Impact of packaged interventions on neonatal health: a review of the evidence
Haws R A, Thomas A L, Bhutta Z A, Darmstadt G L

CRD summary
This review evaluated the impact of packages of interventions intended to reduce neonatal mortality and morbidity in developing countries. The authors concluded that the evidence is weak and further research is needed. The review was based on a thorough literature search and these conclusions appear justified.

Authors’ objectives
To evaluate the impact of packages of interventions intended to reduce neonatal mortality and morbidity in developing countries.

Searching
MEDLINE (via PubMed), POPLINE, LILACS, African Index Medicus, and the databases of the Pan American Health Organization and the WHO Regional Office of the Eastern Mediterranean (EMRO) were searched; the search terms were not reported. Safe Motherhood and Child Survival monographs were searched manually. Further sources of primary studies were the Cochrane Library and the World Health Organization Reproductive Health Library. Agencies, institutions and leading public health researchers in developing countries were contacted for unpublished material. Papers in languages other than English were considered, providing an English abstract was available.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), prospective cohort studies, quasi-experimental studies and studies of retrospective design were eligible for inclusion.

Specific interventions included in the review
Studies of packages of two or more biologically plausible neonatal health interventions were eligible for inclusion; Accepted biologically plausible periconceptual and antenatal, intrapartum and postnatal interventions were listed. The included studies involved: antenatal interventions, mainly micronutrient supplementation, tetanus toxoid immunisation and/or birth preparedness; intrapartum interventions, mainly clean delivery practices, but also use of skilled delivery attendants and labour surveillance; and postnatal interventions, commonly birth attendant and community health worker training, postnatal visitation, maternal health education, breast-feeding promotion, newborn resuscitation, care of low birth weight (LBW) infants and hypothermia prevention/management. Postnatal interventions were the most common components of intervention packages.

Participants included in the review
Studies in developing countries were eligible for inclusion. A range of participant groups was selected in the included studies, including women, pregnant women, women with the human immunodeficiency virus, other at-risk women, neonates, LBW babies, infants and at-risk children.

Outcomes assessed in the review
The primary outcomes of interest were perinatal or neonatal mortality. The secondary outcomes were determinants of mortality and morbidity such as reductions in prematurity, rate of LBW, incidence of birth asphyxia, breast-feeding and infectious disease morbidity.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors stated that they did not assess validity as the included studies were too varied in design for standard scoring criteria to apply.

**Data extraction**
Two reviewers independently extracted the data. Any disagreements were resolved by consensus. Component interventions of each study were identified and categorised according to the time period of delivery and the service delivery mode.

**Methods of synthesis**
How were the studies combined?
The studies were combined in a narrative, accompanied by evidence tables.

How were differences between studies investigated?
The studies were tabulated according to study design, and RCTs of solely antenatal packaged interventions were tabulated separately from other RCTs. These tables enabled the comparison of component interventions and the outcomes of the included studies. The characteristics of, and differences between, studies were discussed under the following headings: service mode delivery; time period of interventions; packaging patterns versus existing recommendations; community mobilisation and participatory method; care-seeking components and behaviours; health systems and effectiveness trials; and public versus private provided in intervention delivery. Within the text and/or additional tables, mortality outcomes were compared for studies grouped by service delivery mode and by whether they used holistic or targeted packages of interventions.

**Results of the review**
Forty-one studies (more than 208,830 participants) were included: 19 RCTs (63,321 participants), 16 prospective cohort studies (more than 140,415 participants) and 6 retrospective/quasi-experimental non-controlled studies (more than 5,094 participants). The sample size ranged from 126 women to more than 100,000 births.

The 'Results' section of the review focused mainly on describing the types of studies and interventions found, the differences between them, and their limitations. Of significance, there were no interventions targeting women of reproductive age periconceptually, and no true effectiveness trials implemented at scale in a health systems setting.

Perinatal and neonatal data mortality outcome data were reported by 23 studies, including 7 RCTs, in the text (although there appeared to be 26 studies reporting mortality outcomes in the data extraction tables). Twenty studies reported moderate to sizeable declines in mortality rates (15 to 84% reduction), while three found no change in mortality. Of the 8 studies reporting greater than 50% reduction in mortality, three-quarters included tetanus toxoid immunisation and/or clean delivery, suggesting the effect was due to a decrease in tetanus cases.

The range of mortality reduction was comparable in holistic studies (more than 5 interventions spanning multiple time periods; 9 studies) and those with a targeted approach (5 or fewer interventions generally in a single time period; 12 studies).

**Cost information**
Two studies reported cost-effectiveness data. One study found a complete package of home-based care for LBW or pre-term babies in India, at a cost of US$5.30 per newborn and US$95 per life saved, to be equally effective as hospital care but lower in cost. An RCT of facilitating women's groups to implement essential newborn care practices reported a cost per newborn life saved of US$3,442 (US$4,397 when including the costs of health-strengthening activities).

**Authors’ conclusions**
The available evidence for the impact of neonatal health care packages provides a weak base for guiding effective public health programmes, and further research is needed.
CRD commentary
The review question and inclusion criteria were clear. Primary studies were sought using a range of strategies and sources. Both unpublished and non-English language studies were eligible for inclusion, thereby reducing the risk of publication and language biases. Although two reviewers independently extracted data from the studies, it is not clear whether similar steps were taken to minimise the introduction of errors and bias at the study selection stage. The review included a range of study designs; study design was considered in the synthesis of the studies, but the methodological quality of the studies was not assessed. The narrative synthesis was appropriate given the heterogeneity of the included studies, and details of the individual studies were presented clearly. The authors discussed at length the limitations of the evidence retrieved by a thorough literature search, and their conclusions appear justified.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated the need for effectiveness trials that make use of existing human and material resources in health systems and document external inputs including costs. There is also a need for high-quality research into intervention packages that employ multiple service delivery modes along the continuum of care from periconceptual to postnatal periods, and facilitate links between communities and available health care facilities. The authors also recommended research into scaling up the delivery of interventions to large populations and measuring their impact.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract
contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.