March 2017 – SUPPORT Summary of a systematic review

Do changes to hospital nurse staffing models improve patient and staff-related outcomes?

Many countries have introduced new nurse staffing models in hospitals to respond to changing patient care needs and shortages of qualified nursing staff. These new models include changes in the mix of skills, qualifications or staffing levels within the hospital workforce, and changes in nursing shifts or work patterns. Nurse staffing might be associated with the quality of care that patients receive and with patient outcomes.

Key messages

➔ **The addition of a specialist nursing post to staffing may decrease patient length of stay; and may lead to little or no difference in in-hospital mortality, readmissions, attendance at emergency departments within 30 days, or post-discharge adverse events.**

➔ **Adding support staff (dietary assistants) to nurse staffing may decrease mortality in trauma units, in hospital, and at 4 months after discharge.**

➔ **Team midwifery shortens the length of stay in special care nurseries for infants, slightly shortens the length of stay in hospital for women giving birth, and probably leads to little or no difference in perinatal deaths.**

➔ **None of the included studies was conducted in a low-income country.**

Who is this summary for?

People deciding whether to change hospital nurse staffing

! This summary includes:

- **Key findings** from research based on a systematic review
- **Considerations about the relevance of this research** for low-income countries

X Not included:

- Recommendations
- Additional evidence not included in the systematic review
- Detailed descriptions of interventions or their implementation

This summary is based on the following systematic review:

Butler M, Collins R, Drennan J, et al. Hospital nurse staffing models and patient and staff-related outcomes. Cochrane Database Syst Rev 2011; (7):CD007019.

What is a systematic review?

A summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise the relevant research, and to collect and analyse data from the included studies

SUPPORT was an international project to support the use of policy relevant reviews and trials to inform decisions about maternal and child health in low- and middle-income countries, funded by the European Commission (FP6) and the Canadian Institutes of Health Research.

Glossary of terms used in this report: www.supportsummaries.org/glossary-of-terms

Background references on this topic: See back page

Background

Hospitalised patients have become more seriously ill, requiring more intensive nursing care and ageing populations are further stretching nursing resources. A range of nurse staffing model interventions has been introduced across countries to address nursing shortages. These models include changes to nurse staffing levels and skill mix, changes in nurse education, changes to staff allocation models and shift patterns, and greater use of overtime and agency staff. The numbers of nurses available in a hospital or hospital unit (staffing levels) can be quantified in relation to the nurse per patient ratio or in terms of hours of nursing care. Skill mix may refer to the mix of "licensed/registered" and "unlicensed/unregistered" staff or the proportion of different nursing levels of qualification, expertise, or experience.

How this summary was prepared

After searching widely for systematic reviews that can help inform decisions about health systems, we have selected ones that provide information that is relevant to low-income countries. The methods used to assess the reliability of the review and to make judgements about its relevance are described here: www.supportsummaries.org/how-support-summaries-are-prepared/

Knowing what's not known is important

A reliable review might not find any studies from low-income countries or might not find any well-designed studies. Although that is disappointing, it is important to know what is not known as well as what is known.

A lack of evidence does not mean a lack of effects. It means the effects are uncertain. When there is a lack of evidence, consideration should be given to monitoring and evaluating the effects of the intervention, if it is used.

About the systematic review underlying this summary

Review objective: To determine the effect of hospital nurse staffing models on patient and staff-related outcomes

Types of	What the review authors searched for	What the review authors found
Study designs & Interventions	Randomised trials, non-randomised trials, controlled before- after studies, and interrupted time series studies of interventions relating to hospital nurse staffing models	15 studies (8 randomised trials, 2 non-randomised trials, and 5 controlled before- after studies). 4 studies assessed primary nursing, self-scheduling, and team midwifery; and 11 studies related to nursing skill-mix (9 examining the addition of specialist nurses to usual staffing; 2 examining increases in the proportion of support staff versus usual nursing staff).
Participants	Patients and nursing staff	*Nursing staff*: midwives; surgical, medical and gynaecological ward nurses; nurse case managers; clinical nurse specialists; nursing assistants; advance practice nurses *Patients*: pregnant women; women scheduled for surgery; women admitted with hip fractures; people with breast cancer, diabetes, mental health problems, multiple sclerosis, myocardial infarctions
Settings	Hospital settings worldwide	Unites States (7), United Kingdom (4), Australia (1), The Netherlands (2), and Canada (1)
Outcomes	Any objective measure of patient or staff-related outcome	Staff-related outcomes: absenteeism, staff retention and staff turnover; Patient outcomes: patient falls, medication errors and adverse incidents, length of stay, patient mortality, re-admission and attendance at the emergency department post-discharge; and Costs
Date of most recent search: May 2009		
Limitations: This is well-conducted systematic review with only minor limitations.		

Butler M, Collins R, Drennan J, et al. Hospital nurse staffing models and patient and staff-related outcomes. Cochrane Database Syst Rev 2011; (7):CD007019.

Summary of findings

15 studies were included on the impacts of nurse staffing models.

1) Addition of a specialist nursing post to nurse staffing

The impact of specialist nursing roles on patient outcomes was assessed in eight studies. Specialist nurse roles varied from study to study, but all were focused around the needs of specific groups of patients, such as patients with diabetes, multiple sclerosis, myocardial infarction, mental health problems, or gynaecological problems. The role of the specialist nurse usually involved co-ordinating care, including arranging tests and procedures, assessing patients, planning their care and reviewing their progress, undertaking or prescribing specific interventions based on assessed needs, and educating patients, nurses, and other staff.

➔ **The addition of a specialist nursing post to staffing may decrease patient length of stay. The certainty of this evidence is low.**

➔ **The addition of a specialist nursing post to staffing may lead to little or no difference in in-hospital mortality, readmissions, attendance at emergency departments within 30 days of discharge, or post-discharge adverse events. The certainty of this evidence is low.**

About the certainty of the evidence (GRADE) *

⨁⨁⨁⨁
High: This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different† is low.

⨁⨁⨁◯
Moderate: This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different† is moderate.

⨁⨁◯◯
Low: This research provides some indication of the likely effect. However, the likelihood that it will be substantially different† is high.

⨁◯◯◯
Very low: This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different† is very high.

* This is sometimes referred to as 'quality of evidence' or 'confidence in the estimate'.

† Substantially different = a large enough difference that it might affect a decision

See last page for more information.

Adding a specialist nursing post to nurse staffing compared to usual nurse staffing

People Patients with a range of health issues
Settings Hospital
Intervention The addition of a specialist nursing post(s) to staffing
Comparison Usual nurse staffing

Outcomes	Usual nurse staffing	The addition of a specialist nursing post(s) to staffing	Relative effect (95% CI)	Certainty of the evidence (GRADE)
	Absolute effect (95% CI)			
In-hospital mortality	97 per 1000	93 per 1000 (57 to 151)	RR 0.96 (0.59 to 1.56)	⨁⨁◯◯ Low
Re-admission Study population	174 per 1000	200 per 1000 (153 to 264)	RR 1.15 (0.88 to 1.52)	⨁⨁◯◯ Low
Medium risk* population	144 per 1000	166 per 1000 (127 to 219)		
Attendance at ED within 30 days	192 per 1000	219 per 1000 (152 to 311)	RR 1.14 (0.79 to 1.62)	⨁⨁◯◯ Low
Post-discharge adverse events#	228 per 1000	235 per 1000 (160 to 349)	RR 1.03 (0.7 to 1.53)	⨁⨁◯◯ Low
Patient length of stay		1.35 fewer days (1.92 to 0.78 fewer days)		⨁⨁◯◯ Low

Margin of error = Confidence interval (95% CI) RR: Risk ratio GRADE: GRADE Working Group grades of evidence (see above and last page)

*The assumed risks are drawn from the control group risk across the studies and in part imply patients with less serious health problems.
#One study found that the use of specialist nurses may reduce the incidence of pressure ulcers.

2) Adding support staff (dietary/dietetic assistants) to nurse staffing

The review identified two studies that assessed the addition of dietetic technicians to nurse staffing. This staff, trained (during one or two years) in dietetics and nutrition care, is involved in planning, implementing and monitoring nutritional programs and services in facilities.

➔ **Adding dietary assistants to nurse staffing decrease mortality in trauma units, in hospital, and 4 months after discharge. The certainty of this evidence is low.**

Adding dietary assistants to nurse staffing compared to usual nurse staffing

People Women aged over 65 admitted to a single trauma ward with hip fracture
Settings Hospital
Intervention The addition of dietary assistants (with 14 days of orientation and training) to nurse staffing
Comparison Usual nurse staffing

Outcomes	Usual nurse staffing	Adding dietary assistants to nurse staffing	Relative effect (95% CI)	Certainty of the evidence (GRADE)
	Absolute effect (95% CI)			
Mortality - Deaths in trauma unit	102 per 1000	42 per 1000 (16 to 103)	RR 0.41 (0.16 to 1.01)	⨁⨁◯◯ Low
Mortality - Deaths in hospital	146 per 1000	82 per 1000 (43 to 160)	RR 0.56 (0.29 to 1.09)	⨁⨁◯◯ Low
Mortality - Deaths at 4 months after discharge	229 per 1000	131 per 1000 (78 to 218)	RR 0.57 (0.34 to 0.95)	⨁⨁◯◯ Low

Margin of error = Confidence interval (95% CI) RR: Risk ratio GRADE: GRADE Working Group grades of evidence (see above and last page)

3) Introducing new rosters or shifts versus usual shifts

One study that examined the effect of introducing a self-scheduling system on staff-related outcomes found that this may lead to a reduction in staff turnover. The certainty of this evidence is low.

4) Primary nursing versus usual nursing models

Primary nursing is a system for the distribution of nursing care in which care of one patient is managed for the entire 24-hour day by one nurse who directs and coordinates nurses and other personnel. Two studies examined the effect of introducing primary nursing on staff-related outcomes. The effect of these interventions on absenteeism and turnover rates is uncertain because the evidence is of very low certainty.

5) Team midwifery versus standard care

The introduction of team midwifery (defined as a group of midwives providing care and taking shared responsibility for a group of women from the antenatal period through the intrapartum and postnatal periods) versus standard care, was evaluated in one study.

➔ **Team midwifery shortens the length of stay in special care nurseries for infants and slightly shortens the length of stay in hospital for women giving birth. The certainty of this evidence is high.**

➔ **Team midwifery probably leads to little or no difference in perinatal deaths. The certainty of this evidence is low.**

Team midwifery compared to standard maternity care				
People	Patients with maternity care outcomes			
Settings	Hospital			
Intervention	Team midwifery			
Comparison	Standard care			
Outcomes	**Standard maternity care**	**Use of team midwifery**	Relative effect (95% CI)	Certainty of the evidence (GRADE)
	Absolute effect (95% CI)			
Perinatal deaths	9 per 1000	11 per 1000 (3 to 40)	RR 1.22 (0.33 to 4.5)	⊕⊕⊕◯ Moderate
Length of stay in special care nursery for infants		2 fewer days (2.07 to 1.93 lower)		⊕⊕⊕⊕ High
Length of stay in hospital for women giving birth		0.3 fewer days (0.54 to 0.06 fewer days)		⊕⊕⊕⊕ High
Margin of error = Confidence interval (95% CI) RR: Risk ratio GRADE: GRADE Working Group grades of evidence (see above and last page)				

Relevance of the review for low-income countries

➔ Findings	▷ Interpretation*
APPLICABILITY	
➔ **The trials included in the review were conducted in high-income countries.**	▷ *When assessing the transferability of these findings to low-income countries the following factors should be considered:* – *The availability and training of nurses* – *The acceptability, feasibility and costs of different nurse staffing models. In particular, nurse and other health professional associations may need to be consulted* – *The ability of the health system and hospitals to support the implementation of new nurse staffing models*
EQUITY	
➔ **There was no information in the included studies regarding the differential effects of the interventions on resource-disadvantaged populations.**	▷ *The resources needed for training may be less available in disadvantaged settings.* ▷ *These interventions may increase inequities if they are not applied or adapted to populations in rural or remote areas.*
ECONOMIC CONSIDERATIONS	
➔ **The systematic review did not address economic considerations.**	▷ *Scaling up nurse staffing will require resources, and a well functioning and coordinated health system.* ▷ *Local cost studies should be considered prior to scaling up nurse staffing.*
MONITORING & EVALUATION	
➔ **There is little evidence from rigorous studies for several of the comparisons considered in this review.**	▷ *Larger and more rigorous studies to determine the effects and the cost-effectiveness of alternative nurse staffing models and educational interventions are needed, particualarly in low-income countries.*

*Judgements made by the authors of this summary, not necessarily those of the review authors, based on the findings of the review and consultation with researchers and policymakers in low-income countries. For additional details about how these judgements were made see: www.supportsummaries.org/methods

Additional information

Related literature

These systematic reviews provide additional information on the effects of nurse staffing on other outcomes:

Fernandez R, Johnson M, Tran DT, et al. Models of care in nursing: a systematic review. Int J Evid Based Healthc 2012; 10(4):324-37.

Pearson A, Pallas LO, Thomson D, et al. Systematic review of evidence on the impact of nursing workload and staffing on establishing healthy work environments. Int J Evid Based Healthc 2006; 4(4):337-84.

This systematic review provides information about team midwifery:

Sandall J, Soltani H, Gates S, et al. Midwife-led continuity models versus other models of care for childbearing women. Cochrane Database Syst Rev 2013; (8):CD004667.

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Conflict of interest

None declared. For details, see: www.supportsummaries.org/coi

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The summary should be cited as

Ciapponi A. Do changes to hospital nurse staffing models improve patient and staff-related outcomes? A SUPPORT Summary of a systematic review. March 2017. www.supportsummaries.org

About certainty of the evidence (GRADE)

The "certainty of the evidence" is an assessment of how good an indication the research provides of the likely effect; i.e. the likelihood that the effect will be substantially different from what the research found. By "substantially different" we mean a large enough difference that it might affect a decision. These judgements are made using the GRADE system, and are provided for each outcome. The judgements are based on the study design (randomised trials versus observational studies), factors that reduce the certainty (risk of bias, inconsistency, indirectness, imprecision, and publication bias) and factors that increase the certainty (a large effect, a dose response relationship, and plausible confounding). For each outcome, the certainty of the evidence is rated as high, moderate, low or very low using the definitions on page 3.

For more information about GRADE:
www.supportsummaries.org/grade

SUPPORT collaborators:

The Cochrane Effective Practice and Organisation of Care Group (EPOC) is part of the Cochrane Collaboration. The Norwegian EPOC satellite supports the production of Cochrane reviews relevant to health systems in low- and middle-income countries .
www.epocoslo.cochrane.org

The Evidence-Informed Policy Network (EVIPNet) is an initiative to promote the use of health research in policymaking in low- and middle-income countries. www.evipnet.org

The Alliance for Health Policy and Systems Research (HPSR) is an international collaboration that promotes the generation and use of health policy and systems research in low- and middle-income countries.
www.who.int/alliance-hpsr

Norad, the Norwegian Agency for Development Cooperation, supports the Norwegian EPOC satellite and the production of SUPPORT Summaries.
www.norad.no

The Effective Health Care Research Consortium is an international partnership that prepares Cochrane reviews relevant to low-income countries. www.evidence4health.org

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