A meta-analysis of nurse practitioners and nurse midwives in primary care
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Authors' objectives
To evaluate the outcomes of nurse practitioners and nurse midwives, compared with physicians in primary care.

Searching
MEDLINE and Dissertation Abstracts were searched in June 1991 and in May 1992. National League for Nursing accredited master's programmes in nursing and all schools of public health were surveyed to obtain lists of relevant theses. Unpublished data on nurse practitioners' and nurse midwives' care were requested from 30 health care and professional organisations. Bibliographies of retrieved articles, research studies and other relevant documents were examined.

Study selection
Study designs of evaluations included in the review
Studies with an experimental, quasi-experimental or ex-post facto design, which allowed calculation of an effect size (ES), were included.

Specific interventions included in the review
Interventions provided by nurse practitioners or nurse midwives in primary care settings in either the United States or Canada, compared with physician interventions.

Participants included in the review
The participants were patients in primary care, including pregnant women.

Outcomes assessed in the review
Process of care measures such as the prescribing of drugs, and/or clinical outcomes such as functional status or foetal distress, were assessed. In total 33 outcomes were included.

How were decisions on the relevance of primary studies made?
The two authors applied the inclusion criteria independently; 98% inter-rater agreement was achieved, and any disagreements were resolved by discussion.

Assessment of study quality
Five criteria were used to evaluate quality: study design, assignment to provider, sample selection, blinding and experimental mortality. The two authors applied the five criteria independently.

Data extraction
Each author extracted data on to code sheets independently. Inter-coder agreement was 0.89, and any disagreements were resolved by discussion.

Methods of synthesis
How were the studies combined?
Weighted ES estimates were calculated for each variable in each study; if the same outcome was measured in at least 3 studies, ESs were combined.

How were differences between studies investigated?
Homogeneity analyses were carried out for each outcome, and outliers that contributed significantly to within-group
variance were removed. Those studies that used a randomised design were analysed separately, where possible, from those studies that did not randomise but controlled for patient risk factors. Where this was not possible the two types of studies were combined. A third set of analyses included all studies that contributed data for a particular outcome.

Results of the review
There were 38 studies of nurse practitioners with a total of 21,261 patients (12 randomised controlled trials, RCTs, and 26 non-randomised studies) and 15 studies of nurse midwives with a total of 7,066 patients (2 RCTs and 13 non-randomised studies).

Nurse practitioner/physician comparison studies.

Only patient compliance was assessed by randomised trials: nurse practitioners' patients scored higher than physicians' patients (ES 0.36, 95% confidence interval, CI: 0.08, 0.64, p=0.01). Randomised studies combined with studies controlling for patient severity: nurse practitioners ordered more laboratory tests than did physicians (ES 0.20, 95% CI: 0.10, 0.29, p<0.0001), their patients pathological conditions such as blood-pressure improved (ES 0.28, 95% CI: 0.04, 0.51, p=0.01) and they received higher patient satisfaction scores (ES 0.30, 95% CI: 0.20, 0.40, p<0.0001). There were no differences in quality of care, prescribing of drugs, functional status, number of visits per patient and use of the emergency room.

Nurse midwives/physician comparison studies.

Studies controlling for patient risk: with low-risk patients, nurse midwives used significantly less analgesia (ES -0.52, 95% CI: -0.76, -0.28, p<0.0001), anesthesia (ES -0.99, 95% CI: -1.23, -0.74, p<0.0001), foetal monitoring (ES -0.37, 95% CI: -0.57, -0.16, p=0.0003), forceps delivery (ES -0.48, 95% CI: -0.63, -0.33, p<0.0001), amniotomies (ES 0.37, 95% CI: -0.61, -0.14, p=0.001) and intravenous fluids (ES -0.72, 95% CI: -0.99, -0.46, p<0.0001). Rates of Caesarean sections were equivalent but midwives' patients had significantly more spontaneous abortions than physicians' patients (ES 0.41, 95% CI: 0.27, 0.56, p<0.0001). Foetal distress and 1-minute Apgar scores were the same, midwives delivered fewer low-birth weight babies than physicians (ES -0.10, 95% CI: -0.16, -0.03, p=0.001).

Cost information
The authors report that the individual studies did not include data on the costs.

Authors' conclusions
There was a lack of methodological rigour and logical formulation in many of the included studies, which leaves many unanswered questions about nurse practitioner/nurse midwives' practice. Future studies need to be conducted in controlled settings that provide sound data. The primary care process must be studied, outcomes must be sensitive indicators of the primary care process, and the cost-effective mix of providers needs to be addressed.

CRD commentary
The methods of this review are well-documented and clear. Searches for relevant published and unpublished studies were extensive, although the search dates for MEDLINE and Dissertation Abstracts were unclear. Although studies with different types of study design are included, the authors present the results separately for each grade of study. There is limited information on the types of patients included in this review.

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