



Government of **Western Australia**  
Department of **Health**  
Chief Nursing and Midwifery Office

# Nursing hours per patient day (NHpPD) in Western Australia: stakeholder views and the evidence base

Background review for the Chief Nursing and Midwifery Office, Department of Health, Western Australia

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## **Acknowledgment**

The Chief Nursing and Midwifery Office request the reader acknowledge this report has been reformatted to comply with Department of Health Communication Guidelines.

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## Introduction

The objective of this review is to document local "front line" experiences of the current approach to nurse and midwife staffing in Western Australia (WA): Nursing Hours per Patient Day (NHpPD). The review also provides a broader contextual background, and uses key findings to set out what are the implications for any next steps on nursing/midwifery staffing approaches in WA. It has been prepared as a background review for the Chief Nursing and Midwifery Office, Department of Health, Western Australia. It can also be made available to the working party that will review staffing methodologies that has been established by the Chief Nursing and Midwifery Office.

The review is based on the synthesis of information obtained through feedback from stakeholder meetings organised in Western Australia across the period July 2 to July 5 2019, when approximately 90 individuals from across the WA health system were interviewed one-to-one or as participants in focus groups. This is underpinned by a rapid review of the published evidence on different approaches to determining nurse staffing, with an emphasis on NHpPD. This review is intended primarily as an internal document, for the use of the working party, and which can be used to assist in determining any future direction on nursing and midwifery staffing in WA.

The report consists of five sections:

- Section 1:** provides an executive summary, focused on key points emerging from the stakeholder meetings and from the research review
- Section 2:** provides summary feedback from stakeholder meetings conducted in WA
- Section 3:** provides a scoping of the evidence base on Australian and international research on determining nurse staffing, with a focus on NHpPD
- Section 4:** summarises the evidence-base on current approaches to determining nurse and midwifery staffing in comparator countries
- Section 5:** suggests next steps and options for consideration by the working party.

# 1. Executive Summary

This section summarises a briefing report that was developed to review local "front line" experiences with the current approach to nursing and midwifery staffing in Western Australia (WA) Nursing Hours per Patient Day (NHpPD). The review synthesizes and summarises key points emerging from a series of interviews and focus groups conducted across the period of 2 to 5 July 2019, with approximately 90 staff and managers, and from an evidence review.

## 1.2 Key identified strengths of NHpPD

Participants identified some key positive attributes of the current approach to staffing. These included:

- the flexibility in NHpPD is useful
- it can allow some benchmarking
- it can provide justification for staffing levels
- it can make rostering of staff easier
- it is useful for informing full time equivalent requirements.

## 1.3 Key limitations of NHpPD

Participants identified a range of issues which they reported as being current limitations in the implementation of NHpPD. These will be of relevance to the considerations of the working party:

- i. NHpPD was interpreted by many as indicating the maximum staffing, whilst in reality it should be taken as indicating the minimum.
- ii. The original objective of applying NHpPD was to determine safe staffing, it was now perceived by many to be more closely linked to budget related staffing constraints and financial reporting.
- iii. There is a need to take more account of nurse sensitive indicators, and review, clarify and agree standard definitions of what was "direct" and "indirect" nursing.
- iv. There were also reported "inconsistencies" in different parts of WA in terms of the application of NHpPD, such as the inclusion or exclusion of shift coordinator and how bed count/occupancy is determined i.e. midnight census and/or more frequently, the former can lead to a lower estimate on staffing need.
- v. Some of the interviewees, mainly registered nurses, highlighted that there was not full transparency or understanding of the input/analysis and output aspects of the process,

which in turn contributes to some of the variation in data collection, input, and interpretation of results.

- vi. The outcome from NHpPD was often calibrated as a nurse: patient ratio. For some nurses, this has become “shorthand” for representing the outcome from application of NHpPD but did not reflect the fact that the application of NHpPD was the mechanism by which the ratio had been identified.
- vii. The application of NHpPD can be “inflexible” when bed occupancy changes quickly. For example if two beds are unexpectedly shut, then the nursing hours may then be above the required amount, but management “can’t send home half a nurse”.
- viii. There needs to be more clarity in how NHpPD outcomes are linked to decisions on staff mix and skill mix: for example, NHpPD is calibrated in “RNs” but in reality this relates to a broad continuum of nursing staff from graduate nurses through to experienced staff, and therefore the nursing profile may not be reflected accurately.
- ix. Several groups noted that there was some rigidity in application, with seasonal differences in staffing requirements not fully accounted for; and that it was not always clear what was the source of the number of beds used to calculate NHpPD.
- x. Some respondents, mainly unit managers, noted what they regarded as limitations to the effective application of NHpPD in small wards, or in work environments where they believed that it did not account fully for high patient turnover, for high and variable/unpredictable workflow, and where there are only small numbers of staff. This included, but was not limited to e.g. WACHS (Western Australian Country Health Service), ED (Emergency Department), rehabilitation, paediatrics, ICU (Intensive Care Unit).
- xi. In relation to the previous point, there is a specific need to assess the application of NHpPD in rural/country areas (those covered by WACHS) where there is need to consider how Community/Primary Health/Hospital in the Home (HITH) nursing is to be translated into and impacts on NHpPD, where some small hospitals have mixed specialties and varying acuities e.g. mixed ward general, maternity, paediatrics and high dependency, which makes it difficult to forecast NHpPD targets, how to staff to these specialist skills, where currently there is reportedly no easy-to-use software to support NHpPD; WACHS do manual NHpPD data collection.
- xii. Respondents in several focus groups highlighted difficulties with accounting for “offsite time e.g. when a nurse had patient escort duties.

- xiii. Focus groups highlighted the need to take full account of patient behaviour issues (e.g. disruptive/challenging patients) which can add to workload; similar issues were reported in connection with the high workload when “specialing” not being fully accounted for in the process.
- xiv. The midwifery focus group noted the need to take full account of workload issues with mother and child, and social complexity issues in some clients, when determining workload; they also highlighted that there is no “M” for “Midwifery” in the title “NHpPD”.
- xv. Several managers and groups reported the potential for confusions and/or additional workload being created by the use of parallel reporting systems.
- xvi. The current process for applying for “re-classification” was reported by some to be time consuming to complete; several reported that approved re-classification had not led to the staffing increase being funded in a timely manner.
- xvii. Several groups and managers noted the impact of newer build ward layouts and work environment influences - for example some new wards have more individual rooms which create additional workload and reduced “line of sight”.
- xviii. Several managers pointed to specific minimum staffing requirements for patient safety and security issues which had to be taken into account when determining staffing but were not related directly to the application of NHpPD.

#### **1.4 The evidence base**

Sections 3 and 4 of the review, which scope the evidence base, highlight that there is a relatively strong body of evidence which focuses on the early years of implementation of NHpPD in WA. This can be used to inform the work of the working party. The review also gives consideration to the evidence base on nursing and midwifery staffing in other jurisdictions. The review identified the main approaches to determining nursing or midwifery staffing used in high income countries similar to Australia. These include:

- i. Fixed/ mandatory nurse: patient (or nurse: bed) ratios
- ii. Calculating the number of staff per occupied bed or by patient day
- iii. Calculating the number of nursing hours per patient day (NHpPD); and/ or based on estimates of patient acuity or dependency
- iv. Determining a skill/ staff mix (usually expressed as a % requirement for registered nurses), using timed-task/ activity approaches
- v. Data regression based systems
- vi. “Professional judgement” or expert opinion based approaches.

For the purposes of the working party, the scoping review highlighted that there is no recent national or international level study that provides a comprehensive report on the frequency of use of these different approaches to determining nursing or midwifery staffing levels in any country. There is also no comparative study that sets out in detail the relative strengths and weaknesses of different approaches.

What is apparent, and is of relevance to the working party, is that some of the approaches listed above require little data; others are driven by data on patient profile, patient dependency, acuity or workflow, and require both significant data, and the capacity to analyse and interpret data projections. Some are “live”, applied on a day by day basis; others are used only periodically.

It should also be noted that most approaches to determining staffing have been developed for use in acute base nursing care. The scope for them to be applied effectively in other nursing or midwifery contexts may be limited, and there has been some progress in developing methods or prototypes for use in other care environments, for example mental health workforce, community nursing, and for application in nursing homes. In addition, there is one widely used approach for midwifery; Birthrate Plus<sup>®</sup>.

It is important for the working party to note that these methods and tools for identifying day-to-day staffing levels can only be effective if aligned with staff rostering, to match needs with individual staff availability, particularly where there is a requirement for 24/7 nursing or midwifery care, and must also take account of the possible deployment of temporary staff, either because of staffing gaps or projected peaks in workload/workflow. It is also important to acknowledge that there can be variation between the “established” nurse staffing at organisational level, and the “actual” staffing at any specific time.

### **1.5 Next steps: Issues for consideration by the working party**

The vast majority of participants were in favour of using an adapted and “improved” version of the current approach, based on an adapted implementation of the current NHpPD. There were various suggestions to adapt or improve the application of NHpPD, which draw from identified limitations in the current application of NHpPD in WA. These included:

- i. The current NHpPD system was first implemented in 2002; if it is to be continued there is a need to review its relevance in a changed organisational context.
- ii. Several groups reported that NHpPD could not be implemented as a “one size fits all” approach, and that there was major need to clarify which work and care environments and locales are suitable for implementation of NHpPD, and where there may be a

requirement for adaption (For example, staffing approach used for rural and remote (WACHS))

- iii. There needs to be standardisation of the method of counting “beds”.
- iv. There needs to be an appropriate and standard approach to staff FTE “rounding”.
- v. There is a need to take more accurate account of variations in seasonal fluctuations in workload when applying the staffing approach.
- vi. There is a need to clarify and standardise inclusion/exclusion criteria for shift co-ordinators in calculating staffing.
- vii. There is a need to simplify and standardise the re-classification application process.
- viii. There is a need to standardise the reporting processes from implementation, and reduce duplication.
- ix. There is a need to provide additional training to staff who are responsible for implementing and interpreting NHpPD and schedule periodic refresher training.
- x. There should be an agreed timetable for periodic review of implementation of the new approach.
- xi. There will be a need to develop an advocacy and communications strategy to explain and inform any new and changed approach to NHpPD to staff, managers and other stakeholders.

The working party can also reflect on the findings of the evidence reviews, and also assess original sources for more detail. There are however some key findings that they should consider in their deliberations:

- xii. There is a relatively detailed evidence base on the early years of implementation of NHpPD in WA; this is a unique and highly relevant source, which the working party can draw from, and build on.
- xiii. Published research on the implementation of NHpPD in other countries tends to support its potential as a valid approach, with caveats related to availability of accurate data, effective management, responsive funding, and staff training in sustainable application. The working party can take account of this validation in its deliberations.
- xiv. Whilst there is a weak and fragmented international evidence base on the relationship between staffing levels, costs, patient care activities, and outcomes, there are several

studies than are relevant; notable those that are part of the WA specific evidence base, as above.

- xv. The review highlights that many of the factors which act on local staffing levels are context specific and can vary site by site, and country to country: e.g. staffing profiles and skills levels, work practice environment, health system structure, funding and organisation, culture, legislation and regulation etc. The working party should note that there will always be a need to take account of, and control for context when examining the relevance of approaches being used in other jurisdictions.
- xvi. Several main approaches to determining nurse staffing were summarized in section 4 of the report. The working party can reflect on these approaches, but should note that there is no recent national or international level source which sets out systematically the strengths and weaknesses of each approach. In addition, they should reflect on the expressed support from respondents for a continuation of an updated/adapted NHpPD approach, and the fact that there is no compelling evidence that would suggest an alternative approach should replace NHpPD.
- xvii. The working party should note that some of the approaches described in section 4 require little data, whilst others require both significant data, and the capacity to analyse and interpret data projections. The data requirements, staff time and resources required to implement and sustain any approach must be considered as part of the decision on the way forward.
- xviii. The working party should also note that most of the staffing approaches described in section 4 have been developed initially for use in acute care settings. Whilst there are now some purpose built or adapted tools for use in other care environments (e.g. example mental health workforce, community nursing, and nursing homes), the working party will have to consider that, if the aim is to have a system wide approach, then there will be the need to look at an adapted or tailored elements for different care settings, rather than an “off the shelf” system.
- xix. In relation to the above point, the working party will have to deal with the tension between using a standard “one size fits all” approach across the whole system, and having systems which are responsive to the specific situation in different work environments. In particular, it is clear from the focus groups that that the current use of NHpPD in rural and country areas could require adaption to reflect accurately the different context.

- xx. The working party should agree on what criteria for “effectiveness” they should have in mind when determining which approach should be used. Ideally this should be based on the utility of the approach, limited (or no) additional data gathering burden, other resource implications, flexibility, adaptability and responsiveness to varying client profile and care environment characteristics, clear connections to cost and funding, and an agreed assessment of output/ outcome indicators.
- xxi. The working party should be clear that the effective use of a staffing tool will be dependent on an understanding of its approach, training in its use, and consistent application. This will require a long term commitment to staff training, and to periodic assessment of the implementation and outcomes of the selected approach

## 1.6 Three realistic options

The findings of the engagement with staff, and the broader review of evidence point to three realistic possibilities:

- i. **The first option** would be to conclude that only minor changes or “tweaks” to the current NHpPD approach was required. This has the benefit of having limited disruption, but is unlikely to meet staff expectations, and would not enable some of the current identified limitations of the approach to be addressed.
- ii. **The second option** would be to decide that the current NHpPD approach was unfit for purpose to the extent that an alternative approach had to be developed and implemented. This would be a major undertaking, with significant resource implications; it should be noted that the evidence review does not point to a single clear working alternative that would necessarily be more “effective”; nor would this option match the expressed views of the majority of staff.
- iii. **The third option** is to review, adapt and upgrade NHpPD. This has the benefits of building on the strengths of the current approach, and would meet the preference of the majority of staff involved in the engagement process. However it also has challenges. The feedback from staff engagement, summarised in this review, identifies a series of issues for consideration during such a review process, as well as giving some pointers about where there needs to be a consideration of an upgraded approach.

## 2. Synthesis of feedback from interviews and focus groups

This section synthesizes in greater detail, and summarises key points emerging from a series of interviews and focus groups conducted across 2 to 5 July 2019, approximately 90 participants involved included from Health Service Providers (HSPs) below:

- Child and Adolescent Health Service (CAHS)
- East Metropolitan Health Service (EHMS)
- North Metropolitan Health Service (NMHS)
- North Metropolitan Mental Health Service (NMMHS)
- Quadriplegic Centre
- South Metropolitan Health Service (SMHS) Fiona Stanley Fremantle Hospital Group (FSFHG) and Rockingham General Hospital (RGH)
- WA Country Health Service (WACHS)
- Women and Newborn Health Services (WNHS).

In total, approximately 90 invited staff and managers participated either in one-to-one interviews, or in one of the eight works based focus group meetings.

The focus group discussions were aimed at exploring three inter-related issues:

- Context issues - experience in application of the current NHpPD approach; this included both issues of context (specific health system, demographic and workforce characteristics that played a part in underpinning approaches to determining nurse or midwife staffing) and issues related to its application (strengths, weaknesses, scope for improvement)
- Implementation factors - experiences and views of alternate approaches to determining nursing and midwifery staffing levels
- Experience and views of alternate approaches to determine staffing levels - looking forward, asking participants for any messages that should be fed into the working party that has been established by the Chief Nursing and Midwifery Office (CNMO), Department of Health.

The key points emerging from these interviews and focus groups are reported below. Firstly, issues related to the specific care contexts in which respondents were working are highlighted. This is followed by more details on actual experiences and views of NHpPD.

## 2.1 Context issues

The feedback from the various stakeholder meetings highlighted a range of specific context issues that participants considered are important in shaping the effectiveness of any approach to determining staffing levels; these will apply irrespective of which approach to determining staffing was in place. It will be important that the comprehensive review of staffing which will be undertaken by the working party established by the CNMO, will give full consideration when developing their recommendations on staffing.

Key context issues that were identified were:

- i. Issues related to the geography of WA, the relatively isolated nursing and midwifery labour markets, and the structure and configuration of services, in part a factor of the concentrated urban/very low population density rural and remote geography (primarily the population served by WACHS). This creates challenges in terms of provision of a full range of services, enabling client access to services, varying levels of demand in different geographies within the State, and restricted scope for efficiencies of scale in provision of tertiary level/specialist services, workforce scale and skill up limitations (this point has also been identified in research highlighted in section 3 below).
- ii. Ageing of the client population, leading to more patients/ clients with multiple co-morbidities, which can increase overall dependency and workload and can also require differing specialist input.
- iii. Other changes in client population profile which also impact on complexity and staff requirements (For example, increase in patients with substance dependencies).
- iv. Changes in patient length of stay leading to higher acuity, in part linked to increase in patient profile, but also related to increase in day case treatment, which in some cases reflects the differing models of care now in use. For example, patients being admitted on day of surgery, not staying overnight.
- v. The impact of the physical layout of the care environment. For example, smaller wards, geographically remote small units, and the staffing workload implications of “new build” wards with high numbers of single bed rooms, and relatively limited line of sight for nurses or midwives.
- vi. There is also a need to factor in the workload implications of supervision of students and new staff which will be variable in level across the system.
- vii. Variable availability and use of other complementary/supplementary staff; Assistants in Nursing (AIN) and Patient Care Assistants (PCA).

- viii. Variable provision of support staff such as ward clerks, orderlies, assistants etc., across the different parts of the health system, and by time. In particular several stakeholders highlighted an absence of support staff at nights or weekends which placed additional work on nurses. For example, for patient escort duties, feeding patients etc.
- ix. Some workplaces highlighted significant seasonal variation in workload. For example, higher incidence of 'flu related workload in winter.
- x. The need for the approach to take account of workflow changes, which in some care environments were reported to have increased significantly, and can fluctuate markedly.

## **2.2 Implementation factors**

This section summarises the key points made by the respondents on the strengths and limitations of the application of NHpPD in Western Australia. It should be noted that NHpPD was first implemented in WA in 2002, so it is a long established approach to staffing in the state (section 3 provides the evidence-base on its earlier years of implementation).

The fact that NHpPD has been used in WA for 17 years raises three broader points. Firstly, given the context changes described in the previous section, it would be time to review the implementation and calibration of NHpPD, even if it is regarded as having continued utility. Secondly, some of the original reasons for implementation and rationale for subsequent modifications or additions to the overall approach are not well documented or understood by all who are involved in its current implementation. This would also argue for the need for a review, and for a commitment to consistent and transparent implementation. Thirdly, many of the staff interviewed reported that they did not have detailed working experience of alternate approaches to determining staffing levels.

### **2.2.1 Key identified strengths of NHpPD in WA**

Participants identified some key positive attributes of the current approach to staffing. These drew from their experience in working with the approach, and included:

- i. The flexibility in NHpPD is useful; participants valued the scope for some flexibility in application, and the degree of local input and control
- ii. It can allow some benchmarking; it provides a standardised approach and measures that can be used to assess variations in different units and work locations, and changes across time
- iii. It can provide justification for staffing levels; it gives nurses and Nurse Unit Managers (NUMS) some workload and patient population derived evidence to justify the need for higher staffing levels

- iv. It can make rostering of staff easier
- v. It is useful for informing full time equivalent requirements

### **2.2.2 Key identified limitations of NHpPD in WA**

Participants identified a range of issues which they reported as being current limitations in the full implementation of NHpPD in WA. Inevitably, the focus of discussion was primarily on what was less than optimal and had scope for change or improvement, rather than on what “worked well”. As such, this listing is longer and more detailed than that on identified strengths. These identified limitations will be of relevance to the considerations of the working party:

- i. NHpPD was interpreted by many as indicating the maximum staffing, whilst in reality it should be taken as indicating the minimum.
- ii. The original objective of applying NHpPD was to determine safe staffing, it was now perceived by many to be more closely linked to budget related staffing constraints and financial reporting.
- iii. There is a need to take more account of nurse sensitive indicators, and review, clarify and agree standard definitions of what was “direct” and “indirect” nursing
- iv. There were also reported “inconsistencies” in different parts of WA in terms of the application of NHpPD, such as the inclusion or exclusion of shift coordinator, how bed count/occupancy is determined; (midnight census and/or more frequently, the former, can lead to a lower estimate on staffing need).
- v. Some of the interviewees, mainly registered nurses, highlighted that there was not full transparency or understanding of the input/analysis and output aspects of the process, which in turn contributes to some of the variation in data collection, input, and interpretation of results.
- vi. The outcome from NHpPD was often calibrated as a nurse: bed ratio. For some nurses, this has become “shorthand” for representing the outcome from application of NHpPD but did not reflect the fact that the application of NHpPD was the mechanism by which the ratio had been identified.
- vii. The application of NHpPD can be “inflexible” when bed occupancy changes quickly- for example if two beds are unexpectedly shut, then the nursing hours may then be above the required amount, but management “can’t send home half a nurse”.
- viii. There needs to be more clarity in how NHpPD outcomes are linked to decisions on staff mix and skill mix: for example, NHpPD is calibrated in “RNs” but in reality this relates to a broad continuum of nursing staff from graduate nurses through to experienced staff, and therefore the nursing profile may not be reflected accurately.

- ix. Several groups noted that there was some rigidity in application, with seasonal differences in staffing requirements not fully accounted for; and that it was not always clear what was the source of the number of beds used to calculate NHpPD.
- x. Some respondents, mainly NUMS, noted what they regarded as limitations to the effective application of NHpPD in small wards, or in work environments where they believed that it did not account fully for high patient turnover, for high and variable/unpredictable workflow, and where there are only small numbers of staff. This included, but was not limited to, for example, WACHS (Western Australian Country Health Service), ED (Emergency Department), rehabilitation, paediatrics ICU (Intensive Care Unit).
- xi. In relation to the previous point, there is a specific need to assess the application of NHpPD in rural/country areas (those covered by WACHS) where there is need to consider how Community/Primary Health/Hospital in the Home (HITH) nursing is to be translated into and impacts on NHpPD; where some small hospitals have mixed specialties and varying acuities, for example, mixed ward general, maternity, paediatrics and high dependency, which makes it difficult to forecast NHpPD targets; and how to staff to these specialist skills; and where currently there is reportedly no easy to use software to support NHpPD – WACHS do manual data collection.
- xii. Respondents in several focus groups highlighted difficulties with accounting for “offsite” time. For example, when a nurse had patient escort duties.
- xiii. Focus groups highlighted the need to take full account of patient behaviour issues (e.g. disruptive/challenging patients) which can add to workload; similar issues were reported in connection with the high workload when “specialing” not being fully accounted for in the process.
- xiv. The midwifery focus group noted the need to take full account of workload issues with mother and child, and social complexity issues in some clients, when determining workload.
- xv. Several managers and groups reported the potential for confusions and/or additional workload being created by the use of parallel reporting systems.
- xvi. The current process for applying for “re-classification” was reported by some to be time consuming to complete; several reported that approved re-classification had not led to the staffing increase being funded in a timely manner.
- xvii. Several groups and managers noted the impact of newer build ward layouts and work environment influences - for example some new wards have more individual rooms which creates additional workload and reduced “line of sight”.

- xviii. Several managers pointed to designated minimum staffing requirements for patient safety and security issues in some work environments which had to be taken into account when determining staffing but were not related directly to the application of NHpPD.

### **2.3 Experience and views of alternate approaches to determining staffing levels**

Participants were also asked about their experiences with alternate approaches to determining nurse staffing. Most of those interviewed were relatively “stable” workers within the WA nursing and midwifery labour markets, relatively few respondents had significant direct career experience in other states or countries in recent years.

A small number of participants had worked in other states or countries, and others who were involved in cross state or national professional activities had knowledge of either a dependency/acuity approach (e.g. TrendCare), a staffing ratios approach (Victoria, Queensland), or an approach based primarily only on professional judgement (England).

Key points raised by participants about alternate approaches were:

- i. Many participants had some basic understanding of the mandatory nurse: patient ratios approach, as implemented in Victoria, and now in Queensland. None expressed a preference for this approach, and several commented that they believed that the application of “1 to 4” (or 5 to 20) ratios would be inflexible, constrain professional judgement, and could lead to reduced staffing in some care environments in WA.
- ii. They reported that a ratios approach would have to be underpinned by flexibility in application, taking account of variations in acuity, and being based on clinical and professional judgement. Several of the Nurse Unit Managers (NUMs) that were interviewed had modelled a 1 to 4 ratio approach in their own care environment and reported that this would lead to reduced registered nurse staffing in comparison to the current profile, which in turn could decrease the quality and safety of patient care.
- iii. Some of those working in maternity, as midwives, were interested in looking at the potential for Birthrate Plus<sup>®</sup>, but none had extensive experience of its application;
- iv. Two participants reported some knowledge of TrendCare. They viewed it as overly mechanistic and time intensive to manage and implement.
- v. Some NUMS reported that some registered nurses, who had an incomplete understanding of aspects of the implementation of NHpPD formula/calculations, believed that they were already using “ratios”, as this was how the output from the NHpPD was then calibrated.

### **3. NHpPD: approaches and evidence**

In order to provide a broader context to current activity on nursing and midwifery staffing in WA, the consultant was asked to conduct a review of available evidence base on approaches to determining staffing, with a specific focus on NHpPD.

Given limited resources and time this was not a full systematic review, however derived from desk research using key word searches, focusing on evidence and analysis of approaches to determining nursing and midwifery staffing in Australia and comparator high income Anglophone countries (the four UK countries, Canada and US). The review updated and expanded a previous study completed by the consultant in January 2018, and identified a range of new published studies, and additional material specific to WA.

The review is reported in several sub-sections below. Firstly it summarises published research on NHpPD in Australia; then focuses more broadly on key messages from published research on the application of NHpPD and similar approaches, summarising briefly some relevant material on midwifery staffing, before providing specific detail on current approaches to determining nurse staffing in other countries.

#### **3.1 Research on NHpPD in WA and elsewhere in Australia**

A range of studies were published during the implementation of NHpPD in WA. This relatively rich evidence base differentiates WA from most other jurisdictions in terms of a context specific contemporaneous evidence base on assessment of implementation. There are also some other studies from elsewhere in Australia that make conclusions that should be given consideration in any next steps in WA. This section summarises these findings.

In March 2002 the Australian Industrial Relations Commission ordered the introduction of Nursing Hours per Patient Day (NHpPD) for implementation in WA public hospitals. This method used a “bottom up” approach to classify each hospital ward into one of seven categories using characteristics such as patient complexity, intervention levels, the presence of high dependency beds, the emergency/elective patient mix and patient turnover. Once classified, NHpPD were allocated for each ward. It was reported that shift to shift variations in nursing hours were still possible under the method as it focussed on average hours for a ward or unit over time<sup>1 2</sup>.

There has been several independent assessment studies published on the process and impact of implementation of NHpPD in WA, which establishes the WA process as being relatively well examined in comparison to most other contexts. All the studies were conducted by the same core group of nursing academics which adds to a coherent and standardised approach.

A study published in 2009<sup>3</sup> reviewed various approaches to measuring nursing and midwifery workload to provide a context for the early evaluation of the introduction of NHpPD to all public hospitals in WA. The paper noted that the method was “introduced in response to industrial imperatives to determine reasonable workloads for nurses”<sup>4</sup>. The study focused only on the impact on workload management; reporting target versus actual nurse hours, staff retention and nurse feedback. The study found that the approach to staffing had “improved ward staffing significantly without imposing restrictive nurse-to-patient ratios and facilitates the use of professional discretion within ward groupings to enable diversion of resources to match reported acuity changes”. It concluded that whilst it was successful in attracting nurses back into hospitals and increasing nursing numbers, there was no empirical evidence of the impact this method had on patient outcomes or whether the guiding principles used in the development of this method are appropriate. The authors concluded that the model would also benefit from further refinement to be more sensitive to direct acuity measures.

A report prepared for the Northern Territory Department of Health and Families<sup>5</sup> reflected on introduction of NHpPD in WA and noted that “There has been some success in recruitment” and that there were some supportive comments relating to a decreased workload and increased morale; it also highlighted that in order to meet the staffing benchmarks hospitals had largely used overtime or agency staff, and that no data were available on patient or staff outcomes.

A follow up study focusing on the implementation of NHpPD in WA was published by the same researchers in 2011<sup>6</sup>. It was one of the first to empirically review a specific nurse staffing method, based on an individual assessment of each ward to determine staffing requirements, rather than a “one-size-fits-all” approach. The aim of the study was to determine the impact of implementing the NHpPD staffing method on 14 nursing-sensitive outcomes: central nervous system complications, wound infections, pulmonary failure, urinary tract infection, pressure ulcer, pneumonia, deep vein thrombosis, ulcer/gastritis/upper gastrointestinal bleed, sepsis, physiologic/metabolic derangement, shock/cardiac arrest, mortality, failure to rescue and length of stay. It used retrospective analysis of patient and staffing administrative data from three adult tertiary hospitals in metropolitan Perth over a 4 year period. All patient records ( $N = 236,454$ ) and nurse staffing records ( $N = 150,925$ ) from NHpPD wards were included<sup>7</sup>.

The 2011 study reported “significant decreases in the rates of nine nursing-sensitive outcomes when examining hospital-level data following implementation of NHpPD; mortality, central nervous system complications, pressure ulcers, deep vein thrombosis, sepsis, ulcer/gastritis/upper gastrointestinal bleed shock/cardiac arrest, pneumonia and average length

of stay. At the ward level, significant decreases in the rates of five nursing-sensitive outcomes; mortality, shock/cardiac arrest, ulcer/gastritis/upper gastrointestinal bleed, length of stay and urinary tract infections occurred". The study concluded that "The findings provide evidence to support the continuation of the NHpPD staffing method. They also add to evidence about the importance of nurse staffing to patient safety; evidence that must influence policy".

A further study on NHpPD in WA was published by the same team in 2012<sup>8</sup>; the study focused on the association between skill mix and the same 14 nursing sensitive outcomes as in the 2011 study. A subset of data from the 2011 study was used to determine the impact of skill mix on nursing sensitive outcomes following implementation of the staffing method. All patient records ( $N = 103,330$ ) and nurse staffing records ( $N = 73,770$ ) from nursing hours per patient day wards from October 2002 to June 2004 following implementation were included.

The 2012 study found that the effect of skill mix at a hospital level following implementation of the nursing hours per patient day staffing method is variable depending on ward type and patient characteristics. Study results highlighted that increases in Registered Nurse hours were associated with important decreases in eight nursing sensitive outcomes at hospital level and increases in three nursing sensitive outcomes. The lowest skill mix saw the greatest reduction in nursing sensitive outcome rates. The study concluded that the skill mix of nurses providing care could impact patient outcomes and is an important consideration in strategies to improve nurse staffing. Levels of hospital nurse staffing and skill mix are important organizational characteristics when predicting patient outcomes.

In 2013, the research team then published an assessment of the economic impact of increased nursing hours of care on health outcomes in adult teaching hospitals in Perth<sup>9</sup>. The longitudinal study involved the retrospective analysis of a cohort of multiday stay patients admitted to adult teaching hospitals. Hospital morbidity and staffing data from September 2000 until June 2004 were used to analyse nursing sensitive outcomes pre and post implementation of NHpPD. The cost of the intervention comprised increased nursing hours following implementation of the staffing method.

The study found that the number of nursing sensitive outcomes was 1357 less than expected post implementation and included 155 fewer 'failure to rescue' events. The 1202 other nursing sensitive outcomes prevented were 'surgical wound infection', 'pulmonary failure', 'ulcer, gastritis', 'upper gastrointestinal bleed', and 'cardiac arrest'. One outcome, pneumonia, showed an increase of 493. Analysis of life years gained was based on the failure to rescue events prevented and the total life years gained was 1088. The cost per life year gained was

AUD\$8907. The authors concluded that the implementation of NHpPD staffing method “was cost effective when compared with thresholds of interventions commonly accepted in Australia”.

A 2016 study examined the specific context of small rural hospitals in Western Australia<sup>10</sup> with the aim of exploring staffing issues and the workload drivers influencing nursing activities. The study reported that a “minimum nurse staffing model is in use” and that staff workload is generated from multiple activities involving 24-hour emergency services, inpatient care, and other duties associated with a lack of clinical and administrative services. The study noted that “These factors together impact on nursing staff resources and the skill mix required, ensuring the safety and quality of patient care”. The study recommended that nurse staffing for small rural hospitals required “site-specific recording techniques for workload measurement, staff utilisation and patient outcomes”<sup>11</sup>.

In 2016 the team published a further study, assessing the impact of adding assistants in nursing (AIN) to staffing on 11 acute care metropolitan hospitals in WA, with a focus on adverse patient outcomes<sup>12</sup>. Using administrative health data, study results showed three significant increases in observed to expected adverse outcomes on the wards with AIN workforce (failure to rescue, urinary tract infection, falls with injury), and one significant decrease (mortality). On the wards without AIN workforce, there was one significant decrease (pneumonia) in the observed to expect adverse outcomes and one significant increase (falls with injury). Post-test analysis showed that spending time on assistant in nursing wards was a significant predictor for urinary tract infection and pneumonia. For every 10% of extra time patients spent on AIN wards they had a 1% increase in the odds of developing a urinary tract infection and a 2% increase in the odds of developing pneumonia<sup>13</sup>. The study concluded that the “results suggest that the introduction of assistants in nursing into ward staffing in an additive role should be done under a protocol which clearly defines their role, scope of practice, and working relationship with registered nurses, and the impact on patient care”.

Studies conducted elsewhere in Australia may also have messages for WA and for the working party. A study published in 2015 estimated average staffing levels, skill mix and patient presentations in all New South Wales (NSW) Emergency Departments (EDs)<sup>14</sup>. It noted the “simplicity of ratios in flagging potential staffing problems” but revealed wide variation in staffing levels which was not always linked to patient activity, particularly in the regional EDs (Level five) which must have the capacity to deal with all types of emergencies, but where ratios as high as seven patients per nurse were reported on day shifts. The study concluded that “ratios cannot be used to determine the optimal staffing levels in every clinical situation; their purpose

is to force an increase in nursing supply and to prevent individual units from becoming understaffed”.

In addition there is some evidence from Australia, examining patient outcome measures in relation to staff mix<sup>15</sup>, nurse staffing levels and workload<sup>16</sup> and highlighting the need to take account of the work environment. An Australian led systematic review of the literature on economic evaluations of nurse staffing and patient outcomes identified nine studies and concluded that it was unable to determine conclusively whether or not changes in nurse staffing levels and/or skill mix is a cost effective intervention for improving patient outcomes “due to the small number of studies, the mixed results and the inability to compare results across studies”<sup>17</sup>.

### **3.2 International research on effectiveness of implementation of NHpPD and related approaches**

A range of studies have explored the benefits and limitations of using NHpPD and other structured approaches to determining staffing levels. This section summarises key findings from studies published in the United Kingdom (UK) and United States of America (US).

A US paper published in 2007 argued that, at that time, there was evidence that nurse-patient ratios or NHpPD based approaches to staffing did not accurately predict workload of nurses<sup>18</sup>, “Since these do not take into account the different needs between patients nor the differences in experience and education level of nursing staff”. This review paper referenced the 2009 study from WA, highlighting that it had reported that relying on expert opinion in setting standards for workload “is not optimal and recommends using a standardized patient acuity measurement, in their study a standard NHpPD per ward”<sup>19</sup>.

A US paper published in 2010<sup>20</sup> examined the connection of patient days with nursing-sensitive indicators such as NHpPD and patient fall indicators; it stressed the importance of accurate patient day measurement, and concluded that “Nurse managers should aim to use actual admission and discharge times derived from electronic systems or multiple census approaches to collect patient day data”.

A US commentary published in 2015<sup>21</sup> highlighted that NHpPD “is a metric that is easy to use in determining budgeted FTE (Full time equivalent) and in comparing staffing across organisations”. It highlighted that the combination of automated patient acuity, staffing, and human resource systems “provide a wealth of information for determining the budgeted HpPD (Hours per Patient Day) and in making defensible requests for adjustments in HpPD”. It concluded that “No matter how much data we have about staffing levels, nurse education and

skill levels, the environment of care, or patient acuity, the real key is determining the outcomes we need to compare staffing against”.

An editorial published in a US journal in 2015 highlighted the strengths and weaknesses of different approaches to determining nurse staffing<sup>22</sup>. It noted that a wide range of systems were available for making staffing decisions in hospitals ranging from simple census based approaches, through to complex data-driven systems that assess and aggregate individual patient nursing need. The simple grid systems are insensitive to day-to-day variations in patient need or the training and experience of nurses on the unit on a given shift, while the data-driven systems may be too costly or complex for smaller hospitals or those with less acutely ill patients.

US researchers<sup>23</sup> examined the correlations across three different nurse staffing measures (nurse-reported perception of staffing adequacy, nurse-reported patient workloads, and empirically derived Hours per Patient Day (HpPD)). The study, published in 2011, was based on a cross-sectional correlational study of 92 medical-surgical, rehabilitation, and intermediate in 11 acute care hospitals; it surveyed registered nurses on their perceived staffing adequacy, last shift patient workload, and unit-level structures and processes of care delivery. Individual responses to these measures were aggregated to the nursing unit level, and unit-level HpPD, unit-level case mix index were obtained from each hospital's administrative data. Findings of the study included that HpPD and the nurse-reported patient workload on last shift were correlated, and that unit-level case mix index was significantly associated with both HpPD and nurse-reported patient loads. The study concluded that “these data suggest that the 3 measures of nurse staffing are not highly correlated, and may capture different elements of the unit context to explain nurse staffing” with the researchers recommending that “Researchers should consider the correlates of these measures when selecting nurse staffing measures for future investigations”.

A US commentary<sup>24</sup> published in 2016 noted that the “usual measures” of Registered Nurse Hours per Patient Day (RNHpPD) may not be the best to use when assessing the relationship to quality because they do not distinguish RN hours spent directly with the patient; that administrators should use productive direct-care hours when estimating workforce needs and setting daily staffing plans; and that patient churn and qualitative measures of nurses, such as educational level, tenure and expertise are important to examine when assessing staff adequacy.

A US study published in 2016 identified the main approaches to measure nurse staffing and evaluated the reliability, validity and limitations of Nursing Hours per Patient Day (NHpPD)<sup>25</sup>. The authors noted that “numerous studies have attempted to identify appropriate nurse staffing

levels; however, variations in nurse staffing measures may have caused inconsistent findings regarding the relationships between nurse staffing and quality of care". The review examined seventeen studies using nurse staffing measures; six common nurse staffing measures were identified: nurse-to-patient ratios, FTE, NHpPD, skill mix, nurse perceived staffing adequacy and nurse reported number of assigned patients. The study reported that NHpPD was the most frequently used and is considered to be highly beneficial, with "some evidence of high interrater reliability". It also reported that the predictive validity of NHpPD for patient falls is high, whereas that for pressure ulcers is low. The study concluded that "For NHpPD to be applied more effectively as a nursing staffing measure, there is a need for additional reliability testing in various types of units with large sample sizes; further validity research for additional patient outcomes; appropriate adjustments in its application to capture variations in the characteristics of nurses, patients and hospital units; and a consistent data collection procedure".

A recent UK realist review published in 2018<sup>26</sup> of various nurse workforce planning and deployment tools and technologies (collectively summarised as "WPT") took as its starting point that "Evidence has focused on the effectiveness of WPTs, but little is known about supporting their implementation or the impact of using WPTs across settings". The review aimed to answer the question: 'NHS managers' use of workforce planning and deployment tools and technologies (WPT) and their impacts on nursing staffing and patient care: what works, for whom, how and in what circumstances?' The study explored how NHS managers use workforce management tools and technologies to determine staffing in individual hospitals. Using a variety of data sources, the researchers developed a realist program theory (a theory driven logic model with propositions that are then tested in practice).

The authors of the 2018 review highlighted that the positive impact of the various nurse workforce planning tools can include ensuring that staff are allocated effectively, promoting the patient safety agenda within an organisation, learning through comparison about 'what works' in effective staffing and having greater influence in staffing work, noting that the use of one or more of the various tools can have a positive impact when they visibly integrate data on needs and resources. The authors also cautioned that the evidence, predominantly from acute care, often lacked detail on how managers applied professional judgement to the use of tools for staffing decisions, and lacked specificity about how managers develop skills on communicating staffing decisions to patients and the public. The authors concluded that the way staffing tools are used is dependent on the level of commitment from leaders at all levels of the organisation, and recommended that managers need training to use these tools well and to develop their professional judgement. The researchers suggest leadership and communication skills are

needed to manage the challenges resulting from the decisions they reach about staffing (see also<sup>27</sup>).

Another recent UK based but internationally focused review, published in 2019<sup>28</sup> examined current approaches to nurse staffing across many disciplines. 769 pieces of evidence were reviewed from a variety of disciplines: nursing, medicine, engineering, statistics, population science, computer science and mathematics, where hospital nurse staffing was the subject of the study. The review highlighted the predominance of unit based approaches (e.g., nurse numbers, ratios, activity and workload). The review concluded that ‘although the relationship between staffing in acute care and factors such as units, safety or workload is complex, the evidence suggests an interdependent relationship which should only be dismissed with caution’ and that “The body of knowledge appears substantial and complex yet appears to have little impact on policy”.

Another recent US review, published in 2019<sup>29</sup>, reported on studies that had found that “better staffing” (variously measured by total HpPD, nurses’ HpPD and skill mix, nurse-patient ratios) was associated with various measured of outcome (e.g. fewer hospital-acquired pressure injuries (HAPIs), catheter-associated urinary tract infections, surgical site infections, sepsis, and heart failure). However the review cautioned that there was also a need to take account of the work practice environment. It reported its synthesis of the evidence which revealed that better staffing and practice environments had both individual and shared outcome effects and stressed that “the beneficial effect of nurse staffing on outcomes is conditional on the quality of the work environment” and concluded that “addressing staffing without improving the practice environment will be ineffective”.

Cochrane reviews are regarded as the “gold standard” of peer reviewed research; and a Cochrane review exploring the effect of hospital nurse staffing models on patient and staff-related outcomes, identified 6,202 studies that were potentially relevant. However after detailed examination of each study, only 15 studies met the criteria to be included in the review, highlighting that “Despite the number of studies conducted on this topic, the quality of evidence overall was very limited”<sup>30</sup>. The review concluded that some interventions related to hospital nurse staffing models may improve some patient outcomes, particularly the addition of specialist nursing and specialist support roles to the nursing workforce. Interventions relating to hospital nurse staffing models may also improve staff-related outcomes, particularly the introduction of primary nursing and self-scheduling. However, it concluded that these findings should be treated with extreme caution due to the limited evidence available from the research conducted to date<sup>31</sup>.

Two key points emerge from this rapid review of international evidence. Firstly, there is a weak and fragmented international evidence base on the relationship between staffing levels, costs, patient care activities, and outcomes. The second, linked, point is that many of the factors that act on local staffing levels are context specific and can vary site by site, and country to country: e.g. staffing profiles and skills levels, work practice environment, health system structure, funding and organisation, culture, legislation and regulation etc. This restricts the scope for comparing across jurisdictions and countries: there will always be a need to take account of, and control for context.

### **3.3 Research on midwifery staffing models**

There is limited available evidence on the association between midwifery staffing levels and outcomes in maternity units<sup>32</sup>, and relatively widespread use of one staffing tool, Birthrate Plus<sup>®</sup>. Birthrate Plus<sup>®</sup> is a specifically midwifery-focused workforce planning methodology<sup>33</sup>, which was designed to assess the numbers of midwives required to match the standard of providing all women with a minimum of one-to-one care from a midwife during labour. It uses a classification system for intrapartum care, recording of actual midwife hours required per category, further recording of all other maternal/midwifery activity within hospital and community services, including home births, and uses a professional judgment and 'expert group' approach to assessing midwife hours per defined client need or activity.

Guidance published by the Royal College of Midwives in the UK, in association with its developers highlights that "Birthrate Plus ratios give a good starting point to understanding the needs of any given service and to comparing its staffing, skill mix and models of care with neighbours or units of similar size. However, the way Birthrate Plus works and the difference between a national ratio and the need for local ratios calculated on the basis of specific local circumstances are often misunderstood"<sup>34</sup>.

Birthrate Plus<sup>®</sup> is widely used in the National Health Service (NHS) in the UK. An independent inquiry into maternity services in the NHS, published in 2008<sup>35</sup> noted that "Midwives advocated the use of Birthrate Plus, a tool that takes case-mix (the range and types of women looked after by maternity services) into account, to calculate the required staffing levels." A later review published by the Kings Fund in 2011<sup>36</sup> concluded that "National recommended midwifery staffing ratios are based largely on the Birthrate Plus planning tool, which analyses workforce requirements in terms of what women need, and does not take into account the contribution of other staff apart from midwives. Despite the tool's popularity and widespread implementation, there is an absence of evidence about whether its use contributes to improved safety".

A more recent study in England, published in 2013<sup>37</sup> examined a total of 5800 births in one year, by time and day. Three months of Birthrate Plus data was analysed for variation of workload by case mix, and a computer simulation model was developed to allow prediction of the impact of changing resource levels or shift patterns, and to forecast the impact of changing number of births per year. The findings were that the Birthrate Plus formula for midwifery staffing “leaves labour wards vulnerable to significant periods of overload. Matching resource levels to known patterns of workload may reduce the occurrence of overload. Simulation indicates that smaller units need higher relative staffing levels to provide the same level of 1:1 care to mothers in labour”.

In Australia, the vast majority of survey respondents in a state wide review of postnatal units in Victoria published in 2006<sup>38</sup> reported using the Australian Nursing Midwifery Federation (ANMF) ratios as the basis for their staffing, with three hospitals (out of the 65) reporting that their ratios were based on patient acuity. Of hospitals that staffed their postnatal wards according to ANMF ratios, the review noted that 79% reported that the ratios were met at all times. The paper also highlighted that “many respondents questioned whether these ratios are adequate, particularly given the fact that although a ratio may be one to five in the morning, one to six in the afternoon and one to eight overnight, this usually *also* includes at least five (six, or eight) babies. In addition to this, babies with more complex needs, or of higher acuity, such as those requiring phototherapy, vaccinations and intravenous antibiotics are now more likely to be accommodated on the postnatal ward rather than the special care nursery. At the same time, the number of women who have had operative births, particularly caesarean section has greatly increased, decreasing the proportion of women able to provide care for their babies themselves. The issue of the ratios was raised on a “number of occasions.”

The Health Department in New South Wales and the New South Wales Nurses and Midwives Association have “committed to the adoption of Birthrate Plus as the tool for calculating the required midwifery workforce in NSW maternity services”. NSW Health has “engaged with the Directors” of the consultancy that has the copyright on Birthrate Plus “to formalise the contractual and licensing agreement necessary for the implementation of the tool”<sup>39</sup>.

## 4. Approaches to determining nurse staffing in other countries

This section reports briefly on the approaches used to determine nurse staffing in other high income Anglophone countries.

### 4.1 Different approaches

Some of the main approaches to determining nurse staffing are summarized in Table 1 below. Some have locally developed or “open source” variants, others are mainly based on proprietary systems. No recent national or international level source could be identified that reports on the frequency of use of these different approaches in the countries reviewed for the paper. Some of the approaches require little data, others are driven by data on patient profile, patient dependency, acuity or workflow, and require both significant data, and the capacity to analyse and interpret data projections. Some are “live”, applied on a day by day basis; others are used only periodically.

**TABLE 1: Approaches to Determining Nursing Staffing**

- Fixed/mandatory nurse: patient (or nurse: bed) ratios
- Calculating the number of staff per occupied bed or by patient day
- Calculating the number of nursing hours per patient day (NHpPD), often linked to some assessment of patient dependency or patient acuity
- Determining a skill/ staff mix (usually expressed as a % requirement for registered nurses), using timed-task/ activity approaches
- Data regression based systems
- “Professional judgement” or expert opinion.

Source:<sup>40 41 42 43</sup>

These approaches are not all mutually exclusive. The simpler approaches may be inadequate in care environments where patient acuity and workflow can vary significantly and unpredictably over time, whilst the more complicated data based approaches may be too costly or complex to sustain and can require data sets that are not routinely being generated in some health systems.

Most of these staffing approaches have been developed for use in acute care settings (for example NHpPD, the Safer Nursing Care Tool<sup>44</sup> etc.), and the scope for them to be applied effectively in other contexts may be limited. More recently there has been some limited progress in developing methods or prototypes for use in other care environments, for example mental health workforce<sup>45</sup> community nursing<sup>46,47</sup>, and for application in nursing homes<sup>48</sup>.

There is little evidence available on the utility of different approaches to determining nurse staffing, which can be used to inform local decisions on which approach might be most appropriate. In part this reflects the key points made above, that consideration of context is fundamental to shaping the effectiveness of approaches. In part it reflects the varying assessment of what “effective” means in application - ideally it should be based on an agreed assessment of output/outcome indicators, and cost inputs, but this is rarely the case in practice.

A different but important point is that the effective use of a staffing tool will be dependent on those who are responsible for implementing it having a good understanding of the approach, training in its use, and applying it consistently. For example, in January 2018 it was reported that the Safer Nursing Tool, which is endorsed for use across the NHS in England, as well as in Wales and Scotland, was being used incorrectly in some NHS organisations in England, and that additional training of nurses was required to ensure accurate and consistent use<sup>49</sup>.

In 2015, the UK based National Institute for Health and Care Excellence (NICE) commissioned three linked international reviews of the evidence to support its recommendations on approaches to determining staffing, and concluded that the relevant evidence base was “extremely limited”. Amongst the main limitations it identified were a lack of high-quality studies exploring and quantifying the relationship between registered nurse and healthcare assistant staffing levels and skill mix and any outcomes related to patient safety, nursing care, quality and satisfaction; a lack of research that assessed the effectiveness of using defined approaches or toolkits to determine nursing staff requirements and skill mix; and no economic evidence was found that explored the relationship between ward-based management approaches (including the use of toolkits) and organisational factors and nursing staff requirements<sup>50</sup>.

Professional associations and nurse trade unions have also focused on the evidence base on approaches to determining nurse staffing. In 2012 the UK Royal College of Nursing (RCN) developed its own guidance on safe staffing, noting that “There has not been a recent review of the systems/tools available for planning staffing and these have not been tested for their reliability or validity”. The RCN advocated a “triangulation” approach across activity, professional judgement, and quality indicators<sup>51</sup>, and provided some key messages to consider when reviewing approaches to determining nurse staffing levels (see the summary below).

#### **Key messages when reviewing nurse staffing levels:**

- Have board level commitment (with nursing director key)
- Involve staff and be transparent (decisions not taken in a vacuum)
- Use established approaches and apply them consistently

- Triangulate (for example, dependency scoring system to gauge workload, professional judgment and benchmark)
- Evaluate regularly (against patient and staffing outcomes data)
- Heed the results and implement consistently (no cherry picking).

Source: Royal College of Nursing UK <sup>52</sup>

More recent reviews of safe staffing approaches have reinforced these criteria, focusing on this need for utility, for best use of available data, for consistency in application, and for inclusion of expert judgement<sup>53 54</sup>. Technological progress means that there can now also be more emphasis on provision of timely and easy to read data “dashboards” and apps to support local decision making<sup>55</sup> which can support the attainment of these staffing tool criteria.

## 4.2 The link to rostering/working patterns

It is important to note that these methods and tools for identifying day-to-day staffing levels can only be effective if aligned with staff rostering, to match staffing needs with individual staff availability, particularly where there is a requirement for 24/7 nursing care<sup>56</sup>, and must also take account of the possible deployment of temporary staff, either because of staffing gaps or projected peaks in workload/workflow. It is also important to acknowledge that there can be variation between the “established” nurse staffing at organizational level, and the “actual” staffing at any specific time<sup>57</sup>.

## 4.3 The link to work environment

As noted above one recent review<sup>58</sup> has emphasised the need to take account of the work practice environment when examining the effectiveness of nurse staffing methods. This has included emphasising that the beneficial effect of nurse staffing on outcomes is conditional on the quality of the work environment, and concluding that addressing staffing without improving the practice environment will be ineffective.

Another systematic review published in 2012<sup>59</sup> determined the best available evidence in relation to registered nurses experiences of workplace cultural and climatic factors that influenced nursing workloads, in an acute health care setting. It highlighted that “Nursing workloads are influenced by the largely immeasurable cultural factors within hospital environments.

Organisational climate influences nursing workloads because of inter-professional relationships, clinical governance, workplace support, non-nursing duties, organisational structure and organisation, work redesign, workflow and diversity within nursing roles”. The review stressed that the component of registered nurses' workloads that are not patient-care should be recognised.

## 4.4 Determination of nursing staffing within other countries

This section briefly highlights approaches to nurse staffing in use in other high income English speaking countries.

### 4.4.1 England

Compared to the other three UK countries, NHS England is maintaining a relatively “hands off” approach to determining nurse staffing, providing guidance notes on recommended application of triangulation methods, but stopping short of mandating use of required staffing systems, ratios, ranges, or tools. (In contrast, the other three UK countries have all shifted towards a more systematic, nationally determined and consistent, if less locally flexible, approach).

Determining safe nurse staffing levels in the NHS in England has been a particular national concern since the Mid Staffordshire Inquiry report of 2013 (the “Francis Report”<sup>60</sup>). This Inquiry shone a light on what can go wrong when local nurse staffing concerns are not dealt with adequately, and its report continues to be cited as a baseline to check on subsequent improvements<sup>61</sup>.

Background assessment indicated that between 400 and 1,200 patients died as a result of poor care over the 50 months between January 2005 and March 2009 at Stafford hospital. The Inquiry report identified “A chronic shortage of staff, particularly nursing staff” being largely responsible for substandard care<sup>62</sup> and with other contributory factors including poor governance, a lack of focus on standards of service and inadequate risk assessment of staffing reduction.

Since the Francis report, the NHS in England has relied on “guidance” notes to individual employers, emphasizing that “A systematic approach should be adopted using an evidence-informed decision support tool triangulated with professional judgement and comparison with relevant peers”<sup>63</sup>.

In practice this means “using a systematic, evidence-based approach to determine the number and skill mix of staff required... exercising professional judgement to meet specific local needs... benchmarking with peers... taking account of national guidelines, bearing in mind they may be based on professional consensus<sup>64</sup>”. This guidance also provides links to commissioned evidence, and to “decision support tools”, but these are extremely few in number.

At the time of completing this report, guidance has been published for seven areas:

- Safe staffing in neonatal care and children and young people’s services
- Safe staffing in district nursing services
- Safe staffing in learning disability services

- Safe staffing in mental health services
- Safe staffing in adult inpatient acute care
- Safe staffing in urgent emergency care
- Safe, sustainable and productive staffing in maternity services.

The guidance notes can all be found at: <https://improvement.nhs.uk/resources/safer-staffing/>

#### 4.4.2 Northern Ireland

In Northern Ireland the current approach to determining nurse staffing was established in 2014, and uses what has been termed “Normative Staffing Ranges”. This is based on a standard framework, developed nationally and to be used locally in support of determining nurse staffing ranges: the framework initially covers general and specialist medical and surgical adult care hospital settings.

This framework is clear in that it describes a range (“not ratio”) of nurse staffing which would normally be expected in specific specialties. For example, the reported nurse: patient range for “the majority of general medical wards” is defined as between 1:3 and 1: 4, ‘Recognizing that small number may fall below 1.3 to 1.2 and similarly, a small number existing at the higher end of the range at 1.4”. The framework makes it clear that it does not prescribe the staff numbers that should be on every ward and at every point in time, “as this must be developed in discussion with staff, managers and commissioners and is dependent on a range of factors which influence planning processes”<sup>65</sup>. The framework sets out factors which influence the point within the staffing range which is appropriate for an individual service or care setting. Additional ‘How to Use’ guidance is provided for Ward Sisters, Charge Nurses, general and professional managers.

#### 4.4.3 Scotland

NHS Scotland established a Nursing and Midwifery Workload and Workforce Planning Group which led to recommendations in 2004 for a ‘whole systems’ approach to developing, testing and piloting nurse staffing tools before then standardizing their use on a national basis across the NHS in Scotland<sup>66</sup>. This mandatory use of approved nursing and midwifery workforce planning tools currently now has a suite of 12 workload tools and one Quality Tool for specific specialties which is claimed to cover “98%+” of all clinical areas. The suite of workload tools comprises 11 that were developed in Scotland, and 1 UK wide tool (Adult Inpatient) which has been validated within Scotland<sup>67</sup>. Each of the tools is applied within a Triangulation Process which also includes the use of professional judgement and local indicators of quality.

In 2016 the Scottish government announced that the use of these approved planning tools would become a legal requirement<sup>68</sup>. In May 2019 The Health and Care (Staffing) (Scotland) Bill was passed by the Scottish Parliament; it received Royal assent in June 2019<sup>69</sup>. It sets out principles for staffing, the requirement to use the specified staffing tools and methods, the need to have protocols to respond to staffing concerns, and the requirement to make public these responses through periodic reporting. It is the first legislation of its kind in the UK to apply to all clinical groups, in both health and social care services<sup>70</sup>. The Scottish Government established a group chaired by the Chief Nursing Officer, which supported the development and finalisation of the legislation.

#### **4.4.4 Wales**

Wales has followed a legislative route. The Nurse Staffing Levels (Wales) Act 2016 received royal assent in 2016<sup>71</sup>. The Act focuses on two areas: a general duty requiring Welsh NHS organisations to consider what nurse staffing levels are needed to care for patients; and the use of tool to determine staffing levels in acute adult inpatient medical and surgical wards. This tool is a modified version of the Safer Nursing Care Tool<sup>72</sup>. These requirements came into force in April 2018, and will subsequently (2021) require NHS trusts to report to government on implementation.

The Act does not set out minimum ratios for Wales, but will require “senior nurses to determine the staffing levels appropriate for patients in specific areas” by using an approved workforce tool, supported by a triangulation approach similar to that in use in NHS Scotland, using activity/acuity/outcomes data and professional judgement.<sup>73</sup> Wales has subsequently established the All Wales Nurse Staffing Programme and the related “1000 Lives” initiative<sup>74</sup> which is a portal for updating on progress with developing and implementing the approach. In June 2019 it was reporting that a “suite of work streams” were underway, covering acute medical and surgical inpatient, paediatric inpatient, mental health inpatient, Health visiting, District nursing, and Care homes<sup>75</sup>. Each work stream was working towards developing and testing evidence based workforce planning tool specific to its area.

Given the similarities between the four UK countries in terms of system characteristics, nurse staffing profile, patient population and regulatory framework, it is instructive to note how there has been recent divergence in terms of how each country addresses the issue of how to determine “safe staffing” (see below).

**TABLE 2: Summary of approaches to nurse staffing in four countries of the UK**

	National or local?	Triangulation	Approved “tools”	Current coverage	Legislation?
England	Local.	Yes	Few	Unknown	No
Northern Ireland	Required local use of nationally determined nurse: patient “ranges”	Yes	No.	Medical and surgical, acute. Midwifery is reportedly being planned	No
Scotland	Nationally legislated required local use of approved and mandated staffing tools	Yes	Yes, mandatory use of a suite of tested and approved tools, plus public reporting	Claimed coverage of 98%	Yes, in 2019
Wales	National legislated approach being developed	Yes	Currently developing a suite of tested tools	When legislation is implemented will be 100%?	Yes, in 216

#### 4.4.5 Canada

Canada has similarities to Australia in the configuration of its health services and nurse workforce profile, with a Province focus on governance and regulation. It is a source country of a substantial evidence base on nurse staffing models and impact, and has long established well embedded systems for staffing, often based on Patient Classification Systems (PCS). A Canadian focused review of nurse staffing models, published in 2012,<sup>76</sup> concluded that “there is still a paucity of research that evaluates staff mix decision-making. The literature demonstrates the existence of numerous data elements that influence outcomes for patients, nurses and organizations in an ever-evolving health-care system”. It also noted that nursing care delivery models have increasingly emphasised teamwork and inter-professional collaboration, as well as the use of newer staff mix decision making tools which focus on skill and competency matching, as well as tracking standardized nursing quality indicators to “support a business case for investments in nurse staffing”<sup>77</sup>.

Significant findings include research that examined the equivalence of the workload estimates of three commonly used proprietary patient classification systems in North America (GRASP, PRN and Medicus) and found that the estimates of absolute hours of care provided by the three

systems differed significantly when all three tools are used on the same patient population<sup>78</sup> (see also <sup>79</sup>).

Another survey based study of senior nursing executives from a representative sample of Canadian hospitals found that about 50% of hospitals were using a nursing workload measurement system, and that among those using a system, 70% used information from the system frequently or all the time. The senior nurse respondents were generally satisfied with their current systems; slightly lower levels of satisfaction were reported for staff nurses, with the most common objection being the perception that the systems do not reflect true workload<sup>80</sup>.

A third large scale study concluded that “The effectiveness of methods for determining nurse staffing is unknown. Despite a great deal of interest in Canada, efforts conducted to date indicates that there is a lack of consensus on nurse staffing decision-making processes”. It reported a number of key themes that could form the basis for determining appropriate workload for nursing in Canada. These include the use of:

- (a) Staffing principles and frameworks,
- (b) Nursing and midwifery workload measurement systems,
- (c) Nurse-to-patient ratios, and
- (d) The need for uptake of evidence related to nurse staffing<sup>81</sup>.

Despite widespread use of systematic staffing models, there continue to be reported variations in staffing levels in Canada. A recent large study of nurse staffing in acute units in the Province of Alberta reported considerable variation in staffing levels and mix in the units, and concluded that while some of the differences might be attributable to differences in patient needs and unit types providing different services, there was unexpected variability in nurse staffing levels units with similar services and patient populations<sup>82</sup>

The Canadian Nurses Association (CNA) has developed a similar approach to the RCN in the UK - reviewing the evidence base, and focusing on developing a set of overarching principles and issuing general guidance to its members, rather than advocating a specific approach. The CNA “questions to ask” are listed below.

#### **Questions to ask about appropriateness of staffing tools:**

- Is the tool valid (content and face, construct and criterion)?
- Does the tool have strong inter-rater reliability?
- Is the tool current (validated within the past year)?
- Is the tool easy to understand and use?

- Is the tool appropriate to your clinical setting/service?
- Is the format of the tool (paper vs. electronic) conducive to its completion?
- Were nurses involved in the development and evaluation of the tool?
- Does the tool capture all elements of nursing practice, not just tasks?
- Is the data required to populate the tool readily available and accurate/valid?
- Does the tool address patient, nurse and organizational factors as well as outcome indicators?
- Does the tool include reliance on professional nursing judgment?
- Is the tool flexible enough to allow for real time needs?

Source: Canadian Nurses Association<sup>83</sup>

#### 4.4.6 The United States

The range of different approaches to determining staffing levels in use in the US merits some attention as it has had the longest focus on developing tools and approaches to determining nurse staffing levels at operational level. This is in part because of the need for accuracy in identifying staffing costs for reimbursement, and also to meet hospital accreditation requirements. Activity and outcome data is also routinely captured in US based hospital care, which can assist in determining nurse staffing levels.

Even so, a recent review of patient classification systems used to determining nurse staffing in the US noted that a “gold standard” patient classification system could not be identified, highlighting difficulties in measuring nurse workload, inadequate definitions of nursing work, lack of consistent validity and reliability testing, and incomplete understanding of the relationship to nursing sensitive outcomes<sup>84 85</sup>.

Another recent review of approaches to determining nurse staffing and outcomes in the US noted that “The need for effective, reliable, credible, able systems for projecting appropriate staffing is increasing, driven in part by state requirements that do not mandate minimum staffing but do require hospitals to have staff projection systems that have been vetted by management, staff, and sometimes outside agencies”<sup>86</sup>.

In the US, determining staffing is primarily an organization level responsibility. However it was recently reported that seven US states require hospitals to have staffing committees responsible for plans and staffing policy, five states require some form of disclosure and/or public reporting of nurse staffing levels, one state (Massachusetts) has recently passed a law requiring specific nurse: patient ratios in Intensive Care Units (ICU), and one state (California) stipulates in law the required minimum nurse to patient ratio across different hospitals and care settings<sup>87</sup>.

Another approach used in some US states is the requirement that hospitals periodically publicly report their nurse staffing levels. A recent study<sup>88</sup> noted that eight states in the United States publicly report staffing ratios, five mandated by legislation and the other three electively. It examined in more detail the approach in one of the States, New Jersey (NJ), where a law was passed in 2005, mandating that all health care facilities compile, post, and report nurse staffing information. It analysed data from the State of NJ Department of Health to determine if NJ hospitals complied with legislation, and to identify staffing trends post legislation, based on 30 quarterly reports for 2008 through 2015. The study found that the number of patients per RN decreased for 10 specialties. It concluded that “Although the number of patients does not account for patient acuity, the decrease in the patients per registered nurse over 7 years indicated the importance of public reporting in improving patient safety”.

The use of legislated nurse staffing ratios in California merits attention as the locale with the longest established approach in implementing a ratio based approach, and in relation to subsequent implementation of ratios based approach in Victoria, Australia, and, most recently in Queensland, Australia.

In 1999 the State of California started a process to legislate patient-to-nurse ratios for the State’s hospitals. After taking evidence from different stakeholders, final calibration of the ratios was agreed in 2003, and these were implemented on January 1, 2004. The final “core” nurse: patient ratio in medical/surgical wards was 1:5 or fewer<sup>89</sup>, with other ratios determined for other care settings. There have been various evaluations of the implementation of ratios, using different methods and with different objectives, and reaching different conclusions. Key points are: evidence of increased nurse staffing levels, and increased staffing costs after implementation of the ratios, improvement in some (but not all) patient care indicators that were examined, and reported concerns from nurse managers about staffing “inflexibilities” caused by implementation of standard ratios<sup>90 91 92</sup>. One key issue is the calibration of ratios in different types of hospital and care environment. In California this took several years of analysis, consultation and negotiation before implementing the agreed ratios.

Several different sets of “nurse sensitive” indicators have been promoted in the US: some have research based validity, such as pressure sores, whilst others have been used “without a theoretical or conceptual basis”<sup>93</sup>.

## 5. Next steps

The objective of this review was to assess local "front line" experiences of the current approach to nursing and midwifery staffing in (WA): Nursing Hours per Patient Day (NHpPD), and the broader contextual background, in order to provide a background brief for the Chief Nursing and Midwifery Office, Department of Health, Western Australia. The review can also be used to inform the working party that will review staffing methodologies.

This section suggests next steps and options for consideration by the working party. It is in two parts. Firstly it highlights key issues for consideration of the working party that emerged from the stakeholder interviews and focus groups. Secondly it provides key points for consideration that are drawn from the broader evidence base.

### 5.1 Specific points emerging from the review

Participants were asked to make suggestions on the best way forward in terms of sustaining an effective approach to determining nurse staffing in WA. There was a clear message from the focus groups: the vast majority of participants were in favour of using an adapted or "improved" approach to implementing the current NHpPD.

This response was predicated on the need to consider a range of identified limitations in the current application of NHpPD. There were various suggestions to adapt or improve the application of NHpPD, which drew from identified limitations in its current application in WA (see section 3 for details). The key points made by participants are summarised below:

- i. The current NHpPD system was first implemented in 2002; if it is to be continued there is a need to review its relevance in a changed organisational context (see above): notably in terms of significant changes in the workload implications of increased and more complex care, driven by changing population and client profiles.
- ii. Several groups reported that NHpPD could not be implemented as a "one size fits all" approach, and that there was major need to clarify which work and care environments and locales are suitable for implementation of NHpPD. In particular there is a need to review the staffing approach used for rural and remote (WACHS), for small wards and isolated units, and for some care areas (e.g. outpatient, ED, maternity care) in order to assure a consistent approach where NHpPD is implemented, but to also delineate the limits of where NHpPD is the best option for safe staffing, or where a more context relevant approach is required.
- iii. There needs to be standardisation of the method of counting "beds".

- iv. There needs to be an appropriate and standard approach to staff FTE “rounding”.
- v. There is a need to take more accurate account of variations in seasonal fluctuations in workload when applying the staffing approach.
- vi. There is a need to clarify and standardise inclusion/ exclusion criteria for shift co-ordinators in calculating staffing.
- vii. There is a need to simplify and standardise the re-classification application process.
- viii. There is a need to standardise the reporting processes from implementation, and reduce duplication.
- ix. There is a need to provide additional training to staff who are responsible for implementing and interpreting NHpPD and schedule periodic refresher training.
- x. There should be an agreed timetable for periodic review of implementation of the new approach.
- xi. There will be a need to develop an advocacy and communications strategy to explain and inform any new and changed approach to NHpPD to staff, managers and other stakeholders.

## **5.2 What the evidence base tells us**

There were two evidence assessments conducted for the review. Firstly, the research on the implementation of NHpPD and related approaches was synthesized. Secondly, the current approaches to staffing in use in other jurisdictions and countries were briefly described.

The working party can reflect on the findings of the evidence reviews, and also check back to original sources for more detail. There are however some key findings that they should consider in their deliberations:

- i. There is a relatively detailed evidence base on the early years of implementation of NHpPD in WA; this is a unique and highly relevant source, which the working party can draw from, and build on.
- ii. Published research on the implementation of NHpPD in other countries tends to support its potential as a valid approach, with caveats related to availability of accurate data, effective management, responsive funding, and staff training in sustainable application. The working party can take account of this validation in its deliberations.
- iii. Whilst there is a weak and fragmented international evidence base on the relationship between staffing levels, costs, patient care activities, and outcomes, there are several

studies than are relevant- notable those that are part of the WA specific evidence base, as noted above.

- iv. The review highlights that many of the factors which act on local staffing levels are context specific and can vary site by site, and country to country: e.g. staffing profiles and skills levels, work practice environment, health system structure, funding and organisation, culture, legislation and regulation etc. The working party should note that there will always be a need to take account of, and control for context when examining the relevance of approaches being used in other jurisdictions.
- v. Several main approaches to determining nurse staffing were summarized in section 4 of the review. The working party can reflect on these approaches, but should note that there is no recent national or international level source which sets out systematically the strengths and weaknesses of each approach, in addition they should reflect on the expressed support from respondents for a continuation of a updated/adapted NHpPD approach, and the fact that there is no compelling evidence that would suggest there is an alternative approach should replace NHpPD.
- vi. The working party should note that some of the approaches described in section 4 require little data, whilst others require both significant data, and the capacity to analyse and interpret data projections. The data requirements, staff time and resources required to implement and sustain any approach must be considered as part of the decision on the way forward.
- vii. The working party should also note that most of the staffing approaches described in section 4 have been developed initially for use in acute care settings. Whilst there are now some purpose built or adapted tools for use in other care environments (for example mental health workforce, community nursing, and nursing homes), the working party will have to consider that, if the aim is to have a system wide approach, then there will be the need to look at an adapted or tailored elements for different care settings, rather than an “off the shelf” system.
- viii. In relation to the above point, the working party will have to deal with the tension between using a standard “one size fits all” approach across the whole system, and having systems which are responsive to the specific situation in different work environments. In particular, it is clear from the focus groups that that the current use of NHpPD in rural and country areas could require adaption to reflect accurately the different context.
- ix. The working party should agree on what criteria for “effectiveness” they should have in mind when determining which approach should be used. Ideally this should be based on the utility of the approach, limited [or no] additional data gathering burden, other resource

implications, flexibility, adaptability and responsiveness to varying client profile and care environment characteristics, clear connections to cost and funding, and an agreed assessment of output/ outcome indicators.

- x. The working party should be clear that the effective use of a staffing tool will be dependent on understanding of its approach, training in its use, and consistent application. This will require a long term commitment to staff training, and to periodic assessment of the implementation and outcomes of the selected approach.

### **5.3 Three realistic options**

This review was not developed to determine which approach to staffing is most effective, or which is most appropriate to WA. However, the findings of the engagement with staff, and the broader review of evidence point to three realistic possibilities.

Firstly the working party could conclude that only minor changes or “tweaks” to the current NHpPD approach was required. This has the benefit of having limited disruption, but is unlikely to meet staff expectations, and would not enable some of the current identified limitations of the approach to be addressed.

Secondly, the working party could decide that the current NHpPD approach was unfit for purpose to the extent that an alternative approach had to be developed and implemented. This would be a major undertaking, with significant resource implications; it should be noted that the evidence review does not point to a single clear working alternative that would be more “effective”; neither would this option match the expressed views of the majority of staff.

The third option is to review, adapt and upgrade NHpPD. This has the benefits of building on the strengths of the current approach, and would meet the preference of the majority of staff involved in the engagement process, however it also has challenges. The feedback from staff engagement, summarised earlier, identifies a series of issues for consideration during such a review process, as well as giving some pointers about where there needs to be a consideration of an upgraded approach. Some of these changes relate to ensuring standardised, consistent and full implementation of the approach, but others are more complex, and link to the varying profiles and priorities in different parts of the WA health system. These variations relate to client profile variations, variations in workload and the extent to which this variation is predictable, and variations in different geographic and work environments (variations between urban and country/ rural being most obvious).

It is also important that the working party do not focus exclusively on the technical aspects of the approach to staffing, without considering the context in which it will be implemented.

Irrespective of which of the three options was to be pursued, it will also have to take account of broader contextual and workforce labour market issues related to recruitment, retention, extent of use of part time and temporary staff, access to relevant continuing education, and staff mix, as well as broader issues related to system structures, models of care, and funding streams.

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