![McMaster University | Health Forum logo]

Rapid Evidence Profile

Appendices

Impact of nurse-to-patient ratios for mental health and substance use, primary care, and public health nursing

24 September 2024

[MHF product code: REP 80]

Appendix 1: Methodological details

We use a standard protocol for preparing rapid evidence profiles (REP) to ensure that our approach to identifying research evidence is as systematic and transparent as possible in the time we were given to prepare the profile.

Engaging subject matter experts and citizen partners

At the beginning of each rapid evidence profile and throughout its development, we engage a subject matter expert and one or more citizen partners, who help us to scope the question and ensure relevant context is taken into account in the summary of the evidence.

Identifying research evidence

For this REP, we searched PubMed and Health Systems Evidence for:
1) evidence syntheses
2) protocols for evidence syntheses that are underway
3) single studies.

We searched Health Systems Evidence ([1];[2]) and [PubMed](#) (search strategies can be found by clicking the hyperlinks provided).

Each source for these documents is assigned to one team member who conducts hand searches (when a source contains a smaller number of documents) or keyword searches to identify potentially relevant documents. A final inclusion assessment is performed both by the person who did the initial screening and the lead author of the rapid evidence profile, with disagreements resolved by consensus or with the input of a third reviewer on the team. The team uses a dedicated virtual channel to discuss and iteratively refine inclusion/exclusion criteria throughout the process, which provides a running list of considerations that all members can consult during the first stages of assessment. We screened 556 evidence syntheses and single studies, of which 32 went to full-text review. Five documents were excluded following a full-text review because they did not focus on nurse-to-patient ratios or nurse staffing, there was no methods section, or because the study was set in a hospital. Following this process, we included 27 evidence documents.

During this process we include published, pre-print, and grey literature. We do not exclude documents based on the language of a document. However, we are not able to extract key findings from documents that are written in languages other than Chinese, English, French, Portuguese, or Spanish. We provide any documents that do not have content available in these languages in an appendix containing documents excluded at the final stages of reviewing. We excluded documents that did not directly address the research questions and the relevant organizing framework.

Assessing relevance and quality of evidence

We assess the relevance of each included evidence document as being of high, moderate or low relevance to the question. Two reviewers independently appraise the quality of the guidelines identified as being highly relevant using AGREE II. We use three domains in the tool (stakeholder involvement, rigour of development, and editorial independence) and classify guidelines as high quality if they were scored as 60% or higher across each of these domains.

Two reviewers independently appraise the methodological quality of evidence syntheses that are deemed to be highly relevant using the first version of the AMSTAR tool. Two reviewers independently appraise each synthesis, and disagreements are resolved by consensus with a third reviewer if needed. AMSTAR rates overall methodological quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. High-quality evidence syntheses are those with scores of eight or higher out of a possible 11, medium-quality evidence syntheses are those with scores between four and seven, and low-quality evidence syntheses are those with scores less than four. It is important to note that the AMSTAR tool was developed to assess evidence syntheses focused on clinical interventions, so not all criteria apply to those pertaining to health-system arrangements or implementation strategies. Furthermore, we apply the AMSTAR criteria to evidence syntheses addressing all types of questions, not just those addressing questions about effectiveness, and some of these evidence syntheses addressing other types of questions are syntheses of qualitative studies. While AMSTAR does not account for some of the key attributes of syntheses of qualitative studies, such as whether and how citizens and subject matter experts were involved, researchers' competency, and how reflexivity was approached, it remains the best general quality-assessment tool of which we're aware. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, an evidence synthesis that scores 8/8 is generally of comparable quality to another scoring 11/11; both ratings are considered 'high scores.' A high score signals that readers of the evidence synthesis can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the evidence synthesis should be discarded, merely that less confidence can be placed in its findings and that it needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1): S8.)

Identifying experiences from other countries and from Canadian provinces and territories

For each REP, we work with the requestors to collectively decide on what countries (and/or states or provinces) to examine based on the question posed. For other countries, we search relevant government and stakeholder websites including national and regional governments, national and regional health authorities, research institutes, and professional organizations. While we do not exclude content based on language, where information is not available in English, Chinese, French, Portuguese, or Spanish, we attempt to use site-specific translation functions or Google Translate. A full list of websites and organizations searched is available upon request.

Preparing the profile

Each included document is cited in the reference list at the end of the REP. For all included guidelines, evidence syntheses, and single studies (when included), we prepare a small number of bullet points that provide a summary of the key findings, which are used to summarize key messages in the text. Protocols and titles/questions have their titles

hyperlinked, given that findings are not yet available. We then draft a summary that highlights the key findings from all highly relevant documents (alongside their date of last search and methodological quality) and a few medium and low relevant documents of studies conducted in underrepresented sectors, as well as key findings from the jurisdictional scan. Upon completion, the REP is sent to both the subject matter expert and citizen partner for their review.

Appendix 2: Details about each identified evidence synthesis

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations

• Type of nursing professional
    o Registered/ licensed practical nurse
    o Registered nurse
 • Sector of focus
    o Other
      ▪ Long-term care
 • Outcomes
    o Health outcomes
	Registered nurse staffing levels were likely associated with fewer pressure ulcers (moderate certainty), fewer COVID-19 infections/mortality (low certainty), fewer other infections (low certainty), and lower rates of moderate to severe pain (low certainty) (1)
	 • Higher skill mix among staff was likely associated with fewer pressure ulcers, high resident COVID-19 infections, fewer other infections, and lower rates of moderate to severe pain (low certainty for all outcomes)
	 • Increase in total staffing levels demonstrated mixed results, and is probably not associated with pressure ulcers
	 • Reliance on data mandated by the Centers for Medicare & Medicaid Services (CMS) and variations in nurse staffing definitions make it difficult to establish causal relationships between different types of staffing levels and long-term care resident outcomes
		High	No	8/10	2021	Yes	None reported

• Type of nursing professional
    o Registered/ licensed practical nurse
    o Registered nurse
 • Sector of focus
    o Other
      ▪ Long-term care
 • Outcomes
    o Patient experience
	A systematic review found a non-linear relationship between nurse staffing levels and quality of care, suggesting that quality improves up to a certain threshold, but then provides diminishing returns (2)
	 • The evidence suggests that registered nurses (RNs) are more likely to have a positive influence on quality of care, but the mechanism remains uncertain
	 • Licensed practical nurses had a weaker association with improvements in care quality compared to RNs
	 • Overall, the authors suggest that a combination of RNs, licensed practical nurses (LPNs), and nursing assistants, along with workforce factors like low turnover, may be an important consideration rather than just the total staffing numbers
	 • As a result, policies should aim not only to increase staffing but also improve workforce dynamics, stability, and collaboration across staffing levels
		High	No	6/10	2010	No	None reported

• Type of nursing professional
    o Registered/ licensed practical nurse
    o Registered nurse
 • Sector of focus
    o Other
      ▪ Long-term care
	Nurse staffing was found to have a positive impact on resident safety outcomes, especially with regards to reducing pressure ulcers and urinary tract infections (3)
	 • Both increased staffing levels and higher nurse expertise (e.g., higher proportions of registered nurses) were found to contribute to resident safety such as preventing falls and pressure ulcers
	 • The included research lacks robust models able to explain mechanisms underlying the link between staffing levels and resident
		High	No	7/10	November 2022	No	None reported

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
• Outcomes o Health outcomes	safety, suggesting that future studies should address these methodological gaps to better inform optimal staffing levels						

• Type of nursing professional
  o Registered/ licensed practical nurse
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Patient experience
	No consistent evidence was found for a positive relationship between nurse staffing and quality of care outcomes in long-term care facilities (4)
	• Higher numbers of nurse staff were associated with better as well as lower quality of care outcomes
	• For example, for restraint use and catheterization, both positive (i.e., less restraints/catheterization) and negative (i.e., more restraints/catheterization) outcomes were found
	• With regard to pressure ulcers, it was found that more staff led to better results, no matter who – RN, LPN/licensed vocational nurses (LVN), or nursing assistants (NA) – delivered care
		High	No	6/10	2013	Not available	None reported

Appendix 3: Details about each identified single study

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Type of nursing professional
   o Registered nurse
• Sector of focus
   o Other
      ▪ Long-term care
• Outcomes
   o Health outcomes
	A Centers for Medicare and Medicaid Services (CMS) registered nurse (RN) staffing enforcement policy in long-term care (LTC) facilities led to increased RN daily staffing, better compliance, higher staffing hours per resident, and improved skill mix, subsequently leading to improved resident care (e.g., functional improvements, reduced antipsychotic medication use, weight loss) (5)
	• In 2018 CMS enacted a policy change to downgrade LTC facilities with seven or more days without a registered nurse present by one star on their Care Compare staffing domain quality rating
	• The policy helped improve compliance by LTC facilities, which subsequently improved resident outcomes
	• While the policy assisted in raising care standards, the authors caution against overly strict criteria, which could reduce accuracy and usefulness of the star-rating system, which could in turn lead to consumer misinformation about LTC facility quality
		High	*Publication date:* 2023
			
			Jurisdiction studied: U.S.
			
			Methods used: Observational study using intent-to-treat sample
				• None reported

• Type of nursing professional
   o Registered nurse
   o Nurse practitioner
• Sector of focus
   o Other
      ▪ Long-term care
• Outcomes
   o Health outcomes
   o Patient experience
   o Cost
	Minimum nursing hours per resident day regulations in California and Ohio led to a rise in direct care staffing, mostly among lower-wage certified nursing assistants and licensed nurse practitioners rather than higher-wage registered nurses, resulting in improvements in some quality measures like fewer deficiencies and contractures, but no effect on others like ulcers and antipsychotic medications (6)
	• The regulations also resulted in a reduction in indirect care staff such as housekeeping and food services, which may negatively affect resident quality of life
	• Effects were strongest in LTC facilities with low baseline staffing and in more competitive markets, while non-competitive markets and highly staffed facilities faced challenges such as increased labour costs
		High	*Publication date:* 2014
			
			Jurisdiction studied: U.S.
			
			Methods used: Retrospective analysis using state regulation and OSCAR Database data
				• None reported

• Type of nursing professional
   o Registered nurse
• Sector of focus
   o Other
      ▪ Long-term care
• Outcomes
   o Health outcomes
	Higher registered nurse levels and improved working environment was found to contribute to higher quality of life among long-term care residents (7)
	• Other factors such as job dissatisfaction, burnout, and turnover among RNs directly affect resident quality of life
		High	*Publication date:* 2023
			
			Jurisdiction studied: Korea
			
			Methods used: Cross-sectional observational study
				• None reported

• Type of nursing professional
   o Registered nurse
• Sector of focus
   o Other
      ▪ Long-term care
	Registered nurse staffing was found to have a large and significant impact on quality of care, but no significant association was found for nurse aide staffing and quality of care (8)	High	*Publication date:* 2014
			
			Jurisdiction studied: U.S.
				• None reported

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
• Outcomes o Patient experience			*Methods used:* Retrospective observational study using an instrumental variables approach	

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Patient experience
	The number of nursing staff is associated with relationship centred care in general dining units; however, relationship centred care may be more influenced by staff training in dementia care dining units (9)
	• This study assessed the association between the number of staff in dementia care dining rooms and relationship-centred care
	• Implementation of relationship-centred care seemed less frequent as the number of residents' increase in general care dining units; this may be mediated by increasing the number of staff
	• No association between the number of staff, residents, and relationship-centred care was seen in dementia dining units, suggesting that there may be other factors at play
	• Long term care chain affiliation was associated with lower relationship-centred care practices, perhaps because of procedures influence timing over relationships
	• Additional training and sufficient staff may be needed to influence relationship centred care building
		High	*Publication date:* 2020
			
			Jurisdiction studied: Canada
			
			Methods used: Secondary analysis
				• None reported

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Health outcomes
	Fewer nurse staffing hours was strongly related to more COVID-19 cases in long-term homes in California (10)
	• This study looked at the relationship between nurse staffing and COVID-19 infection and health deficiencies
	• Approximately 80% of California nursing homes did not meet registered nurse staffing requirements
	• Approximately 55% of California nursing homes did not meet the total nurse staffing requirements
	• For-profit nursing homes had more cases of COVID-19 than public
	• Nursing homes with COVID-19 cases were two times more likely to have fewer nursing staff hours
	• Additional factors included affecting likelihood of COVID-19 cases were number of beds, nursing home ratings, and staffing measures; however, nurse hours were one of the strongest predictors
		High	*Publication date:* August 2020
			
			Jurisdiction studied: California, U.S.
			
			Methods used: Cross-sectional
				• None reported

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Other
    o Home and community care
• Outcomes
  o Health outcomes
	Nursing hour per patient day can affect patients' likelihood of falls and need for assistance with daily living in Veteran health community living centres (11)
	• This study looked at the association between nursing hours per patient day and patient outcome measures in Veteran Health Administration Community Living Centres
	• No association was seen between nursing hours per patient day and function, ability to move independently, catheter in bladder, and urinary tract infection
	• As nursing staff hours increased, falls for major injury and help with activities of daily living decreased
		High	*Publication date:* October 2023
			
			Jurisdiction studied: U.S.
			
			Methods used: Retrospective analysis
				• None reported

• Type of nursing professional o Registered nurse	In the relationship between missed nursing care and staffing levels, timely care was correlated with the RN skill mix – the proportion of care hours provided by RNs relative to all nursing staff over a given month (12)	High	Publication date: 2015	• None reported

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Patient experience
	• Patients reported the overall missed care to be 1.82 on a 5-point scale ranging from 1 (care never missed) to 5 (care always missed)
	• Basic care was missed the most at 2.29 followed by communication at 1.69 and timeliness scored the lowest at 1.52
	• Having a greater percentage of RNs in the staffing mix resulted in patient reports of more rapid responses to their needs
			Jurisdiction studied: U.S.
			
			Methods used: Cross-sectional	

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Patient experience
	Higher nurse staffing levels are linked to better quality, with significant relationships observed between staffing levels and both total and substantiated complaints for direct care RNs (13)
	• A 0.1 hours per resident day increase in RN staffing was associated with 0.11 fewer complaints and 0.06 fewer substantiated complaints as well as a 0.28% point lower probability of having any complaints and a 0.72% point lower probability of having any substantiated complaints
		High	Publication date: 2022
			
			Jurisdiction studied: U.S.
			
			Methods used: Cross-sectional
				• None reported

• Type of nursing professional
  o Registered/licensed practical nurse
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Cost
	Higher reported staffing scores are strongly linked to higher expenditures, but this link is weaker for LPN staffing (and RN staffing in for-profit and high-Medicaid facilities) after the release of the 5-star rating system (14)	Medium	Publication date: 2017
			
			Jurisdiction studied: U.S.
			
			Methods used: Pre-post study
				• None reported

• Type of nursing professional
  o Registered nurse
  o Registered psychiatric nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Health outcomes
  o Provider experience (including nurse satisfaction)
  o Cost
	Increasing RN staffing by 12% led to a 3% improvement in quality-of-care outcomes, while a 20% increase in RN hours resulted in a 5% to 8% enhancement, highlighting that even modest increases in RN staffing significantly improve care quality in nursing homes (15)
	• The study examined ways to optimize nurse staffing hours per resident day (HPRD) (e.g., increasing RN hours) to enhance quality-of-care outcomes in Korean nursing homes
	• A notable challenge for key stakeholders (e.g., nurses, researchers, policymakers) is translating research findings into practical, sustainable increases in RN HPRD
	• Increasing RN staffing alone (i.e., without changing certified nurse aides HPRD) is critical to achieving optimal quality of care in nursing homes
	• The study emphasizes how important RN hours per resident day are for improving care quality, suggesting that boosting RN staffing (e.g., increasing RN HPRD by adjusting RN hours) could lead to much better outcomes for residents
	• Key findings from the study included:
	  o administrative and government support (i.e., financial, legal, human resources) is crucial for increasing RN staffing
		Medium	Publication date: 2019
			
			Jurisdiction studied: South Korea
			
			Methods used: Secondary analysis of longitudinal survey data
				• Not reported

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
	o despite financial incentives, only about 3% of Korean nursing homes exceed legal staffing requirements, indicating the need for stronger systems (e.g., legislation, improved working conditions)			

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Patient experience
	Long-term care facilities with a higher ratio of nursing staff and social workers were more likely to be classified as top-quality class institutions in terms of quality of care provided (16)	Medium	*Publication date:* 2019
			
			Jurisdiction studied: Korea
			
			Methods used: Multinomial logistic regression analysis of long-term care insurance claims data and nursing home information
				• None reported

• Type of nursing professional
  o Registered/licensed practical nurse
  o Registered nurse
  o Nurse practitioner
• Sector of focus
  o Other
    ▪ Long-term care
    ▪ Home and community care
• Outcomes
  o Patient experience
	Residential care and assisted living communities with no nurse staffing offered significantly fewer services than all other categories of staffing, and those with only registered nurses offered significantly fewer services than those with licensed practitioner nurses and licensed vocational nurses only (17)
	• The findings suggest that while nurse staffing levels play an important role in service availability for residential care and assisted living communities, skill mix (having a mix of licensed practitioner nurses and licensed vocational nurses rather than just registered nurses) may allow communities to provide a greater range of services
		Medium	*Publication date:* 2018
			
			Jurisdiction studied: U.S.
			
			Methods used: Surveys completed by administrators and healthcare supervisors in residential and assisted living
				• None reported

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Health outcomes
	Nursing facilities with a lower number of residents per registered nurse and additional care staff demonstrated no weight loss among residents without cognitive impairment, but no differences were found among residents with cognitive disabilities (18)
	• The authors highlight the need to identify other factors leading to weight loss among residents with cognitive disabilities such as teamwork and work climate that may play a role
		Medium	*Publication date:* 2018
			
			Jurisdiction studied: Germany
			
			Methods used: Observational study using regression analysis
				• None reported

• Type of nursing professional o Registered nurse	Increasing staffing hours in nursing homes generally improves outcomes, particularly for residents with dementia, though the effects vary across specific outcomes (e.g., facilities with a high dementia population saw improvements in pressure sores and emergency room visits, while those with a lower	Medium	*Publication date:* 2024	• Not reported

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
o Nurse practitioner o Registered psychiatric nurse • Sector of focus o Other ▪ Long-term care • Outcomes o Health outcomes o Patient experience	dementia population performed better in reducing antipsychotic use and maintaining daily activities) (19) • The study examined how staffing levels (i.e., the number of staff per resident) impact health outcomes in nursing homes, particularly for residents with Alzheimer's Disease and Related Dementias-Cognitive Impairment (ADRD-CI) • It hypothesized that facilities with a high percentage of ADRD-CI residents may have adapted their operations (i.e., tailored care practices) to better meet these residents' needs • The study noted that increasing staffing benefits nursing homes, regardless of ADRD-CI census (e.g., the percentage of residents with Alzheimer's Disease and Related Dementias-Cognitive Impairment), but it is not sufficient alone to significantly reduce adverse outcomes • The findings highlight that outcome differences for ADRD-CI residents in general nursing home beds (i.e., beds not specialized for dementia care) reveal specific areas needing targeted improvement		*Jurisdiction studied:* U.S. *Methods used:* Production function estimation	
• Type of nursing professional o Registered nurse • Sector of focus o Other ▪ Long-term care • Outcomes o Health outcomes o Patient experience	Higher RN staffing in South Korean nursing homes significantly reduced resident mortality and improved overall care quality ratings, but it did not have a notable impact on other aspects of resident health (e.g., physical function, cognitive abilities) (20) • The study explored the effects of RN staffing levels on resident health outcomes and quality of care in South Korean nursing homes • Increased RN presence significantly lowers resident mortality rates and boosts overall quality ratings, including specific quality subcategories (e.g., safety, hygiene) • Although RN staffing positively influences care quality, it does not significantly impact various resident health outcomes (i.e., physical and cognitive functions) except for reducing mortality • Enhancing RN staffing levels and revising quality evaluation criteria (i.e., incorporating resident health outcomes) are crucial steps for improving care in nursing homes	Medium	*Publication date:* 2020 *Jurisdiction studied:* South Korea *Methods used:* Secondary data analysis using mixed-effects linear models and multinomial logistic regression models	• Not reported

• Type of nursing professional
o Registered/licensed practical nurse
o Registered nurse
• Sector of focus
o Other
▪ Long-term care
• Outcomes
o Health outcomes
	Increasing both the ratio of RNs to nursing home residents, and the proportion of RNs in the total nursing staff relative to the national median, led to reduced infections and lower mortality rate of nursing home residents during the COVID-19 pandemic in Korea, which highlights the specific importance of the number of RNs in total nursing staff for mitigating COVID-19 infection (21)
	• The mean skill mix of nursing staff was 15.87% for RN/RN + certified nursing assistants (CNA)
	• Independent variables were bed size, skill mix (proportion of RN/RN + CNA), ratio of staff to residents, and facility evaluation across 249 districts
	  o The ratio of RNs to residents of nursing homes with COVID-19 outbreaks was 1:132, while the ratio in nursing homes without COVID-19 outbreaks was 1:113
	  o The ratio of CNAs to residents was 1:19 in nursing homes with COVID-19 outbreaks, and 1:21 in nursing homes without COVID-19 outbreaks
	• When skill mix was higher than the sample median, the infection rate was 0.626% lower ($p = .049$), the mortality rate was 0.088% lower ($p = .076$), the proportion of confirmed COVID-19 resident cases out of the total number of residents was 44.472% lower ($p = .041$), and the proportion of
		Medium	*Publication date:* 2021
			
			Jurisdiction studied: Korea
			
			Methods used: Statistics analysis using dataset from Korean government
				• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
	confirmed COVID-19 resident deaths out of the total number of residents was 6.456% lower (*p* = .055*)*			

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Health outcomes
	Registered nurses' hours per day and turnover rates can affect quality of care outcomes in long-term care homes in Korea including, falls, range of motion, bed rest, dehydration, and medication use (22)
	• This study looked at the association between nurse staff hours per day, turnover, and quality of care outcomes
	• More registered nurse hours per day were correlated with decreases in falls and deterioration of range of motion
	• Higher registered nurse turnover was related to an increase in dehydration, bed rest, and antipsychotic medication use
		Medium	*Publication date:* November 2015
			
			Jurisdiction studied: Korea
			
			Methods used: Cross-sectional
				• None reported

• Type of nursing professional
  o Registered/licensed practical nurse
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Health outcomes
	Requiring additional in-service dementia training for nursing homes with low RN and CNA staffing displayed reduced instances of inappropriate psychotropics use on residents with cognitive impairs associated with dementia, which suggests a relationship between lower nurse staffing, unmet need, and a lack of non-pharmacological treatments, as well as highlighting the role of RNs in providing quality dementia care (23)
	• Nurse staffing levels were measured by hours per resident day (HPRD) using payroll-based journal data (PBJ)
	• HPRD was calculated by dividing the total number of nursing staff working hours for 24 hours by the number of NH residents for the same period
	• Inappropriate psychotropic use was measured using the F-758 deficiency citation, which signals a violation of care standards that a nursing home must ensure that psychotropics are prescribed to treat a specific condition as indicated
	• Inappropriate psychotropics use were only considered in the case of residents with cognitive impairment associated with dementia, while other instances of use were excluded, such as on patients without
	• Higher RN and CNA staffing was related to decreased psychotropic use
	• Having lower RN staffing and less educated CNAs may pose a risk to quality of dementia care, and insufficient staffing and training could further increase workloads on existing nursing staff, leading to issues in managing behavioural symptoms of residents
		Low	*Publication date:* 2023
			
			Jurisdiction studied: U.S.
			
			Methods used: Cross-sectional design with secondary data analysis
				• None identified

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Primary care
• Outcomes
  o Health outcomes
	The inclusion of registered nurses (RNs) in primary care teams is linked to significantly improved diabetes management outcomes (e.g., better control of HbA1c, fasting plasma glucose, and blood pressure levels) (24)
	• The study examined the relationship between RN staffing in primary care teams and clinical outcomes for patients with Type 2 diabetes
	• Significant variability was noted across Family Health Teams in the proportion of patients who completed recommended diabetes management tests and met the targets
	• Nearly half of the patients did not meet the recommended targets, consistent with findings from other studies
	• A positive association was identified between the presence of RNs and improved diabetes outcomes, aligning with international findings (e.g., studies from various healthcare settings)
		Low	*Publication date:* 2016
			
			Jurisdiction studied: Canada
			
			Methods used: Cross-sectional linkage study combining organizational survey data with patient
				• Not reported

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
	• Similar results have been reported in both primary and acute care settings, where a greater RN presence is associated with improved outcomes (i.e., reduced adverse events, better chronic disease management)		electronic medical records	

• Type of nursing professional
  o Registered/licensed practical nurse
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
    ▪ Home and community care
• Outcomes
  o Health outcomes
  o Provider experience (including nurse satisfaction)
	Nurse staffing standards and actual levels for RNs and CNAs are lower in South Korea compared to the U.S. (i.e., fewer RNs and CNAs), while care worker staffing is higher; conversely, the U.S. has higher RN and CNA standards and overall staffing levels (e.g., more stringent requirements), yet both countries face challenges in effectively meeting nursing home residents' needs (25)
	• The study looked at how nurse staffing standards, training requirements (e.g., education, certification), and care quality differ between nursing homes in South Korea and the U.S.
	• It pointed out both the similarities and key differences in how each country approaches nurse staffing and training
	• Both countries had established educational and training requirements (e.g., for CNAs and care workers), but there were significant differences in how these standards were applied
	• To improve staffing and care quality in nursing homes, the analysis highlighted the need for continued research and policy development (e.g., updating standards and guidelines)
	• Addressing gaps in training, staffing standards, and working conditions (e.g., particularly in South Korea) could have led to significant improvements in the quality of care for nursing home residents
		Low	*Publication date:* 2015
			
			Jurisdiction studied: South Korea and the United States
			
			Methods used: Comparative analysis
				• Not reported

• Type of nursing professional
  o Registered nurse
• Sector of focus
  o Other
    ▪ Long-term care
• Outcomes
  o Patient experience
	The RN-to-total-nursing-staff ratio was negatively associated with serious deficiencies in nursing homes that consistently met staffing standards; however, this ratio was also negatively associated with the total number of deficiencies in nursing homes that consistently failed to meet the standard over a five-year period (26)
	• The study examined two groups of California freestanding nursing homes:
	  o 201 homes that consistently met the state's minimum staffing standard over 5 years
	  o 210 homes that consistently failed to meet it
	• As the RN to licensed vocational nurse ratios increased, total deficiencies and serious deficiencies decreased in both groups of nursing homes
	• A higher RN mix is positively related to quality of care, but the relationship is affected by overall nurse staffing levels in nursing homes
		Low	Publication date: 2009
			
			Jurisdiction studied: California, U.S.
			
			Methods used: A Retrospective panel data study
				• None reported

Appendix 4: Details from the jurisdictional scan

Jurisdiction	Organizing framework	Key findings
Australia	- Sector of focus - Other - Long-term care - Home and community care - Rehabilitation care - Outcomes - Health outcomes - Patient experience - Provider experience (including nurse satisfaction) - Cost	**Nurse-to-patient ratios** - The Queensland Government has legislated minimum nurse-to-patient ratios in public sector health facilities to align staffing with patient needs, ensuring safe outcomes (i.e., 1:4 for morning/afternoon shifts and 1:7 for night shifts) - These legislated ratios came into effect on 1 July 2016 - A nurse-to-patient ratio specifies the number of nurses or midwives in relation to the patients they care for on a ward, unit, or department (e.g., a minimum number of nurses per shift) - These ratios will enhance the existing Queensland Health Business Planning Framework, professional standards, and clinical judgment to improve patient safety, care quality, workforce sustainability, and nursing workloads (e.g., better resourcing and support) - Non-compliance with the legislated ratios must be reported, but there are no direct penalties; however, repeated non-compliance prompts local reviews (e.g., through the Nursing and Midwifery Consultative Forum), and facilities can seek temporary exemptions - Certain wards and facilities are excluded due to lower risk or different care models (e.g., alternative care models, multi-purpose wards), with future inclusion dependent on ongoing evaluations **Establishing minimum nurse-to-patient ratios in Victoria's public hospitals** - Nurse-to-patient ratios define the minimum number of nurses required on a ward, ensuring patients receive optimal nursing care - In 2015, Victoria became the first state in Australia to legislate minimum nurse-to-patient ratios in public hospitals, including aged high care residential wards, palliative care inpatient units, and rehabilitation and geriatric evaluation management through the Safe Patient Care Act 2015 - These ratios are based on the number of patients (i.e., occupied beds) on a ward - The Safe Patient Care Act 2015 specifies different ratios according to the level of care required by patients **Impact of improved nurse-to-patient ratios on patient outcomes and healthcare costs** - After implementing nurse-to-patient ratios, intervention hospitals experienced lower mortality rates and a more significant reduction in length of stay (LOS) without an increase in readmissions (e.g., improved patient outcomes) compared to comparison hospitals - In comparison hospitals, mortality rates did not change significantly, but readmissions increased post-implementation (i.e., no improvement in patient outcomes) - Staffing improvements by one patient per nurse led to reductions in mortality, readmissions, and LOS (e.g., better staffing efficiency and patient care) - The cost savings from fewer readmissions and shorter LOS in intervention hospitals were more than twice the cost of additional nurse staffing (i.e., financially beneficial) - Intervention hospitals avoided additional deaths, readmissions, and hospital days, demonstrating the effectiveness of improved staffing ratios (e.g., enhanced patient safety and reduced costs)
United Kingdom (U.K.)	- Type of nursing professional - Registered/licensed practical nurse - Registered nurse - Nurse practitioner - Registered psychiatric nurse	**Society for Acute Medicine guideline** The Society for Acute Medicine recommends a nurse-to-bed ratio of 1:4 for general patients, increasing to 1:2 when higher care levels are needed (e.g., patients on non-invasive respiratory support, vasopressors, or inside rooms) **The Royal College of Nurses' Guidance on safe nurse staffing levels in the U.K.**

Jurisdiction	Organizing framework	Key findings
	- Sector of focus - Other - Long-term care - Home and community care - Rehabilitation care - Outcomes - Health outcomes - Patient experience - Provider experience (including nurse satisfaction) - Cost	- The Royal College of Nurses' Guidance on safe nurse staffing levels emphasizes the importance of appropriate staffing, with oversight from the Nursing and Midwifery Council and regulation by the Care Quality Commission (e.g., by setting standards and ensuring compliance) - Inadequate staffing is linked to patient safety risks and poor outcomes (e.g., increased mortality, adverse events) - Safe staffing levels prevent avoidable complications (e.g., deep vein thrombosis, pressure ulcers) and support cost-effective care - Short staffing leads to increased stress, sickness absence, and turnover, affecting care quality and costs (i.e., higher patient-to-nurse ratios compromise care) - The Royal College of Nurses suggests maintaining a ratio of no more than six patients per registered nurse (RN) to avoid compromised care, while a ratio of eight or more patients per RN often results in compromised care Royal College of Nursing (RCN) Safe Staffing Campaign - The RCN Safe Staffing Campaign calls for legal requirements for nurse staffing in England to ensure safe and effective care (i.e., legislated minimum staffing levels) - The campaign demands government accountability for workforce planning, including detailed assessments of future workforce needs (e.g., Secretary of State for Health and Social Care to publish demand assessments) - There is a push for increased investment in nursing education, including financial support for students, to address workforce shortages (i.e., abolition of self-funded tuition fees) - Ethical international recruitment is supported but must complement, not replace, domestic workforce investments (e.g., adherence to U.K. and global Codes of Practice) - Nursing staff are encouraged to raise concerns about staffing issues using the Nursing Workforce Standards as a benchmark (i.e., ensuring safe and quality patient care) Guidance and resources for safer staffing in National Health Service (NHS) organizations - Evidence-based decision-making on safe staffing is essential for all NHS organizations to ensure effective workforce planning and compliance with governance reporting (i.e., safe, sustainable, and productive staffing) - NHS providers can use available resources (e.g., workforce safeguards, National Quality Board guidance) to make informed staffing decisions and maintain safe staffing levels - The Developing Workforce Safeguards document provides guidelines on workforce planning (e.g., best practices and governance approaches) to ensure consistent staffing decisions across NHS providers - The National Quality Board guidance outlines expectations for nursing and midwifery staffing, supporting NHS provider boards in making local decisions that ensure high-quality patient care within available resources (i.e., safe and effective staffing levels) - The Fundamentals of Safer Staffing e-learning program offers modules on key staffing principles (e.g., policy impact, safe staffing governance) to help healthcare workers apply these concepts in practice
United States – California	- Type of nursing professional - Registered/licensed practical nurse - Nurse practitioner - Registered psychiatric nurse - Sector of focus - Public health - Mental health care - Outcomes	- The California Nurses Association created safe staffing laws for registered nurses based on patient needs, severity of illness, and need for specialized technology - The law restricts unsafe floating and requires significant training (orientation) to assign a nurse to a specific unit, and protects licenced practiced nurses and vocational nurses - The nurse-to-patient ratio is 1:6 for psychiatric patients in hospital wards - The law resulted in increased retention and recruitment

Jurisdiction	Organizing framework	Key findings
	o Provider experience (including nurse satisfaction)	

United States – Oregon	• Type of nursing professional
	  o Registered/licensed practical nurse
	  o Registered nurse
	• Sector of focus
	  o Primary care
	  o Other
	    ▪ Long-term care
	• Outcomes
	  o Provider experience (including nurse satisfaction)
		• Legislative rules about staff ratios in long-term care facilities indicates that Oregon Department of Human Services has the authority to specify the maximum number patients per nursing assistant per shift in long-term care facilities
		  o A statement describing the specific staffing requirement per time period must be posted in the facility in a public place by the facility
		• In response to new federal staffing requirements for nursing homes (finalized in April 2024) that require nursing homes to provide 24/7 registered nurse coverage for patients, a spokesperson from the Oregon Nursing Association referred to data showing that 97% of nursing homes in Oregon could not meet the requirement and that the new requirements may inadvertently force nursing facilities to downsize, limit admissions, or close altogether
		  o In addition to the 24/7 registered nurse coverage requirement, nurse aides (or certified nursing assistants) must provide patients with at least 2.5 hours of care per day, registered nurses providing treatment plans and administering medications must provide at least half an hour of care per day, and each patient must receive at least 3.5 hours of care per day
		• In August 2023, Oregon passed a law that required nurse-to-patient ratios in statute for certain departments in hospitals; however, this law does not address ratios in sectors outside of hospitals
		  o Starting 1 June 2024, hospitals had to approve a staffing plan that includes a minimum of one nurse for every two patients in ICU and one nurse per five patients in surgical units as well as a minimum staffing ratio of one certified nursing assistant for every seven patients
		  o Since implementation, complaints have been received by the state agency responsible for hospital oversight alleging staffing law violations where hospitals unilaterally passed staffing plans without obtaining approval from their appointed staffing committees and sought loopholes to the nurse staffing ratios; nurses alleged that the new staffing plans inhibited their ability to properly care for patients

United States – Maryland	• Type of nursing professional
	  o Registered/licensed practical nurse
	  o Registered nurse
	• Sector of focus
	  o Other
	    ▪ Long-term care
		• The government of Maryland provides ratios for registered nursing staff in nursing homes:
		  o one full-time nurse for 2–99 patients
		  o two full-time nurses for 100–199
		  o three full-time nurses or 200–299
		  o four full-time nurses for 300–399

United States – New Jersey	• Type of nursing professional
	• Sector of focus
	  o Other
	    ▪ Long-term care
		• New Jersey's minimum staffing requirements for long-term care facilities require 1) one certified nurse aide to every eight residents for the day shift, 2) one direct care staff member to every 10 residents for the evening shift, with no fewer than half of all staff members certified nurse aides, and 3) one direct care staff member to every 14 residents for the night shift, with each direct care staff working as a certified nurse aide

United States – New York	• Type of nursing professional
	  o Registered/licensed practical nurse
	  o Registered nurse
	• Sector of focus
	  o Other
	    ▪ Long-term care
	• Outcomes
	  o Health outcomes
	    ▪ Patient experience
		• According to the new Safe Staffing Act, nursing homes would be required to provide 0.75 hours of RN care, 1.3 hours of LPN care, and 2.8 hours of certified nursing assistant (can) care to each resident per 24-hour day, seven days a week
		• This act also requires a nurse-to-patient staffing ratio of one nurse for every two critical care patients in hospital units

Appendix 5: Documents excluded at the final stages of reviewing

Document type	Hyperlinked title
Evidence syntheses	Optimizing staffing, quality, and cost in home healthcare nursing: Theory synthesis
	Outcomes related to effective nurse supervision in long-term care homes: An integrative review
	Staffing levels and nursing-sensitive patient outcomes: Umbrella review and qualitative study
Single studies	The impact of nurse staffing levels on nursing-sensitive patient outcomes: A multilevel regression approach
	Multidimensional aspects of nurse staffing in nursing homes
	Exploring the relationship between extent of person-centered care implementation and staffing levels in Ohio nursing homes

Appendix 6: References

1.   Jutkowitz E, Landsteiner A, Ratner E, et al. Effects of nurse staffing on resident outcomes in nursing homes: A systematic review. *J Am Med Dir Assoc* 2023; 24(1): 75-81 e11.

2.   Spilsbury K, Hewitt C, Stirk L, Bowman C. The relationship between nurse staffing and quality of care in nursing homes: a systematic review. *Int J Nurs Stud* 2011; 48(6): 732-750.

3.   Blatter C, Osinska M, Simon M, Zuniga F. The relationship between nursing home staffing and resident safety outcomes: A systematic review of reviews. *Int J Nurs Stud* 2024; 150: 104641.

4.   Backhaus R, Verbeek H, van Rossum E, Capezuti E, Hamers JP. Nurse staffing impact on quality of care in nursing homes: a systematic review of longitudinal studies. *J Am Med Dir Assoc* 2014; 15(6): 383-393.

5.   Brunt CS. Assessing the impact of enforcement and compliance with minimum staffing standards on the quality of care in nursing homes: Evidence from the Centers for Medicare and Medicaid Services' staff star rating downgrade policy. *Health Econ* 2023; 32(2): 235-276.

6.   Chen MM, Grabowski DC. Intended and unintended consequences of minimum staffing standards for nursing homes. *Health Econ* 2015; 24(7): 822-839.

7.   Cho E, Min D, Heo SJ, Lee K, Kim H. Effects of registered nurses' staffing levels, work environment and education levels on nursing home residents' quality of life and nurse outcomes. *J Clin Nurs* 2023; 32(17-18): 6494-6503.

8.   Lin H. Revisiting the relationship between nurse staffing and quality of care in nursing homes: An instrumental variables approach. *J Health Econ* 2014; 37: 13-24.

9.   Trinca V, Chaudhury H, Slaughter SE, Lengyel C, Carrier N, Keller H. Making the most of mealtimes (M3): Association between relationship-centered care practices, and number of staff and residents at mealtimes in Canadian long-term care homes. *J Am Med Dir Assoc* 2021; 22(9): 1927-1932 e1.

10. Harrington C, Ross L, Chapman S, Halifax E, Spurlock B, Bakerjian D. Nurse staffing and coronavirus Infections in California nursing homes. *Policy Polit Nurs Pract* 2020; 21(3): 174-186.

11. Brown LM, Gauss CH, Billings P, et al. Nurse staffing and veteran outcomes in the Veterans Health Administration's community living centers. *J Nurs Care Qual* 2023; 38(4): 297-303.

12. Dabney BW, Kalisch BJ. Nurse staffing levels and patient-reported missed nursing care. *J Nurs Care Qual* 2015; 30(4): 306-312.

13. Peterson LJ, Bowblis JR, Jester DJ, Hyer K. The relationship between staffing levels and consumer complaints in nursing homes. *J Aging Soc Policy* 2022;34(5): 742-754.

14. Sharma H, Konetzka RT, Smieliauskas F. The relationship between reported staffing and expenditures in nursing homes. *Med Care Res Rev* 2019; 76(6): 758-783.

15. Shin JH. Appropriate Nursing Home Nurse Hours per Resident Day in Korea: A Secondary Analysis of Longitudinal Data. *J Nurs Scholarsh* 2019;51(5): 569-579.

16. Song M, Song H. Staff mix and nursing home quality by level of case mix in Korea. *Geriatr Gerontol Int* 2019; 19(5): 438-443.

17. Beeber AS, Zimmerman S, Madeline Mitchell C, Reed D. Staffing and service availability in assisted living: The importance of nurse delegation policies. *J Am Geriatr Soc* 2018; 66(11): 2158-2166.

18. Zimmermann J, Pfaff H. Influence of nurse staffing levels on resident weight loss within German nursing homes. *Res Gerontol Nurs* 2018; 11(1): 48-56.

19. Mukamel DB, Ladd H, Saliba D, Konetzka RT. Dementia, nurse staffing, and health outcomes in nursing homes. *Health Serv Res* 2024; 59(4): e14270.

20. Cho E, Kim IS, Lee TW, Kim GS, Lee H, Min D. Effects of registered nurse staffing on quality of care and resident outcomes in nursing homes. *Geriatr Nurs* 2020; 41(6): 685-691.

21. Lee J, Shin JH, Lee KH, Harrington CA, Jung SO. Staffing levels and COVID-19 infections and deaths in Korean nursing homes. *Policy Polit Nurs Pract* 2022; 23(1): 15-25.

22. Shin JH, Hyun TK. Nurse staffing and quality of care of nursing home residents in Korea. *J Nurs Scholarsh* 2015; 47(6): 555-564.

23. Yoon JM, Trinkoff AM, Kim M, Kim E. State-level nursing home in-service dementia training requirements and inappropriate psychotropic medication use. *Geriatr Nurs* 2023; 51: 209-214.

24. Lukewich J, Edge DS, VanDenKerkhof E, Williamson T, Tranmer J. Association between registered nurse staffing and management outcomes of patients with type 2 diabetes within primary care: a cross-sectional linkage study. *CMAJ Open* 2016; 4(2): E264-E270.

25. Lee HY, Shin JH, Harrington C. Comparing the nurse staffing in Korean and U.S. nursing homes. *Nurs Outlook* 2015; 63(2): 137-143.

26. Kim H, Harrington C, Greene WH. Registered nurse staffing mix and quality of care in nursing homes: A longitudinal analysis. *Gerontologist* 2009; 49(1): 81-90.

McMaster University | Health Forum

>> mcmasterforum.org
forum@mcmaster.ca