Innovations to Improve Neonatal Mortality in low and Middle-Income Countries

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Abstract

While maternal, infant and under-five child mortality rates in developing countries have declined significantly in the past two to three decades, newborn mortality rates have reduced much more slowly. Every year 3 million newborns die before reaching the first month of life.

Evidence-based interventions are available which, if scaled-up, can prevent roughly half of neonatal deaths; these include tetanus toxoid immunization to mothers, clean and skilled care at delivery, newborn resuscitation, exclusive breastfeeding, clean umbilical cord care, and/or management of infections. Apart from these conventional approaches, few innovative approaches have been developed to reduce neonatal mortality.

Kangaroo mother care (KMC) is recommended for the routine care of newborns weighing 2000 g or less at birth, who are more prone to hypothermia. It is defined as the practice of skin- to-skin care continuously throughout the day without breaking the contact between mother and baby.

More recently, an intervention, employing participatory learning action cycle using women’s groups, has shown an impressive reduction in neonatal mortality in several countries. However, many neonates require facility-based care, thus underscoring the need for strong linkages with the local health systems and the community.
Antenatal corticosteroid therapy for pregnant women at risk of preterm birth is among the most effective hospital-based interventions to reduce neonatal mortality. It is recommended for women at risk of preterm birth from 24 weeks to 34 weeks of gestation when certain conditions are fulfilled.

More effort needs to be made if neonatal mortality, particularly in low and middle income countries, is to be reduced and the SDG 3 targets are met.

Background

Every year 3 million newborns die before reaching the first month of life. The global burden of infant and neonatal mortality is unevenly distributed, being borne largely by low and middle-income countries. The Millennium Development Goal 2015 target of under 5 mortality was 30 mortalities per 1000 live births but was not met universally.1 We are now working to achieve Sustainable Development Goals(SDG), of which SDG 3 is the health goal.2 By 2030, the aim of SDG 3 is to end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births.

Review of literature

Several reviews (Cochrane database of systematic reviews. Meta-analyses, observational studies) have been published on interventions to reduce newborn mortality.3,4.

At full coverage, at least 41% -72% of newborn deaths can be prevented by tetanus toxoid (TT) immunization of the mothers, clean and skilled care at birth, newborn resuscitation, clean umbilical cord care, exclusive breastfeeding, and management of infections in the newborns. Around half of this reduction is possible with community-based interventions.5 These interventions can be delivered in the form of packages delivered by community-based workers. A package is defined as delivering more than one intervention via different set of strategies such as community support groups/women groups, community mobilization, home visits, training TBAs/community health workers (CHWs), which should also be supplemented by developing and strengthening linkages with the local health systems.

Kangaroo Mother Care (KMC), often defined as skin–to–skin contact between a mother and her new-born, frequent or exclusive breastfeeding, and early discharge from the hospital has been effective in reducing the risk of mortality among preterm and low birth weight infants. A meta-analysis of 3 RCTs by Lawn et al 6 shows major mortality reduction (18–71%) for neonatal mortality in babies with birthweight <2000 g, with even greater reductions in serious morbidity. This evidence is sufficient to recommend the routine use of KMC for all babies <2000 g as soon as they are stable.
However, many questions remain around how to implement KMC in hospitals and in the community. Despite the high impact and apparent feasibility of KMC, few preterm babies in low-income countries currently have access to this intervention. A priority research question concerns community KMC. There is only one study examining KMC initiation at home, in a challenging setting in rural Bangladesh. This study demonstrated a substantial mortality benefit for babies <2000 g (or modelled birth weight based on adjusted first weight after birth) but not for normal birthweight babies. At this stage, community initiation of KMC cannot be recommended based on the evidence from this one trial and larger trials in different settings are required.

Although arguments for selective rather than comprehensive primary health care predominated soon after the Alma Ata declaration, it was promptly recognized that community participation was important in supporting the provision of local health services and in delivering services at the community level.

Community participation has long been advocated to build links with improving maternal and child health. Community interventions are a critical component of strategies to improve maternal and newborn health in resource-limited settings. They have used different approaches to improving birth outcomes, with heterogeneous effects on neonatal mortality and no clear impact on maternal mortality.

Some involved home visits to counsel mothers, facilitated referrals in case of problems, and provided home-based care to newborns. Others involved a mix of home-based counselling and community-level activities to strengthen newborn care practices. Finally, another approach has involved participatory women’s groups (PWGs). Several trials from South Asia have evaluated the role of participatory women's groups engaged in community mobilization (CM) on maternal and neonatal health. The trials have shown that CM can reduce neonatal mortality when health systems are weak and Neonatal Mortality Rate (NMR) is high (>30/1000 live births).

Groups, consisting mainly of women of reproductive age, follow a participatory “learning and action (PLA) cycle” (Fig) to identify and prioritize problems in pregnancy, delivery and the postnatal period. PWGs plan how to address the problems through locally feasible strategies such as arranging emergency transport, collecting emergency funds to use for maternal and neonatal emergencies; they implement their chosen strategies; and evaluate their activities.

The groups also spoke to the wider community about their prioritized problems and chosen strategies, and acted as catalysts for broader community mobilization to improve maternal and newborn health. The various approaches described above have different financial and human resource implications. Facilitators, who are salaried and convened regular meetings, speak the local language but do not have a background in health. It was possible to run the cycle without giving financial or other benefits to the members of the PWGs. Rather than women being taught in a traditional way, information and skills are imparted through dialogue, games, picture cards and stories. Picture cards are used to convey simple key messages addressing continuum of care. This non-traditional medium has been shown to be effective in empowering women to build community capacity to improve health and well-being.
A systematic review and meta-analysis of 7 randomized controlled trials were carried out to assess the effects of PWGs practicing participatory learning and action on maternal mortality, neonatal mortality and stillbirths, and to examine the cost-effectiveness and potential impact in Countdown countries.\textsuperscript{20} The meta-analysis showed that women’s groups are associated with a 37 per cent reduction in maternal mortality and a 23 per cent reduction in newborn mortality. Two factors appear to be crucial: coverage of one women’s group per 800 people and the participation of at least one third of pregnant women in the groups.\textsuperscript{18, 20} The intervention leads to a variety of health and non-health benefits, and, in settings where gender inequity is an important determinant of many maternal and newborn health problems, it is widely seen as a valuable contributor to women’s individual and collective empowerment.

Participatory women’s groups have been shown to be highly cost-effective, according to World Bank criteria\textsuperscript{21}, and are potentially sustainable. With political will and financial investment, this proven approach could be scaled up to reach the poorest. Scaling up women’s groups could save the lives of an estimated 116,000 newborns and 9,370 mothers.

WHO’s Global Guideline Development Group (GDG)\textsuperscript{22} passed a recommendation stating that “Implementation of CM through facilitated participatory learning and action cycles with women’s groups to improve maternal and newborn is recommended, particularly in rural settings with low access to services.” The GDG speculated that the intervention might particularly benefit people in marginalized communities, or where women had low status, low access to care or lower levels of education. They also suggested that the intervention would require a minimum period of three
years to take effect, and that a certain level of coverage was important to have impact. There is some evidence that the intervention might be more successful where more than 30% of pregnant women participate. One of the keys to successful implementation is the quality of facilitators, as good quality facilitators can establish and maintain effective groups.

For the intervention to be effective, each facilitator should be responsible for a maximum of 8-10 groups per month to act effectively, and the required resources must be available. Implementation should include awareness of the potential harms (gender violence, conflict with health providers or other family/community members, e.g. mothers-in-law, etc.). Potential harms should be monitored throughout implementation so that they can be managed. Implementation should also take into account the specific context and health system, adapting to reflect each country’s context, specific capacities and constraints, and must build links with the health services for the intervention to be sustainable.

The use of antenatal corticosteroids for pregnant women at high risk of preterm delivery is among the most effective hospital-based interventions to reduce neonatal mortality associated with preterm birth, a leading cause of childhood mortality. However, Althabe et al in their multicenter trial introduced a note of caution for the use of ANCs in low and middle income countries where intensive care facilities may not be available for the treatment of newborns.

A systematic review of 21 randomized controlled trials of antenatal corticosteroids showed a 31% relative reduction in neonatal mortality (relative risk [RR] 0.69, 95% CI 0.58–0.81) and an even larger reduction in severe neonatal morbidity. However, a non-significant increased risk of puerperal sepsis (1.35, 0.93–1.95) was noted from eight studies.

A search of Cochrane Pregnancy and Childbirth’s Trials Register (17 February 2016) was performed. 30 trials where corticosteroids were given to women at risk of preterm birth (7774 women and 8158 infants) were examined. The trials were all carried out in hospitals in high-income countries. The review showed that a single course of a corticosteroids, given to the mother in preterm labour and before the baby is born, helps to develop the baby’s lungs and reduces complications such as breathing problems. Furthermore, this treatment resulted in fewer babies dying at birth, and fewer babies having other serious health problems that commonly affect babies born very early (such as intracranial bleeding or necrotising enterocolitis). For the mother, having a single course of corticosteroids did not appear to impact on the number of women who had infections of the womb (chorioamnionitis or endometritis). Thus, most pregnant women who are at risk of giving birth very early or very preterm will benefit from having a corticosteroid medicine. These medicines appear to be safe for pregnant women and babies when given in hospital settings in high-income countries, and they improve the chance that the preterm baby will survive and avoid immediate health problems. There is less information about the impact of steroids on women with multiple pregnancy and on women with other problems during pregnancy such as high blood pressure or ruptured membranes. Evidence in this review comes from high-income countries and hospital settings; therefore, the results may not be applicable to low resource settings with high rates of infections.

On the basis of this strong evidence, the use of antenatal corticosteroids in hospitals for women at high risk of preterm birth is widely recommended by national and international health
Antenatal corticosteroids have been included in the UN list of life-saving commodities for women and children, and WHO has recommended dexamethasone for women at risk of preterm birth.

Antenatal corticosteroid is recommended for women at risk of preterm birth from 24 weeks to 34 weeks of gestation when the following conditions are met: gestational age assessment can be accurately undertaken; preterm birth is considered imminent; there is no clinical evidence of maternal infection; adequate childbirth care is available (including the capacity to recognize and safely manage preterm labor and birth); the preterm newborn can receive adequate care if needed (including resuscitation, thermal care, feeding support, infection treatment and safe oxygen use).

Summary

More needs to be done to reduce neonatal mortality, particularly in LMICs if SDG 3 is to be attained. Interventions, based on evidence, are available, which can halve neonatal mortality. In addition, some innovative approaches have also been developed. Conventional methods such as TT immunization of mothers, clean and safe delivery, exclusive breastfeeding etc. can be delivered as a package. KMC prevents hypothermia in low birth weight infants and costs nothing! Although community level evidence is lacking on KMC, it has been successfully used in hospital settings. ANC is a life-saving drug and is one of the most effective strategies to prevent deaths from prematurity. But more recently, a note of caution has been introduced regarding the use of antenatal corticosteroids in LMICs. It is recommended that ANC be used only when certain conditions, as mentioned above, are fulfilled.

Additionally, innovative approaches have also been tried with varying degrees of success. Community interventions are examples of such, and have used different methods, such as home visits, community support groups with varying effects on neonatal mortality. Another approach, which has been described here in some detail, has involved participatory women’s groups (PWGs). PWGs have been involved in community mobilization using the PLA method, and the method has been successful in reducing neonatal deaths. PWGs identify and prioritize their problems, plan and then implement strategies to address the problems, and evaluate their impact. The method necessitates the use of facilitators, who must be of good quality to ensure effective groups. There is some evidence that the intervention might be more successful where the neonatal mortality rate is more than 30/1000 live births, more than 30% of pregnant women participate and the population covered by each group is adequate. Evidence from India, Nepal and Bangladesh have shown that the method is a cost-effective sustainable model to cut down neonatal mortality.

Conclusion

Neonatal mortality has not followed the trajectory of reductions in infant and childhood mortality. One size does not fit all, and bringing about a reduction in neonatal deaths in low and middle income countries, needs a different approach from that used in high income countries.
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Implementation of available interventions and development of effective innovations can bring about further reductions in neonatal mortality. PLA through PWGs is a powerful ‘non-medical’ tool, as has been shown in low and middle income countries. Needs-specific interventions need to be developed to address the bottlenecks preventing reduction in neonatal deaths.

References


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