Care Capacity Demand Management

Mix & Match Staffing Methodology
Research Summary Report

Two DHB Impact Study

Prepared by the Safe Staffing Healthy Workplaces Unit

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EXECUTIVE SUMMARY

BACKGROUND TO THE STUDY

The Safe Staffing Healthy Workplaces (SSHW) Unit was originally established to assist District Health Boards and the New Zealand Nurses Organisation to implement elements of the recommendations of the 2006 Safe Staffing Healthy Workplaces Committee of Inquiry. A key task was to develop and deliver a staffing methodology that included ‘best practice guidelines for patient forecasting and patient workload management systems’ and ‘a “toolkit” of best practice in nursing and midwifery staffing systems and the management of those systems...’\(^1\). The staffing methodology that has emerged sits within an overall organisational approach developed by the Unit to optimally manage the match between demand and capacity. The staffing methodology, Mix & Match has now been widely tested in a range of inpatient settings.

In 2012, the SSHW Unit commissioned a study to assess the ability of the Mix & Match system to accurately determine nurse staffing requirement for a shift. This report outlines the findings of the study.

AIM OF THE STUDY

The study sought to establish if shifts that had the staffing design determined by the Mix & Match methodology performed better in terms of staff and patient outcomes than shifts that fell short of the recommended design.

APPROACH OF THE STUDY

The study involved collecting and analysing data from six wards within two DHBs that have had their staffing design determined by the Mix & Match process to assess the impact on staff and patient outcomes. Hospital administration data were used to determine staffing design for each shift, and performance on different design metrics were analysed over a six-week period. Data on staff and patient perceptions of care were examined to see if there were significant differences between shifts that met the design criteria and those that didn’t.

CONCLUSIONS OF THE STUDY

The results indicate that ‘staff perceptions of the work environment, the care they provide, and their reports of the occurrence of events associated with rationing of care were significantly better on design-met shifts than design-not-met shifts’. This was reflected in the data staff provided regarding their perceptions of each shift they worked in terms of their rating of various aspects of the work environment, and their reports of care rationing incidence/events. The data suggested that on the whole, staff perceive design-not-met shifts to be less satisfactory for staff and patients than design-met shifts.

Patient perceptions were less clear about the impact\(^2\). However analysis showed patients in this study placed the highest value on timeliness and completeness of care, good communication, the presence of nursing staff and a consistently professional and friendly demeanour.

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\(^2\) Secondary analysis of the patient data has been undertaken to further assess this area and is reported separately
The study authors also noted that ‘in all six wards the gap between required hours and actual hours is often greatest when required hours go up quickly’ and that ‘what was quite clear was that even though wards try to meet these sudden increases in staffing requirements, they consistently fall short’.

This finding is important because the Mix & Match process determines base staffing for a shift; management of unexpected variance between demand and capacity that emerges on the day is managed by a different but equally important process that requires a staffing buffer to be available to deploy into the gap.

The study authors noted that ‘since the pattern continues all through the six-week period, in the same form and at similar levels, it might be related either to real constraints (i.e. number of available staff) in meeting the requirements, or ability to manage variation in staffing requirements.

This finding from the study and from the SSHW Unit’s experience of working closely with DHBs nationally over the past three years suggests that DHBs cannot expect to have a lean staffing base and a lean buffer, and expect to maintain safe production in the face of predictable and significant variance between demand and capacity. For patients, care quality needs to be maintained at a consistent level across every shift to avoid patient risk, patient harm and poor patient outcomes.

**IMPLICATIONS**

The parties who govern the work of the SSHW Unit have required a staffing methodology able to determine optimum staffing models for all shifts. The results of this study show some early indication that applying the staffing modelling determined by the Mix & Match methodology is a valid method for determining shift staffing.

Further investigation will be required to determine if the recommended staffing design is ‘good enough’ as opposed to simply ‘better than’ shifts that do not meet the design level. Meantime completing the Mix & Match methodology is the first step to improving the work environment for nurses, followed by ensuring base staffing matches patient demands. DHBs that complete the process are more likely to ensure the nursing hours required to meet patient demand are available for every shift. This will improve work environments for nurses which will in turn, according to the accepted current research, translate into better patient care, reduction in patient harm and improved productivity for DHBs.

The Mix and Match work which is underpinned by the use of a validated acuity tool is a valuable contribution to addressing the current evidence based gap to how staffing is implemented in DHBs. The findings from this study will be shared with the participating DHB’s and patients, and the wider health sector.

**DHB SPECIFIC MESSAGES**

- Design met shifts lead to increased staff satisfaction
- Day shifts are most likely to not meet M&M recommended design
- Inability to meet the hours per patient day (HPPD) required is the single leading cause of shifts not meeting design
- M&M recommended design-met shifts are cost effective as staff are able to take breaks and leave on time, thereby reducing sick leave resulting from fatigue and unexpected overtime costs
IDENTIFY AREAS FOR DEVELOPMENT/IMPROVEMENT

The findings identify several opportunities for refining data collection tools and processes to strengthen evaluation of the methodology.

- Consistent and effective on-site support of data collection from patients is a key requirement to support the collection of data from patients that is both of sufficient quality and volume to support analysis.
- Review the impact in a DHB which has fully implemented the M&M methodology and made the recommended changes to provide comparison data to areas that have not yet or partially implemented the M&M recommended changes.
- Review care rationing data to determine possible linkages to care pathways.
- Compare the cost of existing staffing methods to the M&M methodology.
- Include the Trendcare Gold Standard metric.
- Future patient surveys need to include aspects of care that patients identify as mattering to them: care omitted, undue care delay communication, nursing presence/surveillance, and compassion/empathy.

DO WE NEED MORE RESEARCH/EVALUATION?

The tools and processes of the CCDM programme are focused on collecting high value data regarding the relationship between service design, service delivery and staff/patient/service outcomes.

This high value data allows for the design of effective targeted improvement interventions. Further research/evaluation is required to determine unequivocally if the CCDM Programme tools and processes achieve these goals and if these in turn positively influence outcomes for staff/patients and the organisation. More investigation is required into patient perceptions regarding responsiveness of care on both design met and design not met shifts and risks to patients.

Several small evaluations have been undertaken to test some CCDM Programme tools and processes which support their efficacy. This study supports the need for an overall evaluation of the CCDM programme as a complete system.

FUTURE STUDY

1. Adaptation of the method of data collection looking at the patient experience of care
2. Study of wards who have adopted the full Mix & Match methodology and comparison to those who have not
3. An overall evaluation of the CCDM programme as a complete system. This has been commissioned and is planned to be available in early 2015.
LIMITATIONS TO THE STUDY

The aim of the research study was to determine whether wards that fully adopt the base FTE establishment, skill mix and rostering recommendations based on the application of the mix and match methodology result in better patient and staff outcomes than those that do not. This aim has been unable to be fully assessed as none of the wards have adopted all of the Mix and Match recommendations.

While the study was able to conclude that design met shifts were better than design not met shifts from the staff perspective, no conclusion can be drawn that shifts that met the recommended design represented an optimal staffing model. However it is evident that shifts that fall short of the recommended staffing design showed more negative and undesirable characteristics such as increased care rationing and staff anxiety about staffing levels.
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**MIX & MATCH IMPACT STUDY AT TWO DHB’S**

**INTRODUCTION**

In 2012, the SSHW Unit commissioned an evaluation study, as part of the quality improvement cycle for the programme, to assess the ability of the Mix & Match tool to accurately determine nurse staffing requirements for a shift. This report outlines the findings of the study.

**THE STUDY INVOLVED** collecting and analysing data from six wards at two DHBs that have had their staffing design determined by the Mix & Match process, to assess the impact on staff and patient outcomes.

The DHB’s and wards were selected on the following eligibility criteria:

- having completed Part 1 and Part 2 of the Mix & Match methodology
- having an agreed preferred staffing design as defined by total hours to be provided, skill mix, and scheduling of staff
- satisfactory Inter Rater Reliability (IRR) and 100% patient actualisation
- Achieving a cross section of ward types and geographical distribution.

For the purpose of this study the DHB’s involved are referred to as DHB A and DHB B. Both DHB’s have implemented elements of the Care Capacity Demand Management Programme (CCDM). Mix & Match (M&M) is the CCDM tool associated with establishing accurate evidence based staffing models. The wards investigated in this research have used the M&M process to identify the staff numbers, skill mix and roster pattern that would best meet the validated patient demand for each ward.

Two wards in DHB A had not implemented baseline staffing changes at the time of the study.

**PURPOSE OF THE STUDY**

The purpose of this study was to investigate the impact of shift design on shift outcomes for patients and staff, by determining if shifts with staffing determined by the Mix and Match methodology resulted in better outcomes for patients and staff than those that did not meet the recommended design.

Shift design includes such factors as the number of staff on the shift, the skill mix of the staff, the match between hour of care required by patients and the hours of care available to be provided by nurses. In addition patient acuity (how sick each patient is) and service utilisation (how many patients came through the service) were also considered to be shift design elements.

Shift outcomes for patients include factors such as the delivery of the complete package of care for each patient, patient satisfaction with the care they received. For staff, shift outcome measures included their perceptions of the shift, their satisfaction with the care they were able to deliver, missed breaks and overtime. In addition staff provided data on any care activity identified that was sacrificed due to workload pressures or insufficient resources.
WHO WAS INVOLVED

**DHB STAFF**
Data was collected from registered nurses (RN), health care assistants (HCA), associate clinical nurse managers (ACNM) and charge nurse managers (CNM)

**PATIENTS**
A randomised selection of in-patients on each of the 6 wards was asked to provide data over the 6 week data collection period.

**RESEARCHERS**
The SSHW Unit Researcher was the principal researcher. A research associate was employed by the SSHW Unit to support onsite data collection.
The Health Services Research Centre was contracted to complete the analysis and statistical modelling of the data, and write the full evaluation report.

**DATA**
Three sources of data were used for this evaluation.

1. Data on hospital administration was used to determine staffing design for each shift. This data provided values for the underlying staffing design variables (hours, types of staff used, ward affiliation of staff, occupancy, and utilisation) which were then used to determine whether a shift met the design met criteria.
2. Data on staff perceptions of the work environment in a shift were collected via end-of-shift staff surveys.
3. Patient surveys were conducted in one randomly selected shift per day. The CNM or the shift leader each day provided a patient list, after removing the names of patients who in their judgement were unable or too unwell to participate. Patients who had consented to being surveyed again on the previous day’s shift were put at the top of the list and were surveyed for a maximum of 3 days. The remaining patients were randomly ordered.

**DATA TOOLS**
- End of shift form
- Patient survey – Appendix 2
- Trend Care Reports- including Shift Variance, Skill Mix, Total Staff and Ward Activity.

**DATA COLLECTION**
Data was collected from every registered nurse (RN), health care assistant (HCA), associate clinical nurse manager (ACNM) and charge nurse manager (CNM) on every shift over the 6 week data collection on both sites.
A research associate employed by the SSHW Unit was present on site and collected completed end of shift forms from staff and administered the patient survey, offering a choice of self or assisted completion.
DATA VOLUME

End of Shift Data was collected over 6 weeks for 126 shifts in 5 of the 6 wards. One ward in DHB B collected for data for 104 shifts over 5 weeks. In total, 734 shifts were examined.
Patient perception data was collected from 219 shifts.

DATA ANALYSIS

Data on staff and patient perceptions of care were examined to see if there were significant differences between shifts that met the M&M recommended design criteria and those that did not.

The M&M recommended Design-met status is determined by three criteria; skill mix, hours required and home ward staff as a percentage of total staff. A shift was considered design-met if:

1. Actual hours met were within 10% of required hours up to a maximum of 4 hours,
2. Skill mix of Registered Nurse time was met or exceeded
3. Non-home ward hours used were less than 25% of total staffing hours.

(Refer to Appendix 1 for detailed design met criteria)

The evaluation first examined descriptive statistics for all design criteria, and then examined variation in staff and patient outcomes by design criteria, type of shift, and wards. This extensive descriptive analysis provided an overview of patterns and differences during the six-week period of the study.

No statistical tests were undertaken at this stage because simple tests of association (chi-square) and differences in means (t-tests), do not control for other (confounding) factors, and were not immediately suited to the longitudinal structure of the data and the serial correlation in repeated measurements of the same wards over a six-week period.

The descriptive analysis was followed by regression analysis (a statistical process for estimating the relationships among variables) which rigorously examined the impact of M&M on staff and patient outcomes. Regression models control for other determinants of these outcomes and take into account the longitudinal nature of the data. In the absence of a true control group the evaluation was based entirely on a comparison of outcomes in design-met shifts with design-not-met shifts within the same wards.

Two further design metrics were considered to be of interest in this evaluation, and were also subject to the design met analysis. They were occupancy (the number of patients cared for, plus and minus movements in and out of a ward, divided by the maximum number of beds available in a ward) and utilisation (the number of beds in a shift from the ward shift variance report, divided by the number of beds available).
RESULTS

Note: detailed results of data collection are included in the full evaluation report.

PART A: DESIGN-MET

Of the 734 shifts examined in this study 175 (24%) were design-met and 559 (76%) were design-not-met.

There is also systematic variation by type of shift with day shifts least likely to be design-met (15%), evening shifts performing better (26%), and night shifts most likely (31%) to meet the design-met criteria (Figure 1).

As noted earlier, achieving the design-met criterion requires each shift meets all three M&M recommended design criteria of skill mix, home ward composition, and actual staff hours in relation to hours required according to the ward data provided by the DHB validated nursing acuity tool. Of the three criteria, the hours required criterion is least likely to be met (see Figure 2).
Figure 3 show that only 38% of all shifts meet the hours required criterion. In sharp contrast 73% of shifts meet the skill mix criterion, and 81% meet the home ward criterion.

In all wards compliance with the hours required criterion was substantially lower than compliance with the other two criteria, and it is clear that this is the biggest impediment to meeting the overall design criterion.
On review of the ward level variation; the day shift presents the biggest challenge in terms of meeting staffing hours’ requirements (Figure 4). Ward A2 is the noteworthy exception with more day shifts (52%) meeting the hours required criterion than evening (40%) or night shifts (38%). It is interesting that the other ward with less differentiation between day, evening, and night shifts is A3. These are the two wards that had not implemented baseline staffing design changes (of M&M) so an obvious question for future research is the potential effect of M&M on shift-to-shift variability.

Figure 4: Percent of shifts meeting the hours required criterion during the 6 weeks of the study
The two other design metrics considered were occupancy and utilisation. Only around one-half of all shifts (43% for occupancy and 56% for utilisation) were found to meet design met criteria for these metrics. The occupancy criterion was found to be met less often in evening shifts, possibly because patients are discharged at the end of a day shift, and compliance varies considerably across wards. At the low end of the scale the criterion is almost never met in Ward B2, only 17% of the time in Ward B3, and 25% of the time in the A1. At the top end is B1 where the criterion is met 75% of the time. Design-met shifts are more likely (58%) to meet the occupancy criterion than design-not-met shifts (39%), and the difference is particularly large in Ward A2 and Ward B1 (Figure 6).³

Utilisation criterion were found to be met less often on day and evening shifts than on night shifts and performance also varies across wards. The pattern is similar to that for the occupancy criterion. Almost no shift in Ward B2 met the criterion, 25% did so in Ward B3 and 44% did so in Ward A1. At the other end over 80% of shifts in the other three wards meet the criterion.

Figure 6 shows that differences between design-met and design-not-met shifts also follow the same pattern as occupancy: 71% of design-met shifts meet the criterion but only 51% of design-not-met

³ Except for Wards A2 and B1, these differences are statistically significant at the 5% level (data not shown).
PART B: STAFF PERCEPTIONS

Staff responses on various questions relating to their work experiences and the quality of care they delivered during a shift; these questions were asked at the end of a shift.

The overall measure of staff feelings about the shift just concluded was considered together with the reported findings on various questions detailing different aspects of work experience during the shift, and questions regarding care rationing.

![Figure 7: Staff feelings about shift (%)](image)

Staff who completed a design-not-met shift reported being less happy (45%) than those who had just completed a design-met shift (58%). The difference in happiness levels between these two shifts was reflected in higher percentages of design-not-met shift staff being neutral, sad, frustrated/angry and worn out/upset (Figure 7).

There were relatively small differences reported between day, evening, and night shifts, and no differences between three wards in DHB A (all 52%), but large differences between the three wards in DHB B. Ward B3 had the lowest score in terms of this indicator with only 35 % staff reported being happy.

Care Rationing

Staff recollection of compromised care activities (termed "care rationing") during a shift was reviewed. Staffs were asked to consider 24 different patient care activities and report on incidences for each of the patients assigned to their care during the shift where these activities had been either:

a) Not done at all (omitted) during the shift,
b) Unduly delayed longer than was reasonable or desirable for the specific activity,
c) Sub-optimally completed because of insufficient time or attention, or
d) Inappropriately delegated, i.e. should have been done by someone at a higher skill level.

The main findings from analysis of this data are summarised below. Almost all care rationing incidents are more likely to reported (by staff) in a design-not-met shift than a design-met shift (Figure 8.)
In many cases incidents of care rationing were twice as likely to be reported in design-not-met shifts, than design-met shifts. Whilst this may indicate that design-met shifts have better outcomes than design-not-met ones, judgement should be reserved due to (a) the appropriate design-met vs. design-not-met comparison is a comparison within-ward rather than between wards and (b) these data do not take into account variability in the care rationing indicators.

Analysis of the data indicated that across the four types of care rationing, the incidences of care rationing were due to care not being provided (omitted) undue delays, or sub-optimally completed due to time or attention pressures. There was little evidence of inappropriate delegation being of concern.

Of the three M&M recommended design-met criteria, both hours required and skill mix reflect the overall design-met vs design-not-met differences. Design-met shifts for these criteria have lower incidences of care rationing than design-not-met shifts, but this is not so for the home-ward criterion. Shifts which do not meet the home-ward criterion are marginally worse than those that do, though the differences are small and not statistically significant.

The reported incidences of care rationing on night shifts was negligible and may be a reflection of minimum staffing levels with a higher incidence of design met shifts.
Finally, the three wards in DHB B appeared to have had more incidences of care rationing than those in DHB A. and within this group Ward B2 has the highest incidence. Figure 9 shows that, on average, design-met shifts have close to a mean of two care rationing events, while design-not-met shifts have a mean close to four events. The mean score for design-met shifts is consistently lower in all six wards. 

![Figure 9: Mean care rationing events score in design-met and design-not-met shifts during the 6 weeks of the study](image)

The other two performance indicators - occupancy and utilisation - reflect the design-met pattern with higher mean scores for shifts that do not meet these criteria.

In summary the data suggested that on the whole, staff perceive design-not-met shifts to be less satisfactory for staff and patients than design-met shifts. This was reflected in the data staff provided regarding their perceptions of each shift they worked in terms of their rating of various aspects of the work environment, and their reports of care rationing incidence/events.

### PART C: PATIENT PERCEPTION

While the study protocol called for conducting patient surveys in one randomly selected shift per day, actual coverage was less than anticipated, and coverage was uneven resulting in a 30% coverage. As only 15% of patients in a shift were interviewed, it is not possible to determine if this is representative of all patients.

Furthermore, even though shifts and patients were selected at random, the differing ability of selected patients to participate in the survey would necessarily imply a non-random sample. Night shifts were less likely to have been covered, and coverage was also marginally lower in wards in DHB A (by 2-3%).

In regard to analysis of this data great caution needs to be exercised due to the small sample. The sample of data showed that on the whole, patients were somewhat more likely to rate the nursing care they were provided as being more responsive to their needs in design-not-met shifts.

The data also showed that on a 1 to 10 scale patients rated nurse care very highly. Almost one-half of all respondents rated nurse care during a shift at 10, and another 39% rated care at 8 or 9. Less than 5% rated care at 5 or below.
The results obtained from quantitative analysis of the patient survey data were equivocal; they did not show any statistically significant associations between shift design and self-reports of completeness and timeliness of care. Given the association established with the nursing data this raised the possibility that either; no association exists for patients (the null hypothesis), or the survey instrument was not able to capture the data in a form that enabled an association to be made. Neither was able to be concluded from the study.

In all likelihood this reflects the fact that patients are not aware of the complete package of care associated with their admission. They were be able to determine whether their requests for assistance were attended to in a timely way but in most cases less likely to determine that specific aspects of care e.g. medications were delayed, or omitted. Traditionally the package of care is determined by nursing best practice and represented in a care plan/care pathway which patients often have little knowledge.

A report containing the findings from a secondary thematic analysis of verbatim patient comments, that were collected as part of the 2012 study is available to consider alongside this report.

### SUMMARY OF FINDINGS IN THE PATIENT PERCEPTION REPORT

Patients’ perception of nursing care is an important component of assessing the quality of care. Recent research has established a strong association between care deficit/care rationing and increased patient morbidity and mortality. In this secondary study patients reported perceived deficits in both the technical side of care and whether they felt nursing care was compassionate and timely. Care deficit was understood by the patients to be predominantly a result of nurses’ need to make care rationing decisions in the face of high workload (care rationing decisions) and the need to prioritise between competing demands.

The analysis also showed that the patients in this study placed the highest value on timeliness of care, completeness of care, good communication, the presence of nursing staff and a consistently professional and friendly demeanour. Prompt attendance to personal care needs and to the relief of pain were identified most frequently as desirable aspects of care.

**Key findings:**

1. Patients are able to comment validly on aspects of care deficit/care rationing, particularly related to timeliness and responsiveness, but patients may not be able to provide a complete picture of care deficit as they are not aware of all of the technical aspects of the complete package of care.
2. Nursing staff are well placed to identify deficits in the package of care but are less able to comment on whether the patient felt cared for or cared about.
3. Patients have a high degree of situational awareness of the context in which care is delivered and the relationship this has to care deficit/care rationing. If they perceive staff to be busy they are more likely to be forgiving of delays and to rate the care highly.
4. Patients expect empathy and compassionate care from nurses regardless of variation in nursing workload.
5. Rating scales of the quality of nursing care will have limited value if they are not accompanied by a rating of how the patient perceived the context in which the care was delivered.
CONCLUSION

The analysis of data reveals substantial variation in the performance indicators across the six wards, within wards by type of shift, and during the course of the study.

Only 24% of shifts meet the M&M recommended design-met criterion; however at one end of the continuum Ward A1 had only 12% of shifts meeting the criterion, and at the other end Ward A2 had 38% of shifts meeting the design-met criterion.

From the perspective of shift design, the data clearly suggests that delivering staffing hours at the level indicated as being required (according to the wards validated acuity data) may be the greatest challenge to improving staff and patient outcomes. This is particularly the case on day shifts.

Another pattern noted is that in all six wards, the gap between required hours and actual hours is often greatest when required hours go up quickly. What is evident is that even though wards may try to match sudden increases in patient demand with sufficient nursing capacity, they were consistently unable to achieve this. In addition it is important to note that the flexibility required to respond to variations in required hours is less about base staffing and more about buffering and management of variance. This pattern was noted consistently throughout the six-week study period at consistent or similar levels and may be related to the number of staff available to meet requirements, or the ability to manage variation in staffing requirements.

Finally, the results of the regression analyses suggest that overall M&M has a positive impact on staff outcomes, but ambiguous effects on patient perceptions of care. In the case of wards A1, B2, and even A3, M&M had a positive impact on staff outcomes during the course of the study. This was less evident in ward A2, and not at all evident in ward B1 and B3.

The results indicate that ‘staff perceptions of the work environment, the care they provide, and their reports of the incidences of rationing care were significantly better on design-met shifts than design-not-met shifts’. On balance it seems reasonable to conclude that M&M has a positive impact on working conditions for nurses, but from this study the impact on patient outcomes was inconclusive.

IMPLICATIONS

The parties who govern the work of the SSHW Unit have required a staffing methodology able to determine optimum staffing models for all shifts. The results of this study show some early indication that applying the staffing modelling determined by the Mix & Match methodology is a valid method for determining shift staffing.

Further investigation will be required to determine if the recommended staffing design is ‘good enough’ as opposed to simply ‘better than’ shifts that do not meet the design level. Meantime completing the Mix & Match methodology is the first step to improving the work environment for nurses, followed by ensuring base staffing matches patient demands. DHBs that complete the process are more likely to ensure the nursing hours required to meet patient demand are available for every shift. This will improve work environments for nurses which will in turn, according to the accepted current research, translate into better patient care, reduction in patient harm and improved productivity for DHBs.

Further, continued attention must be paid to determining the level of staffing buffer that the organisation requires to be able to maintain resilience and safe production in the face of variation between demand and capacity.
The data provided by this study and from the SSHW Unit’s experience of working closely with DHBs nationally over the past three years, suggests that DHBs cannot expect to have a lean staffing base and a lean buffer and expect to maintain safe production in the face of predictable and significant variance between demand and capacity. For patients, care quality needs to be maintained at a consistent level across every shift to avoid patient risk, patient harm and poor patient outcomes.

It was evident that nurses are appreciated and overall patient satisfaction was more closely linked to nurse behaviour than actual delivery of care.

The Mix and Match work which is underpinned by the use of a validated acuity tool is a valuable contribution to addressing the current evidence based gap to how staffing is implemented in DHBs. The findings from this study will be shared with the participating DHB’s and patients, and the wider health sector.

**DHB SPECIFIC MESSAGES**

- Design met shifts lead to increased staff satisfaction
- Day shifts are most likely to not meet M&M recommended design
- Inability to meet the hours per patient day (HPPD) required is the single leading cause of shifts not meeting design
- M&M recommended design-met shifts are cost effective as staff are able to take breaks and leave on time, thereby reducing unexpected overtime costs

**IDENTIFY AREAS FOR DEVELOPMENT/ IMPROVEMENT**

The findings identify several opportunities for refining data collection tools and processes to strengthen evaluation of the methodology.

- Consistent and effective on-site support of data collection from patients is a key requirement to support the collection of data from patients that is both of sufficient quality and volume to support analysis
- Review the impact in a DHB which has fully implemented the M&M methodology and made the recommended changes to provide comparison data to areas that have not yet or partially implemented the M&M recommended changes.
- Review care rationing data to determine possible linkages to care pathways
- Compare the cost of existing staffing methods to the M&M methodology
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- Future patient surveys need to include aspects of care that patients identify as mattering to them; care omitted, undue care delay communication, nursing presence/surveillance, and compassion/empathy
DO WE NEED MORE RESEARCH/EVALUATION?

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This high value data allows for the design of effective targeted improvement interventions. Further research/evaluation is required to determine unequivocally if the CCDM Programme tools and processes achieve these goals and if these in turn positively influence outcomes for staff/patients and the organisation. More investigation is required into patient perceptions regarding responsiveness of care on both design met and design not met shifts and risks to patients.

Several small evaluations have been undertaken to test some CCDM Programme tools and processes which support their efficacy. This study supports the need for an overall evaluation of the CCDM programme as a complete system. This has been commissioned and is planned to be available in early 2015.
## APPENDIX 1 - DESIGN MET CRITERIA

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<th>DESIGN METRICS</th>
<th>DESIGN MET PARAMETERS</th>
<th>LEVEL 1 VARIANCE</th>
<th>LEVEL 2 VARIANCE</th>
<th>LEVEL 3 VARIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANNED STAFFING MODEL MET/NOT MET — SKILL MIX</td>
<td>YES – SKILL MIX MET OR EXCEEDED (E.G. MORE RNS BUT NOT MORE HCAS) 80% RN : 20% EN &amp; HCA</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>60% RN : 40% EN &amp; HCA (REHAB DAY AND EVENINGS) 40% RN : 60% EN &amp; HCA (REHAB NIGHTS)</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NON HOME WARD STAFF MAXIMUM</td>
<td>&lt;25% OF TOTAL STAFFING (NOT COUNTING CNM OR ACNM)</td>
<td>≥25 &lt;40%</td>
<td>≥40 &lt;50%</td>
<td>≥50%</td>
</tr>
<tr>
<td>HOURS MET IN RELATION TO HOURS REQUIRED</td>
<td>YES = UP TO ±10% BUT A MAXIMUM OF ±4 HOURS</td>
<td>&gt;10% ≤15% OF REQUIRED OR &gt;4 HOURS ≤15%</td>
<td>&gt;15% ≤20% OF REQUIRED OR &gt;4 HOURS ≤15%</td>
<td>&gt;20% OF REQUIRED OR &gt;4 HOURS ≤15%</td>
</tr>
<tr>
<td>OCCUPANCY MAXIMUM (IN RELATION TO BEDS)</td>
<td>OCCUPANCY 80% OR LESS</td>
<td>&gt;80 ≤90%</td>
<td>&gt;90 ≤100%</td>
<td>&gt;100%</td>
</tr>
<tr>
<td></td>
<td>100% OR LESS FOR REHAB</td>
<td>&gt;100 ≤110%</td>
<td>&gt;110 ≤120%</td>
<td>&gt;120%</td>
</tr>
<tr>
<td>UTILISATION MAXIMUM</td>
<td>90% OR LESS</td>
<td>&gt;90 ≤95%</td>
<td>&gt;95 ≤105%</td>
<td>&gt;105%</td>
</tr>
<tr>
<td></td>
<td>100% OR LESS FOR REHAB</td>
<td>&gt;100 ≤105%</td>
<td>&gt;105 ≤115%</td>
<td>&gt;115%</td>
</tr>
</tbody>
</table>
APPENDIX 2: PATIENT SURVEY QUESTIONNAIRE

What time did you fill this survey in? ____________ Date: ______________

Did you fill this survey in yourself? Yes ☐ No → Family Member or friend ☐ Researcher ☐

PATIENT PERCEPTIONS OF NURSING CARE

To the extent you can remember, please answer the following questions, if you cannot remember, leave the answer blank.

Thinking about the time period between ______ and ______

1. Were you clear about which specific nurse was assigned to take care of you for this shift? (Researcher note shift: ____________)
   1) ______ YES
   2) ______ NO

2. How often did your nursing staff discuss your treatment with you?
   1) ______ NEVER
   2) ______ ONCE
   3) ______ TWO OR MORE TIMES

3. How often did your nursing staff give you information about tests (e.g. x-ray, MRI, CT scan) and/or procedures you received?
   1) ______ NEVER
   2) ______ ONCE
   3) ______ SOMETIMES
   4) ______ USUALLY
   5) ______ ALWAYS
   6) ______ I DIDN’T NEED ANY TESTS OR PROCEDURES
4. When you had a question or concern about your care or illness, did your nursing staff listen to you?
   1) _____ NEVER
   2) _____ RARELY
   3) _____ SOMETIMES
   4) _____ USUALLY
   5) _____ ALWAYS

5. When you had an opinion about what needed to be done relative to your care, did the nursing staff consider your opinions and ideas?
   1) _____ NEVER
   2) _____ RARELY
   3) _____ SOMETIMES
   4) _____ USUALLY
   5) _____ ALWAYS

6. How often did the nursing staff check with you to make sure your teeth were brushed and mouth rinsed (or provide the care if you could not do it yourself)?
   1) _____ NEVER
   2) _____ ONCE
   3) _____ TWO OR MORE TIMES

7. How often did the nursing staff check with you to make sure you had a SHOWER or other hygiene needs?
   1) _____ NEVER
   2) _____ ONCE
   3) _____ TWO OR MORE TIMES

8. If you needed any help with your meal, did you get this within 10 minutes of the arrival of the meal tray?
   1) _____ YES
   2) _____ NO
   3) _____ I DID NOT NEED HELP TO FEED MYSELF
   4) _____ I COULD NOT EAT
***REMEMBER TO ANSWER FOR THE TIME WRITTEN ON THE FRONT OF THIS SURVEY***

9. How often did the nursing staff help you or check that you got out of bed and sat in a chair?

1) ______ NEVER
2) ______ ONCE
3) ______ TWO OR MORE TIMES
4) ______ I AM UNABLE TO GET OUT OF BED

10. On average, how often did the nursing staff help you walk or check that you walked?

1) ______ NEVER
2) ______ ONCE
3) ______ TWO OR MORE TIMES
4) ______ I AM NOT ABLE TO WALK

11. How many times did the nursing staff help you reposition in bed?

1) ______ NEVER
2) ______ ONCE
3) ______ TWO OR MORE TIMES
4) ______ I DIDN’T NEED HELP MOVING AROUND IN BED

12. On average, how often did your nurses check your IV or other line (central venous catheter, PICC line, or port)?

1) ______ NEVER
2) ______ ONCE
3) ______ TWO OR MORE TIMES
4) ______ I DIDN’T HAVE AN IV OR OTHER LINE
13. WHEN A MONITOR OR OTHER MACHINE BEEPED, HOW LONG DID IT USUALLY TAKE THE NURSING STAFF TO RESPOND?

1) _____LESS THAN 5 MINUTES
2) _____5 TO 10 MINUTES
3) _____11 TO 20 MINUTES
4) _____21 TO 30 MINUTES
5) _____MORE THAN 30 MINUTES
6) _____NO MACHINE BEEPED

14. When you pushed your call bell, how long on average did it take the nursing staff to answer?

1) _____LESS THAN 5 MINUTES
2) _____5 TO 10 MINUTES
3) _____11 TO 20 MINUTES
4) _____21 TO 30 MINUTES
5) _____MORE THAN 30 MINUTES
6) _____I NEVER PUSHED MY CALL BELL

15. Once your call bell was answered, how long on average did it take for you to receive the help you requested?

1) _____LESS THAN 5 MINUTES
2) _____5 TO 10 MINUTES
3) _____11 TO 20 MINUTES
4) _____21 TO 30 MINUTES
5) _____MORE THAN 30 MINUTES
6) _____I NEVER PUSHED MY CALL LIGHT
16. Did you ask for pain medication?

1) _____ YES (if yes, go to question 17)

2) _____ NO (if no, go to question 19)

17. If you answered yes to question 16, how long did it take you to get the pain medication?

1) _____ LESS THAN 5 MINUTES

2) _____ 5 TO 10 MINUTES

3) _____ 11 TO 20 MINUTES

4) _____ 21 TO 30 MINUTES

5) _____ MORE THAN 30 MINUTES

6) _____ I NEVER RECEIVED THE PAIN MEDICATION

18. If you answered yes to question 16, did the nursing staff check back to see if the medication helped reduce your pain?

1) _____ NEVER

2) _____ ONCE

3) _____ TWO OR MORE TIMES

4) _____ USUALLY

19. If you needed help to go to the toilet, how long did it take the nursing staff to get into your room to help you?

1) _____ LESS THAN 5 MINUTES

2) _____ 5 TO 10 MINUTES

3) _____ 11 TO 20 MINUTES

4) _____ 21 TO 30 MINUTES

5) _____ MORE THAN 30 MINUTES

6) _____ I DID NOT REQUEST OR NEED HELP TO DO THIS
20. OVERALL, HOW WOULD YOU RATE YOUR NURSING CARE FOR THIS SHIFT (NOTE, THE SHIFT WE WANT YOU ANSWER FOR IS WRITTEN ON THE FRONT OF THE SURVEY)?

1……….2………..3……….4……….5………..6……..7……8……..9……..10

VERY POOR          EXCELLENT

IF NOT EXCELLENT, WHAT WOULD HAVE MADE THE NURSING CARE EXCELLENT FOR YOU?

PLEASE WRITE:

THANK YOU FOR YOUR PARTICIPATION!!