Nursing Skill Mix

ONA
Ontario Nurses' Association

A Synopsis of the Literature

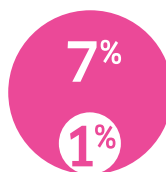**Ontario Nurses' Association**
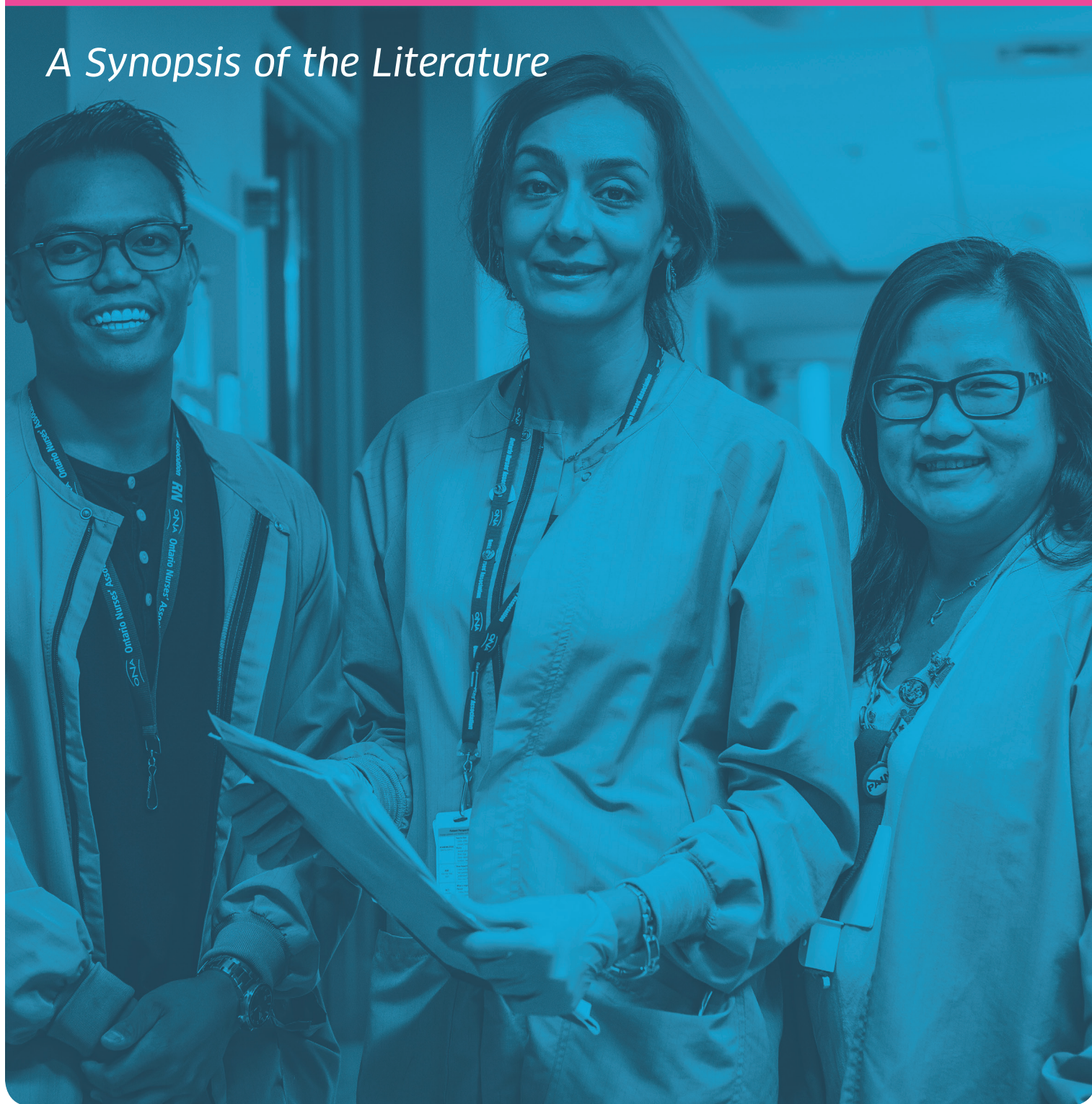
This summary is intended to provide an overview of the literature related to Nursing Skill Mix and is for informational purposes only. For more specific information and guidance, please speak to your Labour Relations Officer (LRO).
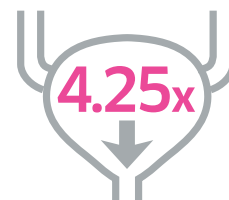
10% **5%**

Hospitals with a higher proportion of professional nurses (RNs) are associated with fewer adverse patient outcomes, lower patient mortality and higher patient ratings of their care.

For each 10% increase in the proportion of baccalaureate prepared or higher degree RNs, there is a decreased risk of failure to rescue and patient mortality by 5%.

7% **1%**

When professional nurses' workload is increased by 1% there is an increased likelihood of patient mortality by 7% within 30 days of admission.

4.25x

When the RN proportion of skill mix increased, the odds of urinary tract infections decreased by 4.25 times.

30

A higher proportion of casual and temporary nurses were associated with higher rates of 30-day patient mortality.

The economic savings from replacing RNs with other health care professionals may be offset by increased patient mortality and length of hospital stay.

16% **9%** **6%**
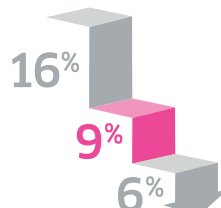
An increase of one RN FTE per patient day was associated with a reduction in the odds of death; 16% in surgical patients, 9% reduction in ICUs patients, and a 6% reduction in medical patients.

RN work often unappreciated. Read the full editorial online: http://qualitysafety.bmj.com/content/early/2016/12/30/bmjqs-2016-006197
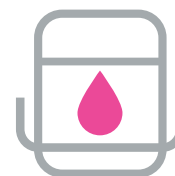
Greater number of hours of care by RNs per day and higher proportion of hours of nursing care provided by RNs are associated with better patient care.

2%
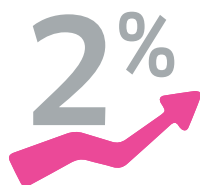
There is an estimated 2% increase in the risk of patient mortality for each shift the unit was short staffed by RNs.

With an increase in the proportion of RNs there is a decrease in pneumonia, urinary tract infections, and shock or cardiac arrest.

More RNs present during hemodialysis (i.e. a richer RN skill mix) and processes of nursing care provided by RNs are necessary to reduce the odds of adverse patient outcomes.

Hospitals should maximize the proportion of RNs in providing direct care.

Hospitals should maximize the proportion of RNs and the proportion of baccalaureate prepared RNs throughout hospital nursing staff.
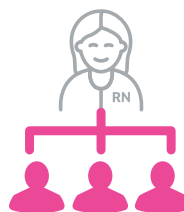
When each RN cares for fewer patients, patients are less likely to be readmitted to the hospital within 15-30 days post discharge.
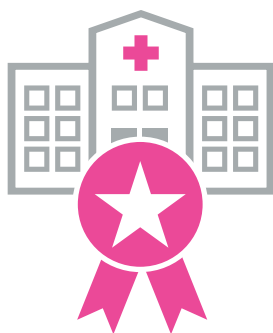
Costs to increase hospital RN staffing could be offset by costs avoided through reducing postdischarge utilization.

The purpose of the study is to determine the association of hospital nursing skill mix with patient mortality, patient ratings of their care, and quality of care indicators in six European countries.

The study reveals that for each 10% increase in the proportion of professional nurses (RNs) is associated with an 11% decrease in the odds of patient mortality after general surgery. In addition, replacing lower qualified personnel (eg. RPNs and PSWs) with professional nurses may lead to an increase in preventable deaths and preventable adverse outcomes for patients. Hospitals with higher skill mix (higher proportion of professional nurses) reported fewer common adverse patient outcomes such as; falls with injuries, urinary tract infections and pressure ulcers.

The study concludes that hospitals with a higher proportion of professional nurses are associated with fewer adverse patient outcomes, lower patient mortality and higher patient ratings of their care.

This study examines if the proportion of hospital registered nurses (RN) with a baccalaureate level or higher degree was associated with lower risk-adjusted mortality and failure to rescue, and if educational backgrounds of RNs are predictors of patient mortality beyond nursing experience and staffing.

The study reveals that for each 10% increase in the proportion of baccalaureate prepared or higher degree RNs, there is a decreased risk of failure to rescue and patient mortality by 5% (after controlling for hospital and patient characteristics).

The study concludes that patients experience lower failure to rescue and mortality rates when there are a higher proportion of RNs educated at the baccalaureate level or higher.
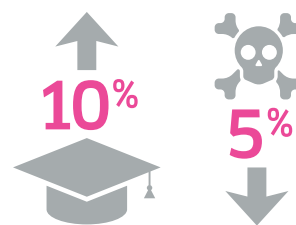

Hospitals with a higher proportion of professional nurses (RNs) are associated with fewer adverse patient outcomes, lower patient mortality and higher patient ratings of their care.

For each 10% increase in the proportion of baccalaureate prepared or higher degree RNs, there is a decreased risk of failure to rescue and patient mortality by 5%.
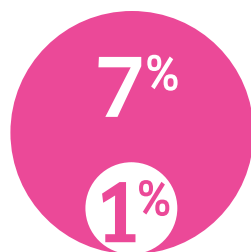
Aiken, L. H., Sloane, D. M., Bruyneel, L., Van den Heede, K., Griffiths, P., Busse, R., et al. (2014). **Nurse staffing and education and hospital mortality in nine European countries: A retrospective observational study.** *Lancet, 383*(9931), 1824-1830. doi:10.1016/S0140-6736(13)62631-8.

Boblin, S., Baxter, P., Alvarado, K., Baumann, A., & Akhtar-Danesh, N. (2008). **Registered nurses and licensed/registered practical nurses: A description and comparison of their decision-making process.** *Nursing Leadership (1910-622X), 21*(4), 56-72.

The study assesses whether differences in patient-to-nurse ratios and nurses' educational qualifications are associated with variations in hospital mortality after having surgical procedures.

The term nurse in this study refers to fully qualified professional nurses (RNs). The study examines data from nine of the 12 RN4CAST countries that have similar patient discharge data.

The study reveals that when nurses' workload is increased by 1% there is an increased likelihood of patient mortality by 7% within 30 days of admission. In addition, for each 10% increase in bachelor's degree nurses, there was a decrease by 7% in patient mortality within 30 days of admission.

The study suggests that hospitals should have safe levels of nurse staffing, which may help reduce surgical patient mortality, and that increased emphasis on bachelor's education for nurses could prevent patient deaths.

This study identifies the challenges being faced by the profession, regulatory bodies and employers to define the differences and similarities between the two categories (registered nurses (RN) and licensed/registered practical nurses (L/RPN)) of nurses in Canada.

The study presents results from a larger study of RNs and L/RPNs descriptions of their decision making process through the use of surveys and focus groups. The findings indicate that RNs reported greater frequency than L/RPNs in eight decision-making elements:

"(a) assessing the client or situation; (b) identifying the problem, need or issue; (c) identifying alternative courses of action; (d) identifying possible outcomes or consequences; (e) considering the likelihood of outcomes; (f) considering the risks and benefits to the client; (g) selecting an intervention or action; and (h) evaluating outcomes". (Boblin et al., 2008, p. 62).

In addition, as compared to RNs, L/RPNs found it more difficult to: "(a) identify the possible outcomes or consequences; and (b) select an intervention or action" (Boblin et al., 2008, p. 62).

Overall, the study reveals that RNs are more frequently involved in elements of the decision-making process; thus, they are better prepared to make decisions where there is an increase in client complexity. Should L/RPNs be used in these circumstances, organizations should have supports in place, such as the ability for the L/RPN to consult with an RN.

7%

1%

When professional nurses' workload is increased by 1% there is an increased likelihood of patient mortality by 7% within 30 days of admission.

The purpose of the study is to examine nurse staffing and RN skill mix patterns and its impact on patient outcomes in medical-surgical units.

The study reveals that after controlling for hospital case mix, size, location and ownership characteristics, when the total hours of nursing care per patient day increased, the odds of urinary tract infections among patients in hospital decreased by 1.013 times.

In addition, when the proportion of RN skill mix increased, the odds of urinary tract infections decreased by 4.25 times.

The study also found that after controls were in place as aforementioned, the higher the RN proportion of skill mix, the shorter the length of stay in hospital.

This study is a cross sectional analysis that assesses the effects and importance of nurse education, skill mix, quality of work environment and continuity of care in predicting 30-day patient mortality.

The results of the study reveal that a higher proportion of baccalaureate-prepared nurses, and a richer skill mix of registered nurses (RN) (i.e. Higher RN to non-RN ratios), and higher scores on collaborative nurse-physician relationships were associated with lower rates of 30-day patient mortality. In addition, a higher proportion of casual and temporary nurses were associated with higher rates of 30-day patient mortality.

The study suggests that attention to the improvement of modifiable conditions (i.e. higher nurse education levels, richer skill mix of RNs, lower temporary and casual employment, and collaborative nurse-physician relationships) that influence 30-day patient mortality has the potential to improve the prognosis for patients. Furthermore, to help improve patient and system outcomes, hospitals should focus on implementing policies that better the work environment for nurses.
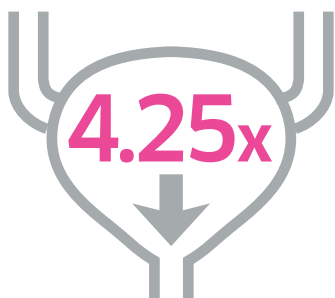
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30

A higher proportion of casual and temporary nurses were associated with higher rates of 30-day patient mortality.

Jacob, E., McKenna, L., & D'Amore, A. (2013). **The changing skill mix in nursing: Considerations for and against different levels of nurse.** *Journal of Nursing Management, 23*(4), 421-426. doi: 10.1111/jonm.12162.
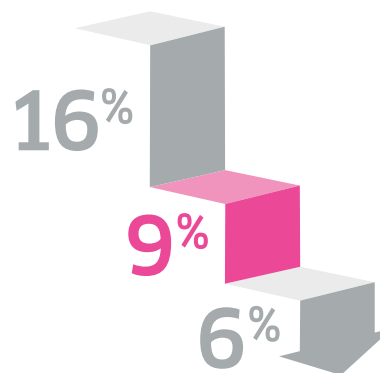
Kane, R., Shamliyan, T., Mueller, C., Duval, S., & Wilt, T. (2007). **The association of registered nurse staffing levels and patient outcomes. Systematic review and meta-analysis.** *Medical Care, 45*(12), 1195-1204.

This commentary examines arguments from various sources that are for and against nursing skill mix to help address the shortage of nurses in the workforce and rising health-care costs.

The article identifies that decisions on how appropriately to mix skills depends on three main issues: workforce shortages, quality issues and economic considerations. The article highlights studies that show the greater the number of registered nurses (RN) in hospitals is associated with a reduction in the length of hospital stay and decreased patient complications.

The article concludes that the economic savings from replacing RNs with other health care professionals may be offset by increased patient mortality and length of hospital stay.

The study conducts a systematic review and meta-analysis on the association between registered nurse (RN) staffing and patient outcomes in acute care hospitals.

One of the findings in the study indicates that an increase of one RN FTE per patient day was associated with a 16% reduction in the odds of death in surgical patients, a 9% reduction in ICUs patients, and a 6% reduction in medical patients.

The study reveals that greater RN staffing was associated with a reduction in the adjusted odds ratio of hospital related mortality, various adverse patient outcomes, shorter length of stay and failure to rescue.

The study explains that should hospitals commit to; high quality of care, access to affordable health care and implementation of evidence-based clinical practice, these may lead to better patient outcomes as a result of greater RN staffing.

The economic savings from replacing RNs with other health care professionals may be offset by increased patient mortality and length of hospital stay.

16%
9%
6%

An increase of one RN FTE per patient day was associated with a reduction in the odds of death; 16% in surgical patients, 9% reduction in ICUs patients, and a 6% reduction in medical patients.

This editorial includes a comprehensive description about the work of the registered nurse (RN) which is often unappreciated and unnoticed.

Needleman describes the work of RNs as complex, as well as cognitively and managerially demanding. The work of the RN involves assessing and monitoring patients, determining if patients are at risk for infections, falls and other complications, and if patients are progressing as expected.

RNs monitor pain in patients and take the corrective action to control it. They provide education to both the patient and family, psychological support to patients with serious illness, and prepare both patients and family for self-care after discharge. RNs engage in critical roles in team-based care, supporting pharmacists and physicians by ensuring medications and other orders are prescribed and administered correctly.

RNs advocate for their patients and serve as their patients' primary coordinator of care. The above activities are implemented by nurses for each patient (4, 5, 6 or more patients) at the same time, thus imposing a significant amount of managerial and other demands on the frontline RNs.

The study examines the relationship between the levels of nurse staffing in hospitals and the rates of adverse patient outcomes.

The study reveals that among medical patients, a greater number and higher proportion of hours of care per day provided by RNs were associated with lower rates of urinary tract infections and upper gastrointestinal bleeding, and shorter length of stay.

In addition, a higher proportion of hours of care provided by RNs were also associated with lower rates of shock or cardiac arrest, pneumonia and failure to rescue. In surgical patients, a higher proportion of RN hours were associated with a lower rate of urinary tract infections and a greater number of RN hours per day were associated with lower rates of failure to rescue.

The study concludes that the greater number of hours of care by RNs per day and the higher proportion of hours of nursing care provided by RNs are associated with better patient care.

RN work often unappreciated.
Read the full editorial online:
http://qualitysafety.bmj.com/content/
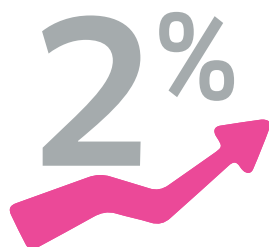early/2016/12/30/bmjqs-2016-006197

Greater number of hours of care by RNs per day and higher proportion of hours of nursing care provided by RNs are associated with better patient care.

Needleman, J., Buerhaus, P., Pankratz, V., Leibson, C., Stevens, S., & Harris, M. (2011). **Nurse staffing and inpatient hospital mortality.** *New England Journal of Medicine, 364*(11), 1037-1045.

Needleman, J., Buerhaus, P., Stewart, M., Zelevinsky, K., & Mattke, S. (2006). **Nurse staffing in hospitals: Is there a business case for quality?.** *Health Affairs 25*(1), 204-211.

This study examines the association between mortality and day-to-day, shift-to-shift differences in staffing at the unit level of a large tertiary academic medical center that has high average nurse staffing levels and lower-than-expected mortality.

One of the findings in the study reveals that there is an estimated 2% increase in the risk of patient mortality for each shift the unit was short staffed by RNs.

The study's findings suggest that nurse staffing models that support shift-to-shift decisions on the basis of matching RN staffing with the patient census and patients' needs are a significant component in the delivery of health care.
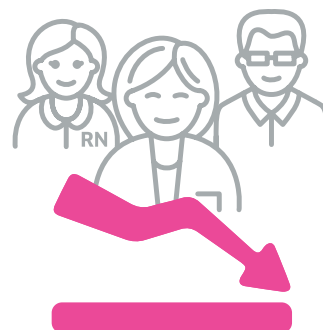
This study provides data for policy makers and hospitals to be mindful of both the business and social cases for investing in nursing staff by estimating the costs to increase staffing and the cost savings from reduced length-of-stay, decreased adverse patient outcomes and avoided deaths associated with higher nurse staffing levels.

The study explains that with an increase in the proportion of RNs there is a decrease in pneumonia, urinary tract infections, and shock or cardiac arrest. These adverse patient outcomes are sensitive to the RN/LPN/RPN mix because RN education and skills in patient assessment and intervention are heavily utilized to prevent these adverse outcomes.

The study illustrates that the cost to increase the proportion of RNs without changing the licensed nursing hours is lower than the costs associated with the two other options outlined in the study.

2%

There is an estimated 2% increase in the risk of patient mortality for each shift the unit was short staffed by RNs.

With an increase in the proportion of RNs there is a decrease in pneumonia, urinary tract infections and shock or cardiac arrest.

Thomas-Hawkins, C., Flynn, L., & Clarke, S. (2008). **Relationships between RN staffing, processes of nursing care and nurse-reported patient outcomes in chronic hemodialysis units.** *Nephrology Nursing Journal, 35*(2), 123-131.

Tourangeau,A.,Doran, D., Hall,L., O'Brien Pallas, L., Pringle, D.,Tu,J ., & Cranley,L. (2007). **Impact of hospital nursing care on 30-day mortality for acute medical patients.** *Journal of Advanced Nursing, 57*(1), 32 – 44.

This study examines the effects of RNs staffing levels and processes of nursing care on nurse-reported patient outcomes in hemodialysis units.

The study reveals that higher patient-to RN ratios (i.e. lower levels of RN staffing) were significantly related to higher frequencies of skipped dialysis treatments, patient complaints and shortened dialysis treatments. In addition, higher patient-to-RN ratios was significantly related to necessary nursing tasks left undone by RNs. These necessary tasks left undone by RNs were positively associated with frequencies of adverse patient events.

Furthermore, the failure to complete key processes of nursing care and lower RN staffing levels contributed to a greater likelihood of adverse patient events.

Overall, the study concludes that more RNs present during hemodialysis (i.e. a richer RN skill mix) and processes of nursing care provided by RNs are necessary to reduce the odds of adverse patient outcomes.

The purpose of the study is to identify nursing-related determinants of risk-adjusted 30-day mortality for acute medical patients in Ontario hospitals.

The findings from the study reveal that a higher proportion of baccalaureate prepared nurses, a higher proportion of RNs, a higher nurse-reported adequacy of staffing and resources, a higher use of care maps and higher nurse-reported quality of care, were associated with a lower 30-day hospital mortality rates for acute medical patients.

The study recommends that hospitals maximize the proportion of RNs in providing direct care, hire and retain baccalaureate prepared nurses to care for acute medical patients, and invest in the development, use, and systematic updating of protocols or care maps to guide patient care.

More RNs present during hemodialysis (i.e. a richer RN skill mix) and processes of nursing care provided by RNs are necessary to reduce the odds of adverse patient outcomes.

Hospitals should maximize the proportion of RNs in providing direct care.

Tourangeau, A., Cranley, L. & Jeffs, L. (2006). **Impact of nursing on hospital patient mortality: A focused review and related policy implications.** Q*ual Saf Health Care, 15*(1), 4-8.
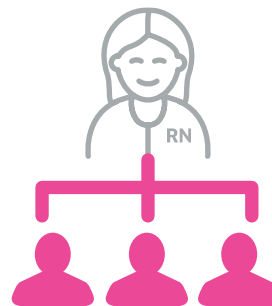
H., Sloane, D. M., & Aiken, L. H. (2013). **An observational study of nurse staffing ratios and hospital readmission among children admitted for common conditions.** *BMJ Quality & Safety, 22*(9), 735-742. doi:10.1136/ bmjqs-2012-001610.

The study provides a focused review of the hospital characteristics that prevent mortality and minimize unnecessary patient deaths.

Seven categories of determinants of mortality were derived from incorporating the findings of 15 studies. The categories of determinants of mortality are as follows: nursing-physician relationships, physician characteristics, nursing staffing characteristics, nurse experience, registered nurse educational preparation, clinical nursing support and professional practice environment.

The study offers four recommendations for health-care decision making and policy development to enhance patient safety and to reduce unnecessary patient death.

One of the four recommendations is to maximize the proportion of RNs and the proportion of baccalaureate prepared RNs throughout hospital nursing staff.

The study examines the association between hospital RN staffing ratios and readmission of paediatric patients for common medical and surgical conditions within 14 days and 15-30 days post discharge.

The study reveals that children receiving care in a hospital with a staffing benchmark of four or fewer paediatric patients per nurse were associated with a 24% (medical patients) and 63% (surgical patients) decrease in the risk of 15-30 day readmission.

Higher nurse staffing ratios (fewer RNs) were associated with an increase (15%) of readmission for medical paediatric patients within 15-30 days post discharge. With regards to paediatric nurse staffing ratios, for each one patient increase in the ratio there is an 11% (medical patients) and 48% (surgical patients) increase in the patient's odds of readmission within 15-30 days.

The study concludes that when each RN cares for fewer patients, patients are less likely to be readmitted to the hospital within 15-30 days post discharge.

Hospitals should maximize the proportion of RNs and the proportion of baccalaureate prepared RNs throughout hospital nursing staff.

When each RN cares for fewer patients, patients are less likely to be readmitted to the hospital within 15-30 days post discharge.

Weiss, M. E., Yakusheva, O., & Bobay, K. L. (2011). **Quality and cost analysis of nurse staffing, discharge preparation, and postdischarge utilization.** *Health Services Research, 46*(5), 1473–1494. http://doi.org/10.1111/j.1475-6773.2011.01267.x.

The purpose of the study is to determine the impact of RN & non-RN overtime/non-overtime staffing on the quality of discharge teaching, postdischarge readmission, patient perception of discharge readiness and Emergency Department (ED) visits.

The study reveals that in the first 30 days post hospital discharge, when nursing units had higher RN non-overtime staffing, patient readmissions were lower and when RN overtime staffing was higher, postdischarge occurrence of ED visits increased.

The study also found when RN hours were higher, there was a higher reported quality of discharge teaching. In addition, RN non-overtime staffing reduced ED visits indirectly through discharge readiness and quality of discharge teaching.

The study further reveals that the costs to increase hospital RN staffing could be offset by costs avoided through reducing postdischarge utilization.

Costs to increase hospital RN staffing could be offset by costs avoided through reducing postdischarge utilization.

Additional Resources

Canadian Nurses Association. (2003). ***Staffing decision for the delivery of safe nursing care*** *[Position statement].* Ottawa: Author.

College of Nurses of Ontario. (2015). ***Professional standards, Revised 2002*** *[Practice standard].* Toronto: Author.

College of Nurses of Ontario. (2014). ***RN and RPN Practice: The Client, the nurse and the environment*** *[Practice guideline].* Toronto: Author.

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Grinspun, D., Harripaul-Yhap, A., Jarvi, K., & Lenartowych, T. (2016). ***Mind the safety gap in health system transformation: Reclaiming the role of the RN.*** Toronto: Registered Nurses' Association of Ontario.

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Registered Nurses Association of Ontario (RNAO). (2017). ***Developing and sustaining safe, effective staffing and workload practices*** *[Best practice guideline]* (2nd ed.). Toronto: Author.

Registered Nurses' Association of Ontario (RNAO). (2015). ***Person and family-centred care*** *[Best practice guideline].* Toronto: Author.

The Canadian Federation of Nurses Union. (2014). ***Valuing patient safety responsible workforce design.*** Ottawa: Author.

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