Effects of neonatal nutrition interventions on neonatal mortality and child health and development outcomes: a systematic review

Aamer Imdad, Rehana Salam, Zulfiqar A. Bhutta
Title of the review

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Background

Global child mortality is on the decline with 52% fewer under-five deaths in 2015 compared to 1990 (GBD 2015 Child Mortality Collaborators, 2016). However, the decrease in neonatal (0-28 days) mortality was lower (42%) during this period (GBD 2015 Child Mortality Collaborators, 2016). The main causes of neonatal morality include complications of preterm birth, birth asphyxia, congenital anomalies and infections (GBD 2015 Child Mortality Collaborators, 2016; GBD 2016 Causes of Death Collaborators, 2017).

Poor nutritional management at birth increases the risk of neonatal morbidity and mortality and adversely affects neonatal growth (Bhutta, 2013; Christian, 2015; Imdad, 2013). Early initiation of breastfeeding and exclusive breastfeeding during the first 6 months have been shown to reduce the risk of neonatal morbidity and mortality due to infections (Bhutta, 2013). Kangaroo Mother Care, or newborn skin-to-mother contact, has been shown to reduce mortality in low birth weight and preterm babies (Bhutta, 2013; Imdad, 2013). Other potential nutrition interventions include vitamin A supplementation in full-term and low birth weight babies, vitamin K supplementation, delayed cord clamping, and neonatal probiotic/prebiotic supplementation (Bhutta, 2013; Christian, 2015; Deshpande, 2017; Nguyen, 2017; Pammi, 2017). Previous reviews has addressed these interventions; however, some of the review were published a long time ago and recent data has not been incorporated, some have conflicting results and some of the interventions are new and an up-to-date synthesis of evidence is needed. For example, Cochrane review on vitamin K supplementation was published 18 years ago and no updates has been published since then (Puckett 2000). Similarly, two reviews on neonatal vitamin A supplementation reached different conclusion (Haider 2017 and Gogia 2009) and the probiotics/prebiotics for prevention of necrotizing enterocolitis is a relatively new intervention and the last Cochrane review was published 4 years ago (AlFaleh 2014). Furthermore, most of the previous reviews have not assessed programmatic evaluation of neonatal nutrition intervention and long term outcome after supplementation during the neonatal period have not been assessed in these reviews. This review will evaluate up-to-date evidence related to neonatal nutrition interventions for the prevention of morbidity and mortality and improved child health and development.
Objectives

1. What is the effectiveness of delayed neonatal cord clamping on neonatal mortality and child health and development?
2. What is the effectiveness of neonatal vitamin A supplementation on neonatal mortality and child health and development?
3. What is the effectiveness of Kangaroo Mother Care on neonatal mortality and child health and development?
4. What is the effectiveness of early initiation of breastfeeding on neonatal mortality and child health and development?
5. What is the effectiveness of neonatal probiotic/prebiotic supplementation on neonatal mortality and child health and development?
6. What is the effectiveness of neonatal vitamin K supplementation on neonatal mortality and child health and development?

Existing reviews

Objective 1: Delayed neonatal cord clamping


Objective 2: Neonatal vitamin A supplementation


Objective 3: Kangaroo Mother Care


Objective 4: Early initiation of breastfeeding


Objective 5: Neonatal probiotics/prebiotics


Objective 6: Neonatal Vitamin K supplementation


**Intervention**

The following interventions targeting neonates will be included:

- Delayed neonatal cord clamping
- Neonatal vitamin A supplementation
- Kangaroo Mother Care
- Early initiation of breastfeeding
- Neonatal probiotics/prebiotics
- Neonatal prophylactic vitamin K supplementation

**Population**

The target population is neonates (aged 0-28 days), regardless of health status and gestational age, living in low- and middle-income countries as defined by the World Bank.

**Outcomes**

**Primary outcomes:**
- Neonatal all-cause mortality
- Infant all-cause mortality

**Secondary outcomes:**
- Cause-specific mortality
- Cause-specific morbidity
- Admission to intensive care facility
- Biochemical indicators of micronutrient status (such as retinol for vitamin A)
- Intracranial hemorrhage
- Adverse events
- Growth (Weight for age, height for age and weight for height) during infancy
- Neurodevelopmental outcomes measured by scales such as Bayley Scales of Infant Development and McCarthy Scales of Children’s Ability (MSCA)

**Study designs**

We will include primary studies, including large-scale programme evaluations that assess the efficacy and/or effectiveness of interventions using experimental and quasi-experimental study designs that allow for causal inference:

1. Studies where participants were randomly assigned, individually or in clusters, to intervention and comparison groups.

2. Studies where non-random assignment to intervention and comparison groups is based on other known allocation rules, including a threshold on a continuous variable (regression
discontinuity designs) or exogenous geographical variation in the treatment allocation (natural experiments).

3. Controlled before-after studies in which allocation to intervention and control groups was not made by study investigators, and outcomes were measured in both intervention and control groups at baseline, and appropriate methods were used to control for selection bias and confounding, such as statistical matching (e.g., propensity score matching, or covariate matching) or regression adjustment (e.g., difference-in-differences, instrumental variables).

4. Interrupted time series studies in which outcomes were measured in the intervention group at least three time points before the intervention was implemented and at least three time points after.

References


### Review authors

**Lead review author:** The lead author is the person who develops and co-ordinates the review team, discusses and assigns roles for individual members of the review team, liaises with the editorial base and takes responsibility for the on-going updates of the review.

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Roles and responsibilities

Aamer Imdad and Rehana Salam have methodological, statistical, and information retrieval expertise. Zulfiqar Bhutta has content expertise. All additional team members (to be determined) will receive training in systematic review methods.

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Potential conflicts of interest

The authors are not aware of any conflicts of interest arising from financial or researcher interests.

Preliminary timeframe

- Date you plan to submit a draft protocol: 30 January 2018
- Date you plan to submit a draft review: 30 June 2018