

SUPPLEMENT ARTICLE

FIGO good practice recommendations: Bundle of care to reduce neonatal mortality and improve outcomes after preterm and term delivery

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Abstract

An integrated approach is lacking for the management of childbirth and newborn care, even though their codependence is critical for improving maternal and newborn outcomes. FIGO's Prep-for-Labor rapid triage methods for women arriving at a clinical facility are addressed in earlier papers in this Supplement, but do not include newborn care. Immediate postpartum rapid triage using established Apgar score helps determine whether standard of care can be followed on site with available staff/tools. If not, newborn transfer alone or with the mother to a higher-level center as soon as feasible may be required. Updated newborn management tools with special emphasis on pragmatic steps that are applicable for any clinical setting including low- and middle-income countries (LMICs) are presented in this article. Given that more than 80% of newborn care can be managed at the birthing facility, transfer to a higher-level center for care is required only in selected cases. Management steps for healthy newborns are described and the actions needed for those requiring resuscitation are summarized. The simple noninvasive kangaroo mother care approach—universally applicable for both term and preterm newborns—is associated with a significant reduction in morbidity and mortality. Kangaroo mother care involves continuous maternal skin-to-skin contact from birth, exclusive breastfeeding, and home support after discharge. Hence, hypothermia, hypoglycemia, and acquired infections are frequently prevented. It is anticipated that implementing simple noninvasive management steps will have a substantial positive impact on improving maternal and newborn outcomes.

KEYWORDS

bundle of care, neonatal mortality, newborn care, preterm delivery, primary setting

1 | INTRODUCTION

Reducing neonatal mortality is an ever-present challenge, especially in low- and middle-income countries (LMICs). In 2019, the neonatal

mortality rate was 17 deaths per 1000 live births—a decrease from 37 per 1000 live births in 1990 and 30 per 1000 live births in 2000, representing a 52% and 42% decline, respectively.¹ The United Nations' Sustainable Development Goals² call for initiatives to

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TABLE 1 Apgar score for newborn triage used at 1 and 5 minutes after birth to determine management (score above 7 is normal; 3 and below is critical).

Apgar score	0	1	2
Activity, muscle tone	Absent	Flexed arms/legs	Active
Pulse	Absent	Less than 100bpm	Above 100bpm
Grimace, irritability	Floppy	Minimal response to stimulation	Active
Appearance, skin color	Blue pale	Pink body blue extremities	Pink
Respiration	Absent	Slow, irregular	Vigorous cry

reduce newborn deaths, with the aim for all countries to achieve a neonatal mortality rate of less than 12 per 1000 live births by the year 2030.³ To achieve this goal, the global community must double its efforts to ensure the survival of newborns. Current neonatal mortality data trends are alarming, and it is estimated that more than 60 countries will miss the target reduction in neonatal mortality without immediate action.³

Reducing neonatal mortality and adverse outcomes requires timely decision-making on both adequate maternal care during labor and adequate neonatal care at the time of delivery and in the immediate post-delivery period.

The purpose of the present article is to provide good practice recommendations to improve neonatal well-being and define essential newborn care measures required on site at the time of delivery, especially in LMICs. Immediate postpartum rapid triage using the established Apgar score is performed within 1 minute of birth and repeated after 5 minutes. Apgar score criteria are shown in Table 1.³ A score of 7 and above is normal, whereas a score of 3 and below is critical. The caveat is that in preterm newborns and those with congenital malformations, these criteria are less rigorous since tone and appearance may be less evident. Importantly, information on delivery indications, fetal condition during labor (i.e. prolonged hypoxia, fetal distress, fever), and others complement the Apgar score. In addition, whether delivery was term or preterm and whether there are malformations dictate further management. Seamless integration of information between the obstetric team and those who handle the newborn, if they are separate, is key but rare in LMICs. The main advantage is that such prompt triage and scoring can be implemented in all LMICs. Once Apgar score is well defined (and associated information provided) subsequent management steps, as detailed in the boxes in this article, can be followed on any site or newborns requiring advanced care can be urgently transferred to an advanced care site.

2 | HOW TO REDUCE MORTALITY AND IMPROVE ADVERSE OUTCOMES IN FULL-TERM INFANTS

The most common causes of neonatal mortality, excluding those secondary to preterm birth, include intrapartum-related events leading to birth asphyxia; sepsis or meningitis; and congenital abnormalities, most of which occur within the first 72 hours of life.⁴

BOX 1 Management of neonates with spontaneous breathing

- Immediate drying of the neonate at birth
- Immediate and sustained skin-to-skin contact with the mother
- Delayed cord clamping (i.e. until after the baby is placed on the mother, dried)
- Assessment for breathing, tone, and activity
- Promotion of early and prolonged breastfeeding
- Hand hygiene for the prevention of infection

To reduce neonatal mortality, it is paramount to use Apgar score and implement a care program that includes evidence-based interventions to prevent or manage the most common causes of neonatal morbidity and mortality. These interventions are the subject of the early essential newborn care (EENC) program.⁴ This program includes a series of measures for the care of infants with spontaneous respirations and those with labored breathing or no spontaneous breathing.⁵ A practical stepwise approach for managing newborns with spontaneous breathing is given in Box 1. For rapid assessment and management of nonbreathing neonates, care may range from oxygen administration to cardiopulmonary resuscitation, which may require transfer to a neonatal intensive care unit (NICU) if there is not complete recovery of respiratory status by the delivery team (Box 2). In this case, the newborn should be transported to a higher-level facility that serves as a referral advanced care hospital (Box 3). Rapid identification of newborn breathing/nonbreathing and pulse/no pulse enables immediate care steps to be implemented on site or rapid transfer, which can have a major positive impact on neonatal outcomes.

3 | HOW TO REDUCE MORTALITY AND IMPROVE ADVERSE OUTCOMES IN PRETERM INFANTS

Preterm birth is defined as infants born alive prior to 37 completed weeks of gestation.⁶ The preterm birth rate is 10.6% worldwide, ranging from 8.7% to 13.4% in infants born across different countries, with an increasing trend in most industrialized countries.⁷

BOX 2 Management of nonbreathing neonates despite complete drying

- Positive pressure ventilation by mask
- Endotracheal tube if available and cardiopulmonary resuscitation
- Monitoring of vital functions
- Post-resuscitation care, including aseptic cutting of the cord
- Umbilical venous catheter placement to administer fluids and medications
- For incomplete recovery, transfer to the highest-level care center

BOX 3 Management of neonates requiring transfer to neonatal intensive care unit (NICU)

- Management of neonatal infections (sepsis, pneumonia, meningitis)
- Management of neonatal complications (jaundice, malformations)
- Prevention of hypothermia prior to transfer to NICU
- Oxygen supply as needed
- Therapeutic hypothermia if eligible, address hypoglycemia, hypoxemia, apnea, and infection—transfer to NICU
- Continuous positive airway pressure (CPAP) for those suffering from respiratory distress—transfer to NICU^{5,6}

Preterm birth complications are the leading cause of death in children younger than 5 years of age worldwide and were responsible for approximately 1 million deaths in 2015.⁸ Preterm infants are 20 times more likely to die than full-term infants due to increased vulnerability to hypothermia, infections, and both breathing and feeding difficulties.

Prevention and treatment interventions for preterm infants should begin during the intrapartum period and once birth occurs. Apgar score is determined within the first 24 hours after birth. In preparation for preterm delivery, tocolytics for 48 hours are given to enable administration of corticosteroids to mature the lungs, magnesium sulfate for neuroprotection, and antibiotics for preterm rupture of membranes and/or chorioamnionitis. FIGO's good practice recommendations for preterm labor and preterm prelabor rupture of membranes (PPROM) are described in the article by Ubom et al.⁹ in this Supplement. The specific steps involved in kangaroo mother care, feeding with breast milk, and monitoring of complications related to prematurity are described below.

Preterm infants who are vigorous and without respiratory distress should receive skin-to-skin contact with their mother immediately after birth and kangaroo care whereby the mother wraps her

preterm infant close to the skin on her breast, so that the baby is kept warm and able to breastfeed and is protected from infection. These interventions can reduce preterm mortality by up to 50% and should be used in all settings.¹⁰

4 | MATERNAL AND NEWBORN MORTALITY RATES REMAIN HIGH IN LMICS

There is a global commitment to end stillbirths and infant deaths. Data on the global distribution of deaths in 2019 report that 7.3% are due to neonatal sequelae from preterm birth.¹¹

In 2020 there were 2.4 million stillbirths worldwide. The number of stillbirths for every 1000 births varies among regions, with higher rates in lower income regions. Among 2.4 million global newborn deaths, 35% were due to preterm birth complications, 24% were due to intrapartum-related complications, 15% occurred secondary to sepsis, 11% to congenital abnormalities, and 9% to other causes.¹² Two-thirds of these deaths are thought to be preventable,¹³ indicating the need to increase efforts to enable access to equitable, high-quality medical care globally.

It is important to know and systematically apply the strategies and effective interventions that are internationally validated. Medical needs can be contextualized locally and shared by all those involved in neonatal health, including medical personnel and health policy leaders. Since 1990 there have been improvements, but further reductions in newborn deaths need to occur.

5 | ONGOING CHALLENGES AND STEPS TO REDUCE MATERNAL AND NEWBORN MORTALITY IN LMICS

The neonatal period is the most vulnerable for the newborn. Although 80%–90% of newborn sequelae are physiological, close monitoring must be done to prevent the pathology that occurs in 10%–20% of newborns, such as low birth weight, prematurity, asphyxia, jaundice, respiratory distress syndrome, and infections.¹⁴ Taking charge of maternal and newborn welfare means considering and possibly adapting to the typical customs and traditions of the local community, which vary greatly. Therefore, working in harmony on three levels (community, primary clinical facility, hospital) is useful for achieving the Sustainable Development Goals for 2030 for maternal and newborn health.¹⁵

It is necessary to define a classification of interventions according to the level of healthcare delivery available on site, trying to avoid the delays in access to appropriate care that exist in each of the levels. In the community, pregnant women and/or neonates die because they are not immediately taken to the nearby health care unit or to the attention of the village health volunteer to receive treatment. In the dispensary there are difficulties in reaching the health center owing to distance, insecurity, or the absence of transportation. In the healthcare center or even with a village's health

BOX 4 Promoting early essential newborn care (EENC)-based management

- Provide heat to prevent hypothermia
- Dry skin and, if necessary, apply vacuum
- Promote skin-to-skin contact within the first hour
- Encourage early and exclusive breastfeeding
- Perform delayed clamping of the umbilical cord, keeping it dry and clean
- Perform ophthalmic prophylaxis by applying erythromycin (0.5%) ophthalmic ointment¹⁶
- Administer an intramuscular dose of 0.5–1 mg vitamin K¹⁷ to prevent hemorrhage
- Vaccinate according to national guidelines¹⁸

volunteer, delays in offering early and accurate diagnostic services and quality care can impact outcomes.

The actions required are based on three important aspects: strengthening EENC,¹⁶ carrying out systematic data analysis to guide actions, and encouraging advanced newborn care (low birth weight, prematurity, jaundice, infections, respiratory distress syndrome) as required. Box 4 describes practical steps in strengthening the EENC concept. Using the Apgar score and providing prophylactic low-cost medications and vaccines, these simple applicable steps will have long-term beneficial effects.

6 | PRACTICAL NEWBORN PREVENTIVE MEASURES

The rapid triage method using Apgar score for early identification is highly utilitarian. Preventive steps for hypothermia, hypoglycemia, and infections, and their prompt identification, and management of sick newborns are essential.¹⁷

1. *To prevent hypothermia:* do not bath the baby at birth (wait at least 6 hours or more); keep the baby in skin-to-skin contact on the mother's chest or at her side, in a warm, draught-free room; dress the baby or wrap in soft dry clean cloth covering the head with a cap; assess warmth every 4 hours by touching the baby's feet.¹⁷
2. *To prevent hypoglycemia:* start breastfeeding within the first hours; support exclusive breastfeeding on demand day and night; assess breastfeeding in every baby before hospital discharge.¹⁷
3. *To prevent infections:* keep the baby away from sick children or adults; wash hands before taking care of the baby; keep the umbilical cord clean and dry; give vaccines (oral polio, hepatitis B, and tuberculosis); let the mother and the baby sleep under a bed net.
4. *Newborn care by support team after patient discharge:* extra newborn care should be provided to all sick newborns especially if the mother needs extra care and has difficulty caring for the newborn.

In this case a family member could take over to reduce the burden.¹⁷ While a trained support person to care for the newborn could be advantageous, this is rarely adaptable in LMICs as such an approach would require an integrated healthcare system.¹⁸

7 | ONGOING BURDEN OF PRETERM BIRTH IN LMICS

Over 90% of extremely preterm babies (<28 weeks) born in high-resource countries survive; yet less than 10% of these babies survive in LMICs and rural settings. Most of the 1 million deaths due to preterm birth complications could be prevented with advanced in-hospital medical NICU care, equating to more than 757 000 lives per year.¹⁹

Preterm birth represents a major issue worldwide. The World Health Organization (WHO) affirms that addressing the global burden of preterm birth is crucial to achieving Sustainable Development Goal 3 (ensure healthy lives and promote well-being for all at all ages) and for reducing preterm-related neonatal and child mortality.

8 | PATHWAYS TO PREVENT PRETERM BIRTH AND TRANSFER TO NICU

1. *Preventive measures:* Prevent preterm birth by family planning, antenatal care package, policy environment including smoking cessation and employing safeguards for pregnant women.
2. *Preterm management:* Manage preterm labor using tocolytics to enable a full course of corticosteroids, magnesium sulfate for neuroprotection, administration, and antibiotics for PPROM and chorioamnionitis as needed.
3. *Newborn care:* Preterm newborn care using essential newborn care, especially neonatal resuscitation, feeding support, and kangaroo mother care.^{20,21}

9 | KANGAROO MOTHER CARE

Box 5 lists the practical steps in kangaroo mother care that have demonstrated major benefits for newborn outcomes. Compared with conventional care, kangaroo mother care was associated with

BOX 5 Practical steps to reduce preterm/newborn morbidity and mortality

- Skin-to skin contact with mother (prolonged and continuous starting shortly after birth)
- Exclusive breastfeeding
- Early hospital discharge
- Home care support

a 36% lower mortality, 47% decreased risk of neonatal sepsis, 78% less hypothermia, 88% less hypoglycemia, 58% lower hospital readmission, and 50% more exclusive breastfeeding.²² Newborns receiving kangaroo mother care had lower mean respiratory rate and pain measures, and higher oxygen saturation, temperature, and head circumference growth.²³

10 | STEPS FORWARD TO IMPROVE NEWBORN CARE

Based on data from LMICs, it is also important to consider that the essential tools for effective daily newborn care at a clinical facility involve context evaluation (observation, data collection, dialogue with operators/care takers, and staff training), knowledge of standard of care, and action required to manage and work in teams and establish ongoing collaborative networks between primary and advanced care sites. Developing coordinated maternal and newborn treatment protocols, seamless communication with declared and shared indicators, evaluation of results generated, and actions for continual improvement will improve clinical facility performance and maternal and newborn outcomes.²⁴

11 | CONCLUSION

The present paper describes an up-to-date approach to newborn care following childbirth that will allow the care team at the clinical facility to address immediate newborn care needs. Employing a practical stepwise approach for healthy newborn care has been shown to improve newborn outcomes. However, when the newborn is preterm and/or sick on site, immediate management steps are required in view of transfer to NICU when it is feasible. Overall, seamless childbirth and newborn care integration will significantly improve maternal and newborn outcomes.

AUTHOR CONTRIBUTIONS

Eytan R. Barnea conceived the article. Simonetta Costa, Nicoletta Menzella, Giovanni Vento, and Eytan R. Barnea prepared the draft.

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed.

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APPENDIX A

FIGO CHILDBIRTH AND POSTPARTUM HEMORRHAGE COMMITTEE

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