



Royal College  
of Nursing

# **Impact of Staffing Levels on Safe and Effective Patient Care**

Literature Review



**SAFE STAFFING  
SAVES LIVES**

# Acknowledgements

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# Scope and purpose of the literature review

This evidence review was commissioned to support policy influencing and to point RCN staff and members towards the latest evidence on staffing for safe and effective care. A previous evidence review was completed to support RCN's *Staffing for Safe and Effective Care* (2019) report, with this current evidence review bringing that up to date.

The review summarises the most relevant evidence in nursing care settings on the topic of safe staffing, including the impact of this on patient care across the settings of acute care and primary and community care settings.

The recent review looked for a selection of published research articles and research reports between January 2019 and October 2021. The Cumulative Index to Nursing and Allied Health Literature (CINAHL) and British Nursing Index (BNI) database were searched. The search strategy focussed on safe staffing within nursing, the impact on patient care, and covered all nursing care settings. The search terms included single words and a combination of terms (complete list in **Appendix 1**).

This evidence review identifies research from the UK, USA and other countries across the world. It is important for the UK to learn from countries where the research findings can be transferable. The impact of these pressures identified in this research impact patient outcomes, patient safety and the wellbeing of nursing staff.

The nursing workforce is critical in any health care system and has great capacity to avoid or reduce adverse patient outcomes, such as mortality and morbidity (prevalence of health condition), and to contribute to the wider productivity of an overall health system (Sworn and Booth, 2019). Nursing provides high risk clinical care, 24/7.

A growing evidence base shows the impact of registered nurse staffing levels on the quality of patient care and outcomes. The evidence demonstrates that having the right number of appropriately qualified and experienced nurses is essential to protect patients and the nursing profession moving forward. Nursing staff across the UK are working under pressure to deliver patient care.

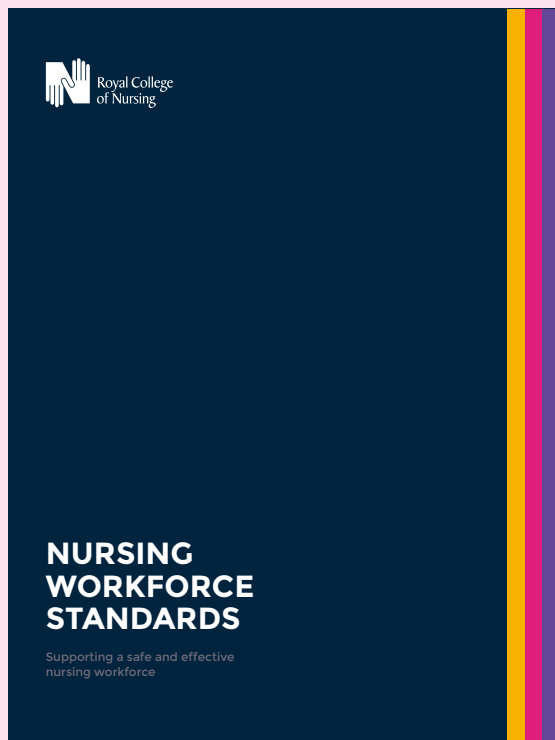
Overall, the evidence shows us that the patient outcomes affected the most by registered nurse staffing numbers are mortality, care quality, missed care and adverse events (for example, infection, pressure ulcers, medication errors). There is also evidence within study findings of a positive association between an appropriately planned nursing skills mix and patient safety outcomes (Sworn and Booth, 2019).

The evidence has been presented under various themes and topics as relevant to the literature available. For acute settings the themes are:

- workforce staffing levels and patient outcomes
- modelling staffing levels and ratios
- reliance on temporary staff
- skill mix
- missed care
- positive workforce environments
- wellbeing.

There is limited evidence for primary care and community settings, but two key themes have been identified:

- staffing levels and skill mix
- missed care.



The findings have been linked to the RCN ***Nursing Workforce Standards*** where they are applicable and offer evidence to support the delivery of safe and effective patient care.

# Acute settings

## Workforce staffing levels and patient outcomes

The National Institute for Health Research (NIHR)<sup>1</sup> conducted a themed review focused on staffing on inpatient wards. This suggested a relationship between the number of registered nurses in hospital wards and patient safety (NIHR, 2019).

Evidence suggests nursing workforce staffing levels and clinical patient outcomes are correlated. A study on staffing for safe and effective care in an acute NHS Trust in England (Leary et al., 2016) found 40 correlations between safety factors, physiological data and staffing factors. For example, wards with a higher ratio of registered nurses to health care support workers (HCSWs) had lower rates of slips, trips and falls, whereas wards with a higher number of HCSWs had a higher rate of slips, trips and falls.

Several studies have demonstrated a link between low staffing levels and poor patient outcomes, such as for each day that registered nurse staffing fell below the ward average, the relative risk of a patient dying increased by 3% (Griffiths et al., 2018). Research across nine countries (including England) reported that an increase in a registered nurse's workload by one patient increased the likelihood of an inpatient (undergoing common general surgery) dying within 30 days of admission by 7% (Ball et al., 2012).

In the UK, research found that increased numbers of ward-based registered nurse staff were significantly associated with reduced mortality rates for patients in hospitals. Higher mortality links to more occupied beds per registered nurse/doctor, and trusts with an average of six or less patients per registered nurse, had a 20% lower mortality rate than those with more than 10 patients per nurse (Griffiths et al., 2016).

A recent study of 52,000 patients across 116 hospitals in the USA looked at the effect of nurse staffing levels and the impact on patient outcomes for people with sepsis (Lasater et al., 2021). **Each additional patient per nurse was associated with the patient having to stay longer in hospital, as well as being: 12% more likely to die in hospital; 7% more likely to die after 60 days; 7% more likely to be readmitted after 60 days.** Although this study is specific to sepsis and demonstrates the impact that hospital nurse staffing pressures have on sepsis patient outcomes, it evidences how nurses are well placed and key in recognising the signs of sepsis early in patients and how nurse staffing levels can impact this happening.

In 2019, a study of data from three hospitals in the USA found that the risk of a patient developing health care associated infections (HAIs) was 15% more likely on units where registered nurses were understaffed (staffing level was below 80% of the median staffing levels for that unit) on both shifts two days prior to the infection onset, compared to patients who had both shifts sufficiently staffed. The risk was 11% higher for patients on units with nursing support staff understaffing on both shifts, than for those in units where both shifts were adequately staffed with nursing support staff (Shang et al., 2019). However, in this study no significant association was found between HAIs and understaffing when only one of the shifts was understaffed, suggesting that the effect of understaffing in one shift may be temporary as nursing staff may still manage to maintain patient surveillance.

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<sup>1</sup>The NIHR is centred on England, working closely with the devolved administrations in Northern Ireland, Scotland and Wales and which co-fund many of their programmes

There is limited research on the impact of nursing-led interventions specifically on patient outcomes. However, one study focused on registered nurses on an inpatient surgical unit who assessed patient risk and used this as a guide for staffing decisions and nurse-patient assignments. They found that this example of nurse-led practice led to a decrease in adverse events for patient safety indicators including falls, catheter-acquired urinary tract infections and pressure ulcer prevalence. Additionally, this delivery model reduced both overtime and patient cost (Pappas et al., 2015). Appropriate staffing levels are not only needed to ensure safe and effective patient care, but limited time due to workload demands affect other areas of care such as staff development.

The evidence on acute settings demonstrates how staffing levels are correlated with patient outcomes. It is important that this link is recognised by employers and policy makers. Health and care providers should ensure patient safety and offer assurance that services are safe for the public. The evidence clearly shows that when workforce staffing levels fall below what is acceptable, this impacts the care provided.

The RCN *Nursing Workforce Standards* (2021) state that workforce should be set based on service demand and the needs of the people using services. The evidence shows that when workforce staffing levels fall, patient safety is compromised and there are increased risks of infections being unidentified, patients experiencing unnecessary slips or trips and chances of mortality increase.

The evidence does show that there is no significant association between patient outcomes and a shortage in staff numbers for one shift. For this reason, establishments need to have contingency plans in place to manage the current and future workforce demands, and as directed by the *Nursing Workforce Standards*, the workforce should be calculated taking into consideration planned and unplanned absences so that care provided remains safe and effective.

The results from the RCN's *Nursing Under Unsustainable Pressure* (2022) report evidence that shortfalls in staff on shift has grown increasingly worse with each iteration of the survey, and that shifts rarely have 100% of the planned staff.

## Modelling staffing levels and ratios

Multiple studies support modelling staffing levels to assess the impact on nursing workload and quality of care. One such study modelled the effects of differing nurse-patient ratios on care quality and nurse workload. The model demonstrated that as the ratio increases; care-quality deteriorated (for example, both missed care and number of tasks increased by 120% when the ratio increased from medium to high) (Qureshi et al., 2019).

Evidence indicates that patient safety and patient outcomes are improved in hospitals where there are better nurse workforce staffing levels. In 2016, Queensland (Australia) established minimum nurse-patient ratios for adult medical-surgical wards in 27 public hospitals. The legislation required that for morning or afternoon shifts the ratio would not be lower than 1:4, and on night shifts no lower than 1:7. McHugh et al., (2021) conducted an evaluation of the legislation to assess the effects of better staffing levels policies and the associated improvement to patient outcomes.

The data on patient outcomes from these hospitals were compared to 28 comparison hospitals that were not subject to the nurse-patient ratios at two points: before implementation of the staffing level ratios as a baseline, and two years after implementation.

**Decreasing the workload of a nurse by one patient led to 7% fewer patients returning to hospital within a week, 30-day mortality rates decreased by 7% and patients left hospital 3% faster.** Financially, it was estimated that the cost of hiring the 167 nurses needed to reduce the workload by one patient per nurse would cost 33 million Australian dollars over two years, but there would be savings of 68 million dollars (AUD) due to the reduced admissions and shorter hospital stays (McHugh et al., 2021). Based on their estimates, the authors concluded that investing in more nurses would result in significant cost savings in the long term.

The implementation of the staffing ratios within the policy offered more flexibility, rather than implementing a ratio per nurse, the policy instead mandated a minimum average staffing level at the ward level.

The evidence demonstrates the impact nursing workload has on the quality of care provided and patient outcomes, however effective staffing levels should not be determined by a fixed number or ratio. Modelling of staffing numbers needs to consider the different type of settings, the severity of patient needs and use the professional judgement of registered nurses.

### Reliance on temporary staff

Increasing nurse staffing levels is beneficial to patient outcomes, and tools have been used to identify and model the required staffing level to meet patient needs. The cost effectiveness and impact on patient care of different nurse staffing scenarios was modelled using a computer simulation (Griffiths, et al., 2021).

The conclusion was that the economic simulation model of hospital units showed low baseline staff levels with high use of flexible staff are not cost-effective and do not solve nursing shortages. They found that staffing levels with higher baseline rosters led to higher costs but improved outcomes for patients, and that cost savings from lower baseline rosters arose because shifts were left understaffed. Although adverse patient outcomes from low baseline staffing reduced where more temporary staff were available, the higher baselines were more cost effective because the saving on staff costs also reduced. They concluded that **patient harm is more likely to occur with staffing plans that minimise the number of nurses rostered in advance as temporary staff may not be available at short notice** (Griffiths, et al., 2021). This study shows that staffing level plans which heavily rely on flexible deployments are not an efficient or effective use of nurses.

Evidence from the RCN's *Nursing Under Unsustainable Pressure* (2022) report show an increase in the reliance on temporary nursing staff; however, this evidence review shows that staffing levels modelled on utilising temporary staff are not cost effective or an efficient use of nurses. Workforce planning should use temporary staff members as a contingency to manage vacancies and to have nurses available when patient demand requires it.

The evidence reinforces the RCN *Nursing Workforce Standards* that temporary staff members must be competent to work in the role or setting and evidences that adverse patient outcomes reduce when temporary staff are used, however they should be used as an exception not as normal workforce planning.



## Skill mix

The education level, practical training, skills and experience that nursing staff hold need to be considered when determining how many staff are needed, and when setting the skill mix. Evidence has been conducted to understand how the nursing skill mix impacts on patient care. Research found that a greater percentage of registered nurses in the staffing mix resulted in patient reports of more rapid responses to their needs (and fewer delays to their care) (Dabney et al., 2015).

In the UK, research found that lower registered nurse staffing levels and higher numbers of patients per registered nurse were associated with increased risk of death during admission to hospital (Griffiths et al., 2019). The study looked at data on staffing levels of registered nurses and nursing assistants, alongside patient mortality in adult medical and surgical wards in a south of England NHS hospital.

For every day that a patient was on a ward and there were fewer than the average number of nurses for that ward, their chance of dying increased by 3%. On days where admissions per each registered nurse were 25% more than the average, patients were 5% more likely to die. Both lower and higher than average nursing assistant staffing levels were associated with increased patient mortality, with the study suggesting that there may be an 'optimal level of assistant staffing' (Griffiths et al., 2019).

Positive patient outcomes are associated with a higher nurse skill mix within the acute setting. A systematic review of 63 articles found that nursing skill mix affected 12 patient outcomes (Twigg et al., 2019). The authors concluded that: **A higher nurse skill mix (registered nurse staffing levels and proportion of registered nurses) was significantly associated with a reduction in these adverse patient outcomes: Length of stay, ulcer, gastritis and upper gastrointestinal bleeds, acute myocardial infarction, restraint use, failure to rescue, pneumonia, sepsis, urinary tract infection, mortality/30-day mortality, pressure injury, infections, and shock/cardiac arrest/health failure.**

A conclusion from the evidence was that having enough nursing assistants is beneficial to maintain patient safety, however nursing assistants should not be used to offset a shortfall in the registered nurse workforce. The study concluded that registered nurses and nursing assistants should not be treated as equivalent. The skill mix needs to be appropriate to meet the needs and dependency of patients effectively and safely, the evidence highlights registered nurse workforce shortages cannot be fixed by simply increasing the numbers of lesser trained staff in the workplace.


Increasing the concentration of registered nurses among the nursing skill mix was associated with lower chances of mortality, lower probability of poor hospital ratings from patients and fewer reports of poor quality and safety. The study concluded that dilution of the nursing skill mix might contribute to preventable deaths, reducing quality and safety of hospital care (Aiken et al., 2017).

A recent study looking at nurse staff rostering and patient data, found a statistically significant association between the proportion of planned registered nurse staffing and inpatient mortality. **On average, an extra 12-hour shift worked by a registered nurse reduced the odds of patient mortality by 9.6%.** An additional senior registered nurse (NHS Agenda for Change pay bands 7 or 8) had 2.2 times the impact of lowering the odds of a patient death than an additional pay band 5 nurse, and 1.5 times the impact than an additional band 6 nurse. However, the research found that there was no association with a reduction in the odds of patient death for working hours filled by health care support workers (HCSWs) or agency nurses, concluding that HCSWs and agency nurses are not an

effective substitute for registered nurses who regularly work the inpatient hospital ward (Zaranko et al., 2022). Policy should focus on increasing the number of trained registered nurses and improving the retention of existing experienced nurses.

The success of safe staffing is reliant on having a sufficient workforce available to ensure that patients receive the nursing care they require, and workforce requirements need to be based on the population's needs for health services. Ball et al., 2019 looked to understand what difference safe staffing policies introduced after *The Francis Inquiry* made to the achievement of safe staffing in the NHS. They noted that a constrained labour market still threatens achieving safe staffing in acute hospital wards, and that one in four (24%) of trusts surveyed reported that the number of patients per registered nurse routinely exceeded 1:8 on more than 65% of shifts in the last 12 months (1:8 is the level that had been associated with increased risk of harm in National Institute for Health and Care Excellence guidelines for safe staffing). It is evident that registered nurse staffing levels and patient safety are correlated. In the short term, the solution of using support staff is beneficial but this does not offer a long-term option for ensuring safe staffing.

The skills across the nursing team and the balance between registered nurses and health care support workers need to be planned to meet the needs and dependencies of the patients being cared for. The evidence demonstrates that having an appropriate skill mix not only improves patient outcomes but also the time it takes to respond to patient's needs.



These findings reinforce the RCN *Nursing Workforce Standards* recommendation that registered nurses and nursing support workers must be appropriately prepared to work within their scope of practice, and have the knowledge, skills and competencies to deliver person-centred care. The evidence shows that a shortage in registered nurses cannot simply be replaced with a staff member who is not educated, trained or experienced to complete the role as this will lead to compromised patient care.

### Missed care

Missed nursing care which relates to nurse staffing is associated with increased odds of patients dying in hospital following common surgical procedures (Ball et al., 2018). A combination of survey data from registered nurses and routinely collected data on patient characteristics and outcomes from 300 acute hospitals in nine European countries found that nurse staffing and missed care were significantly associated with mortality within 30 days of admission. **For every additional patient a registered nurse was caring for, the odds of a patient dying within 30 days of admission increased by 7%, and for every 10% increase in the percent of missed care by registered nurses, the chance of a patient dying within 30 days of admission increased by 16%.** Measuring missed care can be an early indicator of an elevated risk of poorer patients' outcomes (Ball et al., 2018).

Further analysis from 2020 focused on how nurse forecasting can affect 'ancillary' nursing work, in this context, ancillary nursing work includes:

1. staff development and education programs;
2. discussing patient care with other nurses;
3. patient care assignments that promote continuity of care;
4. loss of patient care information during handovers (Emmanuel et al., 2020).

The study found that **for every additional patient per nurse, subsequently increasing the nurse's workload, there was a 9% reduction in time for discussing patient care, 5% reduction in reports of assignments that foster continuity and a 3% increase in reports of loss of care information during shift changes.** Staff development and education programmes were also affected by an increase on the nurse's workload: for every additional patient per nurse, **there was a 4% reduction in staff reporting enough time for staff development.**

A study across hospitals in 12 European countries examined links between shift length and overtime with care quality, safety and care left undone. They found that nurses working shifts of 12 or more hours (and those working overtime) were more likely to report poor or failing patient safety, poor/fair quality of care and increased care activities left undone.

The report highlights that having staff work overtime to fill staffing shortages risks care quality (Griffiths et al., 2014). The recent evidence suggests that the length of shift and working overtime can also impact 'ancillary' nursing work. Nurses who worked shifts of 12 hours or more, compared to nurses who worked eight hours or less, were less likely to report having time for staff development or continuing education programmes by 42%. When compared to those who worked eight hours or less, nurses who worked 12 hours or more were 28% less likely to report having time and opportunity to discuss patient care with other nurses (Emmanuel et al., 2020).

Finally, when looking at overtime, nurses who worked their scheduled hours were more likely to report that they had enough time for staff development/education programmes or the opportunity to discuss patient care problems with other nurses, when compared to nurses working overtime. Nurses working their scheduled hours were 28% less likely to report observing loss of care information during shift changes, and were more likely to report care assignments that foster continuity of care.

A study looked to examine the relationship between hospital readmissions and missed nursing care. They identified that the most frequently missed nursing care activities in US acute care hospitals were talking to and comforting patients, developing and updating care plans and educating patients and their families (Carthon et al., 2015).

A Canadian study found that building a personal connection between patient and staff was a precursor to ensure patient involvement in care and safety, however the potential for this connection reduced when nursing staff were under stress or had a high workload. The study reasoned that high workloads and stress for nursing staff does not provide a basis for building relationships, thus making patients less involved in their care and safety (Bishop and Macdonald, 2017).


The evidence highlights that missed nursing care is correlated to negative patient outcomes. However, missed care is an unintended but almost predictable occurrence, the inability for nursing staff to provide essential care affects both the patients, their relatives and members important to the patient and is increasing, as evidenced by the RCN's *Nursing Under Unsustainable Pressures (2022)* report.

The RCN *Nursing Workforce Standards* (2021) state that rostering patterns for the nursing workforce should consider best practice on safe shift working. The evidence of working longer shifts or overtime shows the impact that fatigue can have on nursing staff and how this can lead to clinical errors and missed care. The findings reinforce the standard on the recommendation to avoid shifts that are longer than eight hours, the evidence demonstrates that nurses who worked eight hours or less had an increased chance of providing care activities or developing skills which support improving patient care.

### Positive workforce environments

Alongside sufficient numbers, the evidence highlights the necessity of a positive working environment. Recent studies show that this has positive effects on both patient experience and staff wellbeing (Griffiths et al., 2018). Patient experience is generally better and more positive when staff feel part of a good team with support from colleagues, are satisfied with their jobs, experience a positive organisational climate and have low emotional exhaustion (Maben et al., 2012).

Research of medical-surgical units in US hospitals found that patients being cared for in hospitals with better work environments for registered nurses (for example, having greater autonomy and control over their resources and practice, having excellent working relationships with colleagues), were 16% more likely to survive after an in-hospital cardiac arrest (IHCA) than those cared for in hospitals with poor work environments. Further, each additional patient per nurse was associated with a 5% lower likelihood of surviving IHCA to discharge (McHugh et al., 2016).




The evidence supports the RCN *Nursing Workforce Standards* that nursing staff should receive appropriate support and be treated with dignity and respect within their workplace and feel comfortable to be able to raise concerns which will be addressed. The evidence demonstrates that patient experience is better in workforce environments where nursing staff are supported, satisfied in their job, have autonomy and positive working relationships with their colleagues.

### Wellbeing

Maslach (2003) found that nurse to patient ratios and registered nurse burnout (a key component of which is emotional exhaustion that can lead to emotional and cognitive detachment from work), were associated with health care associated infections, for example, urinary tract and surgical site infections in patients. The study hypothesized that the increase in infections were due to a failure in control procedures and hygiene practices in response to nurse burnout attributed to an increase in nurse workload. Further, when registered nurse burnout was reduced, there were fewer infections (Cimiotti et al., 2012).

A survey of 4,298 registered nurses working on medical-surgical units and 2,182 registered nurses working in intensive care units in New York and Illinois looked at the associations of nurse staffing levels with care quality, patient experience and nurse burnout. **Nurses working in hospitals with fewer registered nurses per patient were more likely to report higher levels of burnout, intent to leave their job, lower qualities of care and give their hospital an unfavourable patient safety grade** (Lasater et al., 2021). They were also more likely to report episodes of missed care including missed patient surveillance, medications not being administered on time and missed treatments or procedures.



The evidence supports the RCN *Nursing Workforce Standards* on working in a healthy and safe environment, and that safe work environments are vital for all nursing staff. The working environment should be used as a place for promoting health and wellbeing, however, the evidence demonstrates that when this does not happen, staff experience burnout, detachment from work and an intent to leave. Supporting the wellbeing of the nursing workforce will help improve recruitment and support the retention of existing staff members, and consequently improve patient outcomes and patient safety.


# Primary care and community settings

Existing evidence is limited within these care settings. Most of the research has taken place in acute hospital settings, and it was recognised in the RCN's *Staffing for Safe and Effective Care (2019)* report that further research is needed in other settings.

## Staffing levels and skill mix

A study from the USA looked at the impact nurse staffing and skill mix have on rehospitalisation and emergency department visits in nursing care home residents (Yang et al., 2021). They found that higher staffing levels are protective factors, especially with increased registered nurse staffing as they increase the capacity of nursing homes to care for clinically complex residents. **The study found that nursing homes with high levels of registered nurses had the lowest rehospitalisation and emergency department visit rates**, whereas residents in nursing homes with high numbers of licensed practical nurses (LPNs, who are qualified to provide basic nursing care to patients and fulfil nursing tasks such as documentation, medication administration and assisting registered nurses) were most likely to have to return to hospital or visit the emergency department.

Nursing homes with high levels of LPNs tended to have proportionally fewer hours of care provided by certified nursing assistants (CNAs, who under the supervision of licensed nursing staff, provide direct care to patients such as eating and bathing) and registered nurses (Yang et al., 2021). The authors concluded that several factors could explain the differences in outcomes associated with staffing strategies, which included a poor fit between the residents' needs and scope of practice. This study provides evidence that when registered nurse care is in short supply and care by LPNs is increased, LPNs may be working beyond their scope of practice and without the training needed to implement the necessary care activities safely.



The evidence from this study reinforces the importance of the RCN **Nursing Workforce Standards** recommendation that registered nurses and nursing support workers must be appropriately prepared and work within their scope of practice, and that establishments should be based on service demand. Higher staffing levels and the correct skill mix act as protective factors and improve patient outcomes.

## Missed care

The University of Sheffield conducted analysis on the 3,000 responses from registered nurses working in the community and care homes from RCN staffing survey data (Senek et al., 2020). A total of 37% of community respondents, and 81% of care home staff, reported having the planned number of nurses on their last shift, however care left undone was 34% in the community sector, 33% in the care home sector and 23% in primary care. Less than 40% of community nursing shifts had the planned number of registered nurses present, and the prevalence of care left undone increased as the proportion of registered nurses dropped below planned numbers. In the care home sector, despite over 80% of shifts reporting the planned number of registered nurses, there remained a high prevalence of care left undone, raising questions about whether the planned number of registered nurses is sufficient for providing safe and effective care in the care home sector.



A study of district nursing teams in Scotland found that direct involvement of registered nurses in patient visits enhanced patient safety (McIntosh et al., 2000). Following their scoping review, a systematic review examined evidence specifically on missed care in primary and community care settings (including nursing homes) (Sworn and Booth, 2019).

The most common type of missed care identified in the systematic review related to optimising health outcomes, ongoing health monitoring and relational care, with evidence suggesting that these were caused by patient acuity, complexity of cases, volume of work and organisational factors. There were also findings that suggest that groups (older people, people with complex conditions, and people with mental health challenges) experience the most severe impacts from missed care (such as care follow up activity, availability of resources).

The evidence identified, indicates that the impact of missed care on patient safety in primary and community care settings may impact differently on missed care in acute care settings, and that some of the causes of missed care may be unique to primary and community care settings, due to caseload complexity. The review highlighted the less well-evidenced issues including relationships between nursing staff (appropriate skills, staffing levels) and patient safety in primary and community care settings. The review also found gaps in the evidence in primary care settings, and that theoretical models have not been developed or tailored to primary and community care settings in empirical studies (Sworn and Booth, 2019).

The evidence demonstrates that there is a correlation between patient acuity and missed care within primary care and community settings. This reinforces the RCN **Nursing Workforce Standards** recommendation that acuity, complexity and dependency should be considered when calculating nursing workforce for the management of planned and unplanned absences, especially where patients have complex conditions or other challenges.

Overall, missed care is underexplored in primary and community care settings and existing empirical studies have focused on a few specific initiatives. More research (both quantitative and qualitative) is required to conceptualise and evaluate missed care and more specifically, the impact of numbers of registered nurses on patient safety outcomes in primary and community care settings.

## Conclusions

The nursing workforce is integral to our health care system and the UK Government needs to be willing to invest in the nursing workforce to ensure that the health and care workforce can grow and sustain the supply of nurses needed. It is important for the UK to learn from other countries where safe staffing policies have been implemented and the evidence suggests improvements to patient outcomes in relation to workforce staffing levels.

The evidence from other countries shows that having minimum nurse to patient ratio policies help improve nurse staffing levels and improve patient outcomes. However, these policies need to be flexible in their approach and the evidence demonstrates that minimum staffing average levels at a ward or setting level are easier to implement, and evidence good outcomes for both patients and employers.

As concluded in our 2019 *Staffing for Safe and Effective Care* report, the concept of patient safety is not only defined as error and neglect, but also encompasses missed care and care left undone. However, there is a lack of evidence using intervention studies in relation to skill mix interventions and safety being the principal outcome (Sworn and Booth, 2019). This is an important finding for the research community to note. We have a growing understanding of the impact of nursing staff shortages, but little evidence on how this can most effectively be managed.

In reality, workforce planning relies on a supply of temporary staff being available to cope with shortages, however the evidence shows that this is not an effective or efficient use of nurses when relied on in advance planning. Temporary workforces are essential to manage a shortfall of nurses but when the proportion of temporary staff is too much, this can impact patient care. Modelling staffing levels are important to ensure there are the right number of nurses with the right skills in the right place at the right time to provide safe and effective care, however there is no evidence to support the choice of any tools and limited research exists in how staffing levels should be modelled.

Whilst the evidence base in acute care settings provides a clear indication of the impact of registered nurse staffing on patient outcomes and experience of care, most of this research is from the US, and research from the UK is mostly from English acute care settings.

As previously discussed, evidence is limited for community and primary care settings. Further research is needed within these settings to explore how staffing levels, skill mix and missed care impact differently to other settings, and to further evidence theoretical decisions in relation to safe staffing within the primary care and community setting.

Further research needs to be conducted into the optimal level of registered nurses in a skill mix, but evidence does suggest that adverse patient outcomes can be improved with a higher skill mix. Skill mix is more important than the number of nurses in reducing adverse patient outcomes and, those making staffing decisions cannot ignore the association, it is about having the right number of trained nurses in the right place to do their role and this needs to be considered in workforce planning.

## Appendix 1

### Search Strategy: CINAHL

Search ID#	Search Terms	Results
<b>S17</b>	<b>S8 AND S15</b>	<b>31</b>
<b>S16</b>	<b>S4 AND S15</b>	<b>96</b>
S15	S11 OR S12 OR S13	284
S13	(MM "Nursing Shortage")	5,776
S12	(MM "Nursing Manpower")	3,450
S11	(MM "RN Mix")	503
<b>S10</b>	<b>S6 AND S8</b>	<b>95</b>
<b>S9</b>	<b>S3 AND S8</b>	<b>49</b>
S8	patient outcomes or quality of care or health outcomes or patient satisfaction	192,231
<b>S7</b>	<b>S4 AND S6</b>	<b>32</b>
S6	TI staffing number* OR TI staffing level*	671
S5	S3 AND S4	151
S4	safe or safety or risk* or registered nurs* or ratios	315,917
S3	(MH "Understaffing") OR (MH "Skill Mix")	290
<b>S2</b>	<b>TI "safe staffing"</b>	<b>71</b>

### Search Strategy: British Nursing Index

Set#	Searched for	Results
<b>S6</b>	<b>2 and 5</b>	<b>11</b>
S5	ti("patient outcomes" or "quality of care" or "health outcomes" or "patient satisfaction")	3171
<b>S4</b>	<b>2 and 3</b>	<b>53</b>
S3	ti(safe OR safety OR risk* OR "registered nurs*" OR ratios)	39284
S2	(mainsubject.Exact("staffing levels" OR "staffing") OR (understaffing) OR ("staffing numbers") OR ("nursing shortage") OR mainsubject.Exact("health manpower" OR "manpower planning" OR "staffing levels" OR "manpower" OR "staffing"))	409
<b>S1</b>	<b>ti("safe staffing")</b>	<b>30</b>



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