Effect of the hospital nursing environment on patient mortality: a systematic review
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CRD summary
This review assessed whether attributes of hospital nursing practices affect outcomes of patient care including mortality. The authors concluded that a broad interpretation of the studies indicates that social and environmental attributes have an effect on outcomes of care. The authors’ conclusions seem appropriate, but due to the paucity of high-quality studies may not be particularly robust.

Authors’ objectives
To assess whether workplace attributes such as nurse autonomy, nursing work demands, nursing management, inter-professional relationships, standards of practice and career ladder progression, affect patient mortality.

Searching
MEDLINE (1966 to June 2001), HealthSTAR (1975 to June 2001), EMBASE (1988 to June 2001), CINAHL (1982 to June 2001) and Current Contents (1996 to June 2001) were searched without language restrictions; the search terms were reported. The searches on MEDLINE and CINAHL were updated in March 2004. In addition, the Cochrane Library, Dissertation Abstracts, web catalogues and the databases of professional organisations were searched for unpublished or ongoing studies. The references of all retrieved studies were checked.

Study selection
Study designs of evaluations included in the review
Studies of any design were eligible for inclusion. Narrative reviews and opinion pieces were excluded.

Specific interventions included in the review
Studies that assessed an attribute of the hospital nursing environment were included. Studies that evaluated the effects of recent changes in hospital structure, specific administrative tools, programmes (e.g. outreach or triage), specialised nursing staff or units, or that were conducted in developing countries, were excluded. The specific interventions assessed were nursing autonomy, workload, inter-professional relations, management, nursing standards, professional development and mediating processes.

Participants included in the review
Studies conducted in acute care hospital settings were included. Twelve of the included studies were conducted in intensive care units.

Outcomes assessed in the review
Studies that reported patient mortality rates were included.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed studies for inclusion. Any disagreements were resolved by discussion.

Assessment of study quality
The validity of the studies was assessed according to two dimensions: overall study validity and explicit case-mix adjustment. The overall validity criteria assessed were the methods of data collection, random sampling, geographic dispersal of the study sites, sample size, period of data collection, study design (randomised controlled trial, prospective or retrospective study) and whether adjustments were made in the analysis. The specific aspects of case-mix adjustment assessed were acute clinical stability, principal diagnosis and severity of diagnosis, co-morbidities, age, gender, socioeconomic and functional status, and dimensions relating to the use of particular health care interventions (e.g. surgery), prior hospitalisation and source of admission. The authors did not state how many reviewers performed the
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Data were extracted on patient mortality rates.

Methods of synthesis
How were the studies combined?
The studies were grouped according the intervention and combined in a narrative. Publication bias was not assessed.

How were differences between studies investigated?
Differences between the studies in methodological quality and methods of case-mix adjustment were tabulated.

Results of the review
Twenty-seven studies were included: 3 randomised controlled trials (RCTs), 7 prospective studies and 17 retrospective studies. The number of patients in the included studies was not reported.

The quality of the included studies varied considerably. Three of the studies were RCTs, two did not fulfil any of the validity assessment criteria, and in one study no validity assessment scores were reported. Eleven studies had used uniform methods of data collection, two had used methods of random sample to select hospitals for inclusion in the study, nine had used a sample of hospitals from dispersed geographic regions, 13 had included five or more hospitals in the study, seven were of a prospective design (excluding the 3 RCTs), nine had collected data for more than one year, and 17 had used statistical methods in the analysis.

Nursing autonomy (5 studies): 3 studies found an association between nursing autonomy and lower patient mortality rates. The remaining 2 studies found no significant association.

Nursing workload (10 studies): 8 studies found a correlation between nursing workload and patient mortality rates, but this was not consistent across the studies. Five studies found that greater nursing workload demands were associated with higher patient mortality rates, three found that increased workload was associated with lower patient mortality, and two found no association.

Inter-professional relations (10 studies): 6 studies found a significant positive association between nurse-physician relations and patient mortality, three found no association, and one had insufficient power to detect a difference. The two most rigorously conducted studies, produced disparate results.

Nursing management (6 studies): the one RCT that assessed the relationship between nursing care and patient mortality found no significant differences in mortality rates. Four other studies found lower rates associated with a diverse range of nursing management attributes, whilst one study found no association.

Nursing standards (3 studies): all 3 studies found a significant positive correlation between an attribute that represented a nursing standard and patient mortality. However, many of the case-mix and validity criteria were not fulfilled in the studies.

Professional development (4 studies): 3 studies found a significant negative association between nursing professional development and mortality. The fourth assessed the impact of a continuing education programme and found no significant association.

Mediating processes (3 studies): all 3 studies found lower mortality rates associated with favourable nurse-mediating processes.

Authors' conclusions
On balance, social and environmental attributes of hospital nursing practices have an effect on the outcomes of care, including mortality.

**CRD commentary**
The review question was broad but had been defined in terms of the interventions, participants and outcomes. Several sources were searched for relevant studies and measures were taken to minimise language and publication bias. Two reviewers were involved in selecting the studies for inclusion in the review. However, it was not reported how many reviewers were involved in the data extraction and validity assessment processes. Therefore, it is not known whether any steps were taken to minimise reviewer bias and errors. The quality of the primary studies had been adequately assessed and the results reported. The use of a narrative synthesis was appropriate given the differences between the studies, and some differences were discussed in relation to methodological quality. Overall, the authors’ conclusions seem appropriate given the evidence presented, but may not be robust given the paucity of high-quality studies.

**Implications of the review for practice and research**
**Practice:** The authors stated that the evidence provides insufficient insight into the development of optimal nursing environments.

**Research:** The authors stated that studies of greater methodological rigour of mechanisms linking practice environment and outcome are needed. Such studies should attempt to develop and standardise patient outcome measures and case-mix adjustment methods.

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