reflect diagnostic uncertainty and a certain degree of clinician bias as well as reflecting the way the world actually is. These are questions for the future and further work is required to better understand these findings from the perspective of both Māori and Pacific peoples.

Figure 36 profiles acute inpatient episodes based on the diagnosis reported for the 4 broad ethnic groupings. The profiles are quite different. Schizophrenia, Paranoia and Acute Psychotic Disorders accounted for about two thirds of Māori and Pacific Island episodes (63% and 66% respectively). In contrast, this same diagnostic cluster accounted for 39% of European episodes and 45% of other episodes.

In contrast, Mood Disorders accounted for 33% of European episodes, 22% of Māori episodes, 19% of Pacific Island episodes and 28% of other episodes. The other significant difference is Personality Disorders. These accounted for 6.3% of European episodes but only 2% of Māori episodes and 1% of Pacific Island episodes.

Given the small numbers, the diagnostic profile of child and youth inpatient episodes by broad ethnic group was not analysed.

Figure 36: Diagnosis by Ethnicity - adult inpatient episodes

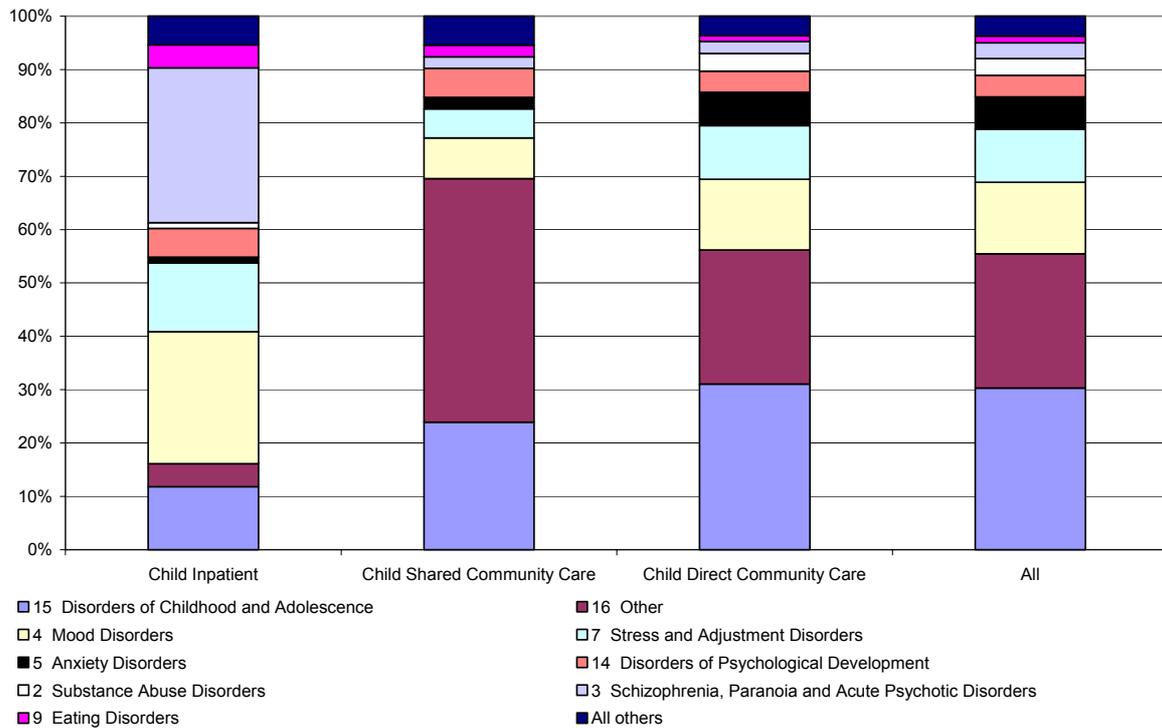
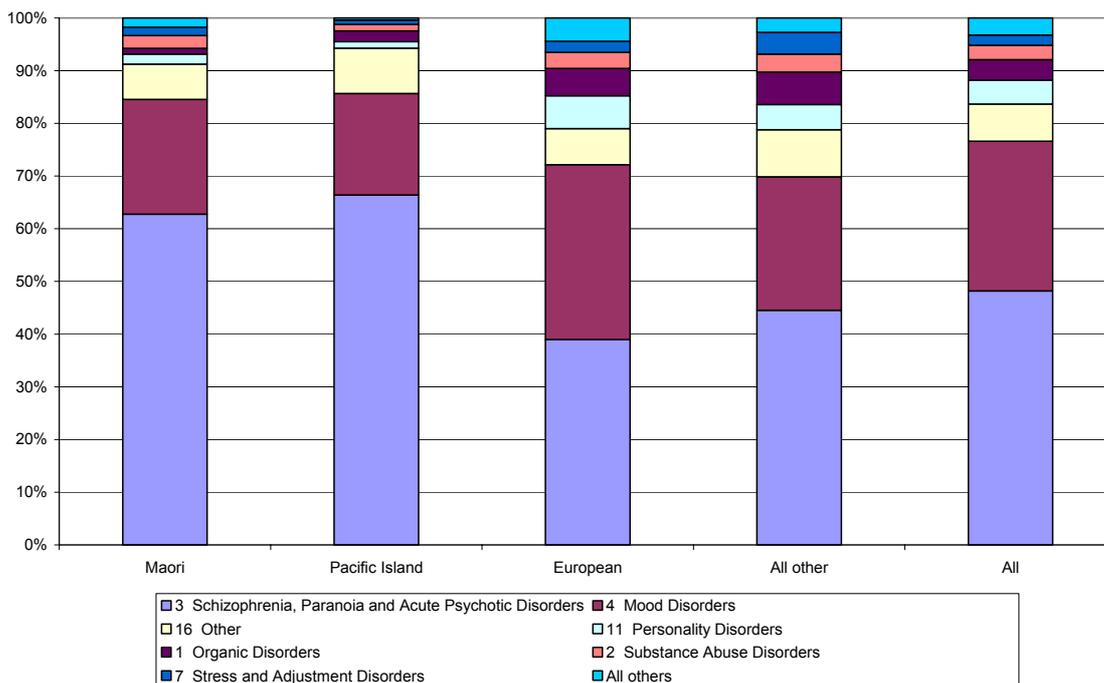


Figure 37 profiles adult community episodes based on the diagnosis reported for the 4 broad ethnic groupings. The profiles are again quite different. Schizophrenia, Paranoia and Acute Psychotic Disorders accounted for 50% of Pacific Island episodes. In contrast, this same diagnostic cluster accounted for 38% of Māori, 24% of European episodes and 27% of other episodes.

NB: These figures relate to the *treated population* only and incidence and prevalence figures cannot be extrapolated from these findings and applied to the general population.

Figure 37: Diagnosis by Ethnicity - adult community episodes

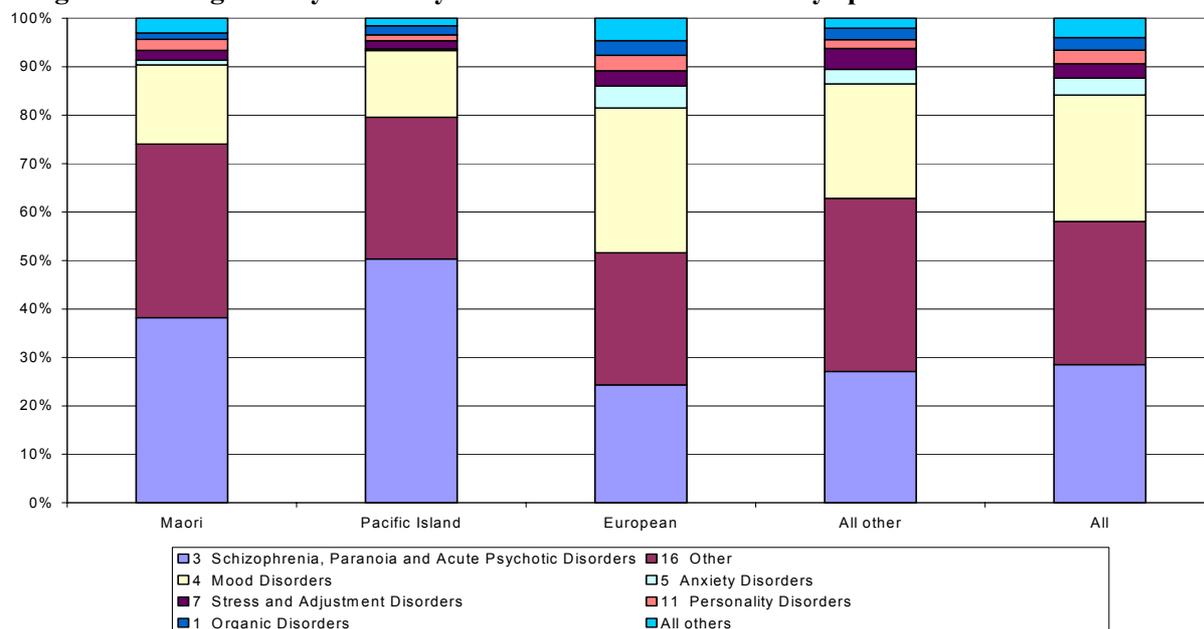


In contrast, Mood Disorders accounted for 30% of European episodes, 16% of Māori episodes, 14% of Pacific Island episodes and 24% of other episodes. The other significant difference is Anxiety Disorders. These accounted for 4.5% of European episodes but only 0.9% of Māori episodes and 0.3% of Pacific Island episodes.

Figure 38 profiles child and youth community episodes based on the diagnosis reported for the 4 broad ethnic groupings. Again, the profiles are quite different. Disorders of Childhood and Adolescence account for 30% of all community episodes. But this varies from 33% for European to 10% for Pacific Islands. This diagnostic cluster accounted for 29% of Māori episodes and 14% of other episodes.

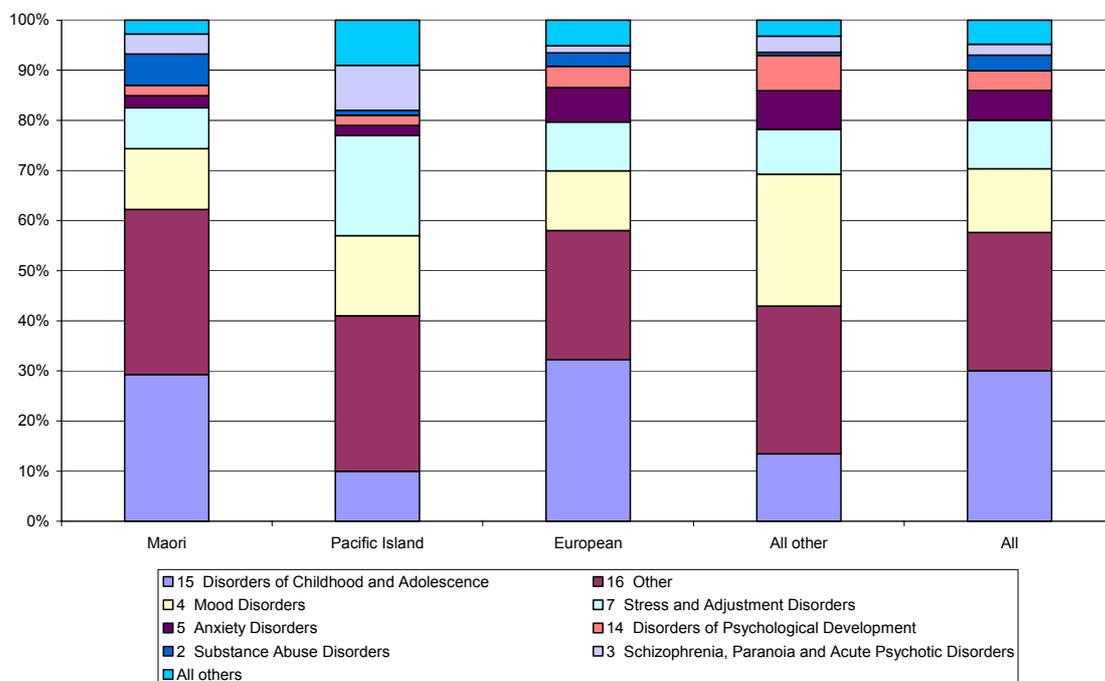
NB: These figures relate to the *treated population* only and incidence and prevalence figures cannot be extrapolated from these findings and applied to the general population.

Figure 38: Diagnosis by Ethnicity - child and Youth community episodes



In contrast, Schizophrenia, Paranoia and Acute Psychotic Disorders accounted for just 2% of total community episodes. But, for Pacific Island episodes, this cluster represented 9% of episodes (4% for Māori, 1% for European and 3% for others). Mood Disorders accounted for 12% of both European and Māori episodes, 16% of Pacific Island episodes and 26% of other episodes.

Figure 39: Diagnosis by Ethnicity – child and youth community episodes



9.2.8 Reasons why episodes started and ended

Table 42 to Table 45 profile the reasons why episodes started and ended for each type of episode. Both raw numbers and percentages are provided in each table. In each case, the tables have been sorted by the reasons why episodes ended. Table 42 profiles adult inpatient episodes. 20% of inpatients were already in care when the study started, while a further 60% were admitted during the course of the study period. 11% of episodes were triggered by a 3-month review.

Table 42: Adult inpatient episodes – reasons for start and end of episodes

Reason why episode ended		Reason why episode started								
		A	B	C	D	E	F	L	Y	All
		Ongoing inpatient at study start	Admitted from the community, not this DHB	Admitted from the community, this DHB	Transferred from psychiatric unit, another hospital	Intra-hospital transfer from medical unit	Unplanned return from indefinite leave	Court assessment	3-month review	
A	Discharged to community care - this DHB	215	258	767	46	51	5	4	34	1380
L	Episode ongoing, study end		54	171	24	10	3	5	252	519
Y	3-month review	263	10	23	11	3		3	2	315
B	Discharged to community care - other DHB	22	34	47	9	1	1	2	4	120
Blank		8	35	56	5	4	1	2	7	118

Reason why episode ended		Reason why episode started								
		A	B	C	D	E	F	L	Y	All
		Ongoing inpatient at study start	Admitted from the community, not this DHB	Admitted from the community, this DHB	Transferred from psychiatric unit, another hospital	Intra-hospital transfer from medical unit	Unplanned return from indefinite leave	Court assessment	3-month review	
C	Discharged to community care - other provider (eg. GP, NGO)	15	27	38	8			1	10	99
D	Discharged to another DHB for inpatient psychiatric care	10	29	23	12	1		2	3	80
I	Discharged, no further treatment arranged	2	17	5	1	1		7		33
F	Discharged for inpatient non-psychiatric care within this DH	1	6	18	2	5				32
H	Absconded	5	6	12				1		24
G	Discharged at own risk	2	9	5		1			1	18
K	Sent on indefinite leave	3	1	3	1				1	9
E	Discharged to another DHB for inpatient non-psychiatric care	1	1	5				1		8
All		547	487	1173	119	77	10	28	314	2755
Percentage of total										
A	Discharged to community care - this DHB	7.8%	9.4%	27.8%	1.7%	1.9%	0.2%	0.1%	1.2%	50.1%
L	Episode ongoing, study end	0.0%	2.0%	6.2%	0.9%	0.4%	0.1%	0.2%	9.1%	18.8%
Y	3-month review	9.5%	0.4%	0.8%	0.4%	0.1%	0.0%	0.1%	0.1%	11.4%
B	Discharged to community care - other DHB	0.8%	1.2%	1.7%	0.3%	0.0%	0.0%	0.1%	0.1%	4.4%
Blank		0.3%	1.3%	2.0%	0.2%	0.1%	0.0%	0.1%	0.3%	4.3%
C	Discharged to community care - other provider (eg. GP, NGO)	0.5%	1.0%	1.4%	0.3%	0.0%	0.0%	0.0%	0.4%	3.6%
D	Discharged to another DHB for inpatient psychiatric care	0.4%	1.1%	0.8%	0.4%	0.0%	0.0%	0.1%	0.1%	2.9%
I	Discharged, no further treatment arranged	0.1%	0.6%	0.2%	0.0%	0.0%	0.0%	0.3%	0.0%	1.2%
F	Discharged for inpatient non-psychiatric care within this DH	0.0%	0.2%	0.7%	0.1%	0.2%	0.0%	0.0%	0.0%	1.2%
H	Absconded	0.2%	0.2%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%
G	Discharged at own risk	0.1%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
K	Sent on indefinite leave	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
E	Discharged to another DHB for inpatient non-psychiatric care	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
All		19.9%	17.7%	42.6%	4.3%	2.8%	0.4%	1.0%	11.4%	100.0%

Care was defined in the study protocol as either being ‘complete’ (within 3 months) or ‘ongoing’ (care lasting longer than 3 months). Episodes of care for consumers having ongoing care were defined as a period of 3 months of care. Thus, a consumer in care for 6 months was defined as having 2 episodes of care, each of 3 months duration. These episodes or periods of care began and ended with a ‘90 day review’.

50% of adult inpatient episodes ended with the consumer being discharged to community care within the DHB that provided the inpatient episode, while a further 19% were still in care at the end of the study.

Table 43 shows the same information for child and youth inpatient episodes. 12% of inpatients were already in care when the study started, while a further 73% were admitted during the course of the study period. Reflecting their national referral role, 41% of episodes were admitted from outside the local DHB and 32% were admitted from within the DHB. 5% of episodes were triggered by a 3 month review. 61% of child and youth inpatient episodes ended with the consumer being discharged to community care while 14% were transferred to other providers. 16% were still in care at the end of the study.

Table 43: Child and youth inpatient episodes – reasons for start and end of episodes

Reason why episode ended		Reason why episode started						All
		A	B	C	D	E	Y	
		Ongoing inpatient at study start	Admitted from the community, not this DHB	Admitted from the community, this DHB	Transferred from psychiatric unit, another hospital	Intra-hospital transfer from medical unit	3-month review	
B	Discharged to community care - other DHB	4	20	5	4	2	2	37
A	Discharged to community care - this DHB	3	8	7		1	1	20
L	Episode ongoing, study end		4	9	1		1	15
C	Discharged to community care - other provider (eg. GP, NGO)		5	7			1	13
Y	3-month review	3		2				5
D	Discharged to another DHB for inpatient psychiatric care	1	1					2
E	Discharged to another DHB for inpatient non-psychiatric care				1			1
All		11	38	30	6	3	5	93
Percentage of total								
B	Discharged to community care - other DHB	4.3%	21.5%	5.4%	4.3%	2.2%	2.2%	39.8%
A	Discharged to community care - this DHB	3.2%	8.6%	7.5%	0.0%	1.1%	1.1%	21.5%
L	Episode ongoing, study end	0.0%	4.3%	9.7%	1.1%	0.0%	1.1%	16.1%
C	Discharged to community care - other provider (eg. GP, NGO)	0.0%	5.4%	7.5%	0.0%	0.0%	1.1%	14.0%
Y	3-month review	3.2%	0.0%	2.2%	0.0%	0.0%	0.0%	5.4%
D	Discharged to another DHB for inpatient psychiatric care	1.1%	1.1%	0.0%	0.0%	0.0%	0.0%	2.2%
E	Discharged to another DHB for inpatient non-psychiatric care	0.0%	0.0%	0.0%	1.1%	0.0%	0.0%	1.1%
All		11.8%	40.9%	32.3%	6.5%	3.2%	5.4%	100.0%

Table 44 shows why adult community episodes started and ended. The protocols for defining episodes in the community were the same as those used for inpatient episodes. 41% of adult community episodes were in care at the start of the study, with a further 26% being triggered by a 3 month review. 23% of episodes began as new episodes following a referral (including a self-referral) and 5% began with a court review.

Surprisingly, only 528 (4.1%) episodes began following a transfer from inpatient care. This result does not easily reconcile with the reasons for episode end recorded for inpatients. As shown previously in Table 42, inpatient units reported that a total of 1,500 inpatient episodes ended with the consumer being transferred to community care. The reasons for the significant gap between the numbers of referrals made and received are unclear but it is likely that some community staff may not have registered some community episodes for those consumers returning to the community after an inpatient stay.

Table 44: Adult community episodes – reasons for start and end of episodes

Reason why episode ended		Reason why episode started						
		H	I	J	K	L	Y	All
		Ongoing patient, first contact since study start	community referral	First contact following community referral	Transfer of care from inpatient unit - this DHB	Transfer of care from inpatient unit - other DHB	Court assessment	3-month review
S	Episode ongoing, study end	401	619	204	7	5	2718	3954
Y	3-month review	3322	339	126	7	6	31	3831
Blank		708	711	43	1	35	412	1912
T	Assessment only	87	643	5	2	611		1348
P	Case closure - no further treatment arranged	249	387	19	2	41	83	781
O	Case closure - referred to another provider (DHB, GP, NGO)	195	229	25		1	94	544
M	Admitted to psychiatric unit - this DHB	253	76	82	1	2	72	486
R	Case closure - lost to care	77	32	1			20	130
Q	Case closure – deceased	9	8	2			6	25
N	Admitted to psychiatric unit - other DHB	7	6	1			5	19
All		5308	3050	508	20	701	3441	13030
Percentage of total								
S	Episode ongoing, study end	3.1%	4.8%	1.6%	0.1%	0.0%	20.9%	30.3%
Y	3-month review	25.5%	2.6%	1.0%	0.1%	0.0%	0.2%	29.4%
Blank		5.4%	5.5%	0.3%	0.0%	0.3%	3.2%	14.7%
T	Assessment only	0.7%	4.9%	0.0%	0.0%	4.7%	0.0%	10.3%
P	Case closure - no further treatment arranged	1.9%	3.0%	0.1%	0.0%	0.3%	0.6%	6.0%
O	Case closure - referred to another provider (DHB, GP, NGO)	1.5%	1.8%	0.2%	0.0%	0.0%	0.7%	4.2%
M	Admitted to psychiatric unit - this DHB	1.9%	0.6%	0.6%	0.0%	0.0%	0.6%	3.7%
R	Case closure - lost to care	0.6%	0.2%	0.0%	0.0%	0.0%	0.2%	1.0%
Q	Case closure – deceased	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2%
N	Admitted to psychiatric unit - other DHB	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
All		40.7%	23.4%	3.9%	0.2%	5.4%	26.4%	100.0%

Table 45 shows why child and youth community episodes started and ended. The protocols for defining episodes in the community were the same as those used for inpatient episodes. 43% of child and youth community episodes were in care at the start of the study with a further 25% being triggered by a 3 month review. 32% of episodes began as new episodes following a referral (including a self-referral).

Only 20 (0.6%) episodes began following a transfer from inpatient care. This is not surprising, given the small number of inpatient episodes. Indeed, as was shown in Table 43, inpatient units reported that a total of 20 inpatient episodes ended with the consumer being transferred to community care within their DHB.

Table 45: Child and Youth community episodes – reasons for start and end of episodes

Reason why episode ended		Reason why episode started						
		H	I	J	K	L	Y	All
		Ongoing patient, first contact since study start	First contact following community referral	Transfer of care from inpatient unit - this DHB	Transfer of care from inpatient unit - other DHB	Court assessment	3-month review	
S	Episode ongoing, study end	87	457	7	2	1	652	1206
Y	3-month review	808	236	2			4	1050
P	Case closure - no further treatment arranged	186	131	2			74	393
Blank		168	108		3	1	70	350
O	Case closure - referred to another provider (DHB, GP, NGO)	84	44	3			33	164
T	Assessment only	15	78		1		1	95
R	Case closure - lost to care	70	12				6	88
M	Admitted to psychiatric unit - this DHB	7	2				1	10
N	Admitted to psychiatric unit - other DHB	3	1					4
Q	Case closure – deceased	1						1
All		1429	1069	14	6	2	841	3361
Percentage of total								
S	Episode ongoing, study end	2.6%	13.6%	0.2%	0.1%	0.0%	19.4%	35.9%
Y	3-month review	24.0%	7.0%	0.1%	0.0%	0.0%	0.1%	31.2%
P	Case closure - no further treatment arranged	5.5%	3.9%	0.1%	0.0%	0.0%	2.2%	11.7%
Blank		5.0%	3.2%	0.0%	0.1%	0.0%	2.1%	10.4%
O	Case closure - referred to another provider (DHB, GP, NGO)	2.5%	1.3%	0.1%	0.0%	0.0%	1.0%	4.9%
T	Assessment only	0.4%	2.3%	0.0%	0.0%	0.0%	0.0%	2.8%
R	Case closure - lost to care	2.1%	0.4%	0.0%	0.0%	0.0%	0.2%	2.6%
M	Admitted to psychiatric unit - this DHB	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.3%
N	Admitted to psychiatric unit - other DHB	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Q	Case closure – deceased	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
All		42.5%	31.8%	0.4%	0.2%	0.1%	25.0%	100.0%

9.2.9 Average number of treatment days by reason for episode end

One issue of interest is the service utilisation patterns for consumers whose episode ended because they have been lost to care, absconded or discharged at their own risk compared to those consumers who had an planned end to their episodes. One simple measure of this is to examine the average number of treatment days.

Table 46 shows the average number of inpatient care days based on the reason why the episode ended for adult inpatient episodes. The results in this table should be treated with caution as the number of consumers in some categories is very low. No clear pattern is apparent. Consumers who were discharged at their own risk had the shortest episodes while those who absconded had much longer episodes. Presumably, these two groups have different clinical characteristics. This same variable will be examined in a subsequent outcome analysis to see if these groups have different outcomes.

Table 47 shows the same information for child and youth episodes. None of these episodes ended by the consumer discharging at their own risk or absconding. Not surprisingly, the shortest episodes were those in which the consumer was transferred elsewhere for further inpatient care.

Table 46: Average number of inpatient care days by reason for episode end - adults

Reason for episode end		Average inpatient days
G	Discharged at own risk	14.4
I	Discharged, no further treatment arranged	15.5
F	Discharged for inpatient non-psychiatric care within this DHB	16.2
E	Discharged to another DHB for inpatient non-psychiatric care	19.3
A	Discharged to community care – this DHB	22.2
D	Discharged to another DHB for inpatient psychiatric care	22.4
B	Discharged to community care – other DHB	23.2
H	Absconded	24.0
C	Discharged to community care – other provider (eg. GP, NGO)	26.1
K	Sent on indefinite leave	44.1
	Blank	74.8
L	Episode ongoing, study end	83.5
Y	3-month review	89.7

Table 47: Average number of inpatient care days by reason for episode end – children and youths

Reason for episode end		Average inpatient days
E	Discharged to another DHB for inpatient non-psychiatric care	6.0
D	Discharged to another DHB for inpatient psychiatric care	10.0
C	Discharged to community care – other provider (eg. GP, NGO)	25.4
B	Discharged to community care – other DHB	30.5
A	Discharged to community care - this DHB	31.1
Y	3-month review	85.8
L	Episode ongoing, study end	96.8

Table 48 and Table 49 show the same information for community episodes. For adults, those lost to care (130 in total) had more treatment days than the average. The reverse was true for the 88 children and youth who were lost to care.

Table 48: Average number of community treatment days by reason for episode end – adult direct care episodes

Reason for episode end		Average contact days
Q	Case closure – deceased	4.4
P	Case closure - no further treatment arranged	6.0
O	Case closure - referred to another provider (DHB, GP, NGO)	7.7
S	Episode ongoing, study end	10.3
N	Admitted to psychiatric unit – other DHB	10.4
	Blank	10.8
R	Case closure - lost to care	11.3
M	Admitted to psychiatric unit – this DHB	11.8
Y	3-month review	12.5

Table 49: Average number of community treatment days by reason for episode end – child and youth direct care episodes

Reason for episode end		Average contact days
P	Case closure - no further treatment arranged	5.3
R	Case closure - lost to care	6.6
T	Assessment only	6.8
O	Case closure - referred to another provider (DHB, GP, NGO)	8.1
S	Episode ongoing, study end	8.5
	Blank	9.3
Y	3-month review	10.0
M	Admitted to psychiatric unit – this DHB	21.5
N	Admitted to psychiatric unit – other DHB	43.5

The next section summarises the clinical profile of the episodes in the study.

9.3 Clinical ratings at episode start

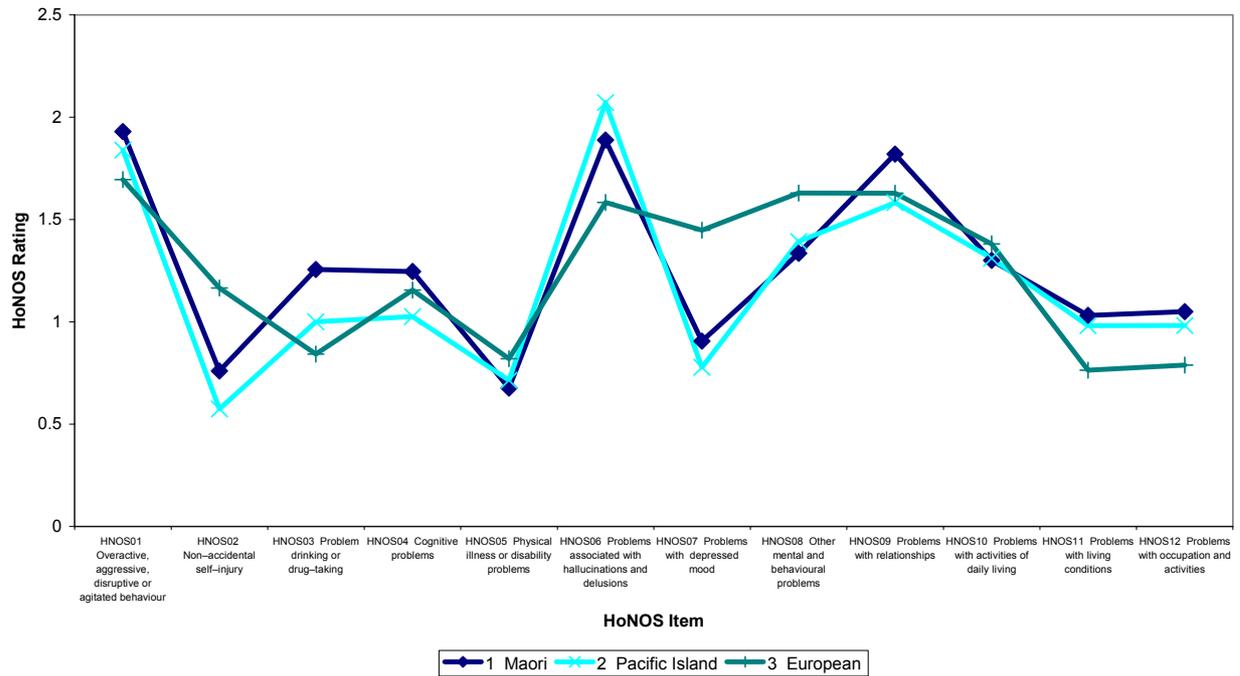
This section profiles the clinical ratings collected at the start of each episode. In all cases, episodes with missing data are excluded. An analysis of ratings collected at the end of episodes, and changes from the start to the end of episodes, is being undertaken in the separate outcomes analysis. The purpose of this section is not to assess the technical performance of the measures or to evaluate their performance as outcome tools. Nor is the purpose to draw definitive conclusions about differences between different types of consumers. The purpose of this section is simply to provide a descriptive profile of the key clinical measures that will be tested as contender variables in the subsequent casemix analysis. As such, only basic statistical results are included. The outcomes analysis will include a fuller range of statistical results, including measures of central location, relative standing, variability and association.

Throughout the study both Māori and Pacific groups raised questions about the cultural appropriateness of the clinical tools that were used in the study, particularly around the misinterpretation of consumer behaviour contributing to ratings on item 1 (aggression) and item 6 (problems associated with delusions and hallucinations) of the HoNOS. Given the findings from this study it is important that further work be undertaken to explore and understand the statistical differences in the mean clinical rating scores between the different ethnic groups. Whilst some of this work will be undertaken as part of the outcomes analysis further investigation of these differences will be required regarding these particular populations of interest.

9.3.1 Clinical ratings: the HoNOS

Figure 40 shows the HoNOS profile by item at the start of the inpatient episodes. In total, there were 2,715 inpatient episodes with valid HoNOS ratings, representing 98.5% of all inpatient episodes.

Figure 40: HoNOS item scores by ethnicity grouping – inpatient episodes



The HoNOS is rated on a scale of 0 to 4. The higher the score, the greater the severity of the problem. The pattern across the items is broadly similar for the 3 ethnicity groupings, with the average scores on item 1 (Overactive, aggressive, disruptive or agitated behaviour), item 6 (Problems associated with hallucinations and delusions) and item 9 (Problems with relationships) being the most elevated. There are some differences between the 3 ethnicity groupings for particular items. These differences will be explored in the subsequent outcomes analysis.

Figure 41 : HoNOS item scores by ethnicity grouping – community episodes

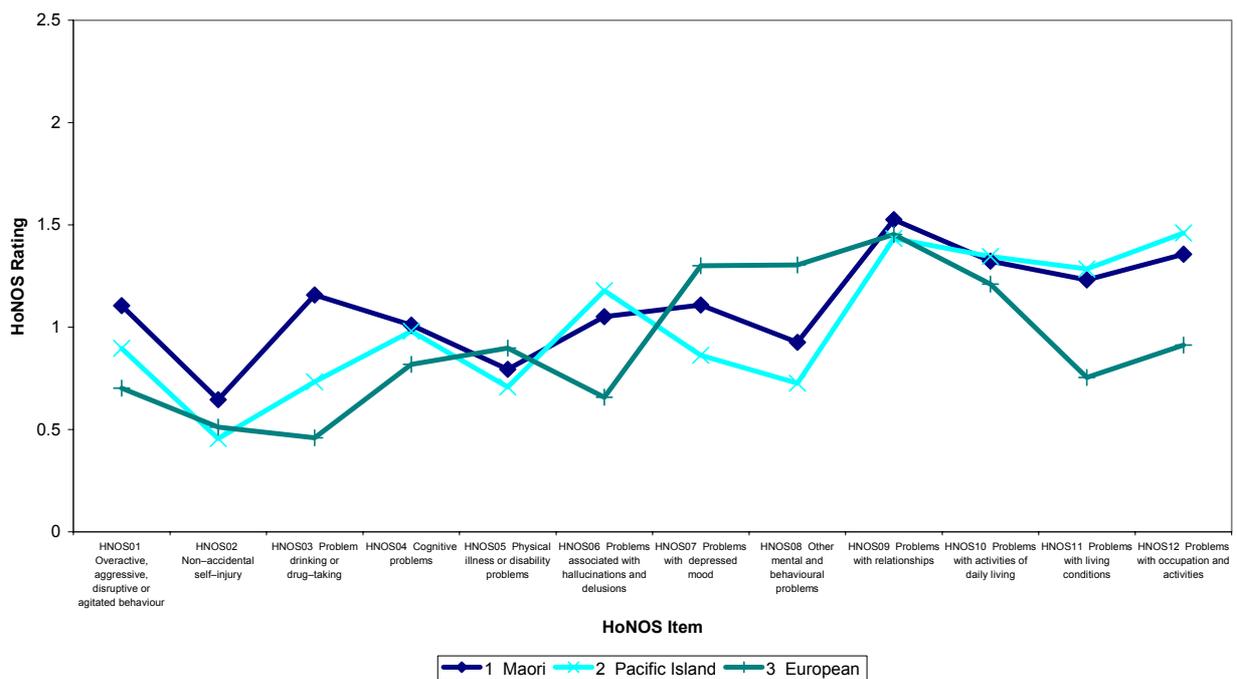


Figure 41 shows the same information for community episodes. In total, there were 10,130 community episodes with useable HoNOS ratings, representing 77.7% of all direct and shared care community episodes. The HoNOS was not collected for ‘Assessment Only’ episodes. Overall, community episodes have lower ratings than inpatient episodes, suggesting lower levels of symptom severity. The pattern across the items is not as clear as the pattern in the inpatient setting but, overall, items 7 (Problems with depressed mood), 8 (Other mental and behavioural problems), 9 (Problems with relationships) and 10 (Problems with activities of daily living) have the higher average scores. Again, there are differences between the three ethnicity groupings on particular items.

It is important to review the findings from the perspective that they raise interesting questions that are worthy of further investigation. Further work is required in order to better understand the extent that the cultural competency of clinical staff and the cultural context of consumers play a role in the differences between ratings. These differences will start to be explored as part of the subsequent outcomes analysis but will require additional research at some stage in the future.

Figure 42 profiles total scores for inpatients on items 1 to 10 of the HoNOS. The distribution approximates a normal distribution.

Figure 43 shows the same information for community episodes. Reflecting the lower levels of symptom severity for community episodes, the total scores are more skewed to the low end rather than being normally distributed.

Figure 42: HoNOS total scores – inpatient episodes

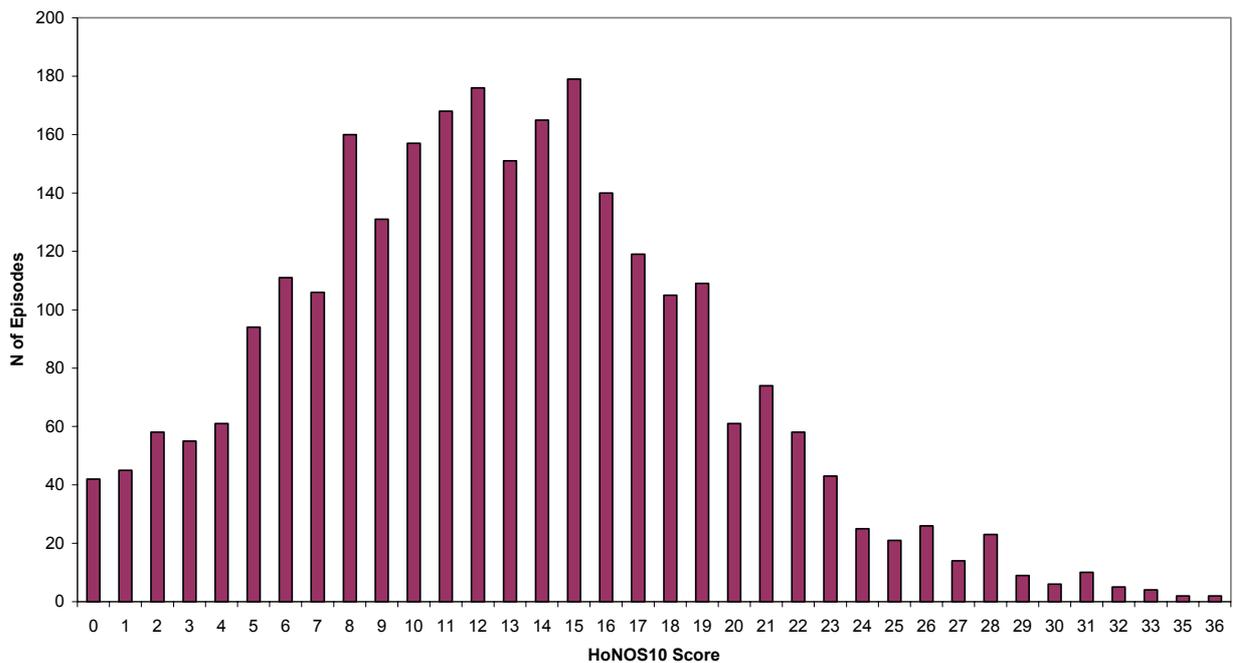
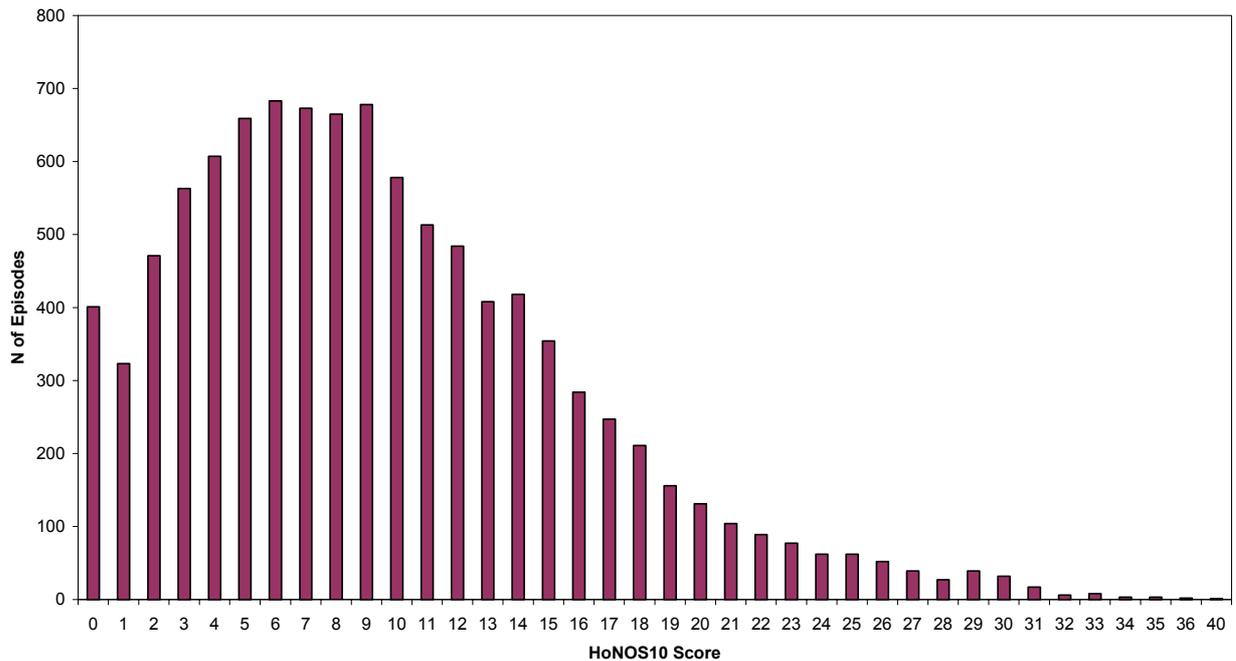


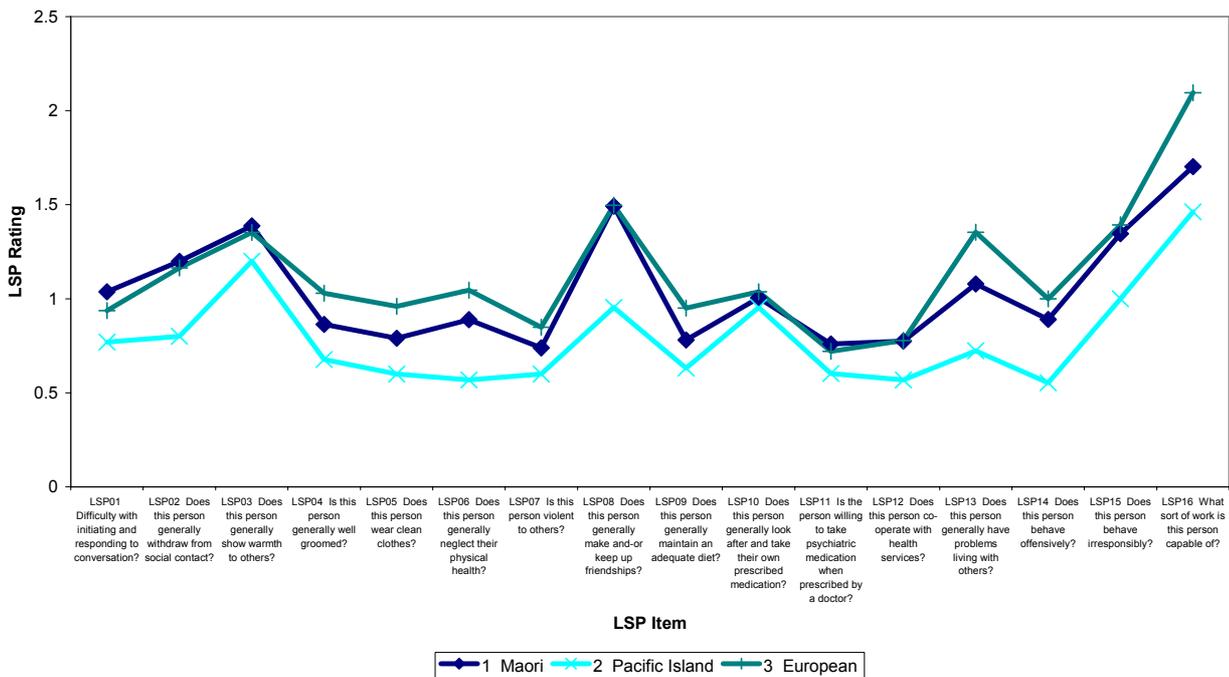
Figure 43: HoNOS total scores – community episodes



9.3.2 Clinical ratings: the LSP-16-16

Figure 44 shows the LSP-16 profile by item at the start of the inpatient episodes. In total, there were only 561 inpatient episodes with valid LSP-16 ratings, representing just 20.4% of all inpatient episodes. This low level of compliance has significant implications for the potential to use the LSP-16 in the subsequent casemix analysis. This issue is discussed further in Chapter 11, where the LSP-16 is discounted as a contender casemix variable because of the volume of missing data.

Figure 44: LSP-16 item scores by ethnicity grouping – inpatient episodes



The LSP-16 is rated on a scale of 0 to 3. The higher the score, the greater the level of functional impairment. The pattern across the items is again broadly similar for the three ethnicity groupings, with the average scores on item 16 (What sort of work is this person capable of?), item 8 (Does this person generally make and-or keep up friendships?), item 3 (Does this person generally show warmth to others?) and item 15 (Does this person behave irresponsibly?) being the most elevated. Overall, Pacific Island episodes have the lowest ratings on all items. Again, differences between the three ethnicity groupings will be explored in the subsequent outcomes analysis.

Figure 45: LSP-16 item scores by ethnicity grouping – community episodes

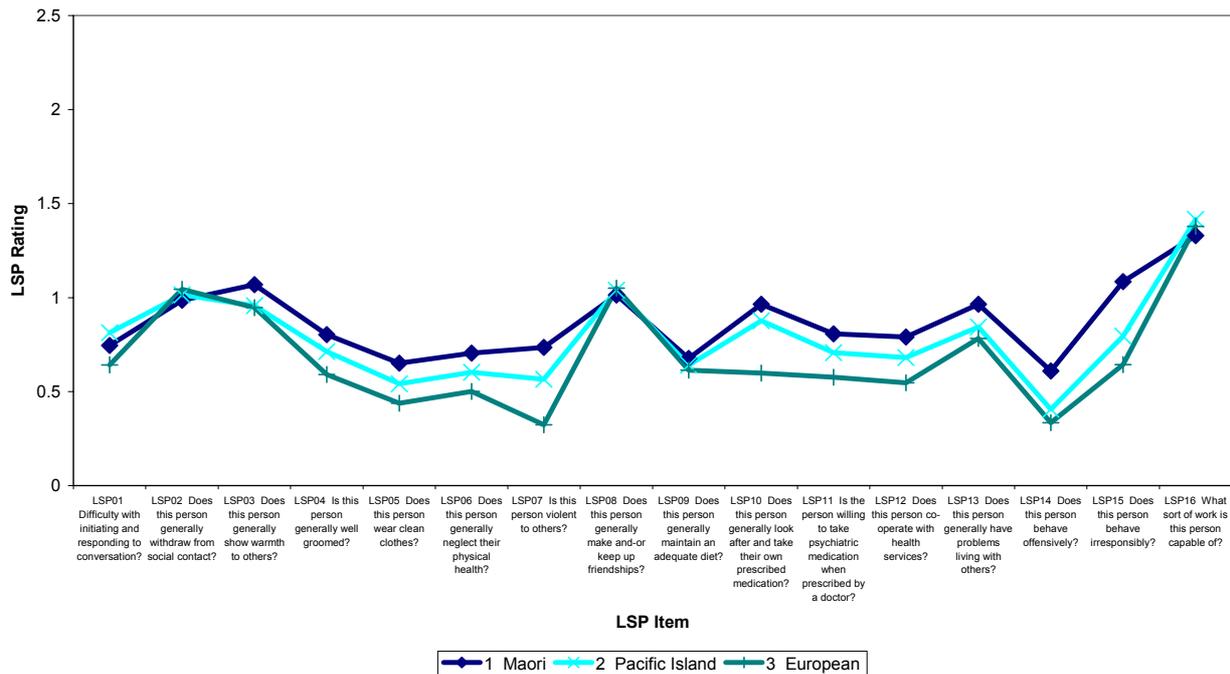


Figure 45 shows the same profile for community episodes. In total, there were 10,038 community episodes with valid LSP-16 ratings. The LSP-16 was not collected for ‘Assessment Only’ episodes. As with the HoNOS, community episodes have lower ratings than inpatient episodes, suggesting higher levels of function. Because the average scores are quite low, the pattern across the items is not as clear as the pattern in the inpatient setting. However, overall, the average scores on item 16 (What sort of work is this person capable of?), item 8 (Does this person generally make and-or keep up friendships?) and item 2 (Does this person generally withdraw from social contact?) being the most elevated. Again, differences between the 3 ethnicity groupings will be explored in the subsequent outcomes analysis.

Figure 46 profiles total scores for inpatients on the LSP-16. Figure 47 show the same information for community episodes. Reflecting the higher levels of functioning of community consumers, the total scores are more skewed to the low end relative to inpatient episodes.

Figure 46: LSP-16 total scores by ethnicity grouping – inpatient episodes

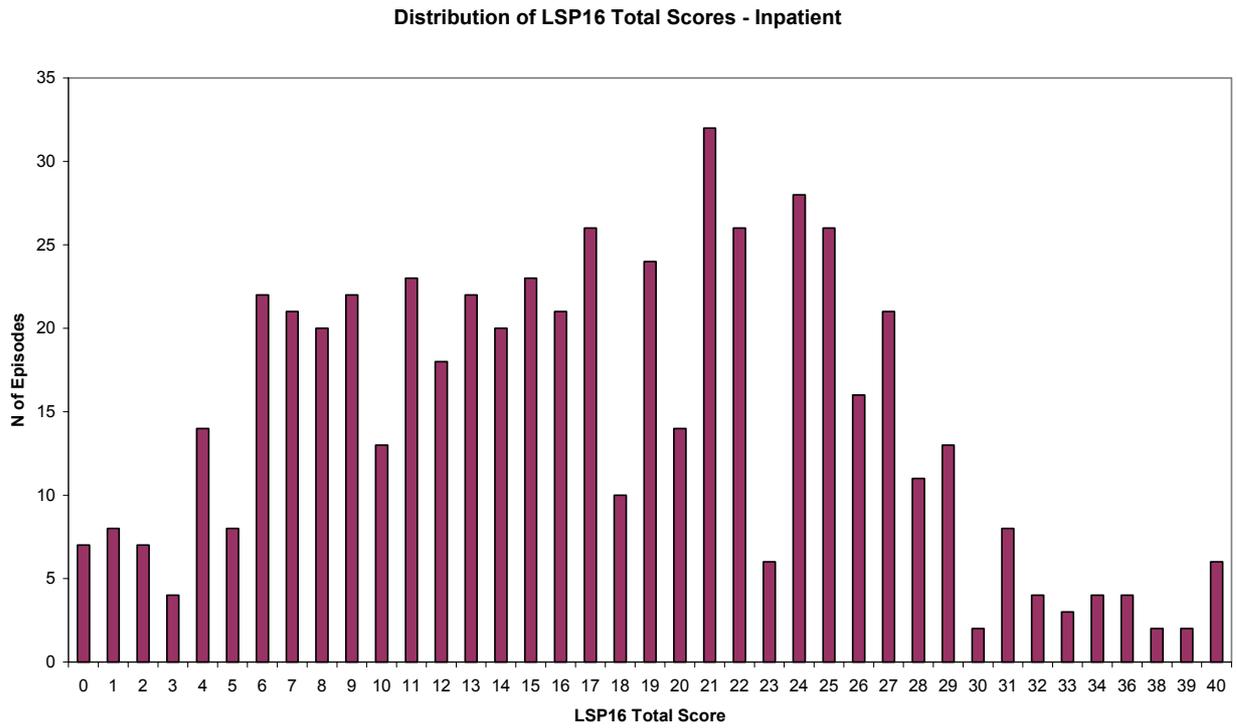
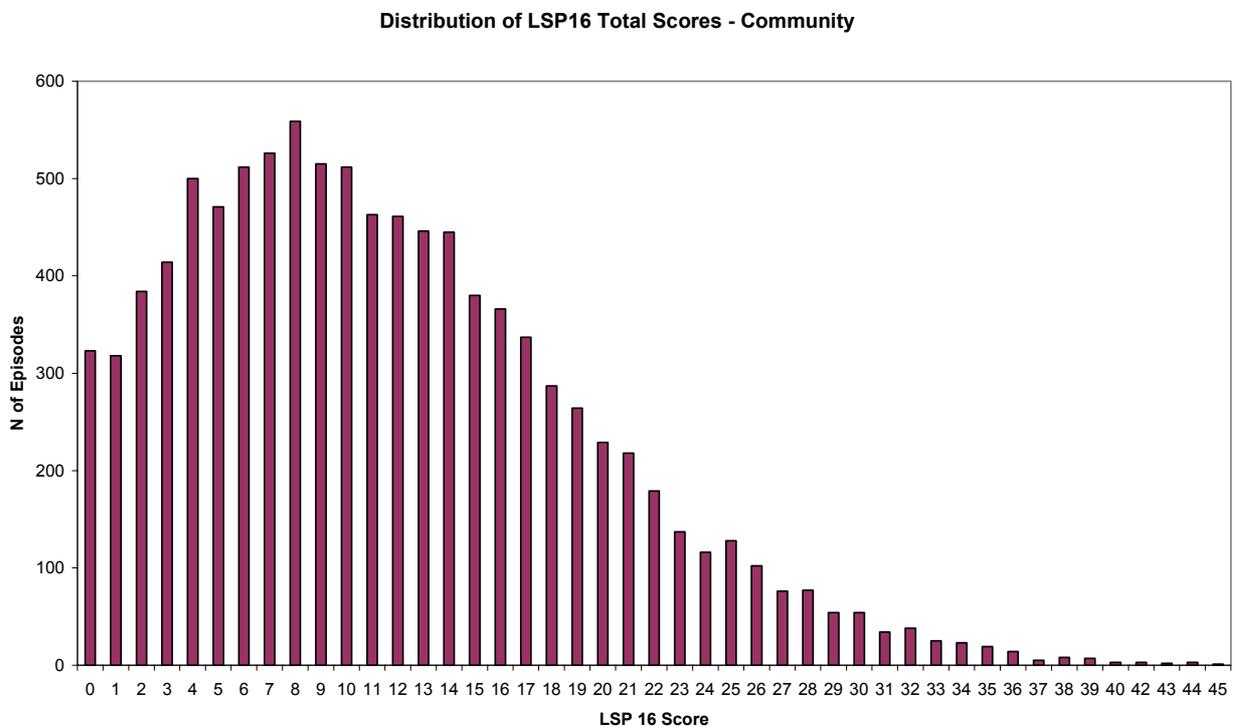


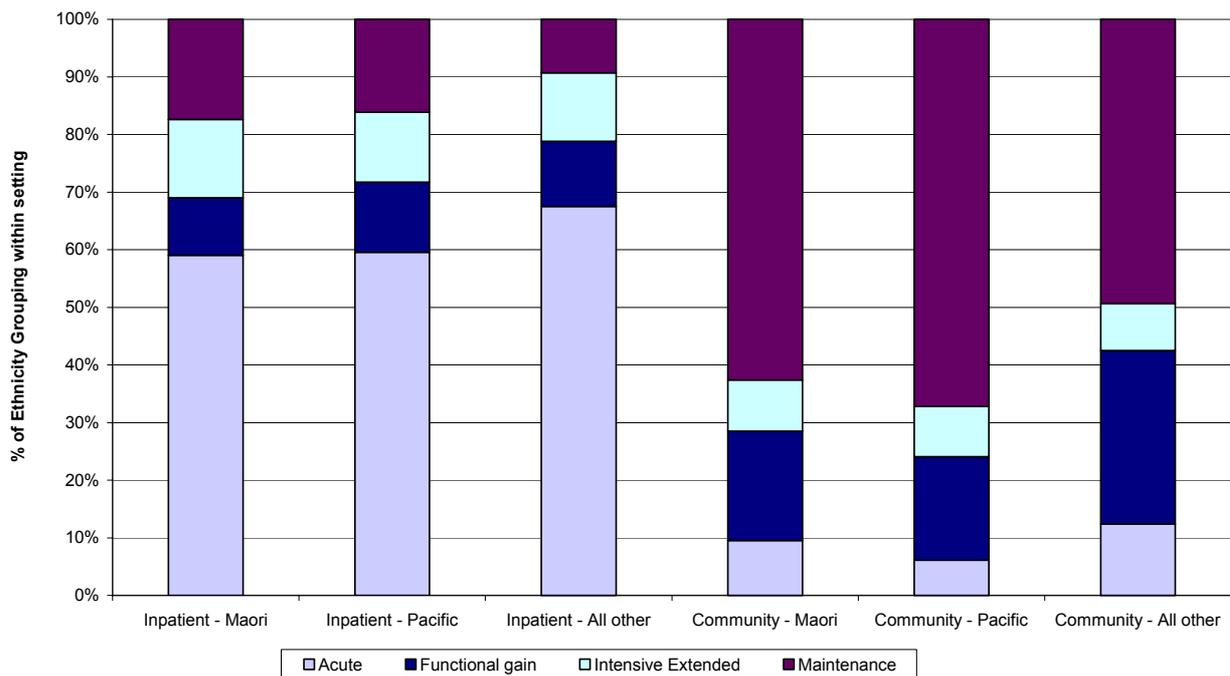
Figure 47: LSP-16 total scores by ethnicity grouping – community episodes



9.3.3 Clinical ratings: the FOC

Figure 48 profiles the Focus of Care (FOC) by ethnicity grouping and episode type. The FOC is not an outcome measure as such. Instead, it is a composite measure reflecting some consumer attributes and the goal of care for the current episode. As such, it is a useful measure when interpreting outcome data, as outcomes can be expected to differ based on the goal that the service and the consumer is aiming to achieve. In the Australian MH-CASC study it was also found to be a predictor of cost, presumably because the package of care that a consumer receives is related to the goal of that care.

Figure 48: Focus of Care Profile by Ethnicity Grouping and Episode Type



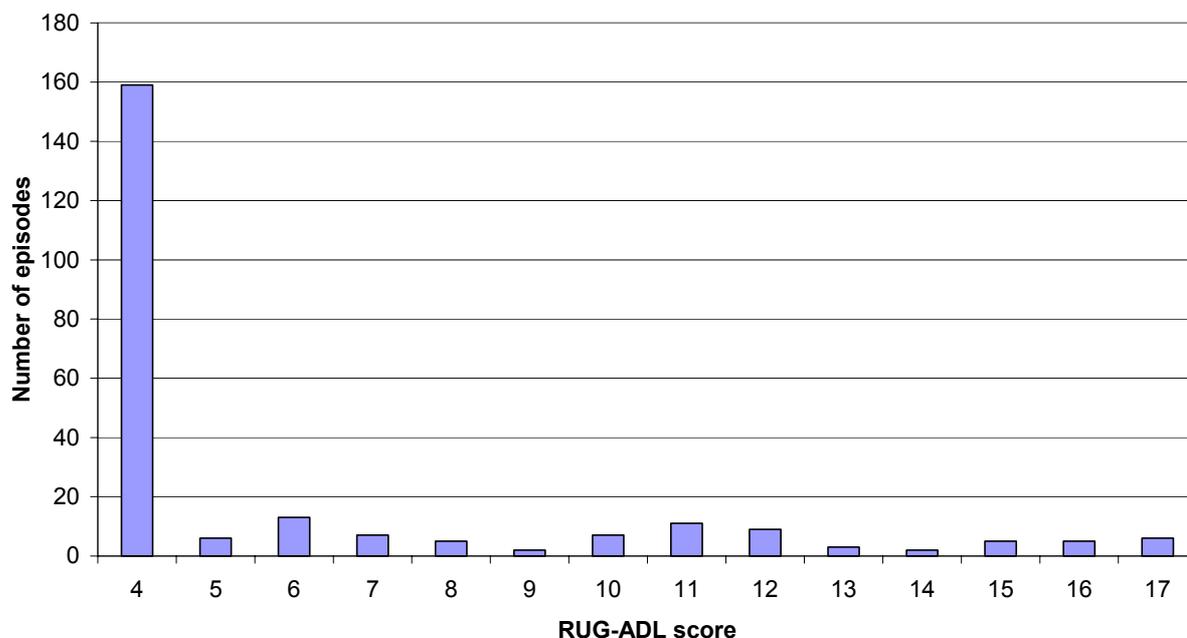
In total, there were 2,629 inpatient episodes with valid FOC ratings (representing 95.4% of all inpatient episodes) and 9,173 community episodes with valid LSP-16 ratings (representing 70.4% of all community episodes). Further analysis of the community episodes missing a FOC rating identified that 97% were also missing other key data, including the routinely collected variable of 'legal status'. This issue is discussed further in Chapter 11.

Overall, the FOC profile of the 3 broad ethnicity groupings in the inpatient setting is similar. However, a smaller proportion of Māori and Pacific Island episodes were classified as 'acute'. There are larger differences in the profile of community episodes. In particular, Māori and Pacific Island episodes were less likely to be classified as 'functional gain' and more likely to be classified as 'maintenance'. This finding will need to be further investigated in the subsequent outcomes analysis.

9.3.4 Clinical ratings: the RUG-ADL

In total, only 240 episodes had a valid score on the Resource Utilisation Groups Activities of Daily Living Scale. This measure was only collected for inpatients aged over 65 years. Their profile is shown in Figure 49. Of the 240 episodes, 66.3% of episodes had a score of 4, indicating no problems in 'late loss' functional ability. These results suggest that the RUG-ADL will not be a useful variable in the subsequent casemix analysis.

Figure 49 : RUG-ADL Profile – inpatient episodes



9.3.5 Clinical ratings: the HoNOSCA

Figure 50 shows the HoNOSCA profile by item at the start of the community episodes. Given their small numbers, inpatient episodes are excluded. In total, there were 3,058 community episodes with valid HoNOSCA ratings, representing 91% of all community episodes. HoNOSCA ratings were not collected on 'assessment only' episodes.

Like the HoNOS, the HoNOSCA is rated on a scale of 0 to 4. The higher the score, the greater the severity of the problem. The pattern across the items is broadly similar for the 3 ethnicity groupings, with the average scores on item 12 (Problems with family life and relationships), item 9 (Problems with emotional and related symptoms) and item 10 (Problems with peer relationships) being the most elevated. There are some differences between the 3 ethnicity groupings for particular items. These differences will be explored in the subsequent outcomes analysis.

Figure 51 profiles total scores community episodes on items 1 to 13 of the HoNOS. The distribution of total scores is slightly skewed to the low end.

Figure 50: HoNOSCA item scores by ethnicity grouping – community episodes

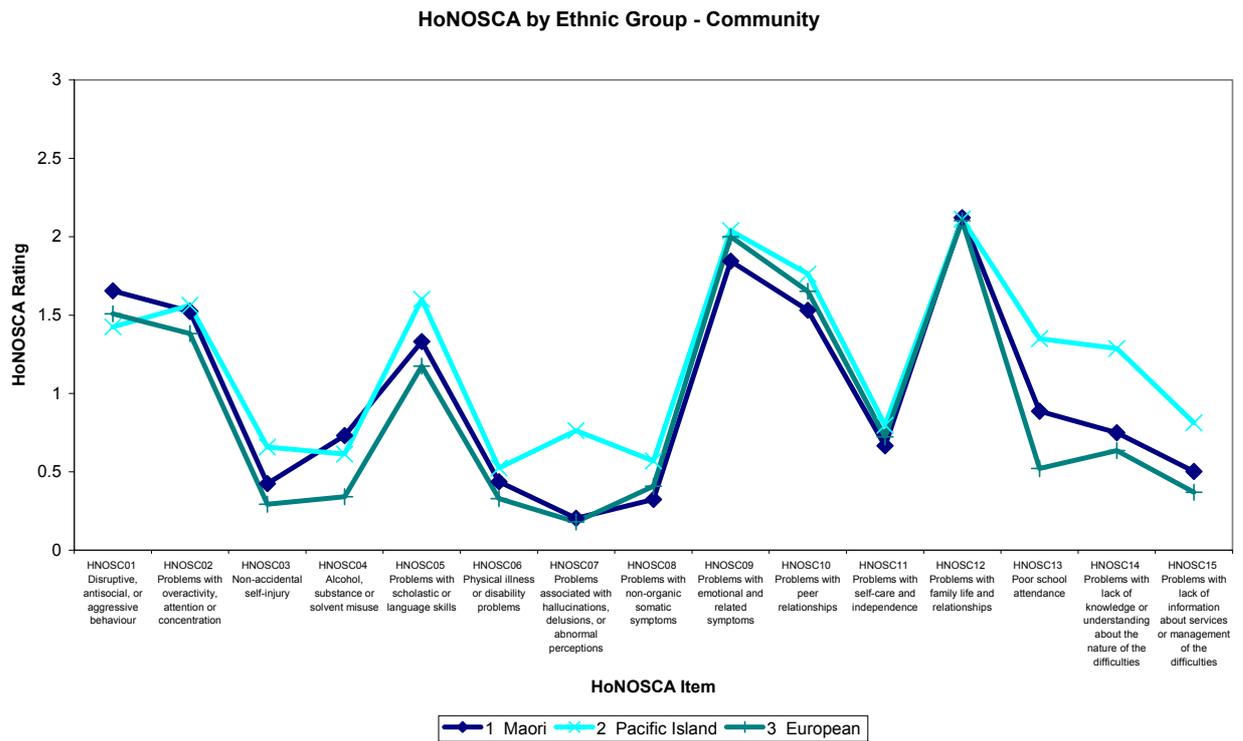
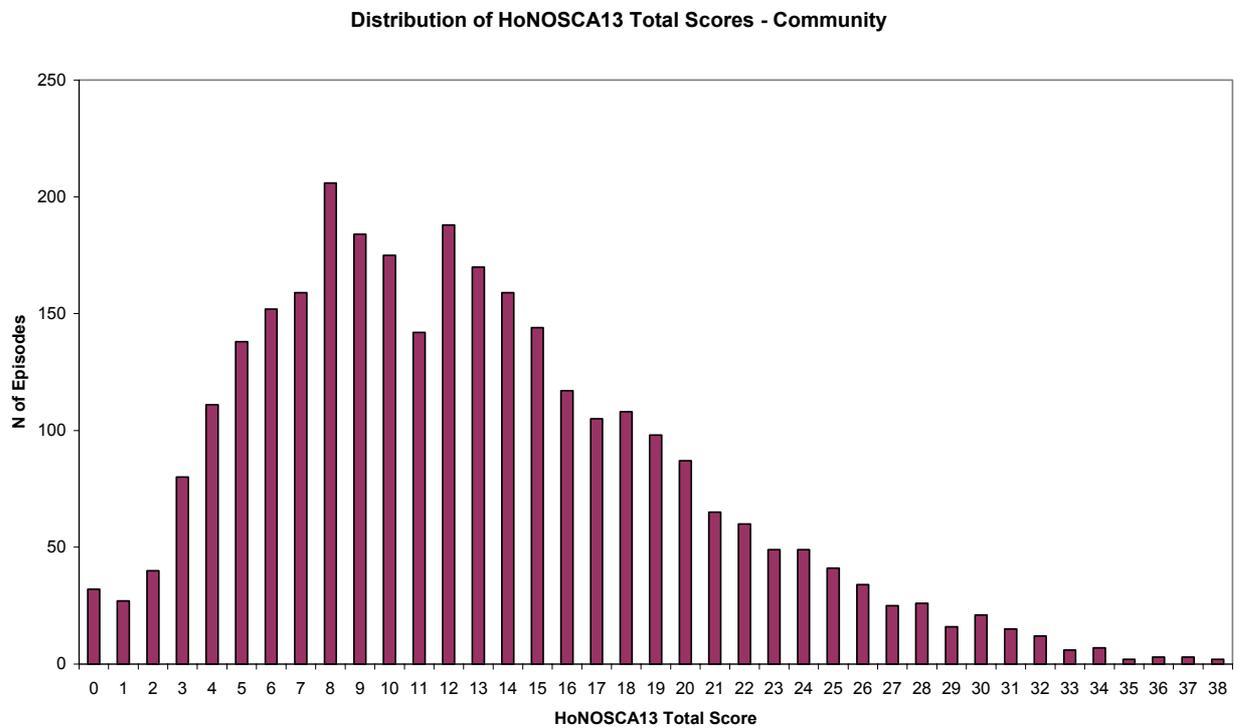


Figure 51: HoNOSCA total scores by ethnicity grouping – community episodes



9.3.6 Clinical ratings: the CGAS

Table 50 profiles child and youth episodes on the Children’s Global Assessment Scale (CGAS). Using this 100 point scale, the consumer is scored on any value from 1 to 100. For convenience, scores have been grouped into the standard CGAS levels. In total, there were 3,352 episodes with a CGAS rating, representing 93.6% of child and youth episodes. Three-quarters of episodes had a rating of between 31 and 60, indicative of a moderate level of impairment as measured by this scale. Given this clustering in the middle values, it is doubtful whether it will prove to be useful in discriminating between differences in cost.

Table 50: CGAS Profile – Child and Youth Episodes

CGAS score range	CGAS level	Number of epis	% of epis
1 – 10	Needs constant supervision	16	0.5%
11 – 20	Needs considerable supervision	137	4.4%
21 – 30	Unable to function in almost all areas	258	8.2%
31 – 40	Major impairment of functioning in several areas and unable to function in one of these areas	691	22.0%
41 – 50	Moderate degree of interference in functioning in most social areas or severe impairment of functioning in one area	892	28.4%
51 – 60	Variable functioning with sporadic difficulties or symptoms in several but not all social areas	788	25.1%
61 – 70	Some difficulty in a single area but generally functioning pretty well	303	9.6%
71 – 80	No more than slight impairments in functioning	27	0.9%
81 – 90	Good functioning in all areas	17	0.5%
91 – 100	Superior functioning	13	0.4%
All		3142	100.0%

9.3.7 Clinical ratings: FIHS

Figure 52 shows the item profile of Factors Influencing Health Status (FIHS) for child and youth inpatient episodes. In total, there were 2,618 episodes with these items completed, representing 78.1% of child and youth episodes.

As this profile shows, the most common factor influencing the health of child and youth consumers was ‘Problems related to primary support group, including family circumstances’, followed by ‘Problems related to negative life events in childhood’ and ‘Problems related to upbringing’.

Figure 53 shows the number of factors recorded for children and adolescents. 15% of episodes had no problems on any of the 7 factors in this instrument. At the other end of the extreme, 5% of episodes had problems on all 7 factors. Three quarters of all episodes had 4 or less factors recorded as a problem.

Figure 52: Factors Influencing Health Status – item profile of Child and Adolescent episodes

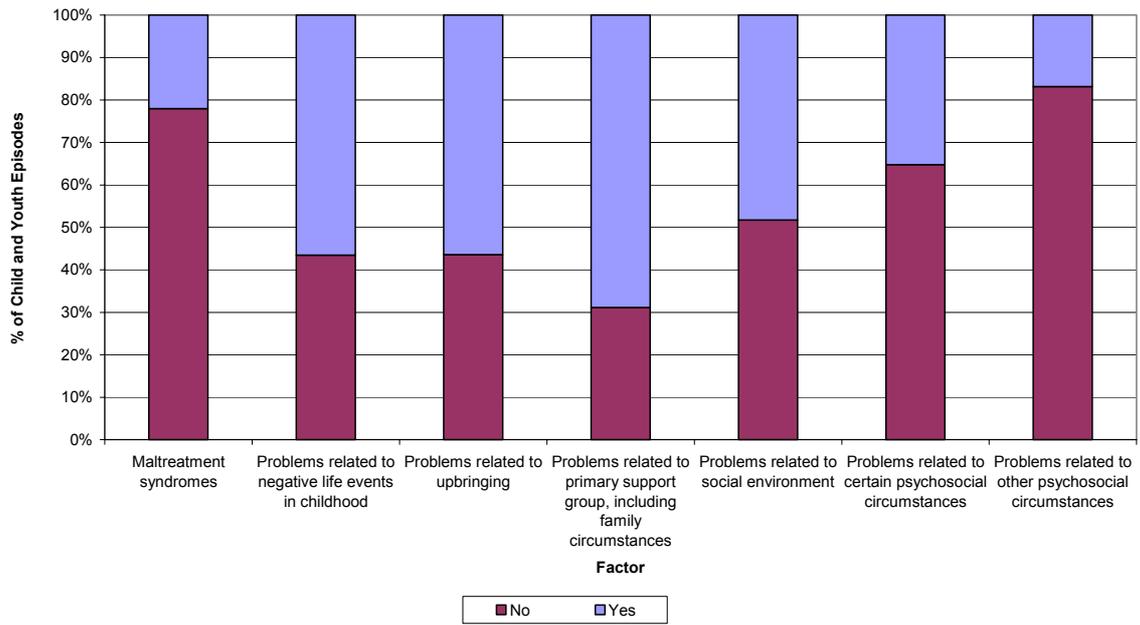
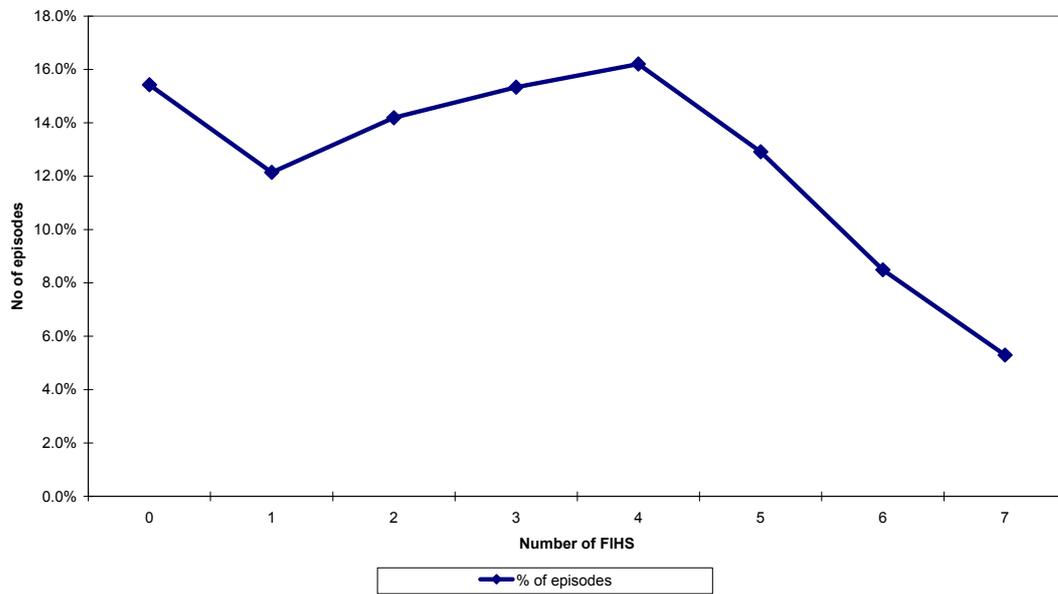


Figure 53: Factors Influencing Health Status – summary profile of Child and Adolescent Episodes



9.4 Episode costs

This section profiles the cost per episode after applying the study protocol in relation to defining episodes as outlined in Chapter 2. In all cases, the costs reported are those defined in the study protocol as core costs.

9.4.1 Summary of cost differences between different types of episodes

Table 51 summaries the episode cost profile of the different types of episodes. The data in this table are sorted in order of mean episode cost.

Table 52 presents the equivalent information on per diem costs for the different types of episodes. Again, the data are sorted in order of mean cost.

These tables include the costs for episodes that were not completed during the study period. These episodes either began before the study started, were still going when the study ended, or both. As per the study protocol, the cost for incomplete episodes is the cost of 91 days (3 months) of care. The cost of episodes that were less than, or more than, 91 days were scaled to become 91 day period of care costs. For class finding purposes (reported in the next chapter), episodes with a duration of less than 60 days are subsequently removed. However, for descriptive purposes here, all incomplete episodes are included.

The mean (average) cost per episode varies by episode type, ranging from \$11,757 but there was significant variation between the sites ranging from \$74,772 for the small volume of incomplete child and youth inpatient episodes to \$423 for adult assessment only episodes. The median (middle) cost is often quite different from the mean cost. Large differences between the mean and the median are because the mean is influenced by extremely high cost cases.

The minimum and maximum cost per episode is shown in the next two columns. The next two columns show costs at the 25th and 75th percentile. Fifty percent of episodes fall within these values. So, for example, half of the complete adult inpatient episodes costed between \$3,329 and \$15,201. The final column shows the coefficient of variation (CV). The CV is a proportionate measure of variability and indicates the level of cost variability within each episode type. The higher the CV, the more variability. Variability of costs within episode types may be casemix-related or service-related. The casemix classification reported in the next section is designed to control for this variability. There are significant differences in the CV reported for each episode type. Incomplete child and youth inpatient episodes have a CV of only 0.29, suggesting that there is little variability of costs within this group. At the other end of the spectrum, adult shared community care has a CV of 1.47 suggesting considerable variability within these episodes.

Table 51: Episode cost profile by episode type

	No. of episodes	Mean	Median	Minimum	Maximum	Percentile 25	Percentile 75	CV
9 Child Inpatient - Incomplete	26	\$74,772	\$79,543	\$23,869	\$122,916	\$56,775	\$90,715	0.29
2 Adult Inpatient - Incomplete	1094	\$43,545	\$39,821	\$1,764	\$227,596	\$31,160	\$50,062	0.44
8 Child Inpatient - Complete	67	\$25,762	\$17,633	\$1,612	\$77,175	\$9,374	\$37,366	0.82
1 Adult Inpatient - Complete	1661	\$11,757	\$7,635	\$284	\$108,041	\$3,329	\$15,201	1.08
11 Child Shared Community Care - Complete	10	\$4,209	\$2,332	\$218	\$17,797	\$885	\$5,349	1.27
5 Adult Shared Community Care - Incomplete	681	\$1,971	\$1,105	\$64	\$40,837	\$600	\$2,332	1.47
14 Child Direct Community Care - Incomplete	2613	\$1,867	\$1,207	\$56	\$33,490	\$584	\$2,338	1.15
13 Child Direct Community Care - Complete	554	\$1,744	\$1,192	\$59	\$17,783	\$476	\$2,272	1.07
7 Adult Direct Community Care - Incomplete	9034	\$1,694	\$1,085	\$37	\$36,517	\$561	\$2,116	1.14
12 Child Shared Community Care - Incomplete	82	\$1,682	\$853	\$169	\$8,999	\$407	\$2,213	1.10
4 Adult Shared Community Care - Complete	216	\$1,673	\$1,100	\$71	\$28,510	\$471	\$1,877	1.47
6 Adult Direct Community Care - Complete	1781	\$1,560	\$1,010	\$46	\$14,328	\$577	\$1,960	1.06
10 Child Assessment Only	102	\$459	\$399	\$131	\$1,109	\$262	\$661	0.54
3 Adult Assessment Only	1318	\$423	\$366	\$71	\$1,412	\$233	\$549	0.58

Table 52: Per diem cost profile by episode type

	No. of episodes	Mean	Median	Minimum	Maximum	Percentile 25	Percentile 75	CV
8 Child Inpatient - Complete	67	\$945	\$929	\$512	\$1,621	\$804	\$1,029	0.22
9 Child Inpatient - Incomplete	26	\$842	\$879	\$535	\$1,351	\$628	\$997	0.25
2 Adult Inpatient - Incomplete	1094	\$497	\$458	\$231	\$2,501	\$363	\$561	0.42
1 Adult Inpatient - Complete	1661	\$494	\$475	\$227	\$1,796	\$404	\$545	0.31
11 Child Shared Community Care - Complete	10	\$356	\$359	\$207	\$521	\$316	\$409	0.26
3 Adult Assessment Only	1318	\$339	\$263	\$71	\$810	\$194	\$504	0.51
10 Child Assessment Only	102	\$332	\$358	\$69	\$1,030	\$181	\$434	0.46
12 Child Shared Community Care - Incomplete	82	\$296	\$334	\$72	\$645	\$218	\$377	0.39
14 Child Direct Community Care - Incomplete	2613	\$227	\$198	\$59	\$621	\$158	\$311	0.49
6 Adult Direct Community Care - Complete	1781	\$221	\$177	\$46	\$1,098	\$128	\$252	0.61
4 Adult Shared Community Care - Complete	216	\$220	\$220	\$53	\$668	\$147	\$263	0.46
5 Adult Shared Community Care - Incomplete	681	\$219	\$173	\$49	\$771	\$136	\$269	0.58
13 Child Direct Community Care - Complete	554	\$217	\$191	\$59	\$602	\$132	\$255	0.55
7 Adult Direct Community Care - Incomplete	9034	\$169	\$148	\$45	\$987	\$114	\$187	0.57

The key findings are:

- Overall, child and adolescent episodes cost more than adult episodes;
- Overall, complete (short-term) episodes cost more on a per diem basis than incomplete (longer-term) episodes. But they cost less on an episode basis;
- Overall, shared care episodes cost at least as much as direct care episodes on both a per diem and an episode basis;
- Child and adolescent inpatient episodes cost more than adult inpatient episodes on both an episode and a per diem basis;
- Assessment only community episodes cost significantly less on an episode basis but, on a per diem basis, they are the most costly community treatment days.

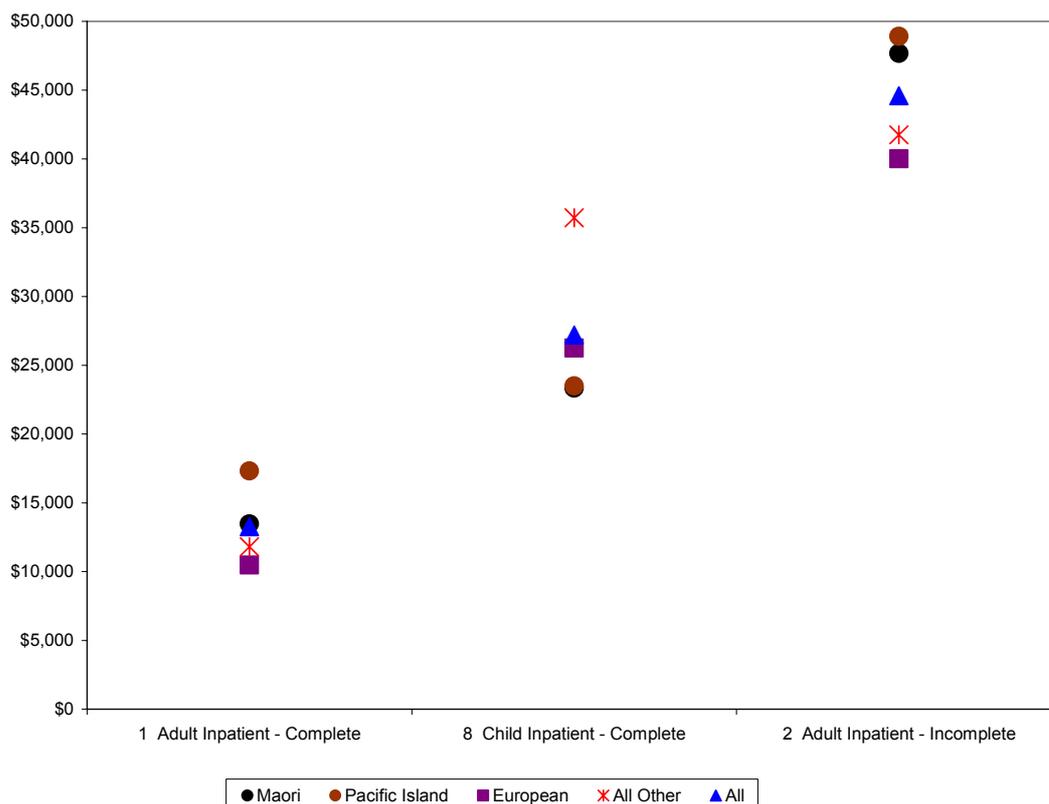
These findings lay the groundwork for the design of the casemix classification in the next chapter.

9.4.2 Summary of episode costs by Ethnicity

Figure 54 profiles the costs of inpatient episodes for the major ethnic groupings.

Pacific Island episodes are the highest average cost for adult episodes, followed by Māori episodes, ‘all other’ episodes and then European. The situation is different for child and youth inpatient episodes. The ‘all other’ group has the highest child and youth episode cost, followed by European episodes. There was no difference between Māori and Pacific Island episodes.

Figure 54: Cost profile of inpatient episodes by major ethnicity groupings



This same information is shown in Figure 55 for adult community episodes and in Figure 56 for child and youth community episodes.

The costs vary according to the type of community episode. For adult community episodes, the Pacific Island episodes are the most costly for 3 types of episodes (incomplete shared care, complete direct care and incomplete direct care). Māori episodes are the most costly of the complete shared care group. There are no differences in the cost of assessment only episodes.

For child and youth community episodes, Pacific Island episodes are the highest cost assessment only, shared care complete, direct incomplete and direct complete episodes. Māori shared incomplete episodes are the most costly in that group.

It is important to note that the results reported here include incomplete episodes. These episodes either began before the study started, were still going when the study ended, or both. For class finding purposes (reported in the next chapter), many of these episodes are subsequently removed. The question to be resolved as part of the casemix analysis in the next chapter is whether differences between ethnicity groupings exist after removing partial episodes and after controlling for other factors such as diagnosis, severity of symptoms and age.

Figure 55: Cost profile of adult community episodes by major ethnicity groupings

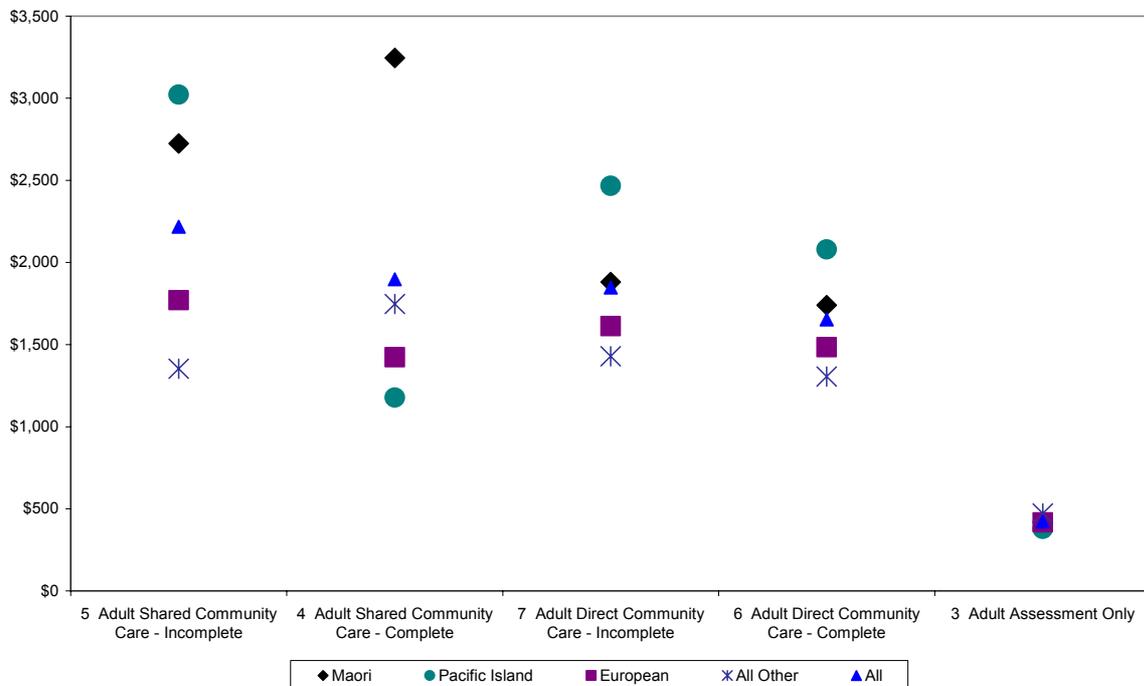
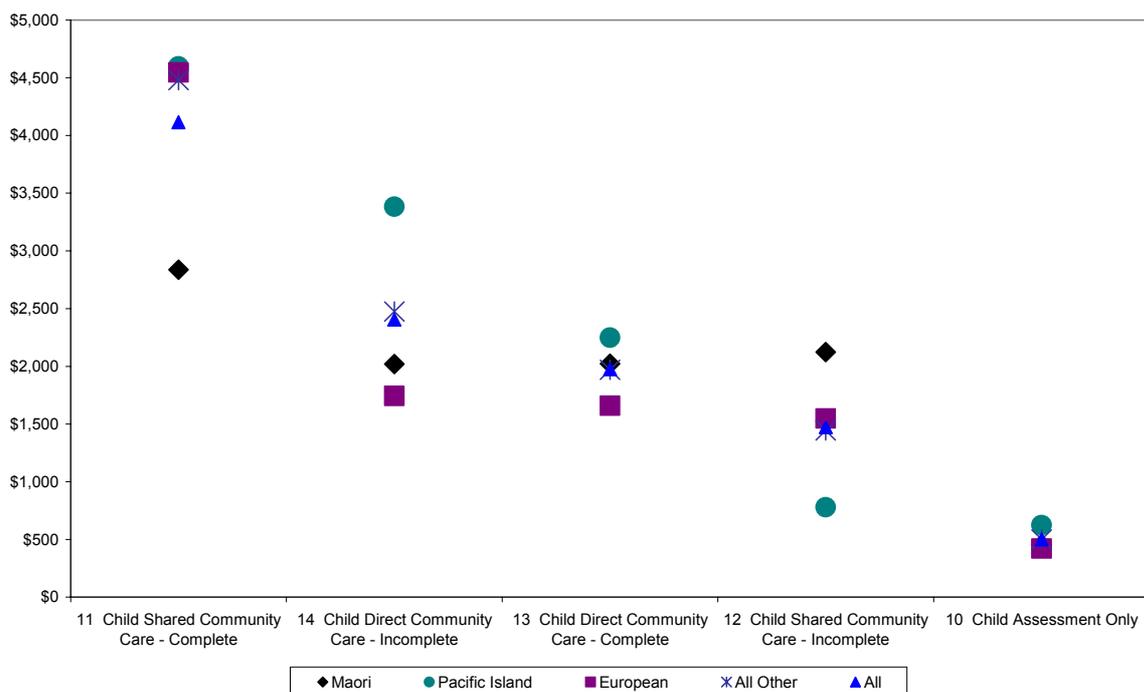


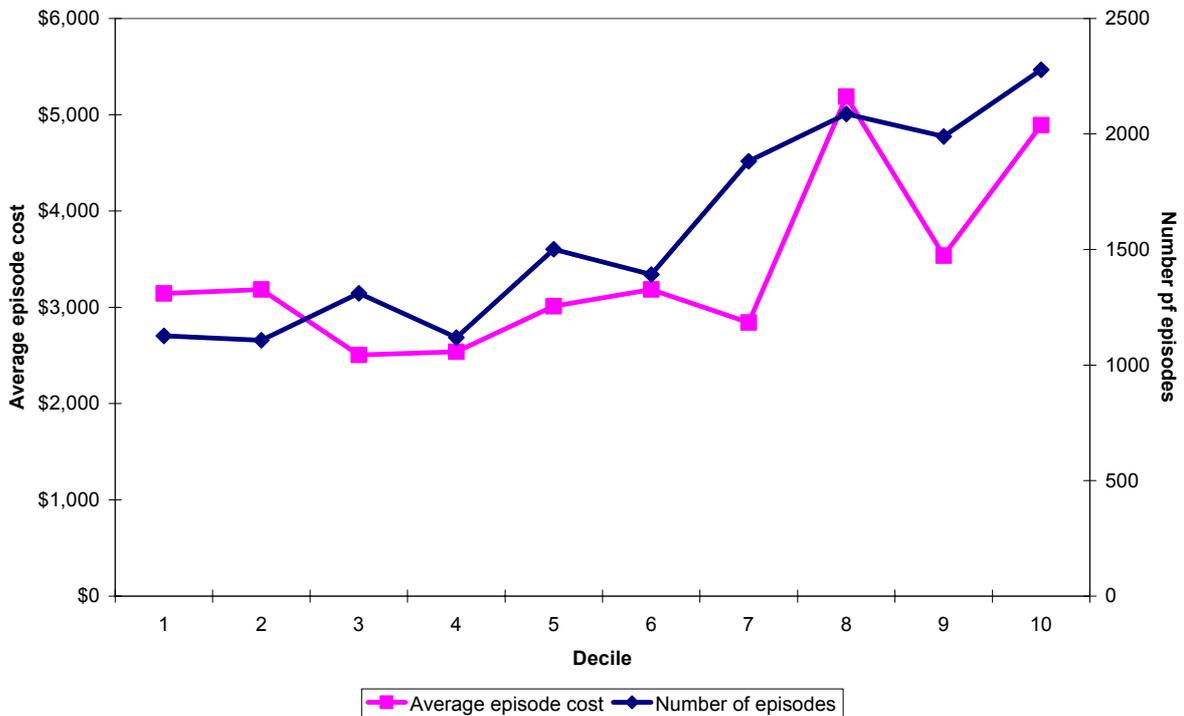
Figure 56: Cost profile of child and youth community episodes by major ethnicity groupings



9.4.3 Average episode costs by socioeconomic status

Figure 57 shows the average episode cost for each decile of the NZ CAU Index of Deprivation. As described previously, people in the '1st decile' live in areas that have the lowest rate of social deprivation. People in the 10th or 'top decile' live in areas that have the highest rate of social deprivation.

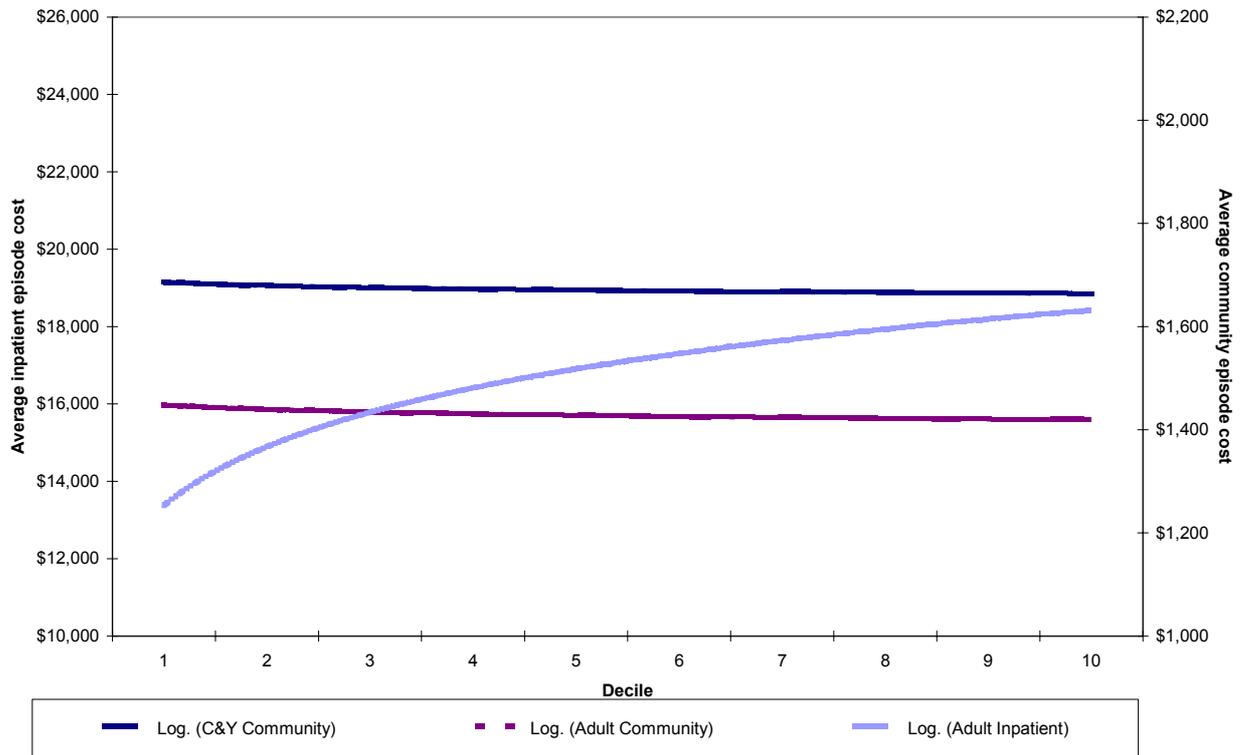
Figure 57: Average episode cost by decile



This figure shows the number of consumers in each decile (on the right axis) and, for each decile, the average cost per episode (on the left axis). The trend is clear. Consumers living in areas with the lowest rate of social deprivation have lower episode costs. Consumers living in areas with the highest rates of social deprivation have higher episode costs.

Figure 58 provides a partial explanation. This figure shows the trend (using a logarithmic trendline) in average costs by type of episode. Again, child and youth inpatient episodes are excluded because of their small volumes. The logarithmic trendlines for community care episodes are almost flat, suggesting no differences in average episode costs across the deciles. The trendline for inpatient care is different, with average episode costs increasing as the level of deprivation increases. These results are not the rate at which consumers in each decile are admitted. They are the average costs of those admissions. In summary, community episode costs do not vary by decile. Consumers living in areas with higher rates of social deprivation do not have higher community episode costs. But consumers living in areas with higher rates of social deprivation do have higher cost inpatient episodes.

Figure 58: Average episode cost by decile and type of episode



10. The NZ-CAOS casemix classification model

10.1 Overview of data preparation and statistical methods

There were two main stages in the analysis of the final data set. The first stage involved a thorough investigation of the variables to ensure that there were no errors or inconsistencies. Only when this careful checking was completed did the second stage of modelling the data begin.

The grouping of the data constituted the second stage of the analysis. Cost of care was used as the response variable, measured as the core cost per episode. For class finding purposes, episodes were defined as either complete or ongoing.

The principles for determining whether an episode was complete or ongoing were as follows:

1. Complete episodes were identified as those episodes that started and finished within the study period where the number of elapsed days were less than 91 days;
2. Ongoing episodes were identified as those episodes where either the number of elapsed days was greater than 91 days or the reason for episode end was “3 month Review” or “Episode Ongoing at Study End”. ‘Elapsed days’ is the number of days between the start and finish of an episode, and not the number of days in which a consumer is seen. The difference is important, particularly for community episodes. For example, a consumer seen weekly for 12 weeks is seen on 12 days and has 91 elapsed days (3 months). In summary, ‘ongoing’ episodes were defined to include both those that were continuing and episodes that were completed but were long-term (more than 91 days from start to finish).

For class findings purposes, all complete episodes were included. Additional preliminary analyses were undertaken with the ongoing episodes. Given censoring effects of the study period (i.e. the study occurred over a fixed 6 month calendar period), legitimate ongoing episodes would be overlooked as not having met the 91 day rule. Analysis of the distributions of elapsed study days suggested that a minimum observation period of 60 days for left and right censored episodes could be used as a criterion to include such episodes for class finding purposes. Costs for ongoing episodes of more than 60 and less than 91 days were scaled to 91 days to ensure standardised comparisons for these types of episodes.

Removing partial episodes that did not meet these criteria resulted in a total of 16,665 episodes in the final data set used for class finding. The breakdown of these episodes is shown in Table 53.

Table 53: Final data set used for class finding

Episode of Care Type	Speciality					
	Adult		Child and Youth		Total	
	number	%	number	%	number	%
Inpatient	2279	16.61%	77	2.61%	2356	14.14%
Assessment Only (community)	1318	9.61%	102	3.46%	1420	8.52%
Shared Community Care	774	5.64%	77	2.61%	851	5.11%
Direct Community Care	9349	68.14%	2689	91.31%	12038	72.24%
Total	13720	100.00%	2945	100.00%	16665	100.00%

PC-Group was used for the class finding. Explanatory variables were selected from the variety of demographic and clinical measurements recorded for consumers. The ‘best’ tree was selected as that which accounted for the largest proportion of variation in the cost of care, the response variable. As this tree was not necessarily clinically the most sensible, PC-Group was also used to improve the clinical logic of the classification. Details of PC-Group may be found in the software manual²⁰.

The ultimate aim of the analysis was to form distinct groups within the data, such that consumers within each group were similar to each other, but different from consumers in the other groups. Similarity and dissimilarity between consumers was measured by the cost of care, and groups were to be defined in terms of clinical and other attributes of the consumers.

Explanatory variables were compared to find the one that could best split the data into two homogeneous groups that were as different from one another as possible. These two groups were then split further, sometimes using the same explanatory variable, sometimes another. Successive binary splits were performed on the data until there was no significant improvement to be made. At that time, the best classification solution would have been reached.

The data could be divided in many different ways to form alternative sets of classification groups. Each of these alternatives needed to be evaluated and compared with other options. Typically, the criterion used in such an evaluation is the proportion of the sum of squared deviations about the means that is explained by the classes. This is generally expressed as the percentage of variation, or the proportion of the variance of the response variable, that can be explained by the selected groups. This statistic is known either as the Reduction in Variation (RIV) statistic or as R-squared (R^2), as in a regression analysis. It is influenced by 3 (interrelated) factors:

1. How much variation there is to explain. In general, the more variation to start with, the more variation can be explained. Within a group, variation relative to the mean is measured by the coefficient of variation (CV) statistic. The higher the CV, the more relative variability.
2. The level of homogeneity within each of the final classes. Again, this can be measured by the CV.
3. The degree of heterogeneity between the final classes. If classes have similar costs, the R^2 is reduced. If classes have different costs, the R^2 is increased.

The evaluation of the options involved not only statistical criteria but also clinical considerations. Several options were discounted on this basis. Other options were selected on clinical, and not necessarily statistical, grounds. For example, adult inpatient episodes were separated from child and youth episodes because this separation makes clinical sense. However, one outcome of including clinical criteria is that the R^2 performance is likely to be weakened. This is because some classes, while being clinically different from each other, have similar costs. Including classes that have similar costs (even if they are clinically distinct) does not improve the R^2 .

In parallel with this class-finding analysis, a number of multilevel models were fitted to the data. Using this technique, the multilevel structure of the data (consumers, at one level, within District Health Board, at the second level) can be modelled. The variability in the cost data can be separated into different components corresponding to variability between District Health Boards and variability between consumers within District Health Boards. This is particularly useful when a relatively high proportion of the total variation can be attributed to differences between (rather than within) District Health Boards. A multilevel model fitted to such data can be used to identify variables that significantly contribute to the cost of care. The multilevel models that we built confirmed the choice of variables to be included in the class-finding.

²⁰ Austin Data Management Associates (1992) PC Group User's Guide, Version 3.01. Austin, TX: Austin Data Management Associates

After the classes had been created, they had to be examined, one by one, for outlying cases. Several trimming techniques were considered. To decide on the best technique, a number of criteria were considered. The method employed had to be able to isolate low cost as well as high cost outliers. The method of trimming had to be statistically defensible. It was considered not to be necessary to trim severely at this stage. It needs to be stated that the degree of variability within classes that is acceptable during the development of the classification may not be acceptable when rules for the allocation of funds are being determined. For funding purposes, a more severe technique for the selection of outliers may be appropriate.

Outliers were considered to be atypical values of the natural logarithm of the core cost rather than the cost itself. A value was considered to be atypical within a class if it was more than 1.5 times the interquartile range above the third quartile or more than 1.5 times the interquartile range below the first quartile of its class. For the majority of classes, the natural logarithm of the core cost was normally distributed. For the remaining classes, the distribution of the natural logarithm of the core cost was symmetric. Strictly speaking, it is not necessary to have a symmetric distribution to apply the interquartile range trim. However, a symmetric distribution increases the likelihood of detecting both low cost and high cost outliers.

This trimming method removed only 94 (0.06%) of episodes. These trimmed episodes consisted of 69 extremely low cost episodes and 25 extremely high cost outliers. Given the very small number of trimmed episodes, the trimming made little difference to the final R^2 .

10.2 Classification design principles

Four design rules were adopted for use during the class finding. The dependent or response variable was the cost of an episode of care. The independent variables were those characteristics of consumers that can be measured and that can be demonstrated to be predictive of cost.

The four design rules used to guide classification development were:

1. Consumer related cost drivers

The cost drivers used in the design of the classification should, wherever possible, be related to consumer characteristics and not to the type, or extent, of services utilised.

2. Variance reduction

The selection of the cost drivers should result in minimum variation within each class and maximum differences between classes.

3. Sensible clinical groups

The final classes should be clinically sensible.

4. Ease of collection

The variables used in the classification should be capable of routine collection, coding and data entry.

10.3 Results of testing the Australian MH-CASC model

The first step in the analysis involved classifying each episode using the Australian MH-CASC model. In total, applying the MH-CASC classification to the NZ-CAOS database achieved an R^2 of 75.17%. The R^2 for the inpatient branch was 60.28%, but the R^2 for the community branch was only 4.10%. Results for each of the branches are shown in Table 54.

Table 54: Results of testing the Australian MH-CASC classification

Episode Type	R ²
All	75.17%
All inpatient	60.28%
Adult Inpatient Complete	4.28%
Adult Inpatient Ongoing	3.52%
Child Inpatients	2.08%
Adult Community	3.50%
Child Community	5.30%

Reflecting differences in the role and organisation of mental health services in the two countries, some MH-CASC classes had a very small number of episodes in the NZ-CAOS database, while others were very large. Diagnostically, the two samples are reasonably similar; the main differences arise with respect to the greater proportions of missing data, Personality Disorders and Anxiety Disorders, and lower proportions of Organic Disorders in the NZ adult sample. The age- gender structures differ mainly with respect to the relatively greater numbers of 15-19 NZ males and females. In general the clinical profiles were remarkably similar. Overall, the key difference between the samples rests with ethnicity. There was a much greater proportion of indigenous episodes in the NZ sample and, hence, the decision to test specific ethnic groupings in the class finding analyses.

Given these differences, and the above statistical results, it was clear that the MH-CASC model is not appropriate in the New Zealand context. The final stage of the analysis was to develop a classification model that is appropriate in the New Zealand context.

10.4 Overview of the NZ-CAOS Classification

Figure 59 provides an overview of the NZ-CAOS classification model. This model is the one that achieved the best statistical result while at the same time being clinically sensible.

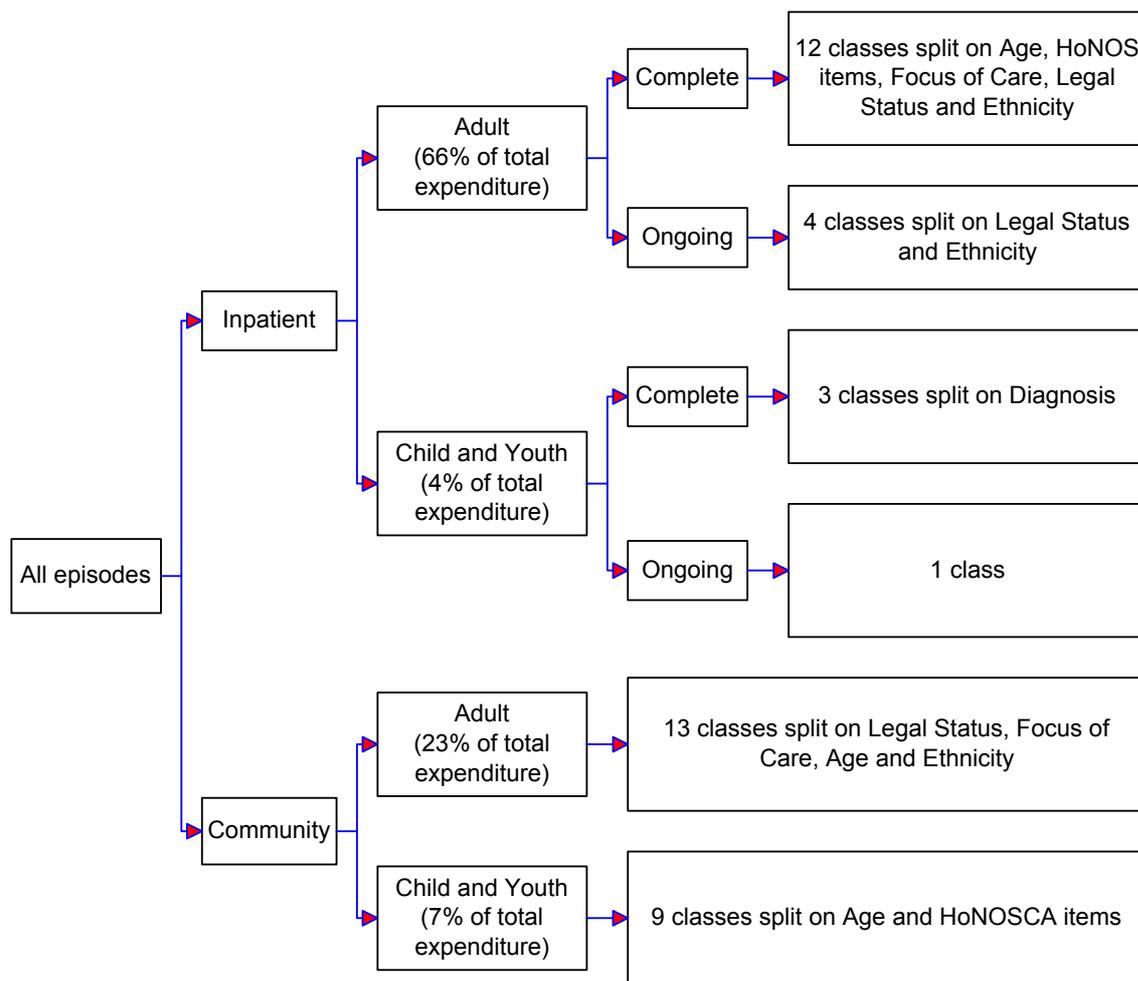
This figure, and all subsequent ones, shows the results with untrimmed data. The response variable for class finding is the core episode cost. The core episode cost excludes Psychiatric Pharmaceuticals while the untrimmed data include atypical or outlier cases.

The final step in developing the classification involves trimming the data to remove outlier cases and adding back in the non-core episode costs. Completion of this step gives a mean total episode cost and a trimmed CV for each class.

The starting point CV with untrimmed data was 2.36 indicating that there is a reasonable degree of variability to be explained. In total, there are 42 classes, 20 for inpatient episodes and 22 for community episodes. This classification model explains 78.49% of the variation in core episode costs with untrimmed data and 77.83% with trimmed data. This compares to 75.2% R² that was achieved by the Australian MH-CASC model with its 42 community classes.

At the top level, episodes are split into 2 branches – one for inpatient episodes and one for community episodes. Each of these is then split based on whether the episode was provided by an adult or a child/youth service (not by the age of the consumer).

Figure 59: Overview of the NZ-CAOS Casemix Classification



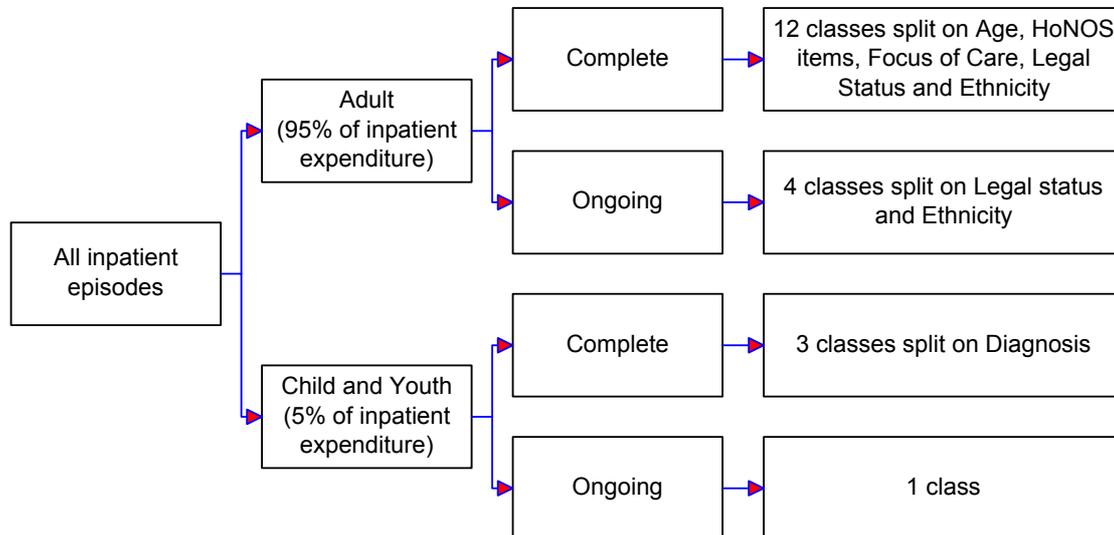
In the sections that follow, each branch of the classification tree is discussed. These sections describe the classes within each branch and provide an RIV (R^2) statistic for each separate branch. As expected, the starting point CV within each branch is lower than for the classification tree as a whole. One consequence is that the R^2 within branches is lower than the R^2 for the tree as a whole as there is relatively less variation to be explained. In all cases, the figures show the results with untrimmed data.

10.5 Inpatient episodes

Figure 60 provides an overview of the NZ-CAOS classification model for inpatient episodes. The starting point CV was 0.98, indicating that there is not a significant degree of variability to be explained. In total, there are 20 inpatient classes, 16 for adult episodes and 4 for child and youth episodes. This classification model explains 64.7% of the variation in core episode costs with untrimmed data and 63.98% with trimmed data. This compares to 60.3% RIV (untrimmed) that was achieved by the Australian MH-CASC model.

At the top level, episodes are split into 2 branches – one for adult episodes and one for child/youth episodes. Each is discussed separately in the following sections.

Figure 60: The NZ-CAOS inpatient classification model



10.5.1 Adult inpatient episodes

In total, 16 classes are recommended for the classification of adult inpatient episodes. The starting point CV for this branch was 0.98, indicating that there is not a significant amount of variability to be explained. There are 12 classes for complete episodes and 4 for ongoing episodes. This classification model explains 64.67% of the variation in core episode costs with untrimmed data and 64.03% with trimmed data.

At the top level, episodes are split into 2 branches – one for complete episodes and one for ongoing episodes. Each is discussed separately in the following sections.

Adult inpatients – complete episodes

The 12 classes recommended for adult complete inpatient episodes are shown in Figure 61. Each of the classes is regarded as clinically sensible. Of the 12 classes, 10 have a coefficient of variation (CV) of less than 1 indicating that each of these classes is relatively homogeneous. Of the two that do not, one (Class AI4) is a low volume class.

Six of the 12 classes are based on 3 broad ethnicity groupings (Māori, Pacific Island and European/Other). These 6 final classes were justified by the statistical analysis. Each of the final classes that are not based on ethnicity groupings is shown in Figure 61 with the costs for each of the 3 broad ethnicity groups included for descriptive purposes. In these cases, they were not supported by the statistical analysis as casemix classes, nor were they included when the R^2 for the branch was calculated.

The RIV for this branch is 14.74% using untrimmed data and 15.23% with trimmed data. This compares favourably to 4.3% RIV when the MH-CASC model is applied to the New Zealand data set. In the Australian study, MH-CASC achieved an R^2 of 8.7% with untrimmed data and 16.6% with trimmed data.

Diagnosis explained only 3.5% of the variation in total cost with this branch. Given this poor result, the DRG classification (which groups episodes based predominantly on the principal diagnosis) was not worth testing.

For this branch, the best splitting variable at the top of the tree was Item 6 on the HoNOS scale. This item captures hallucinations and/or delusions. Consumers with a rating of less than 3 (either no problem or a mild problem) had an average episode cost of \$8,281. Consumers with a rating of 3 or 4 (a moderate to severe problem) had an average cost that was \$12,566 or about 50% higher.

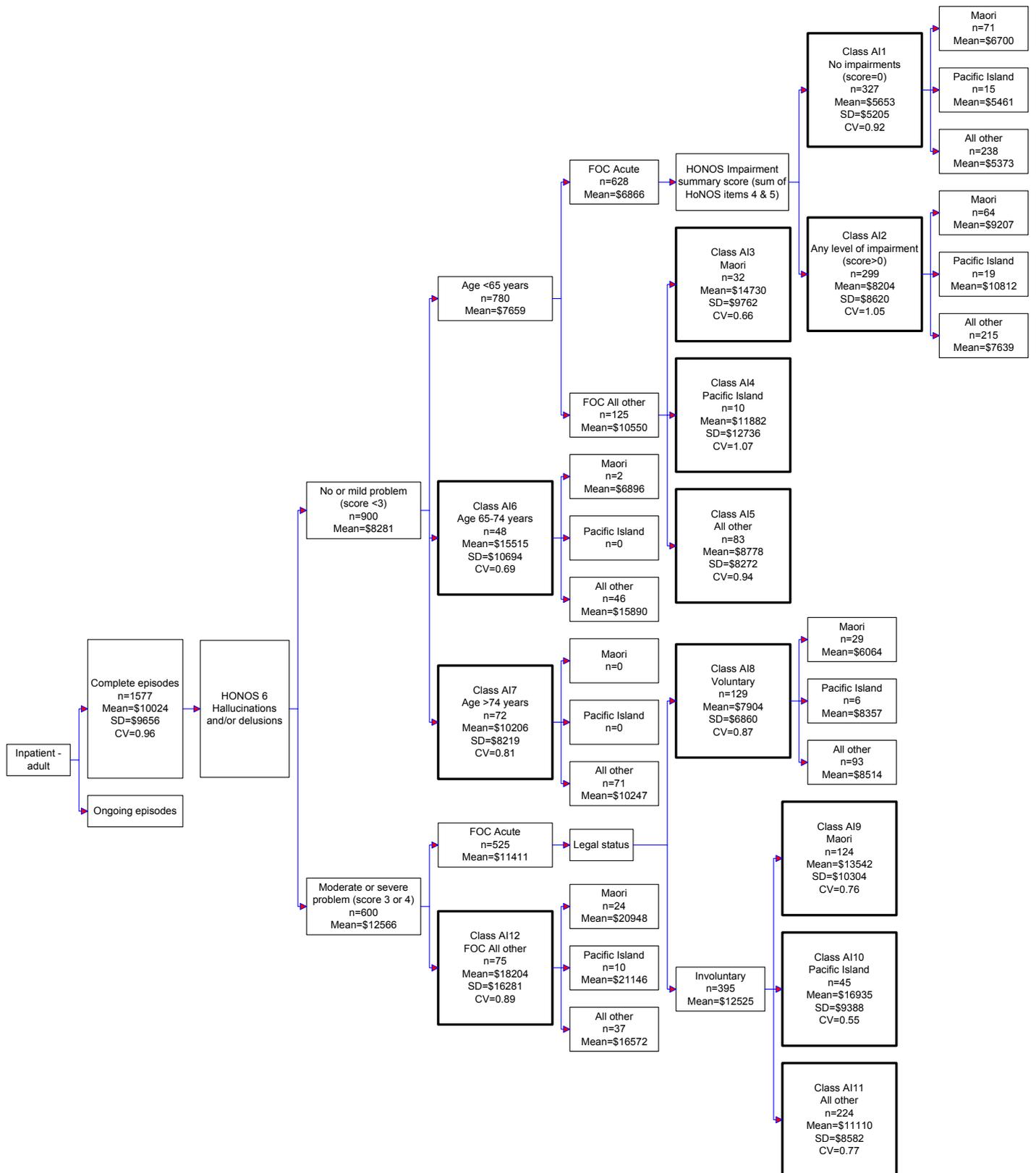
The group with low ratings on hallucinations and/or delusions is then split based on age. The young group (age less than 65 years) are then split into two groups based on Focus of Care (FOC). Episodes with an 'Acute' FOC are significantly less costly than other episodes (\$6,866 compared to \$10,550).

At the next level, episodes for consumers aged less than 65 and with an Acute FOC are split into two final classes based on their ratings on two items that capture the presence or absence of cognitive or physical impairment (Items 4 and 5). Class AI1 is for episodes with no impairments (a rating of 0 on both items). This class had an average episode cost of \$5,653. Class AI2 is for episodes with any level or type of impairment (a rating of more than 0 on at least one item). This class had an average episode cost of \$8,204. Neither group can be split by ethnicity in a way that is statistically justifiable. However, as already noted, costs for the broad ethnic groupings have been included for descriptive purposes for these and subsequent classes.

In parallel with splitting the Acute FOC group, episodes for consumers aged less than 65 and with a FOC other than Acute are split into three final classes (Classes AI3, AI4 and AI5) based on Ethnicity Grouping. The Māori class has the highest episode cost (\$14,730). The Pacific Island class is small (n=10), with an average episode cost of \$11,882. The European/Other class has the lowest episode cost (\$8,778).

Consumers with low ratings on the hallucinations and/or delusions item and who are between 65 and 74 years form a final class (Class AI6). This class has an average episode cost of \$15,515, which is significantly more expensive than the younger age group.

Figure 61: The adult complete episode inpatient branch



Likewise, consumers aged over 74 years form a final class (Class AI7). Unexpectedly, this class has an average episode cost (\$10,206) that is significantly less than the 65-74 year group. One reason is that some of these episodes are shorter than expected, with the consumer being transferred to a specialist psychogeriatric or aged care unit (both out of scope in the NZ-CAOS study). However, this does not fully explain this result as the majority of consumers in this class are discharged directly to community care within the local DHB.

A final point to note about older consumers (age 65 and older) with low ratings on hallucinations and/or delusions is that there were only 2 Māori episodes and no Pacific Island episodes. In total, 164 of the 1,577 adult complete episodes were for consumers aged 65 or older. Included in this total group were only 5 Māori episodes and 1 Pacific Island episode. Feedback from clinical consultations suggests that this finding reflects the preference of older people to be cared for by their family and community rather than access specialist mental health services.

Turning now to those consumers with a rating of 3 or 4 (a moderate to severe problem) on the hallucinations and/or delusions item, the best splitting variable was again Focus of Care (FOC). Again, episodes with an 'Acute' FOC were significantly less costly than other episodes (\$11,411 compared to \$18,204).

The larger Acute FOC group are then split into 2 groups based on legal status. The voluntary group form a final class (AI8). Their average cost of \$7,904 is significantly less than the average for episodes that were involuntary (\$12,525).

The involuntary group splits into 3 final classes (Classes AI9, AI10 and AI11) based on Ethnicity Grouping. The Pacific Island class has the highest episode cost (\$16,935). The Māori class has an average episode cost of \$13,542. The European/Other class has the lowest episode cost (\$11,110).

The final class in the adult complete inpatient episode branch is Class AI12. This class includes consumers with a rating of 3 or 4 (a moderate to severe problem) on the hallucinations and/or delusions item and with a Focus of Care (FOC) other than 'Acute'. On average, episodes in this class costed \$18,204. While the descriptive data in Figure 61 suggest differences in costs between ethnicity groupings, ethnicity is not a statistically justifiable split at this point in the tree.

In total, 5 variables are used in the adult complete inpatient branch:

- HoNOS - items 4, 5 and 6;
- Age;
- Focus of Care (FOC);
- Legal status; and
- Ethnicity.

Of these five variables, age, legal status and ethnicity are already routinely collected and the HoNOS has been recently introduced as a routine outcome measure. Likewise, the FOC has recently been introduced for routine collection.

Two of the five variables are not strictly consumer-related cost drivers. Both the FOC and legal status are capturing service-related elements as well as consumer-related elements. For this reason, it would be preferable to utilise clinical characteristics of consumers instead of these two variables. However, as occurred in the Australian MH-CASC study, there were no clinical variables in the data set that worked as proxies for these two variables.

Finally, it is important to note the consumer-related variables that were captured in the study but which did not prove to be strong cost-drivers. The most significant of these is undoubtedly diagnosis. Diagnosis was tested at each point in the tree but was not strongly predictive of costs at any point. The HoNOS scale as a whole was also not a good cost predictor. Individual items worked better than the total HoNOS score.

The other clinical scale that was not incorporated was the RUG-ADL measure of function for older people. The Australian study included specialist psychogeriatric units as well as general units and, in that context, the RUG-ADL was a good cost-predictor for older people. NZ-CAOS included those specialist psychogeriatric units managed through the mental health stream but not those managed through the aged care stream. In total, there were only 187 episodes with a completed RUG-ADL score in the NZ-CAOS data set used for class finding.

Adult inpatients – ongoing episodes

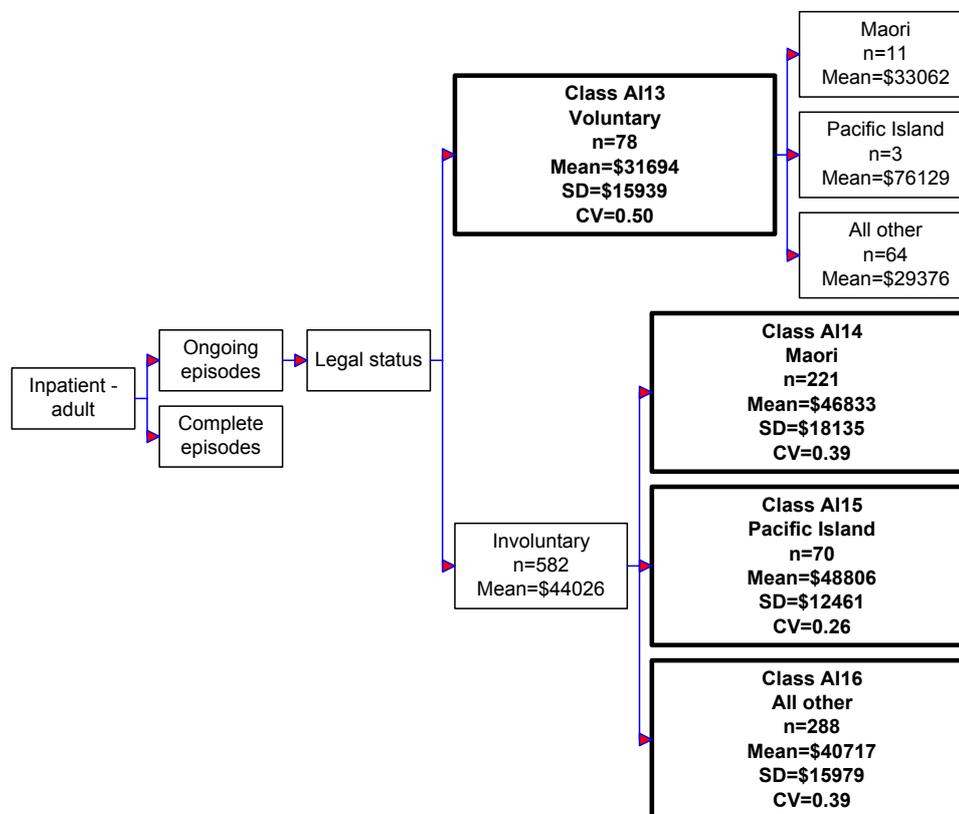
The 4 classes recommended for adult ongoing inpatient episodes are shown in Figure 62. The starting point CV for this branch was 0.41, indicating that there is relatively little variability to be explained. Not surprisingly, all 4 classes have a low coefficient of variation (CV), indicating that each of these classes is quite homogeneous.

Diagnosis explained 6.4% of the variation in total cost with this branch, but the diagnostic groupings were not sensible. Given this result, the DRG classification (which groups episodes based predominantly on the principal diagnosis) was again not worth testing.

For this branch, the best splitting variable at the top of the tree was legal status, with voluntary episodes having an average cost of \$31,694 and involuntary episodes having an average cost of \$44,026. The (smaller) voluntary group forms a final class (Class AI13). The larger involuntary group is split based on the 3 broad ethnicity groupings (Māori, Pacific Island and European/Other). These 3 final classes were justified by the statistical analysis. Such a split was not statistically justifiable for the voluntary group. However Figure 62 includes the costs for each of the 3 broad ethnicity groups within this class for descriptive purposes.

The R^2 for this branch is 8.79% using untrimmed data and 9.68% with trimmed data. This compares to 3.5% when the MH-CASC model is applied to the New Zealand data set. The low R^2 is because the costs of the final classes are not very different from each other. In the Australian study, MH-CASC achieved an R^2 of 16.8% with untrimmed data and 19.1% with trimmed data.

Figure 62: The adult ongoing episode inpatient branch



Only 2 variables are used in the adult ongoing inpatient branch:

- Legal status; and
- Ethnicity.

As already noted, both are already routinely collected and legal status is not, strictly speaking, a consumer-related cost driver. Again, it would be preferable to utilise clinical characteristics of consumers instead of legal status. However, as in the complete episode branch, there were no clinical variables in the data set that worked as proxies for this variable.

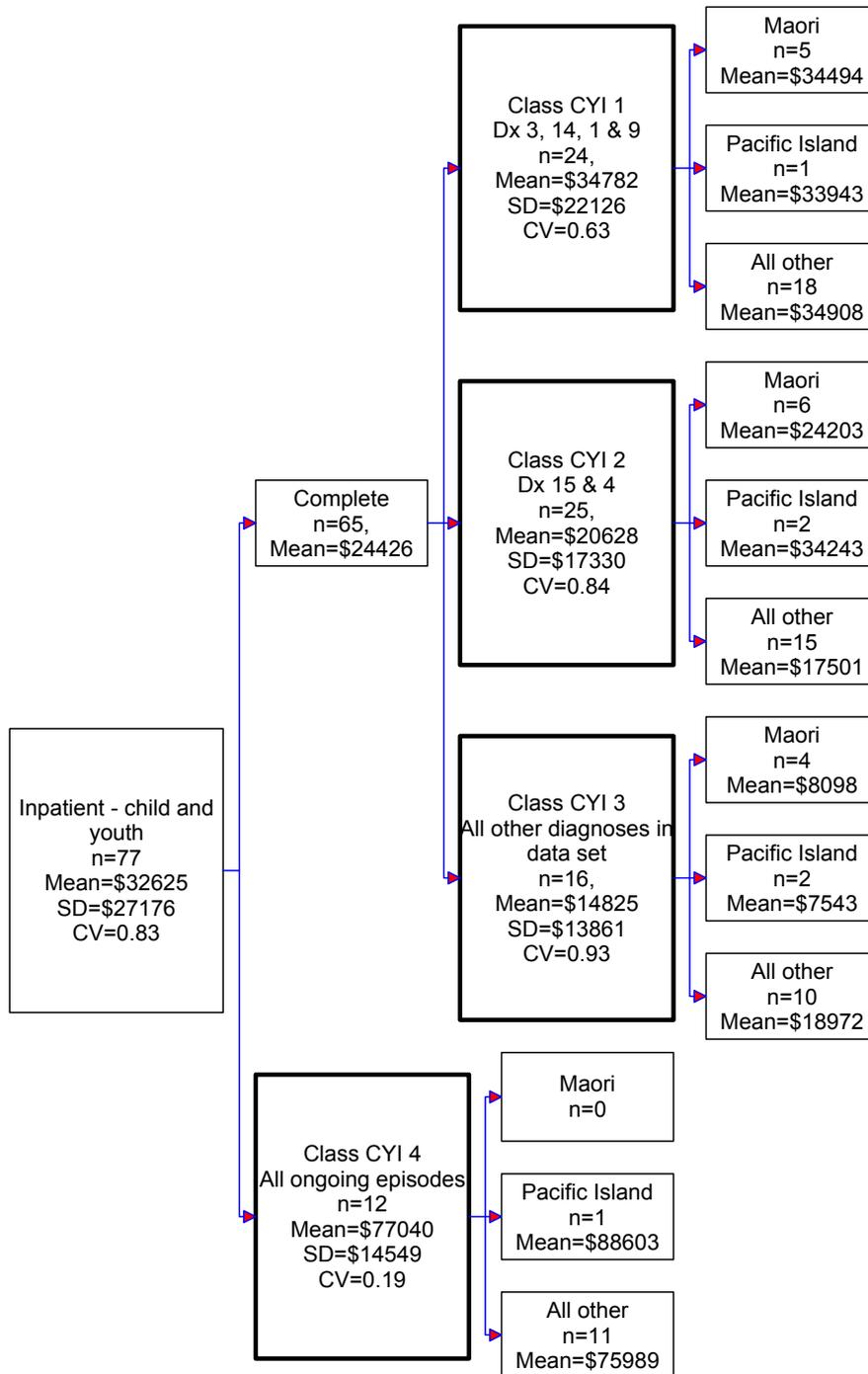
Finally, it is important to note the consumer-related variables that were captured in the study but which did not prove to be strong cost-drivers. These included diagnosis, the HoNOS scale and the RUG-ADL measure of function for older people.

The Life Skills Profile (LSP-16) was collected in the study but the volume of missing data meant that it could not be tested for inclusion in the NZ-CAOS model. The analysis team understands that this occurred because many staff participating in the study felt that the LSP-16 was an inappropriate instrument. Given this qualitative feedback and the poor level of compliance, there would be little point in incorporating this measure in the inpatient classification. It was thus discounted as a contender variable in the casemix analysis.

10.5.2 Child and Youth inpatient episodes

Figure 63 shows the 4 classes recommended for child and youth inpatient episodes. All 4 classes are small but each has a coefficient of variation (CV) of less than 1 indicating that each is relatively homogeneous.

Figure 63: The child and youth inpatient branch



The three classes for complete episodes are based on diagnostic groupings. These groups are:

1. Organic Disorders
2. Substance Abuse Disorders
3. Schizophrenia, Paranoia and Acute Psychotic Disorders
4. Mood Disorders
5. Anxiety Disorders
6. Obsessive Compulsive Disorders
7. Stress and Adjustment Disorders
8. Somatoform Disorders
9. Eating Disorders
10. Behavioural Syndromes Associated with Physiological Disturbance
11. Personality Disorders
12. Sexual Disorders
13. Mental Retardation
14. Disorders of Psychological Development
15. Disorders of Childhood and Adolescence
16. Other

In contrast to adult inpatient episodes, diagnosis was a useful predictor of costs for child and youth episodes. However, not all diagnoses were represented in the NZ-CAOS data set used for class finding. These diagnoses need to be incorporated before the classification could be used. The approach taken is that missing diagnoses were assigned to the low cost group unless indicated otherwise by the Australian MH-CASC results. On that basis, Eating Disorders (missing completely in the NZ-CAOS data set used for class finding) were assigned to the high cost group. All other missing diagnoses are assigned to the low cost group.

CY11 is the high cost complete episode class. This class includes (3) Schizophrenia, Paranoia and Acute Psychotic Disorders (14) Disorders of Psychological Development and (1) Organic Disorders. As noted above, (9) Eating Disorders would also be included in this group.

CY12 is the middle cost complete episode class. This class includes (in order of volume) - (15) Disorders of Childhood and Adolescence and (4) Mood Disorders.

CY13 is the lowest cost complete episode class. All other diagnoses are assigned to this class.

These three classes have significantly different average costs - \$34,782, \$20,628 and \$14,825. All of them are significantly less costly than the cost for the small number of child and youth episodes that were classified as ongoing (3 months of care). There were only 12 episodes in this class, with an average cost of \$77,040 for a 3 month care period. While being small in number, this contrasts to only 6 such episodes in the larger Australian study. One option considered was to exclude this small group of episodes on the basis of their small number. However, this was discounted as a suitable long-term solution. There will always be a small group of consumers with intensive and long-term care needs and any classification needs to be able to accommodate them. The inclusion of this class is thus no different to the inclusion of very low volume, but high cost, classes (such as multiple organ transplants and severe full thickness burns) in the DRG system.

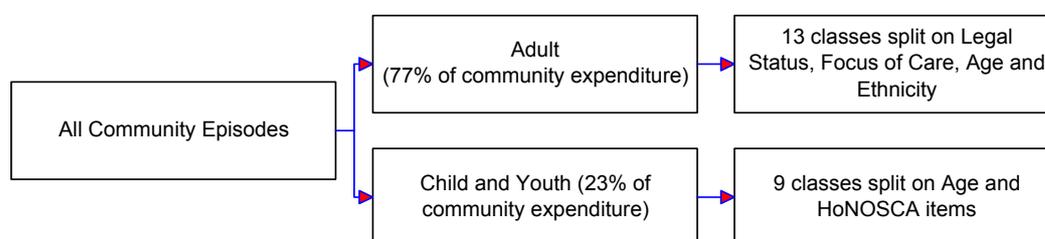
The R^2 for this branch is 57.82% using untrimmed data and 56.57% with trimmed data. This result cannot be compared to the Australian results because ongoing episodes were excluded in the Australian study given their small volume.

Given the small volumes, it was also not possible to employ any other splitting variables in this branch of the tree. Accordingly, none of the clinical ratings captured during the study are incorporated as none worked as well as diagnosis.

10.6 Community episodes

Figure 64 provides an overview of the NZ-CAOS classification model for community episodes. The starting point CV was 1.14, indicating that there is some variability to be explained. In total, there are 22 community classes, 13 for adult episodes and 9 for child and youth episodes. This classification model explains 13.50% of the variation in core episode costs with untrimmed data and 15.06% with trimmed data. This compares to 4.1% R^2 (untrimmed) that was achieved by the Australian MH-CASC model with its 19 classes.

Figure 64: The NZ-CAOS community classification model



10.6.1 Adult community episodes

Figure 65 shows the 13 classes recommended for adult community episodes. At the top of the tree, episodes are first split into an Assessment Only group and a Treatment group. The Assessment Only group forms a final class (AC1) and has an average cost of \$421. As with previous branches, this and subsequent final classes are split in the figure into major ethnicity groupings for descriptive purposes only.

The treatment group is then split on Legal Status. This variable is a routine collection item. However, of the 10,123 treatment episodes, 2,242 (22%) were missing legal status. As noted in Chapter 9, the majority of these were also missing a FOC classification. Given the volume of missing data, one option considered was to exclude legal status as a splitting variable. However, because legal status proved to be the best cost-predictor for those episodes with the required data, and because it should be routinely collected, it was decided to exclude episodes missing legal status data from further analysis. This reduced the treatment cohort to 7,881 episodes.

About two-thirds of remaining episodes (6,437) were voluntary episodes. These episodes are split into 3 groups based on Focus of Care (FOC).

The Intensive Extended FOC group are the high cost voluntary group and they form a final class (Class AC2). Class AC2 has an average cost of \$1,905.

The Functional Gain FOC group are the middle cost group. This group is split based on broad Ethnicity Grouping. Class AC3 is the Māori class and has an average cost of \$1,786. Class AC4 is the Pacific Island class and has an average cost of \$2,529. All others are assigned to Class AC5. This class has an average cost (\$1,785) that is similar to Class AC3.

There were no differences in costs between those classified as ‘Acute’ and those classified as ‘Maintenance’ on the FOC. They were therefore grouped together. This group was then split into 3 final classes based on Ethnicity Grouping.

Again, the Pacific Island class (AC7) is the high cost class (\$2,017). The Māori group (AC6) forms the middle group, with an average cost of \$1,391. The European/Other group forms the lowest cost class (\$1,153).

Turning now to the involuntary groups, the best cost predictor was age. The younger the group, the higher the cost.

Class AC9 contains young people aged 20 years or less. This small group (n=53) have the most costly of all community episodes. Their average cost is \$3,788 per episode and is similar to the high cost group in the Child and Youth community branch (\$3,578).

There were no significant differences in costs based on age in the 21 to 71 years age group. They were therefore grouped together. This group was then split into 3 final classes based on Ethnicity Grouping.

As before, the Pacific Island class (AC11) is the high cost class (\$3,063). The Māori group (AC10) forms the middle group, but its average cost is not much higher than the European/Other group (\$2,176 and \$2,012 respectively).

Finally, consumers aged 72 years and older are grouped together to form the final Class AC13. This group of older consumers (n=79) has very low average costs (\$954 per episode compared to \$2,125 for all involuntary episodes). The other significant observation about this group is that, as before, there are very low numbers of both Māori and Pacific Island consumers. Of the 79 in this group, there are 6 Māori consumers and no Pacific Island consumers. This is consistent with the low numbers of Māori and Pacific Island older consumers in the equivalent inpatient groups and feedback from consultations with Māori and Pacific Island representatives that older consumers from their communities prefer care from their family and community and do not want to access specialist mental health services.

Five variables are used in the adult community episode branch:

- Assessment Only;
- Legal status;
- Focus of Care (FOC);
- Age; and
- Ethnicity grouping.

Age, ethnicity, and legal status are routinely collected (or should be), and the FOC has recently been introduced. ‘Assessment Only’ is not routinely collected. If used in routine practice, episodes with missing data (including the substantial number missing legal status that are reported here) would be routinely assigned to the relevant low cost group.

An important finding in this branch of the tree is that none of the strictly clinical variables proved to be predictive of cost. Neither diagnosis nor the HoNOS (or its items) were associated with cost. Nor was the LSP-16 (although feedback on the unacceptability of this measure effectively excluded it as a contender).

Consistent with the results for Child and Youth episodes reported in the next section, there were no significant differences in costs between direct and shared care episodes. Nor were there significant cost differences between complete episodes and the 3 month period costs of ongoing episodes.

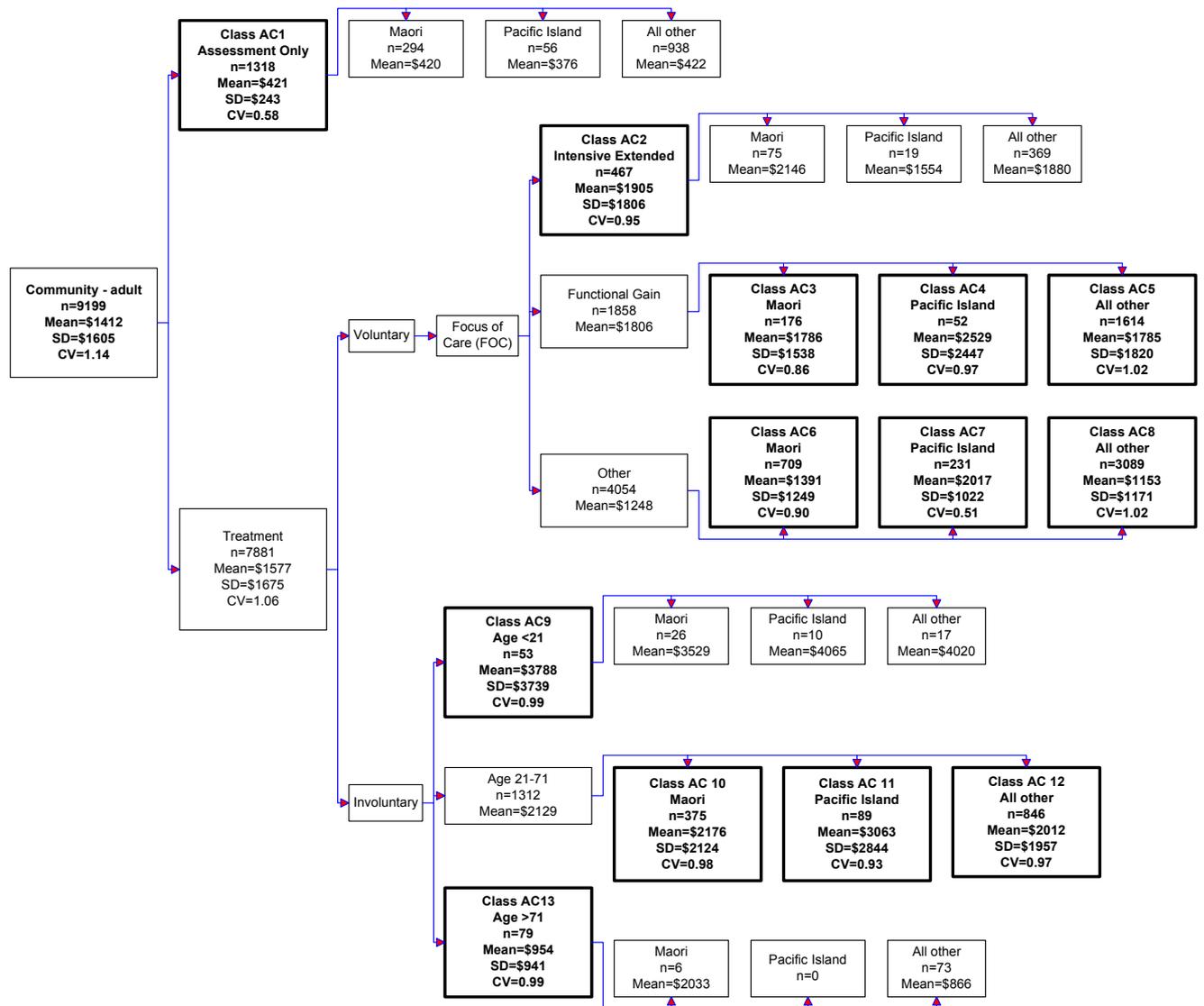
The starting point for this branch of the tree was a CV of 1.14, indicating that there is variability in the costs of adult community care. But this variability is not being driven by clinical differences between consumers (at least as measured by the clinical instruments used in NZ-CAOS).

Three of the five variables are not strictly consumer-related cost drivers. 'Assessment Only' is making a distinction between those consumers who received only an assessment and those that received a service. Again, the FOC and legal status are both capturing service-related elements as well as consumer-related elements. For this reason, it would be preferable to utilise clinical characteristics of consumers instead of these two variables. However, as occurred in the inpatient analysis, there were no clinical variables in the data set that worked as proxies for these two variables.

The overview statistical performance of this branch is only moderate, with an R^2 for this branch of 13.20% (untrimmed). This compares to an R^2 of 3.5% for the MH-CASC classification when tested on the NZ-CAOS database and an R^2 of 5.7% for the MH-CASC classification when tested in the Australian study (untrimmed).

However, of the 13 final classes, 11 have a CV of less than 1.00 while the other 2 both have a CV of 1.02. While the classes are reasonably homogeneous (relative to the starting point of 1.14), their costs are not sufficiently different from each other to achieve a high R^2 . The statistical performance improves a little after data trimming, with a final (trimmed) R^2 of 14.46%. This compares to the R^2 of 12.7% (trimmed) reported in the MH-CASC study.

Figure 65: The adult community branch



10.6.2 Child and Youth community episodes

Figure 66 shows the 8 classes recommended for Child and Youth Community Episodes. At the top of this branch of the tree, episodes are first split into an Assessment Only group and a Treatment group. The Assessment Only group forms a final class (CC1), with an average cost of \$457 per episode (compared to \$421 for adults). As with previous branches, this and subsequent final classes are split in the figure into major ethnicity groupings for descriptive purposes only.

The treatment group is first split by age into 2 groups. The younger group (those less than 14 years) form the child group and those older than 13 years form the youth group. The child group are then split into 2 groups based on Item 13 of the HoNOSCA (poor school attendance, including truancy, school refusal, school withdrawal, and suspension). Children with problems with school attendance have the highest costs, averaging \$1,929 per episode. This is consistent with findings from the MH-CASC study.

Children without school attendance problems are then split into 2 groups based on their total score on the first 13 items of the HoNOSCA. Children with a total score on these items of 0-6 form a final class (CC3), with an average cost of \$926 per episode. Children with a total score of 7 or more form the third and final class for children (CC4). This group has an average cost of \$1,388.

In parallel, episodes for consumers aged 14 years and more ('youth episodes') are allocated to classes using a series of binary splits that create classes in order of cost. These splits are based on individual HoNOSCA items.

The high cost group are youth with mild to severe problem ratings (rating >1) on the Hallucinations, Delusions or Abnormal Perceptions item of the HoNOSCA (Item 7). This group forms a final class (CC5) and has an average cost of \$3,518 per episode.

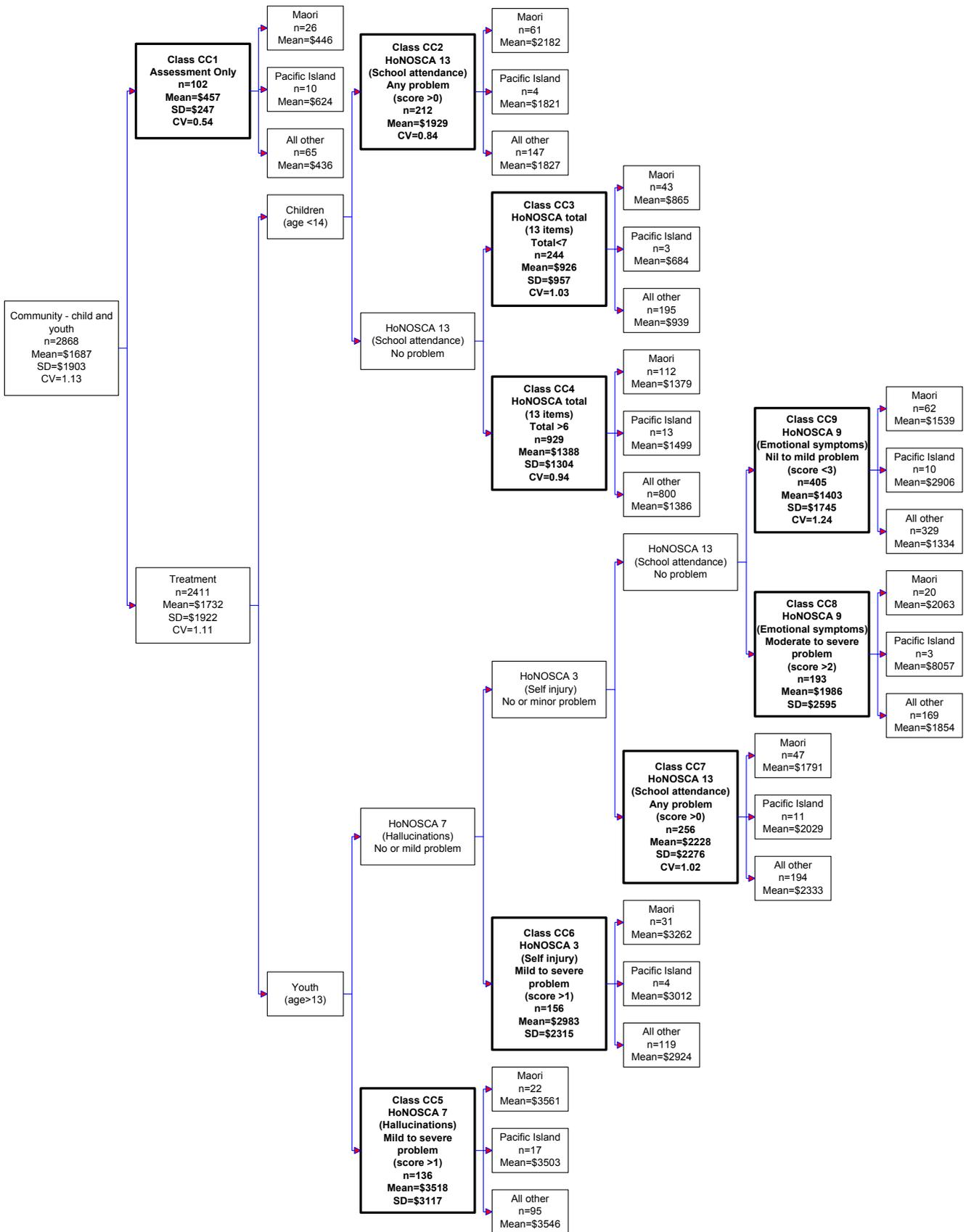
Those with no or minor problems with hallucinations, delusions or abnormal perceptions (rating <2) are then split into 2 groups based on ratings of the Self-Injury item of the HoNOSCA (Item 3). Youth with significant self-injury problems form a final class (CC6), with an average cost of \$2,983 per episode.

Those with no or minor problems with self-injury are then split into 2 groups based on ratings on the HoNOSCA School Attendance item (Item 13). Youth with school attendance problems form a final class (CC7), with an average cost of \$2,228.

Finally, those with no problems with school attendance are split into 2 groups based on ratings on the HoNOSCA item that rates emotional problems (Item 9). Those with problems (score >2) form a final class (CC6) with an average cost of \$1,986. Those with no or minor problems (score 0-2) form the final class (CC9), with an average cost of \$1,403.

Note that these youth classes are based on binary splits with episodes with high ratings on each item forming a final class. Children in the final class (CC9) thus have low ratings on all items used in this branch of the tree – hallucinations, self-injury, school attendance and emotional symptoms. This group represents 35% of all youth episodes. With a CV of 1.24, this group is heterogeneous. However, there were no other statistically justified splits.

Figure 66: The child and youth community branch



Child and youth (inpatient and community) episodes form the only branches of the NZ-CAOS classification that do not include statistically justifiable classes based on broad ethnicity groupings. In both cases, ethnicity was not significantly associated with cost. A further issue for the community branch is that the Pacific Island group has small numbers in all classes.

Only 3 variables are used in the Child and Youth Community Episode branch:

- Assessment only;
- Age; and
- The HoNOSCA.

Age is already routinely collected and the HoNOSCA has recently been introduced as a routine outcome measure. ‘Assessment Only’ is not routinely collected.

Unlike the Child and Youth inpatient branch, diagnosis did not prove to be a strong cost-driver. Other clinical measures that did not prove to be strong cost-drivers included the Children’s Global Assessment Scale (CGAS) and Factors Influencing Health Status (FIHS).

Consistent with the results for adult episodes, there were no significant differences in costs between direct care and shared care episodes. Nor were there significant cost differences between complete episodes and ongoing episodes (3 month period of care).

The overview statistical performance of this branch is only moderate, with an R^2 for this branch of 12.88% (untrimmed). This compares to an R^2 of 5.3% for the MH-CASC classification when tested on the NZ-CAOS database and an R^2 of 12.4% for the MH-CASC classification when tested in the Australian study (untrimmed). Of the 9 final classes, 5 have a CV of less than 1.00 while 4 have a CV of more than 1.00 (with untrimmed data).

The two problems are Class CC8 and CC9, with CVs of 1.31 and 1.24 respectively. In both cases, the small group of Pacific Island episodes within each class has an average cost that is significantly higher than the average. However, these CVs are based on untrimmed data. The statistical performance improves a little after data trimming, with a final (trimmed) R^2 of 14.19%. This compares to the R^2 of 18.8% (trimmed) reported in the MH-CASC study. The CVs of classes CC8 and CC9 also improve after trimming. After trimming just 3 episodes, the CV for Class CC8 is 0.96. After trimming just 1 episode, the CV for Class CC9 is 1.16. However, Class CC9 remains as the worst performing class in the classification.

10.7 Cost weights for each class

As previously noted, the response variable for class finding was the core episode cost and the results reported in the various figures above are based on untrimmed data. The core episode cost excluded Psychiatric Pharmaceuticals while the untrimmed data included atypical or outlier cases.

The final step in developing the classification involved trimming the data to remove outlier cases and adding back in the non-core episode costs. Completion of this step gives a mean total episode cost and a trimmed CV for each class.

These final costs are then used to calculate a set of cost weights or cost relativities in which the average mental health episode has a weight of 1.00. Episodes with a weight of 1.20 are 20% more costly than the average. Episodes with a weight of 0.70 are 30% less costly than the average.

The all-episode cost weights for the 42 classes in the NZ-CAOS classification model are shown in Table 55. This table is based on the core cost only. It shows the number of episodes in each class after trimming, the mean core episode cost and the coefficient of variation of each class. The all-episode cost weight is based on the cost of all episodes, both inpatient and community.

Table 55: Trimmed all-episode cost weights for the NZ-CAOS classification

Class Number	Class Type	Class Description	Number	Mean Cost	CV	All episode cost weight
CY14	Child and Youth Inpatient, ongoing	All child and youth ongoing episodes	9	\$80,205	0.13	17.69
AI15	Adult Inpatient, ongoing	Involuntary, Pacific Island	70	\$48,285	0.29	10.65
AI14	Adult Inpatient, ongoing	Involuntary, Māori	220	\$45,511	0.40	10.04
AI16	Adult Inpatient, ongoing	Involuntary, European/Other	283	\$40,743	0.41	8.99
CY11	Child and Youth Inpatient, complete	Schizophrenia, Paranoia and Acute Psychotic Disorders, Disorders of Psychological Development, Organic Disorders & Eating Disorders	24	\$34,782	0.64	7.67
AI13	Adult Inpatient, ongoing	Voluntary	77	\$29,348	0.26	6.47
CY12	Child and Youth Inpatient, complete	Disorders of Childhood and Adolescence & Mood Disorders	25	\$20,628	0.84	4.55
AI12	Adult Inpatient, complete	HoNOS 6, score 3 or 4, All other FOC	74	\$18,444	0.88	4.07
AI10	Adult Inpatient, complete	HoNOS 6, score 3 or 4, FOC Acute, Involuntary, Pacific Island	45	\$16,935	0.55	3.74
AI6	Adult Inpatient, complete	HoNOS 6, score <3, Age 65-74 years	47	\$15,804	0.67	3.49
AI3	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, All other FOC, Māori	31	\$15,169	0.63	3.35
CY13	Child and Youth Inpatient, complete	All other diagnoses	16	\$14,825	0.93	3.27
AI9	Adult Inpatient, complete	HoNOS 6, score 3 or 4, FOC Acute, Involuntary, Māori	124	\$13,542	0.76	2.99
AI4	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, All other FOC, Pacific Island	10	\$11,882	1.07	2.62
AI11	Adult Inpatient, complete	HoNOS 6, score 3 or 4, FOC Acute, Involuntary, European/Other	222	\$11,206	0.76	2.47
AI7	Adult Inpatient, complete	HoNOS 6, score <3, Age >74 years	69	\$10,624	0.77	2.34
AI5	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, All other FOC, European/Other	83	\$8,778	0.94	1.94

Class Number	Class Type	Class Description	Number	Mean Cost	CV	All episode cost weight
AI2	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, Acute FOC, HoNOS Impair sum>0	297	\$8,257	1.04	1.82
AI8	Adult Inpatient, complete	HoNOS 6, score 3 or 4, FOC Acute, Voluntary	129	\$7,904	0.87	1.74
AI1	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, Acute FOC, HoNOS Impair sum=0	327	\$5,653	0.92	1.25
CC5	Child and Youth Community	Age>13, HoNOSCA 7>1	135	\$4,266	0.95	0.94
AC9	Adult Community	Involuntary, Age <21	52	\$3,782	1.02	0.83
AC11	Adult Community	Involuntary, age 21-71, Pacific Island	89	\$3,610	0.93	0.80
CC6	Child and Youth Community	Age>13, HoNOSCA 7 <2, HoNOSCA 3>1	154	\$3,297	0.78	0.73
AC4	Adult Community	Voluntary, Functional Gain FOC, Pacific Island	50	\$2,613	0.91	0.58
CC7	Child and Youth Community	Age>13, HoNOSCA 7 <2, HoNOSCA 3<2, HoNOSCA 13>0	255	\$2,468	1.00	0.54
CC2	Child and Youth Community	Age <14, HoNOSCA 13>0	212	\$2,333	0.83	0.51
AC10	Adult Community	Involuntary, age 21-71, Māori	369	\$2,223	0.79	0.49
AC12	Adult Community	Involuntary, age 21-71, European/Other	839	\$2,212	0.97	0.49
AC7	Adult Community	Voluntary, Other FOC, Pacific Island	228	\$2,163	0.89	0.48
AC2	Adult Community	Voluntary, Intensive Extended FOC	464	\$2,090	0.96	0.46
AC3	Adult Community	Voluntary, Functional Gain FOC, Māori	175	\$2,038	0.94	0.45
CC8	Child and Youth Community	Age>13, HoNOSCA 7 <2, HoNOSCA 3<2, HoNOSCA 13=0, HoNOSCA 9>2	190	\$1,952	0.96	0.43
AC5	Adult Community	Voluntary, Functional Gain FOC, European/Other	1598	\$1,940	0.98	0.43
CC9	Child and Youth Community	Age>13, HoNOSCA 7 <2, HoNOSCA 3<2, HoNOSCA 13=0, HoNOSCA 9<3	404	\$1,607	1.16	0.35
CC4	Child and Youth Community	Age <14, HoNOSCA 13=0, HoNOSCA total 13>6	923	\$1,595	0.97	0.35
AC6	Adult Community	Voluntary, Other FOC, Māori	707	\$1,570	0.93	0.35
AC8	Adult Community	Voluntary, Other FOC, European/Other	3069	\$1,244	0.93	0.27

Class Number	Class Type	Class Description	Number	Mean Cost	CV	All episode cost weight
AC13	Adult Community	Involuntary Age >71	79	\$1,087	0.87	0.24
CC3	Child and Youth Community	Age <14, HoNOSCA 13=0, HoNOSCA total 13<7	244	\$1,083	1.03	0.24
CC1	Child and Youth Community	Assessment Only	102	\$459	0.54	0.10
AC1	Adult Community	Assessment Only	1318	\$423	0.58	0.09
All			13838	\$4,533	0.66	1.00

The class with the highest cost weight is Class CYI4 (Child/youth ongoing inpatient episode). With its cost weight of 17.69, its average cost is 17.69 times higher than the average episode. At the other end of the spectrum, Class AC1 (Adult community assessment only episode) has a cost weight of only 0.09. Its average cost is 91% less than the average.

These weights are used to take into account ('casemix adjust') differences in the mix of cases (the 'casemix') treated by different services.

Table 56 shows the average weight for inpatient and community episodes. Across all episodes, the average core episode cost was \$4,533. With an average cost of \$1,615, community episodes are 64% less costly than the average. Inpatient episodes are 4.44 times more costly than the average. Again, this table is based on the core cost only.

Table 56: Average case complexity for inpatient and community episodes

Episode type	Number	Mean Cost	All episode cost weight
All community	11,656	\$1,615	0.36
All inpatient	2,182	\$20,119	4.44
All episodes	13,838	\$4,533	1.00

Weights have also been separately calculated for inpatient and community episodes. Table 57 shows the inpatient-only cost weights. For inpatients, the average core episode cost (after trimming) was \$20,119. This is given a weight of 1.00. All other inpatient episodes are weighted relative to this. Class CYI4 has an inpatient weight of 3.99. Episodes in this class are 4 times more costly than the average inpatient episode. At the other extreme, episodes in Class AII cost only 28% of the average inpatient episode cost.

Table 57: Trimmed inpatient-only episode cost weights for the NZ-CAOS classification

Class Number	Class Type	Class Description	Number	Mean	CV	Inpatient cost weight
CY14	Child and Youth Inpatient, ongoing	All child and youth ongoing episodes	9	\$80,205	0.13	3.99
AI15	Adult Inpatient, ongoing	Involuntary, Pacific Island	70	\$48,285	0.29	2.40
AI14	Adult Inpatient, ongoing	Involuntary, Māori	220	\$45,511	0.40	2.26
AI16	Adult Inpatient, ongoing	Involuntary, European/Other	283	\$40,743	0.41	2.03
CY11	Child and Youth Inpatient, complete	Schizophrenia, Paranoia and Acute Psychotic Disorders, Disorders of Psychological Development, Organic Disorders & Eating Disorders	24	\$34,782	0.64	1.73
AI13	Adult Inpatient, ongoing	Voluntary	77	\$29,348	0.26	1.46
CY12	Child and Youth Inpatient, complete	Disorders of Childhood and Adolescence & Mood Disorders	25	\$20,628	0.84	1.03
AI12	Adult Inpatient, complete	HoNOS 6, score 3 or 4, All other FOC	74	\$18,444	0.88	0.92
AI10	Adult Inpatient, complete	HoNOS 6, score 3 or 4, FOC Acute, Involuntary, Pacific Island	45	\$16,935	0.55	0.84
AI6	Adult Inpatient, complete	HoNOS 6, score <3, Age 65-74 years	47	\$15,804	0.67	0.79
AI3	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, All other FOC, Māori	31	\$15,169	0.63	0.75
CY13	Child and Youth Inpatient, complete	All other diagnoses	16	\$14,825	0.93	0.74
AI9	Adult Inpatient, complete	HoNOS 6, score 3 or 4, FOC Acute, Involuntary, Māori	124	\$13,542	0.76	0.67
AI4	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, All other FOC, Pacific Island	10	\$11,882	1.07	0.59
AI11	Adult Inpatient, complete	HoNOS 6, score 3 or 4, FOC Acute, Involuntary, European/Other	222	\$11,206	0.76	0.56
AI7	Adult Inpatient, complete	HoNOS 6, score <3, Age >74 years	69	\$10,624	0.77	0.53
AI5	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, All other FOC, European/Other	83	\$8,778	0.94	0.44
AI2	Adult Inpatient, complete	HoNOS 6, score <3, Age <65 years, Acute FOC, HoNOS Impair	297	\$8,257	1.04	0.41

Class Number	Class Type	Class Description	Number	Mean	CV	Inpatient cost weight
		sum>0				
AI8	Adult complete Inpatient,	HoNOS 6, score 3 or 4, FOC Acute, Voluntary	129	\$7,904	0.87	0.39
AI1	Adult complete Inpatient,	HoNOS 6, score <3, Age <65 years, Acute FOC, HoNOS Impair sum=0	327	\$5,653	0.92	0.28
All			2182	\$20,119	0.54	1.00

Table 58 shows the same information for community episodes. For community episodes, the average core episode cost (after trimming) was \$1,615. This is given a weight of 1.00. All other inpatient episodes are weighted relative to this. Class CC5 (youth with problem ratings on the Hallucinations, Delusions or Abnormal Perceptions item of the HoNOSCA) has a community episode weight of 2.65. Episodes in this class are 2½ times more costly than the average community episode. The next most costly (AC9) are young people treated on an involuntary basis by adult services. At the other extreme, episodes in Class AC1 cost only 26% of the average community episode cost.

Table 58: Trimmed community-only episode cost weights for the NZ-CAOS classification

Class Number	Class Type	Class Description	Number	Mean	CV	Community cost weight
CC5	Child and Youth Community	Age>13, HoNOSCA 7>1	135	\$4,266	0.95	2.64
AC9	Adult Community	Involuntary, Age <21	52	\$3,782	1.02	2.34
AC11	Adult Community	Involuntary, age 21-71, Pacific Island	89	\$3,610	0.93	2.24
CC6	Child and Youth Community	Age>13, HoNOSCA 7 <2, HoNOSCA 3>1	154	\$3,297	0.78	2.04
AC4	Adult Community	Voluntary, Functional Gain FOC, Pacific Island	50	\$2,613	0.91	1.62
CC7	Child and Youth Community	Age>13, HoNOSCA 7 <2, HoNOSCA 3<2, HoNOSCA 13>0	255	\$2,468	1.00	1.53
CC2	Child and Youth Community	Age <14, HoNOSCA 13>0	212	\$2,333	0.83	1.44
AC10	Adult Community	Involuntary, age 21-71, Māori	369	\$2,223	0.79	1.38
AC12	Adult Community	Involuntary, age 21-71, European/Other	839	\$2,212	0.97	1.37
AC7	Adult Community	Voluntary, Other FOC, Pacific Island	228	\$2,163	0.89	1.34
AC2	Adult Community	Voluntary, Intensive Extended FOC	464	\$2,090	0.96	1.29
AC3	Adult Community	Voluntary, Functional Gain FOC, Māori	175	\$2,038	0.94	1.26

Class Number	Class Type	Class Description	Number	Mean	CV	Community cost weight
CC8	Child and Youth Community	Age>13, HoNOSCA 7 <2, HoNOSCA 3<2, HoNOSCA 13=0, HoNOSCA 9>2	190	\$1,952	0.96	1.21
AC5	Adult Community	Voluntary, Functional Gain FOC, European/Other	1598	\$1,940	0.98	1.20
CC9	Child and Youth Community	Age>13, HoNOSCA 7 <2, HoNOSCA 3<2, HoNOSCA 13=0, HoNOSCA 9<3	404	\$1,607	1.16	0.99
CC4	Child and Youth Community	Age <14, HoNOSCA 13=0, HoNOSCA total 13>6	923	\$1,595	0.97	0.99
AC6	Adult Community	Voluntary, Other FOC, Māori	707	\$1,570	0.93	0.97
AC8	Adult Community	Voluntary, Other FOC, European/Other	3069	\$1,244	0.93	0.77
AC13	Adult Community	Involuntary Age >71	79	\$1,087	0.87	0.67
CC3	Child and Youth Community	Age <14, HoNOSCA 13=0, HoNOSCA total 13<7	244	\$1,083	1.03	0.67
CC1	Child and Youth Community	Assessment Only	102	\$459	0.54	0.28
AC1	Adult Community	Assessment Only	1318	\$423	0.58	0.26
All			11656	\$1,615	0.94	1.00

Table 59 below shows the average all-episode case weight (also called the ‘case complexity index’) of each DHB in NZ-CAOS. With an all-episode average cost weight of 2.20, DHB1 has a casemix that is 2.2 times more complex (expensive) than the average. At the other end of the spectrum, DHB8 has an average case weight of 0.56. On average, its episodes are 44% less complex (less expensive) than the average. These differences have important implications for funding purposes. However it must also be borne in mind that some DHBs had only some services participating in the study and that these all –episode cost weights reflect those episodes collected by ‘in-scope’ services only.

The table also shows the average all-episode cost weights for inpatient and community episodes. The all-episode cost weight is influenced by both the mix of inpatient and community episodes and the average cost weight of each. DHB1 has the most complex (expensive) inpatient episodes but the least complex community episodes. The most complex community episodes are provided by DHB2.

Table 59: Average all-episode case complexity of each DHB

DHB	Average case weight – inpatient episodes	Average case weight – community episodes	Average case weight – all episodes
DHB 1	9.15	0.26	2.20
DHB 2	3.74	0.41	1.77
DHB 3	5.43	0.37	1.25
DHB 4	6.29	0.35	1.01
DHB 5	2.69	0.36	0.85
DHB 6	3.55	0.34	0.80
DHB 7	4.25	0.36	0.80
DHB 8	2.28	0.38	0.56
All	4.44	0.36	1.00

Table 60 shows the same information but this time with setting-specific cost weights. This table gives a better picture of the variation in community episodes because the weights for community episodes are based on the cost of community episodes and not the cost of all episodes. Likewise, the inpatient weights are based only on the cost of inpatient episodes. DHB 1 has an average inpatient weight that is twice the national average for inpatient episodes, while DHB8 has a weight that is half the national average. For community episodes, DHB2 has an average weight that is 16% higher than the national average, while DHB1 has an average community weight that is 17% below the national average. DHB8, the site with the lowest inpatient weight, has a community weight that is 6% above the national average. The average case complexity for community episodes in the other 5 DHBs is within 4% of the national average.

Table 60: Average setting specific case complexity of each DHB

DHB	Average weight – inpatient-only weights	Average weight – community-only weights
DHB 1	2.06	0.73
DHB 2	0.84	1.16
DHB 3	1.22	1.03
DHB 4	1.42	1.00
DHB 5	0.60	1.03
DHB 6	0.80	0.96
DHB 7	0.96	1.02
DHB 8	0.51	1.06
All	1.00	1.00

Table 61 shows the all-episode cost weights for each of the 3 large ethnicity groupings. With an average all-episode weight of 1.93, the Pacific Island grouping has an average case weight that is 93% more complex (expensive) than the average. The Pacific Island episodes have higher weightings in both the inpatient and the community setting. Māori episodes are 49% more costly than the average. Māori episodes have a slightly higher community episode cost weight than the average community episode, but are significantly more costly than the average inpatient episode.

At the other end of the spectrum, the European/Other grouping has an average case weight that is 19% less complex (less expensive) than the average. These episodes have the lowest weights for both inpatient and community episodes.

Table 61: Average case complexity of the three broad ethnicity groupings

Ethnicity Grouping	Average case weight – inpatient episodes	Average case weight – community episodes	Average case weight – all episodes
Pacific Island	6.00	0.51	1.93
Māori	5.40	0.37	1.49
European/Other	3.83	0.34	0.81
All	4.44	0.36	1.00

Table 62 shows the same information, but this time with setting specific cost weights. As before, this table gives a better picture of the variation in community episodes because the weights for community episodes are based on the average cost of community episodes and not the cost of all episodes. Likewise, the inpatient weights are based only on the cost of inpatient episodes.

Table 62: Average setting specific case complexity of the three broad ethnicity groupings

Ethnicity Grouping	Average weight – inpatient-only weights	Average weight – community-only weights
Pacific Island	1.35	1.44
Māori	1.22	1.05
European/Other	0.86	0.96
All	1.00	1.00

Pacific Island inpatient episodes have an average weight that is 35% above the national average for inpatient episodes, while Māori inpatient episodes have a weight that is 22% above the national average. The European/Other grouping has an inpatient weight that is 14% below the national average.

For community episodes, Pacific Island episodes have an average weight that is 44% above the national average for community episodes, while Māori inpatient episodes have a weight that is 5% above the national average. The European/Other grouping has a community weight that is 4% below the national average.

Again, these results have important implications for funding purposes. These implications are discussed in the next chapter.

11 Limitations, Implications and Recommendations

11.1 The performance of the NZ-CAOS classification

The four design rules outlined in Chapter 10 were used to guide the development of this casemix classification. The performance of each of these design rules are discussed below:

Rule 1 - Consumer related cost drivers

Of the entire number of consumer related variables that were tested in the classification, nine variables proved to be significant and are employed in the classification. They fall into three groups:

Direct service measure:

- Length of stay (used to define Complete and Ongoing episodes in the inpatient branch)

Direct consumer measures:

- Age
- Ethnicity (adults)
- HoNOS (adult inpatient)
- Diagnosis (child/youth inpatient)
- HoNOSCA (child/youth)

A blend of consumer and service attributes:

- Assessment Only (community)
- Legal status (adults)
- Focus of Care (adults)

NB: These three variables are service measures because they are determined by clinical and legal decisions – whether to provide a treatment service, whether care is provided on a voluntary or involuntary basis and the goal and phase of care. But they are also capturing consumer attributes such as severity of symptoms and functional capacity. The problem is that it appears that they are not capturing any single consumer attribute, but rather various combinations.

It would have been preferable to use direct consumer measures instead of these 3 measures. They are used in the classification when no direct consumer measure could be found that would act as a proxy.

In reality, no existing casemix classification consists solely of consumer-related variables. For example, over half the classes in the Diagnosis Related Group (DRG) system are defined on length of stay, the nature of the procedure or the type of intervention. These measures work in the DRG system in the same way that Assessment Only, Legal Status and FOC work in the NZ-CAOS classification.

If the DRG system is the benchmark, the mix of consumer-related and service-related measures in NZ-CAOS is more than acceptable.

Rule 2 - Variance reduction

With an overall RIV of 77.83% with trimmed data, the statistical performance of the classification is satisfactory.

The inpatient model explains 63.98% of the variation in core episode costs with trimmed data. This is also satisfactory and is better than the performance of the total DRG system which explains about 50% of variance. Only 2 inpatient classes have a CV greater than 1.00, indicating that most inpatient classes are quite homogenous.

The community model explains only 15.06% of the variation in core episode costs with trimmed data. However, 18 of the 22 community classes have a CV less than 1.00, again indicating that most classes are relatively homogenous. The lower RIV for this branch is mainly because the mean costs of the final classes are not sufficiently different from each other.

Rule 3 - Sensible clinical groups

This study has found that in general diagnosis is not a good cost predictor. This is not surprising. Indeed, one of the reasons for this study (and its precursor, MH-CASC) was a recognition that even though a diagnosis-based model generally makes more clinical sense, the DRG system does not perform adequately in the classification of mental health episodes.

The only exception in this study was in the classification of child/youth inpatient episodes. For this small group of episodes, diagnosis was predictive of costs.

With the exception of the child/youth inpatient branch, diagnosis is not employed in the classification. However, as discussed in the results in Chapter 10, the classification structure and the final classes are regarded as clinically plausible by the CAOS National Reference Group and the cost relativities are clinically logical. Perhaps the only exception is the use of Ethnicity Grouping as a splitting variable in the classification. This issue is discussed further in Section 11.3 below.

Rule 4 - Ease of collection

Of these nine variables employed in the classification, all but 'Assessment Only' is already routinely collected or planned for collection. The collection of 'Assessment Only' for community episodes does not represent a major burden.

For any further refinement of the classification model, all of these variables need to be routinely collected.

Overall assessment

When assessed against the four criteria above, the performance of the NZ-CAOS classification is satisfactory. It incorporates consumer-related cost drivers, is statistically and clinically acceptable and incorporates variables that are capable of routine collection, coding and data entry.

Further, it is based on a large and representative sample of NZ mental health services. The eight participating District Health Boards represent approx 23% of New Zealand mental health services and, amongst them, provide a comprehensive range of services. They had the combined capacity to provide a sufficient volume and mix of episodes and the required information infrastructure to collect the required clinical data, track service utilisation at the individual consumer level and assign costs. Some small volume services, particularly forensic psychiatry, were deliberately included to ensure that the sample reflected the full range of mental health services.

There have been some concerns expressed that the final casemix classification has been driven by the over-sampling of forensics services. The analysis team undertook some additional analysis to determine the impact, if any, on the final casemix classification and it was found that the forensic episodes did not drive the classification. Those consumer episodes with a Criminal Justice Indicator (any kind) are represented in all community classes except one (age >71 years), which means that the effect is diluted. Overall, these episodes have a slightly lower cost weight (0.27 vs 0.34) due to the high number of 'Assessment Only' episodes (many consumers on bail) but this is still likely to have had only a small impact because of low volume/low cost. These findings clearly indicate that the casemix classification is NOT driven by forensic episodes.

The resulting classification outperforms both the DRG system and the MH-CASC system in the classification of New Zealand mental health episodes.

This result is considered to be satisfactory for the first version of a national classification and is sufficiently high to allow the classification to be used for management purposes and to inform funding decisions.

11.2 Weaknesses and limitations

This study is the first time that mental health information on consumer attributes, service delivery inputs and service costs have been integrated into one dataset in New Zealand and consequently the potential power of the final consolidated database to inform future service improvements is significant. However there are a few issues to bear in mind when considering the findings.

Extrapolation of Data:

It must be remembered that the findings represents a sample of the *treated population* only. Incidence and prevalence figures cannot be extrapolated from these findings and applied to the general population. The current epidemiology study (also being undertaken under the Mental Health Research and Development Strategy) will give us much better information about the mental health of the general population and will offer a benchmark against which to review the findings regarding the CAOS consumer cohort. This issue is of particular relevance to Māori and Pacific peoples where there are differences in the age structure compared to the general population that are not reflected in the CAOS analysis and which have the potential to confound the findings.

Missing Data:

The findings represent a significant portion of the total activity of mental health services but the findings need to be reviewed in the context of variable staff compliance with data collection. A full discussion on the data quality issues experienced throughout the study is covered in Chapter 8 of this report but the following comments are made to give readers a quick overview of the issues associated with data quality. The total number of episodes collected by the eight DHB sites over the six-month period of data collection for the study was **20,946** compared with 20,553 collected in the equivalent Australian study (MH-CASC). After culling those ‘orphaned episodes’ that were without any associated staff time, we were left with a total of **19, 239** episodes which formed the sample used for the descriptive analysis. This is a good result but we acknowledge that 22.4% of total staff contact time reported in the community could not be assigned to any consumer episodes. This staff activity time amounted to approx \$12.8 million in costs that was excluded from the development of the casemix classification.

Possible reasons for missing data include:

- there were few mechanisms to feedback immediate findings to the clinical staff who collected the data resulting in data collection fatigue over the six months of the study.
- staff may have seen the additional data collection associated with the study as a burden and irrelevant to their clinical work.
- staff may have not understand the reasons for the study and thought it was about cost containment and service funding so did not support it.

Mental health information systems that support good decision-making at both a clinical and a management level are rare and most sites are unable to manipulate the current MHINC generated reports into meaningful, timely and clinically relevant reports. Until such time as this can be done, any equivalent research project that relies on a significant amount of data to be collected by clinical staff is likely to experience similar problems with staff compliance and data quality.

Inaccurate assignment of costs:

In addition to the problems experienced with data collection by clinical staff, the inaccurate assignment of dollars by DHB financial systems to those individual staff that did report data also created problems. This problem was common to all DHBs and was resolved by rolling up all labour category costs under three main staff headings (medical, nursing and allied health staff). This high level approach was also used in the equivalent Australian study.

Removal of partial episodes:

Finally the sample was further reduced to **16,665** episodes for class finding analysis as all partial episodes that did not meet the strict criteria for inclusion for class finding were removed.

Weaknesses identified during the analysis:

As previously stated, Chapter 8 of this report details the extensive data validations performed on the data before the analysis and class finding work began and includes edits, where these were required, to ensure that each component met data quality standards. The comments below deal only with weaknesses identified during the analysis.

- Consumer attributes were found in the study to be cost drivers. However, consistent with the findings of MH-CASC, the clinical attributes of consumers are often not the major cost drivers. Like the Australian study, the analysis did find variation between study sites. However, once within the branches and the classes, this study found that the variation that could be systemically attributed to the DHB in which the consumer was seen was no different to the variation seen in other types of health care. The results of multi level modelling undertaken during the analysis suggest that much of the variation appears to be random in nature.
- Because of the size of the sample, the data set was not split into test and re-test samples. To do so would have resulted in both sample groups being too small to test the study hypotheses and to produce results that would have been reliable. While this is a methodological weakness, it is no different to the method used to develop the DRG classification where no test and re-test is undertaken in the low volume groups.
- Because the classification includes classes defined by the ethnicity of the consumer, it is not suitable for use outside New Zealand. One outcome is that it cannot be used for international benchmarking purposes.

11.3 Ethnicity

Setting an international precedent, this study has resulted in a casemix classification that includes some casemix classes based on ethnicity. The decision to include such classes was carefully considered by the National Project Team, the National Project Reference Group, the Māori Monitoring and Review Group and Pacific Island representatives during the design, implementation and analysis phases. However, as well recognised by these key stakeholders, incorporation of classes defined by ethnicity is not without its risks if the results are misinterpreted or over-interpreted.

It must also be borne in mind that ‘ethnicity’ was collected through a combination of records supplied by the participating sites and, in those instances where this field was left blank by the site, by NZHIS. The study asked for only one consumer self-identified ethnic group to be recorded on the study episode forms, unlike NZHIS where a maximum of three ethnic groups can be stored on the MHINC database. If the client identifies with more than three ethnic groups, then a prioritisation algorithm for ethnicity codes is used by NZHIS to reduce the ethnic groups to a maximum of three in ranked order. The decision by CAOS to combine data received from both DHB sites and the NZHIS in order to ensure a high completion rate means that this prioritization algorithm was not applied to all the data. Any other researchers using the dataset should consider using only that data supplied to the study by

NZHIS when making comparisons with general population statistics as both Statistics NZ and NZHIS use the same prioritisation algorithm.

The study found that, after controlling for clinical differences in the mix of cases, there were still statistically significant differences between the three major ethnicity groupings at some points in the classification tree. But there were no differences at others. An important finding was that there were no differences in child/youth episodes, irrespective of setting. All statistically significant differences were differences between adult episodes.

At those points in the classification tree at which there are statistically significant differences, the consistent pattern is that Pacific Island episodes are the most costly, followed by Māori episodes and then European/Other episodes. In all cases in which there are separate classes based on ethnicity, the European/Other class is the least costly.

Likewise, there are differences in the distribution of the three major ethnicity groupings between the casemix classes. As one example, Māori and Pacific Island consumers are under-represented in those classes that are for older people. As another example, European/Other consumers are more likely to be voluntary and are more likely to be found in those classes defined by the absence of major problems. This latter finding suggests that consumers in the other ethnicity groupings may be entering the service system later in the stage of illness and that, when they do, they have higher levels of symptom severity and lower levels of function.

There have been some suggestions made that a lack of understanding and training in different cultural paradigms increases the risk that clinical staff will misdiagnose or misrate consumers/tangata whai ora. However, it was beyond the scope of the current study to investigate the reasons behind these differences or to undertake an epidemiological analysis. However, such a study is clearly warranted. This analysis needs to be undertaken at both the DHB and national levels and should form part of an ongoing agenda to improve mental health outcomes in New Zealand.

11.4 A classification is not a payment model

The purpose of this study was to develop a casemix classification for New Zealand mental health care. It was not to develop a funding model.

The overall assessment above was that the classification could be used to inform funding decisions. As an example, the classification could be used to inform population-level funding models. It is important to note that, in the funding context, the Ministry of Health has advised that there are no immediate plans to introduce purchasing on a casemix basis for mental health services.

Irrespective, the NZ-CAOS classification could not be used for funding purposes until such time as a suitable funding model was developed. Adopting an episode payment model such as that used with the DRG classification will not be sufficient.

Development of a suitable funding model would not be a trivial task and would need to constitute a substantial piece of work in an ongoing research and development agenda. However, this is a separate decision for the future and has not been the prime driver of the NZ-CAOS project.

11.5 An ongoing research & development agenda

11.5.1 Improvement comes by doing – the routine collection of variables

This study has no precedent in New Zealand. It represents a substantial investment of funding and time and a significant contribution by numerous clinicians, researchers and managers.

The resultant classification has strengths, but there are also areas for improvement. It should be regarded as a good first generation classification. The question now is whether improvement is best achieved by further one-off studies or by implementation of the classification into routine practice.

In our view, implementation of the classification into routine practice is the best path to improvement. There is an important R&D agenda that arises from this study. But, more importantly, the New Zealand mental health classification model will be improved by implementing it into routine practice and using routinely collected data to improve it. Given that the Mental Health Directorate of the Ministry of Health has signalled that the development of an information management strategy is a priority area and the potential impact of the national outcomes initiative (MH-SMART) on MHINC, a discussion regarding the possibility of implementing the collection of the classification variables into routine practice is timely.

We acknowledge that the adoption of the NZ-CAOS episode model and its key data items could have a significant impact on MHINC (the NZ National Mental Health Information Collection) and should not be done without a period of considerable consultation and careful planning. The MHINC Steering Group has already undertaken to consider the collection of a specific cultural staff activity data item generated by CAOS as part of its workplan for 2003. Any other significant changes to MHINC would need to follow the usual NZHIS consultation processes, at the end of which providers would need to be given at least six months to make the necessary changes to their data collection systems. Any changes would require the following:

- agreement on the purposes to which the information will be put;
- additional data items such as the outcome measures to be approved for collection (collection of the HoNOS and the FOC are already currently under the outcomes implementation initiative, MH-SMART);
- agreement by the sector to orient the data collection cycle towards a consumer ‘episode of care’;
- and consequently agreement to a change in the national reporting requirements.

Whilst the collection of casemix related data could potentially create a platform for the development of a sector more focused on investigating the reasons for variable service performance, it also increases the risk of abuse or misuse of clinical data. Whilst there is enthusiasm for the development of a mental health information system that can support better decision-making at all levels, we need to exert caution when interpreting outcomes data or making comparisons using casemix related data.

11.5.2 Improving the quality of routinely collected data

Not surprisingly, this study raises questions about the quality of routinely collected data. The challenge remains to convince clinicians that data collection is more than just ‘more paper work’. Data are the foundation of evidence-based practice and outcome measurement. However there needs to be more immediate benefits for clinicians who are expected to collect the data as, while they may be concerned about issues such as the equitable allocation of resources amongst services, ultimately the utility value for clinicians is the extent to which the system can produce clinically relevant reports that assist them to improve their clinical practice on a day-to-day basis. This will be the key factor in determining better compliance and more meaningful clinician participation.

The key to the long term success of mental health information collection is how the analysis, interpretation and presentation of the results of comparable data can contribute to the body of information that supports better decision making at all levels of the mental health system. Building high quality services will increasingly rely on performance indicators, ‘report cards’ and consumer outcome data as critical components for the accountability, quality improvement and management of mental health systems. The introduction of outcome measures into routine clinical practice through the MH-SMART initiative and the shift towards gathering data on the basis of consumer ‘episodes of care’ offers a new platform for discussing and improving both local systems and the national mental health collection with quality improvement goals in mind.

Details regarding the issues experienced with data quality during this study are detailed in Chapter 8 of this report.

11.5.3 Ethnicity

The results of this study raise substantial and important questions about the clinical profiles of, and the services provided to, different ethnic groups. It also raises the issue of the importance of recording and collecting accurate ethnicity information that will allow comparisons with data about the general population. As identified in Section 0 above, the results suggest that further analysis and research is warranted. One such analysis should involve an investigation of patterns of care using the Cultural Service Indicators collected in the study. This was unable to be undertaken within the time available for the casemix analysis.

11.5.4 The appropriateness of the clinical measures

In addition to routinely collected data such as diagnosis, six clinical measures were collected in this study:

- HoNOS / HoNOS65+ (Health of the Nation Outcome Scale)
- LSP-16 (an abbreviated version of the Life Skills Profile)
- Focus of Care item (FOC) - *not strictly a clinical measure*
- HoNOSCA (Health of the Nation Outcome Scale for Children and Adolescents)
- Children's Global Assessment Scale (CGAS)
- Factors influencing health status

A key question is whether these measures are appropriate for routine collection. This needs to be answered from several perspectives.

Both the HoNOS and the HoNOSCA are incorporated in the classification and the quality of the data on both measures suggests that there was acceptable clinical compliance. The overall pattern of clinical ratings on these measures was similar to that found in the various Australian studies, suggesting that these measures can be used for international benchmarking purposes by the two countries.

The Focus of Care item, although not a clinical measure is also incorporated. Data quality on this measure was reasonable. However, the FOC variable works differently in the NZ model than it did in the Australian MH-CASC study. In the NZ context one FOC group - 'Acute' – had sufficiently different costs to warrant its incorporation as a splitting variable in the inpatient branch. The other FOC groups - Functional Gain, Intensive Extended and Maintenance – were not significantly different from each other. The FOC variable is not used in the MH-CASC classification for inpatient episodes. In the community branch, the FOC variable is used to distinguish between episodes with a voluntary legal status, with the 'Intensive Extended' FOC group being the most costly, followed by the Functional Gain FOC group. There were no differences in costs between those classified as 'Acute' and those classified as 'Maintenance'. In the MH-CASC study, one FOC group - 'Intensive Extended' – had sufficiently different costs to warrant its incorporation as a splitting variable in the community branch.

It is not clear whether these differences are due to differences in clinical practice or due to differences in the way that the definitions were interpreted in the two settings. Either way, further clinical consultation appears warranted with perhaps also some refinement of the definitions of Functional Gain, Intensive Extended and Maintenance. A further issue for investigation is the differences in the Focus of Care profile of the 3 broad ethnicity groupings in the community setting. Further clinical consultation and research appears warranted with perhaps also some refinement of the definitions of Functional Gain, Intensive Extended and Maintenance.

The other three measures collected in the study are not incorporated in the classification. As noted in Chapter 10, the LSP-16 was discounted as a contender variable because of poor data quality and compliance. This leaves the classification with no measure of function except subscale items in the HoNOS. Assuming that New Zealand mental health services do not routinely collect this measure, another functional measure will be required.

Neither the Children's Global Assessment Scale (CGAS) or Factors Influencing Health Status (FIHS) proved to be good predictors of cost. The question to be resolved through further clinical consultation and research is whether the collection of the HoNOSCA alone provides adequate clinical data for outcome measurement and benchmarking purposes in Child and Youth services.

Whilst the analysis on the clinical rating instruments has demonstrated clear differences amongst different ethnic groupings, the validity of these findings may be affected by consumers being diagnosed inappropriately and hence caution needs to be exercised regarding the apparently higher proportion of Māori and Pacific with psychosis. As previously stated a more detailed analysis will be undertaken on the clinical ratings collected for CAOS from the perspective of outcomes. The findings from this analysis will help inform the national outcomes implementation initiative (MH-SMART) but the issue of cultural competency remains a challenge for the mental health sector and will need to be specifically addressed as part of the workforce outcomes development and training programme.

11.5.5 Funding model design

The New Zealand mental health classification recommended in this study is not a funding model. A funding model would represent another step in the R&D program.

11.5.6 The richness of the NZ-CAOS data set and the need to exploit it

NZ-CAOS has resulted in an incredibly rich data set that is ripe for further analysis at both the DHB and national levels. This analysis was concerned solely with the development of a casemix classification. Many important questions lie unanswered and some of the suggestions that have been made regarding possible topics for further investigation are included as Appendix One in this report. This list is in no way an exhaustive one but captures some of the immediate issues raised by various reference groups throughout the consultation process used in the compilation of this report.

An immediate issue that New Zealand must address is to ensure that appropriate data are provided to those with the skills to analyse it. The results need to be used to inform the ongoing agenda on how to improve mental health services and consumer outcomes in New Zealand. To this end the eight participating DHB sites have agreed to continue working together to benchmark their services using the CAOS dataset.

11.5.7 Issues specific to Māori

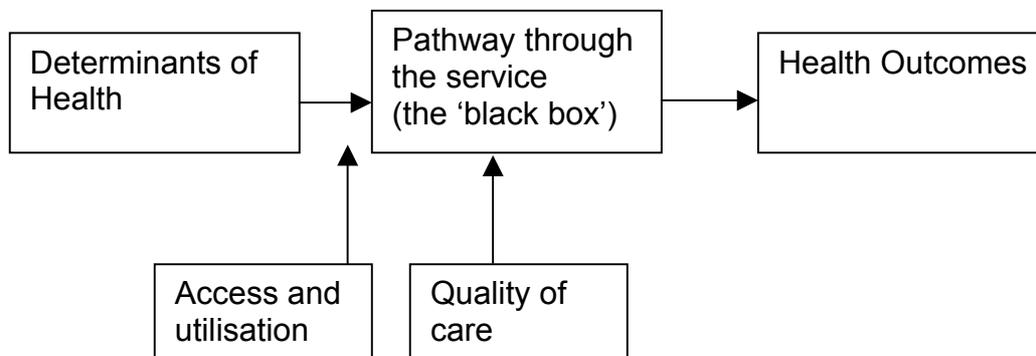
There is much information on the extent of the disparities between Māori and non-Māori. Māori health status levels are considerably lower than those of non-Māori across a range of health indicators. The Māori youth suicide rate was two and a half times higher than the non-Māori rate in 1997 (Te Puni Kokiri: 2000). Similarly, admissions to psychiatric hospitals for Māori in 1993 were almost twice those of non-Māori (Te Puni Kokiri: 1998). Alcohol related admissions represent the greatest area of increase but readmission rates were also particularly high for schizophrenia and the affective psychoses. Hospitalisation patterns for Māori also indicate that proportionally more Māori are committed to hospital under the Compulsory Mental Health Assessment and Treatment Act, suggesting inadequate early intervention (Durie: 1994). This pattern is also seen in NZ-CAOS. This increases the likelihood that, by the time Māori do come into contact with specialist services, they will experience them as punitive rather than as making a contribution towards the process of self-healing.

All of these statistics are not new information. They give us a rough indication of serious mental health disorder in the community and add weight to the obligations of the Crown under the Treaty of Waitangi to allocate resources to reduce avoidable health inequalities for Māori. However, statistics like these do not measure the effects of other health determinants such as housing, education and employment on the mental health of Māori, nor do they explain the differential service response to consumers on the basis of their ethnicity.

Dr Suzanne Crengle (Division of Māori and Pacific Health, Auckland School of Medicine and Health Services) proposes a model²¹ that moves away from the never ending description of the problem (hospitalisation rates and mortality figures) coupled with a deficit model (blaming the victim) and suggests an investigation of those areas where there are differences in the pathways of care and in provider behaviour. Such investigation is a way of making a practical difference to the quality of care that Māori currently receive. The pathway of care is described as the ‘black box’ of health and, similar to requests made by consumers, Crengle suggests that researchers should focus their efforts on what is going on in the ‘black box’ by:

- Identifying areas where differences in pathways of care and provider behaviour exist
- Describing and quantifying the extent of disparities in the types of care received
- Improving our understanding of provider and institutional behaviour
- Developing interventions
- Evaluating the impact of those interventions

Diagnostic and Treatment Services:



Over several decades, an extensive body of research has documented that variation in health care utilisation is not simply the result of random or economically driven clinician decision making, but that it varies in association with certain consumer characteristics including sex, race and income. In general, women, persons from underrepresented minority groups, and the poor are less likely to receive treatments than their counterparts. A service utilisation study such as CAOS allows us to compare the clinical pathways of, for example, a 20 year old male with early psychosis presenting to a mainstream service with the clinical pathway of a 20 year old Māori male with early psychosis presenting to both mainstream and kaupapa Māori services. Whilst we do not have the degree of uniformity and sensitivity required to do any detailed analysis of clinical pathways, we can still make some basic comparisons using MHINC and CAOS data.

One of the risks identified by Māori for the CAOS project was that clinical staff would not be able to provide all the services that they would like to provide to tangata whai ora due to resource constraints and that the study would not therefore capture ‘best practice’. However there is also general recognition that CAOS received data from sites that reflected current practice that may or may not be ‘best practice’. One of the possible outcomes of this project is that data that accurately reflects current actual clinical (and cultural) practice could potentially inform future clinical and costing benchmarking work and allow for some initial comparisons to be made between teams, services and organisations.

²¹ Crengle; S (2001) presentation to the Health Services and Policy Research Conference, 2001

The evidence from other nations is that studies of service utilisation actually shift attention from ‘over-use’ of services to ‘under-use’ and for Māori, this is an important point. Some of the most basic questions that need to be asked about the mental health services are related to how well all population groups are being served. For example, if the organisation has a geographic area for which it is responsible, are tangata whai ora coming from all parts of the service area? Are all age groups being served? To what extent are tangata whai ora represented in caseloads? What disorders do they have compared to non-Māori consumers? What complexity of disorders do they have compared to non-Māori consumers? In order to answer these and other questions it is critical that clinical staff accurately collect ethnicity and diagnostic data. Service utilisation data can further improve our understanding of what happens to tangata whai ora by offering information on what provider interventions are occurring past the point of access, when they have entered the ‘black box’ of service delivery.

The Regional Health Needs Assessment project produced a number of recommendations from a national hui of Māori stakeholders held at Kuratini marae in Wellington (March 2nd, 2001). The hui recommended that Māori models of health and well-being must be incorporated into such assessments to give a broader and more relevant context for Māori needs as perceived by Māori. Further, it was thought that health needs assessments have traditionally paid inadequate attention to Māori preferences for having their culture placed at an integral point in the research and implementation of findings. These ideas reiterate the need for advances to be made at the clinical and cultural interface in the future planning and provision of mental health research and service delivery, both CAOS and MH-SMART offer opportunities to begin exploring this potential.

There is a real risk that by the sector not focusing attention on describing the complexities of the work that it does that, in the absence of any useful data, errors will be made by DHBs in assessing ‘population need’. Whilst the Mental Health Commission ‘Blueprint’ benchmarks (1998) have allowed the sector to argue for equitable funding within Vote Health they only describe estimated volumes or service inputs based on population size. We still need additional data to describe ‘population complexity’ to usefully inform discussions regarding equitable funding. As current funding for health services is driven by inputs influenced by, amongst other things, historical funding patterns AND empirical evidence, population need assessments may underestimate mental health needs rather than overestimate it, especially if there is better evidence available to planners that supports the development of other personal health initiatives.

Population mental health needs assessments are difficult to do for the following reasons:

- Diagnosis is not reported in many cases and when it is, there are doubts as to how accurate it is.
- Ethnicity data is not accurately and consistently collected so current service utilisation figures cannot be assumed to accurately reflect the true number of Māori currently accessing services.
- There is a large discrepancy between access rates for Māori and non-Māori based on census information.

With the above issues in mind both CAOS and the current epidemiology study will offer valuable information that could be used to complement the population-based approach to the funding and provision of mental health care in New Zealand.

Clinical Outcome Measures for Māori

The classification has also been based on an essentially monocultural value system and whilst every attempt has been made to include Māori cultural practices in terms of service inputs (the C52 data item) and to encourage clinicians to exercise cultural sensitivity when completing the clinical measures it did not include a measurement of outcome that reflected Māori holistic views of health. *Hua Oranga* (1997) offers the nation much in this regard but was not ready to be incorporated into the design of this study and is still undergoing tests to determine how well it can function in practical/clinical settings and to address its limitations (the tool does not appear to work well with

children). The validity of the tool is also unknown, and it is anticipated that work on this will begin sometime this year. Once it has been validated it would be possible to test its performance in this casemix classification by incorporating it into a smaller cohort study (see Appendix One).

In the meantime we should proceed with the cautious use of mainstream measures while we gain more experience and learn from the opportunities presented by this study to test the value of the tools within the NZ environment. The analysis of the CAOS outcomes data that follows this study will significantly contribute to the pool of information on the outcome tools at both a local, national and international level.

Summary

The development of a culturally competent information system that supports the collection of appropriate information for Māori, as well as the development of a culturally effective purchasing framework, are challenges for the future. For this casemix classification system to be useful it must enable the mental health system to become more responsive to the needs of all the individual consumers who use the system, especially for those who present to it with the highest needs. The members of the CAOS Māori Monitoring and Review Group have given extensive advice to the project regarding the risks and the potential areas of gain for Māori through this study and have recommended further research to investigate the patterns of care for tangata whai ora highlighted by this classification. It is clear from the findings that tangata whai ora continue to present to specialist mental health services with higher levels of severity than other ethnic groups and that the development of appropriate models of care for these consumers remains one of the most significant issues that providers, funders and planners need to address in the immediate future.

11.6 What the study does not tell us

The primary objective of this study was to develop a casemix classification for specialist mental health services based on the services delivered to those mental health consumers who presented to the eight DHBs during the six-month period of data collection. The resulting 'snapshot' reflected actual clinical practice over that time but also raised questions that were beyond the scope of the study to address. Further work is required to better understand some of the findings if we are to mitigate the risk of over-interpreting the data.

Although consumer factors were shown to drive costs, other factors may have contributed to the study findings including resource availability, types of services available and the practice of individual clinicians. For this reason, whilst the NZ-CAOS classification can be used to inform management and planning decisions, it is important to remember that this is a first version classification only and that it requires further testing and modification to improve it. In practice it may be very difficult to identify and measure those factors extrinsic to the sites that impact on service delivery and for which they cannot be held accountable. Perhaps the best use of the kind of comparative information offered by this study is to treat the differences amongst sites as suggestive rather than definitive and in this way continue to explore the differences and to learn from them.

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Appendix 1: Suggestions for further analysis & research using the CAOS dataset.

As previously stated the NZ-CAOS project has resulted in an incredibly rich data set that is ripe for further analysis at both the DHB and national levels. The following list of possible research topics is not an exhaustive one but represents those topics put forward by members of the various reference groups consulted throughout the process of compiling this report.

Specific areas of interest to Māori:

1. There is a risk that other researchers may over-interpret the data from the perspective of Māori, especially in the case of those episode types where smaller numbers of consumers are involved. For this reason it is strongly recommended that a separate paper be written regarding the methodological issues with the CAOS dataset with specific reference to Māori interests. This paper should then be made available as a mandatory reference document to any other researcher requesting access to the CAOS dataset.
2. Qualitative interpretations of the CAOS dataset to draw potential conclusions from it and to inform a process whereby other potential research topics are identified.
3. Further investigation of equity of access, service utilisation and equity of outcome in relation to different population characteristics.
4. Further investigation of the cultural appropriateness of the clinical ratings scales, especially the HoNOS family of instruments.
5. Further investigation of proportional differences in diagnosis with regard to ethnic groupings, especially in relation to episodes of psychosis and the proportion of consumers with co-morbid issues in the high severity classes.
6. There are differences in the distribution of the three major ethnicity groupings between the casemix classes. For example it would appear that tangata whai ora may be entering the service system later in the stage of illness and that, when they do, they have higher levels of symptom severity and lower levels of function. This finding supports the work of both Geoff Bridgeman & Lorna Dyal (1993) and of Durie (1994) and it would be useful to investigate the reasons behind these differences in the light of the findings from both CAOS and the current epidemiology study.
7. An investigation of patterns of care using the Cultural Service Indicators collected in the CAOS study is to be undertaken as part of the outcomes analysis.

Areas of interest to Pacific Nations peoples:

8. It is recommended that specific future research topics designed to benefit Pacific peoples are best considered by the Mental Health Commission Pacific Reference Group and that this group in the first instance should review this report and make any recommendations to the Mental Health Research and Development Steering Committee on the research priorities for Pacific mental health consumers.

General:

9. A smaller consumer study could be undertaken in the future to predict the functionality, and to test the inclusion of, new clinical measures in this casemix classification (e.g. Hua Oranga).

Appendix 2: MHINC and CAOS Service Codes

Service Code	Service Description	Service Comment
C50	Did Not Attend/Not Home	Scheduled activity did not occur either because the patient did not attend or was not home. A standard duration of 15 minutes should be recorded regardless of the length of the activity scheduled.
C51	Services on Behalf	Time spent on services which are related to an individual patient, but which are not directly to the patient, e.g. making case or nursing notes, Mental Health Tribunal preparations, Mental Health Act administration. Travel time should not be included.
C52	Mācultural activity	Application of Māori Models of practice, traditional and contemporary, which recognises the value of culture to the healing process including whakawhanaungatanga and increased access to te ao Māori, incorporating but not limited to: purakau; mau rakau; waiata; te reo; raranga; karakia; whakapapa; mirimiri; and rongoa. <i>Note: This would also include services provided by tohunga, kaumatua, kuia, Māori staff and Māori cultural advisors</i>
C53	Multi-staff contact	Time spent providing services to a consumer where more than one clinician from the same team is involved in the provision of the same service. <i>Note: The primary clinician should report in the usual way to MHINC, with the secondary, and any further clinicians involved, reporting this "C" code only.</i>
C54	Pacific cultural activity	Activity involving Pacific Consumers which relates to the application of traditional and contemporary pacific cultural practices, processes and models of assessment, treatment and healing with appropriate and increased access to pacific families, communities and services.
T01	Mental health crisis attendances	Brief intervention involving the client in comprehensive assessment and treatment, to stabilise symptoms and assist with problem solving, in response to crisis situations that require an immediate response.
T02	Mental health intensive care inpatient occupied bed days	Time spent by a client in a mental health intensive care inpatient service. 24 hour care and treatment services provided to manage people with serious acute mental health disorders whose condition presents a danger to themselves or other people.

Service Code	Service Description	Service Comment
T03	Mental health acute inpatient occupied bed days	Time spent by a client in a mental health acute inpatient service. 24 hour care and treatment services provided to people experiencing severe acute symptoms requiring intensive input for a short period of time (generally up to 3 weeks).
T04	Mental health sub-acute inpatient occupied bed days	Time spent by a client in a mental health sub-acute inpatient service. 24 hour care and treatment services provided to manage unwell people requiring less intensive input for a longer period of time.
T05	Mental health crisis respite care occupied bed days	Time spent by a client in a mental health crisis respite care service. Home-based or residential services provided as an option for people who would otherwise require admission to acute inpatient mental health services.
T06	Mental health individual treatment attendances	Individual assessment, treatment, care planning, review and discharge services provided for less than 3 hours. Family/whanau or significant others may be present.
T07	Mental health group programme attendances	Assessment, treatment, care planning, review and discharge services provided in a group setting for less than 3 hours.
T08	Mental health care co-ordination contacts	Significant contact between mental health professionals and other teams or agencies/persons relating to the care of a client, to ensure continuity of service provision, where the mental health service is the lead agency. Client generally not present.
T09	Early psychosis intervention attendances	Assessment and treatment services provided to people experiencing a first psychotic illness regardless of age, aimed at minimising the risk of chronicity.
T10	Support needs assessment attendances	Comprehensive assessment and review of client's living and support needs the goal being return to optimal levels of functioning.
T11	Mental health maximum secure inpatient occupied bed days	Time spent by a client in a mental health maximum secure inpatient service. 24 hour care and treatment services provided to eligible people who require higher levels of observation and intensive treatment and/or secure care over longer periods than can b
T12	Mental health medium secure inpatient occupied bed days	Time spent by a client in a mental health medium secure inpatient service. 24 hour care and treatment services provided to eligible people who are in need of more intensive assessment and/or treatment than can be provided in a less secure setting.
T13	Mental health minimum secure inpatient occupied bed days	Time spent by a client in a mental health minimum secure inpatient service. 24 hour care and treatment services provided for eligible persons as part of recovery oriented process.
T14	Mental health forensic pre-discharge hostel occupied bed days	Time spent by a client in a mental health forensic pre-discharge hostel. 24 hour care and treatment services in a step-down facility within forensic services and usually with the hospital site.

Service Code	Service Description	Service Comment
T15	Court liaison attendances	Attendance at court by a staff member to provide advice, assessment and referral in respect of a client.
T16	Substance abuse detoxification occupied bed days (medical)	Time spent by a client in a medical substance abuse detoxification service. 24 hour care and detoxification services provided by or on behalf of contracted alcohol and drug providers or facilities in an inpatient setting.
T17	Substance abuse detoxification attendances (social)	Detoxification services provided by or on behalf of contracted alcohol and drug providers or facilities in a community setting.
T18	Methadone treatment specialist service attendances (clients of specialist services)	Treatment or counselling services provided by staff from an alcohol and drug treatment provider or facility for people receiving methadone under specialist A&D service case management (excludes clients of authorised GP's).
T19	Methadone treatment specialist service attendances (clients of authorised GP's)	Treatment or counselling services provided by staff from an alcohol and drug treatment provider or facility for people receiving methadone prescribed by GPs under specialist service authority while receiving case management from specialist A&D services.
T20	Substance abuse residential service occupied bed days	Time spent by a client in a substance abuse residential service. 24 hour care and treatment services provided to people with particular requirements unable to be met in less structured or supported settings.
T21	Psychiatric disability rehabilitation occupied bed days	Time spent by a client in a mental health psychiatric disability rehabilitation unit.
T22	Mental health day treatment programme attendances	Provision of non-residential assessment, treatment and recovery oriented rehabilitative programme for more than 3 hours to non-inpatient clients requiring specialised programmes and/or more intensive care than can be provided within outpatient services.
T23	Mental health day activity programme attendances	Provision of non-residential therapeutic, recreational, social or other related programmes for more than 3 hours to non-inpatient clients.
T24	Work opportunities programme attendances	Training in basic skills needed to seek, find and maintain employment.
T25	Community mental health residential level 1 occupied bed days	Time spent by a client in level 1 community residential home. Brief/daily support provided by experienced non-clinical staff.
T26	Community mental health residential level 2 occupied bed days	Time spent by a client in level 2 community residential home. 24 hour support provided by non-clinical staff. May include sleepovers.
T27	Community mental health residential level 3 occupied bed days	Time spent by a client in level 3 community residential home. 24 hour support provided predominantly by non-clinical staff with some clinical staff available short term (day hours/sleep over).

Service Code	Service Description	Service Comment
T28	Community mental health residential level 4 occupied bed days	Time spent by a client in level 4 community residential home. 24 hour intensive support provided by a mix of clinical/non-clinical staff.
T29	Community mental health residential long term occupied bed days	Time spent by a client in long term community residential home. 24 hour support for clients with complex needs over long term.
T30	Respite care occupied bed days	Time spent by a client in a respite care service or receiving home based respite care for use by people who require a short break from their usual living situation (usually planned).
T31	Home based care contacts	Non-clinical support services provided to clients with a psychiatric disability to enable them to stay in their own homes.
T32	Family Therapy (contact with family / whanau)	

Appendix 3: Labour category codes

MEDICAL PERSONNEL	
2005	Specialist Medical Officer
2015	MOSS
2025	General Practitioner
2035	Registrars
2045	House Officers
2055	Probationers and Interns
NURSING PERSONNEL	
2205	Senior Nurses, Nurse Manager, Nurse Educator
2210	Registered Nurses
2215	Enrolled Nurses
2220	Senior Midwives
2225	Registered Midwives
2230	Internal Bureau Nurses
2235	Health Service Assistants
ALLIED HEALTH PERSONNEL	
<i>Therapies</i>	
2404	Audiologists
2406	Child Therapists
2408	Dental Therapists
2412	Occupational Therapists
2414	Physiotherapists
2416	Podiatrists
2418	Speech Therapists
2420	Therapist Aids/Assistants
2422	Therapist Interns/Trainees
2428	Other Therapists

ALLIED HEALTH PERSONNEL***Psychologists, Social and Community workers***

2434	Case Managers
2436	Community Support Workers
2438	Cultural Workers
2440	Health Education Workers
2442	Health Promotion Officers
2444	Health Protection Officers
2446	Home Aides
2448	Psychologists
2450	Psychotherapists
2452	Recreation/Training/Welfare Officers
2454	Social Workers
2456	Trainee Psychologists
2458	Youth Workers

ALLIED HEALTH PERSONNEL***Other allied health***

2508	Technicians
2510	Dieticians
2512	Hearing/Vision Testers
2514	Scientific Officers and Researchers
2520	Other Allied Health Staff

Appendix 4: National CAOS Reference Group

Name	Position	Agency
Professor Graham Mellsop	Chairperson, South Auckland School of Medicine	University of Auckland
Mr Jim Burdett	Consumer consultant	Mind and Body Consultants
Dr Colleen Coop	Manager, Mental Health and Intellectual Disability Services	Otago DHB
Ms Rita Chant	Nurse representative, mental health crisis team	Counties-Manukau DHB
Ms Michelle Levy	Assistant Lecturer, Māori and Psychology Research Unit, Department of Psychology	Waikato University
Mr David Lui	Team Leader, mental health	Pasifika Healthcare, West Auckland
Dr Peter McGeorge	Clinical Leader, Mental Health Services	Capital & Coast DHB
Ms Susan Noseworthy (replaced by Mr Chris Ford from 6 Sept 2001)	Carer representative	Schizophrenia Fellowship NZ, National Office
Dr Murray Patton	Clinical Director, Mental Health Services	Counties-Manukau DHB
Ms Janet Peters	Manager, Mental Health Research & Development Strategy	Health Research Council of New Zealand
Ms Annette Shea	Manager, Taylor Centre	Auckland DHB

Appendix 5: National Māori Monitoring and Review Group

Name	Organisation
Ms Te Paea Winiata (chairperson)	Ministry of Health
Dr Te Kani Kingi	Massey University
Mr Paul Hirini	Te Rau Matatini, Massey University
Ms Michelle Levy	Waikato University
Dr Rees Tapsell	Waitemata DHB
Ms Rita Chant	Counties-Manukau DHB
Ms Arawhetu Peretini	Ministry of Health
Ms Moe Milne	Independent Consultant
Ms Ana Sokratov	Waitemata DHB
Mr Wi Te Tau Huata	Te Whare Hauora O Ngongotaha
Ms Materoa Mar	Independent Consultant
Dr Joanne Baxter	Otago University
Dr Sylvia Van Altvorst	Counties-Manukau DHB
Mr Wiki Pene	Kaumatua
Ms Puti Nicholls	Support Coordinator

Appendix 6: National Project Team and DHB Site Coordinators

Name	National Project Team
Phillipa Gaines Alison Bower Peter Brannan Puti Nicholls Bill Buckingham	Project Manager Service Development Officer Data Analyst Support Coordinator, Maori Monitoring and Review Group Consultant to the National Team
<p style="text-align: center;">Name</p> Janine van Beek Nigel Moulton Grant Paton-Simpson Fiona Anderson (followed by Rosie Whittington) David Ireland Richard Jeffcoat Steve Dick Anthony Nally	<p style="text-align: center;">DHB Site Coordinator</p> Northland DHB Counties-Manukau DHB Waitemata DHB Auckland DHB Waikato DHB Lakeland Health Capital and Coast DHB Otago DHB