Case Study: How data can help with understanding the high numbers of people using a mental health inpatient unit

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This paper critically analyses the data associated with tāngata whai ora admitted into the Waikato District Health Board's (DHB) Mental Health and Addictions Service (MHAS) inpatient unit, the Henry Rongomau Bennett Centre (HRBC) with the aim of developing a greater understanding of that data to inform clinical decision making. We review data relating to the three-month period prior to admission, data gathered during admission and then data collected in the three months after discharge. We describe the methodology adopted to understand the presentation of tāngata whai ora in the HRBC, utilising the patient management system data and programme for the integration of mental health data (PRIMHD) and how this was developed into simplified infographics that was used for a workshop presentation to senior managers and clinicians from the MHAS. There are several interesting findings from this case study, which will be of interest to other DHB's. The development of a general and Māori specific Infographic plus data for people admitted to HRBC showing the importance of Health of the nation outcome scales, a comparison of people admitted and not admitted with 10+ contacts and those presenting at emergency department (ED) with mental health and addiction problems. Analysing data from the HRBC has resulted in a greater understanding of individuals prior to, during and after their admission to HRBC. This greater understanding has created new knowledge of potential points in tāngata whai ora journeys where clinicians can intervene to create better outcomes for them.

Keywords: *Inpatient Mental Health, Data, Access.*

Introduction

A significant issue for Mental Health and Addiction Services in New Zealand has been the well documented increase in the number of people accessing these services (MoH, 2019a). This increase has been particularly challenging for inpatient units who are typically treating the most acutely unwell individuals in the mental health and addiction system. One consequence of this increased workload is that understanding trends and patterns, in terms of admissions, has become harder because of the volume of work being completed. In addition, there has never been more data available to Mental Health and Addiction Services and yet with so much data, it is hard to distinguish between what is essential and non-essential. As the saying goes 'it is sometimes hard to see the forest for the trees'. While there has been significant work overseas (Statistics for Wales 2018, NHS 2019, NIH 2019) on understanding inpatient data, there has been little analysis of New Zealand inpatient mental health data beyond the Key Performance Indicator project. Much of this literature focuses on wanting better data in mental health services, (Teich, 2016) and a strong emphasis on how ethnic minorities are more likely to be admitted into inpatient units and that their admission tends to be for a longer period of time once admitted (Snowden & Cheung, 1990).

As part of a wider focus on the acuity and volume of admissions into the HRBC, the MHAS of the Waikato DHB decided to initiate a project with Te Pou o Te Whakaaro Nui (Te Pou) to explore their data to see if there were trends or aggregated information that could inform clinical practice.

A small project team (please see acknowledgements) was formed to explore and analyse the wealth of data available. It became quite clear early on in this process that there was considerable data and this would make it difficult to distinguish essential and non-essential data. This insight led to the development of a conceptual and narrative model to assist with identifying what data to gather and then analyse. Conceptually, data was seen as linking progressively to provide, firstly, information and then to generate knowledge and eventually clinical insights utilising the data-information-knowledge hierarchy model (Ackoff et al., 1999; Rowley, 2007). Without understanding the first step, namely understanding the data, this progression would not be possible and the knowledge and clinical insight needed to reduce the high numbers of tāngata whai ora being admitted and treated in the HRBC.

The project group decided the best way of understanding the data of those admitted to the HRBC would come from the MHAS having as much information about individuals' engagement with a range of services. The overall narrative model adopted a flow diagram

which involved understanding tangata whai ora data before, during and after admission to the inpatient unit.

METHOD

Participants

Individuals in this study had been admitted in the HRBC inpatient unit for treatment of a mental health disorder on one or more occasions during the time period of this study. There were 379 admissions to HRBC of 339 individuals. 327 individuals were aged between 18 and 65 years with two under 18 and seven over 65 years of age.

Design

Initial meetings of the project group about the potential to use available data sets to better understand admissions into the HRBC resulted in a decision to focus on data from a four-month period from August to November 2018 for any individual who had been discharged from HRBC. The rationale for this time period was to ensure that information post discharge would be available in the PRIMHD data because of the lag in the production of this data set and that a four month period would be long enough to be representative of a typical time period in the HRBC. The analysis was conducted using an extract from the Ministry of Health dated 9 July 2019 from PRIMHD. Analysts from Te Pou and the Waikato DHB combined patient management system data with data from PRIMHD to complete their initial and later analyses. PRIMHD data is collected by all DHBs and Non-Government Organisations (NGOs) who provide mental health and addictions services in New Zealand. PRIMHD data is submitted to the Ministry of Health who use it as monitor of the performance of respective organisations, a guide for the development of policy, and to aid research. PRIMHD data is collected as a part of the treatment of individuals and includes information about service contacts (date, service type, team and provider), diagnosis and legal status under the mental health act.

The project group decided to look at three-month periods both prior to admission and after discharge to provide a fuller picture of the level of engagement and interventions tāngata whai ora received in the community across a more representative timeframe. Given the importance placed by the Waikato DHB on achieving equity for Māori in health outcomes, a determination was made to analyse Māori data both as a part of the whole data set and separately to see if there were any findings specific to Māori. Where there were any significant differences in the two data sets, the intention was to highlight them.

In terms of pre-admission, the project group looked for data about what community-based services individuals had been accessing prior to admission; for example, community mental health services, local emergency departments (ED), and non-governmental organisations. Data was also gathered on the location of individuals who had been in and whether they were known to the DHB when admitted.

Data gathered about admissions for tāngata whai ora included: whether they were under the mental health act, what their average length of stay was, any diagnoses received while they were an inpatient and what the severity of their mental health presentations were. Further data was also gathered on individuals' engagement with their GP's and their current housing status.

The data gathered about tāngata whai ora on their discharge from HRBC focussed on knowing what services they had engaged with when discharged and what level of contact they received when discharged as well as understanding any readmissions to the HRBC.

This data was worked up into infographics for both the general population (which included Māori) and an infographic specifically for Māori (See Appendices 1 and 2). These infographics and the data connected to them were then presented to a group of senior clinicians and managers from the DHB in a workshop where they were fully discussed and further analysed.

The outcome of this workshop was a decision to focus further analysis in three areas:

1. Gaining a better understanding of the group of tāngata whai ora admitted with subclinical or mild scores on the Health of the Nation Outcome Scale (HoNOS) scores. The HoNOS is a clinician rated tool used to measure the health and social functioning of tāngata whai ora using services (Wing et al., 1998).
2. Exploring whether there were differences between tāngata whai ora with 10+ contacts prior to their admission and those with 10+ contacts who did not have an admission. 10+ contacts refers to tangata whai ora who had 10 or more appointments with health professionals in the three month period prior to their admission.
3. A more detailed analysis of data relating to ED presentations and mental health services.

A longer timeframe of one year (April 2018 to March 2019) was utilised for the additional analysis of ED data to ensure that variations in data due to different times during the year, for example, holidays, were controlled for. Data on ED attendances in this further analysis focussed only on mental health and addiction presentations in that tāngata whai ora needed to have seen a mental health and addiction clinician.

A more detailed analysis of data relating to the 159 tāngata whai ora who had had 10+ face to face contacts in the 3 months prior to admission investigated what their contacts consisted of, for example, what the length of time of the contact was. The dates for these contacts varied depending on when they were admitted. A decision was made to select a comparison group to see if there were any significant differences between the groups that could help to explain why tāngata whai ora were or were not admitted to the HRBC. This comparison group was selected from tāngata whai ora seen between June and August 2018 for people age 18-64 years with at least one contact out of the 10+ at Waikato DHB (further contacts beyond one might be with other services) in the period with those who had no inpatient stay at Waikato DHB. This period of time was selected to be a reasonable comparison with the people who were admitted. These face to face contacts included bed nights from both DHB and NGO services.

RESULTS

Demographics

There were 336 individuals admitted to HRBC in the period analysed with 379 admissions, since a number of tāngata whai ora were admitted on more than one occasion (one tangata whai ora had 5 admissions, seven had 3

Table 1. Number of admissions to HRBC by ethnicity and gender

Ethnicity	Males	Females	Total
Māori	110 (29%)	74 (20%)	184 (49%)
Non-Māori	107 (28%)	88 (23%)	195 (51%)

Table 2. Number of admissions by age range and ethnicity

Age Range	Māori	Non-Māori	Total
0-18 years of age	1 (<0.5%)	1 (<0.5%)	2 (0.5%)
18-24 years of age	56 (15%)	36 (9.5%)	92 (24.5%)
25-44 years of age	82 (21.5%)	81 (21%)	163 (42.5%)
45-64 years of age	45 (12%)	70 (18.5%)	115 (30.5%)
65 years of age or older	0 (0%)	7 (2%)	7 (2%)

admissions and twenty five had 2 admissions) during that time period. Of all the admissions to HRBC, 217 (57%) were male and 162 (43%) were female. 184 (49%) of admissions were Māori, which clearly describes an over-representation of Māori in admissions given the demographics of the Waikato region (MoH 2019 b). Table 1 presents information for ethnicity and gender of admissions.

When admissions are broken down into age ranges, Māori continue to be over-represented, most significantly in the 18-24 age group where they made up 61 percent of admissions. Table 2 summarises data relating to age range and ethnicity.

Three Months Prior to Admission

There were 159 admissions (47%) to HRBC who had 10+ face-to-face contacts in the three months prior to admission – an average of at least weekly contact. A further 65 (17%) had between three and nine face-to-face contacts prior to admission and 60 percent of all admissions had been seen face-to-face in the week prior to admission.

There were 99 admissions (26%) who were not known to MHAS in the three months prior to their admission and the majority of these, 80 (21%), were also not known to other DHB's or NGO's. There were 139 admissions (36%) admitted to HRBC who had attended the Emergency Department in the three months prior to admission on an average of two occasions.

Table 3. Most common diagnoses for admissions to the HRBC

Diagnosis	Count and Percentage
Schizophrenia/Psychosis	129 (34%)
Bipolar Affective Disorder	54 (14%)
Major Depressive Episode	43 (11%)
Schizoaffective Disorder	41 (10.5%)
Psychotic Disorder due to drug use	31 (8%)

Admission

The average length of stay in HRBC was 23.7 days but this was distorted by a small number of tāngata whai ora who had significantly longer admissions. As a result, the median was also calculated and this showed that most people were inpatients for 12 days. A small group of 26 admissions to HRBC had HoNOS scores that were either in the sub-clinical or mild range, with 22 of these identifying as Māori. Table 3 presents information for the most common diagnoses for admissions into HRBC.

Three Months Post Discharge

There were 338 admissions (89%) who were involved with MHAS after their discharge and 341 admissions (90%) were followed-up within one week of their discharge by either MHAS or another service. Over the three-month period post discharge, 124 admissions (33%) had 10 or more face-to-face contacts and another 151 admissions (40%) had between three and nine face-to-face contacts.

28 percent of admissions into HRBC were seen in ED within three months of discharge but there was a reduction in mean frequency from two to one visit. For Māori admissions, a similar percentage presented at ED but the mean frequency remained at two visits.

Data from the second set of analyses, following the workshop with senior managers and clinicians from Waikato DHB, focussed on three specific areas as described in the methods section.

Table 4. Presentations of tāngata whai ora to the Emergency department by age group and gender, Waikato DHB, April 2018 – March 2019

Age group	Female	Male	Total
Under 18 years	174	91	**265**
18-24 years	268	196	**464**
25-64 years	406	385	**791**
65 years and over	30	37	**67**
Total	**878**	**709**	**1,587**

Source: Ministry of Health, PRIMHD extract dated 9 October 2019.

Tāngata Whai ora with Subclinical or Mild HoNOS Scores

Further analysis of this group of admissions indicated that their diagnosis prevalence was consistent with the general inpatient population (Oakley Browne et al 2006). It was clear that this small group of 26 tāngata whai ora was not homogenous and could be divided into two further sub-groups: one which had short admissions of two weeks or less (17 people, 65%) and another group which had extended admissions of several weeks or longer (9 people, 35%). A file review was completed for this group of tāngata whai ora to find more detail about their admissions and the consistent theme was that these admissions were related to socially-driven issues such as a lack of accommodation, disputes with whānau and a lack of money for basics such as food. Interestingly, all of this group had also had admissions at other times that were primarily due to a deterioration in their mental health. This data indicates that this group is at risk of admission at different times for either or both of a deterioration in their mental health and socially-driven issues, which suggests that they require more intensive follow-up by services to prevent both causes of admission for them.

Tāngata Whai ora with 10+ contacts: Comparative Group

A comparative analysis divided tāngata whai ora who had had 10 or more face-to-face contacts on the basis of whether they had had an admission or remained in the community. There was only one significant difference noted in the data from this analysis, which related to the average length of time of a tangata whai ora's face-to-face contact. For tāngata whai ora who had remained in the community, they were significantly more likely to have had appointments of an hour or longer whereas tāngata whai ora who were admitted were significantly more likely to have had appointments which were under an hour. These differences were statistically significant at a 95 percent confidence interval (See Figure 1). This is based on a T test for the difference of the 2 proportions.

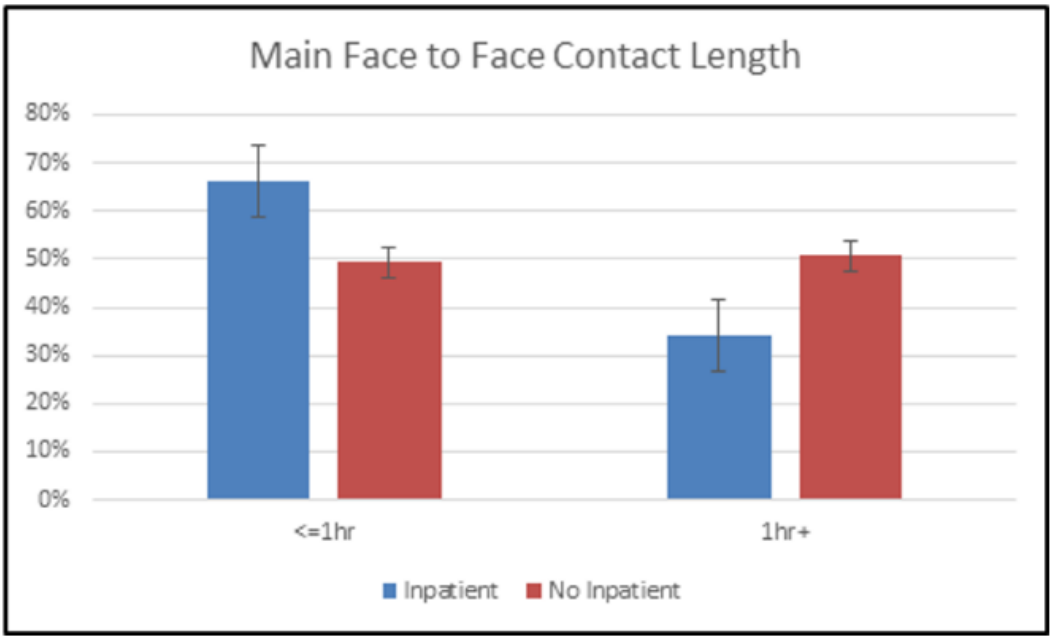

Figure 1. Main face to face contact length for tāngata whai ora with 10 or more contacts in a three-month period

(Source: Ministry of Health, PRIMHD extract dated 9 October 2019).

Emergency department Data

Further analysis on data relating to the ED attendance examined the year from April 2018 to March 2019. One finding was that 28 percent of attendances were by women under 25 years of age who attended on at least one occasion (Table 4). This group was significantly overrepresented as they represent only 18 percent of the population.

An analysis of the language used to describe these attendances found that staff had frequently used words like "harm", "suicide", "od" and "overdose" to describe the presenting problem. This data is summarised in Table 5.

Table 5. Under 25 female visiting ED, Presenting problems free text, count of key work search, April 2017 – March 2018

Key Word	Number of Visits
Suicide	233
Harm	156
OD	174
Overdose	24

Note: Tāngata whai ora can have more than one visit.
Source: Waikato DHB emergency department database.

A question at this point was whether this finding was a Waikato only anomaly or similar to other parts of New Zealand. A further analysis discovered that this was consistent with the rest of New Zealand where women under 25 years constitute 26 percent of all mental health ED presentations and yet are only 16 percent of the population (Table 6).

A further finding was that 74 percent of tāngata whai ora who attended the emergency department for mental health related issues went on to have some form of contact, often regular, with mental health and addiction services within three months of their ED visit.

DISCUSSION

The over-representation of Māori in the HRBC over the timeframe of the data collection is a reminder of how significant this issue is in the Waikato. This finding further reinforces the need for the ongoing effort being made by the Waikato DHB and its partner organisations to change the delivery of services to better meet the needs of Māori in both the preventative and treatment phases as indicated in the national health strategy (MoH, 2018). A revisiting of similar data over time will help to establish whether the changes made have led to a shift in the numbers of Māori being admitted to the inpatient setting. This data also fits with what is known about the over-representation of Māori in mental health services in New Zealand in general, which is an important backdrop to this Waikato-focussed data (MoH, 2019a).

That the majority of individuals who were admitted to HRBC were moderately or severely unwell is an expected finding utilising HoNOS (Wing et al, 1998) but less so the small group admitted who had presentations that were mild or subclinical in nature, based on index of severity (Te Pou, 2019). This group of tāngata whai ora appear to have been admitted for issues relating to social need, for example, homelessness, which have proved challenging to resolve with the result being extended stays in an inpatient setting, which is not required on the basis of their mental health presentation. Finding new ways to assist this group to avoid some of the socially-based issues that can arise for them or alternatives to an inpatient setting if they do arise has also been a focus of the Waikato DHB but comes with significant challenges for all involved because of the complexity of presentations. Again, it is important to note that the vast majority of individuals in this group were Māori and therefore that solutions to this issue might well come with a Māori focus or lens being applied.

Given that the vast majority of individuals admitted into HRBC were known to local mental health services, predominantly the DHB, and had face-to-face contact prior to admission suggests that there is scope to reduce the rate of admissions. This finding connects well with numerous recent reports which have made clear there needs to be a greater focus nationally and locally on

Table 6. Percentage of people who had an ED visit and percentage of the population

		Waikato DHB	all DHBs
Percentage of people who had an ED visit[1]	Under 25yrs females	28%	26%
	Under 25yrs males	18%	16%
Percentage of the population[2]	Under 25yrs females	17%	16%
	Under 25yrs males	18%	17%

[1]People who saw an ED mental health/addiction clinician between April 2018–March 2019
[2]Usual resident population from 2018 census.

Sources: Statistics New Zealand, 2018 census of population and dwellings; Ministry of Health, PRIMHD extract dated 9 October 2019.

dedicated community services (He Ara Oranga, 2019; Mental Health Commission, 2018) that are able to focus more directly and effectively on the needs of their tāngata whai ora and whānau. The statistically significant finding that one difference between being admitted and remaining in the community for those with frequent face-to-face contacts with the service was the length of time of these contacts further reinforces the idea that there are characteristics that contribute to effective interventions that could be enhanced in any new configuration of services. It is reasonable to suggest that having more time to spend with an individual increases the likelihood that a wider range of issues can be addressed, and interventions and treatments provided in a more complete manner. This is one example of a change in the way face-to-face contacts are conducted that could contribute to a reduction in admissions.

The data from ED presentations suggests that this is a place in the Waikato that individuals with mental health issues, generally crises, frequently present and often on more than one occasion. There is evidence that mental health presentations are generally increasing to ED and that waiting times are increasing (Australasian college of emergency medicine 2019). These presentations often will then lead to individuals engaging with services on an ongoing basis, which suggests that their presenting issues require more than can be provided in an ED setting (Gibbs 2018). In particular, young women under the age of 25, are overrepresented and presenting with mental health crises. This data appears consistent with overseas data and research (Hall et al 2019). Although individuals do receive the immediate treatment they require when they present to ED, it is clearly not a setting in which the provision of a more multi-disciplinary and holistic set of interventions can occur. Encouraging people to utilise existing services or investing in the development of new services away from ED requires a clinical understanding of what the data is indicating but also an understanding of the wider social context that leads to people, often young women, presenting at ED. Of further interest is that this finding for young women appears to be consistent across New Zealand and therefore points again to wider issues that apply nationally and may therefore need consideration at both a local and national level. This finding suggests that the ED is a significant access point for mental health presentations and that the interventions provided there are insufficient to prevent someone from needing to access further services in the following three months. It is difficult to be clear whether this finding is indicative of individuals in distress not knowing where else to attend or whether the ED is seen as a more deliberate choice and therefore a gateway into mental health and addiction services.

There are several limitations of this research, chief of which is the difficulty in knowing whether the timeframes chosen, although carefully considered, may or may not have been representative of a longer timeframe of admissions. This limitation needs to be balanced against the challenges for the project group in being able to manage and analyse a larger data set and also that no particular anomalies in the data were noted by clinical staff in the analysis that was presented back to them.
It is difficult to be sure whether most of the data presented in this study is statistically significant because the design of the study means that creating a control group was essentially impossible. This limitation is linked to the study's reliance of PRIMHD and patient management system data. However, to collect the volume of data required to complete a similar study by other means is essentially impossible given available resourcing, which means that this is a limitation that has to be acknowledged and accepted when considering the findings of the study.

Conclusion

This case study has developed a greater understanding of Waikato DHB inpatient data using a combination of PRIMHD and the patient management system data. Examining data from before, during and after individuals' admissions has given the DHB greater knowledge about the potential points at which clinicians can intervene to effect better outcomes for tāngata whai ora. This data analysis process could be replicated by other DHBs and has the potential to offer them the same useful insights into their tāngata whai ora and their needs.

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