

A. Preventive and promotive care

A.1 KANGAROO MOTHER CARE

Recommendation and remarks

RECOMMENDATION A.1a (UPDATED)

Any KMC:

Kangaroo mother care (KMC) is recommended as routine care for all preterm or low-birth-weight infants. KMC can be initiated in the health-care facility or at home and should be given for 8-24 hours per day (as many hours as possible). *(Strong recommendation, high-certainty evidence)*

RECOMMENDATION A.1b (NEW)

Immediate KMC:

Kangaroo mother care (KMC) for preterm or low-birth-weight infants should be started as soon as possible after birth. (Strong recommendation, high-certainty evidence) *(Strong recommendation, high-certainty evidence)*

Remarks

- Any KMC
 - KMC can be given at home or at the health-care facility.
 - Infants who receive KMC should be secured firmly to the mother's chest with a binder that ensures a patent airway.
 - Whenever possible, the mother should provide KMC. If the mother is not available, fathers, partners and other family members can also provide KMC.
 - Infants who need intensive care should be managed in special units, where mothers, fathers, partners and other family members can be with their preterm or LBW infants 24 hours a day.
- Immediate KMC
 - At home, immediate KMC should be given to infants who have no danger signs (22).
 - At health-care facilities, immediate KMC can be initiated before the infant is clinically stable unless the infant is unable to breathe spontaneously after resuscitation, is in shock or needs mechanical ventilation. The infant's clinical condition (including heart rate, breathing, colour, temperature and oxygen saturation, where possible) must be monitored.

Background and definitions

Kangaroo mother care (KMC) is defined by WHO as early, continuous and prolonged skin-to-skin contact between the mother (or other caregiver) and the baby, and exclusive breastfeeding (20). In 2015, WHO recommended that KMC be given to hospitalized babies under 2.0 kg as soon as the

babies were clinically stable (20). However, there has been wide variation among care providers (i.e. parents/primary caregivers and health workers) in the timing and duration of KMC (37,38). New studies have also been published that assess the effects of KMC provided before clinical stabilization and also KMC initiated in community settings (39,40).

Summary of the evidence

| Overview | A.1a Any KMC | A.1b Immediate KMC |
|-----------------------------------|---|---|
| PICO | <p>Population – Preterm or LBW infants</p> <p>Intervention 1 – KMC</p> <p>Comparator 1 – Conventional newborn care</p> <p>Outcomes – All-cause mortality, morbidity, growth, neurodevelopment at latest follow-up</p> | <p>Population – Preterm or LBW infants</p> <p>Intervention 2 – KMC initiated early (within 24 hours of birth, also called immediate KMC)</p> <p>Comparator 2 – Initiating KMC later (more than 24 hours after birth)</p> <p>Outcomes – All-cause mortality, morbidity, growth, neurodevelopment at latest follow-up</p> |
| Setting, timing, subgroups | <p>Setting – Health-care facility or home in any country or setting</p> <p>Timing of intervention – From birth</p> <p>Subgroups</p> <ul style="list-style-type: none"> • Gestational age at birth (< 34 weeks, ≥ 34 weeks) • Birth weight (< 2.0 kg, ≥ 2.0 kg) • Daily duration of KMC achieved (< 8 hours, 8–16 hours, > 16 hours) | |

Effectiveness: Comparison 1 – KMC versus conventional newborn care

Sources and characteristics of the evidence

For the first comparison of KMC versus conventional newborn care, the effectiveness evidence was derived from a systematic review of 27 RCTs conducted between 1994 and 2021 that enrolled 11 956 infants (41). Six studies were from high-income countries (Australia, the United Kingdom of Great Britain and Northern Ireland and the United States of America [USA]), four studies were from upper-middle-income countries (China, Colombia, Ecuador and Malaysia), 15 were from lower-middle-income countries (Bangladesh, India, Indonesia, Kenya and Nepal) and two studies were from a low-income country (Ethiopia). Twenty-five studies were conducted in health-care facilities and two were community-based. In all but one of the studies, the infants were stabilized before enrolment. KMC was started within 24 hours after birth in two studies, between 1 and 7 days after birth in 10 studies, and more than 7 days after birth in 12 studies, but 3 studies did not report the timing of initiation of KMC. The duration of KMC was less than 8 hours in nine studies, between 8 and 16 hours in nine studies and more than 16 hours in four studies, while five studies did not report the duration of KMC.

Critical outcomes

Sixteen trials reported all-cause mortality, 11 reported severe morbidity (9 reported severe infection, 11 hypothermia), 11 reported growth outcomes (weight gain) and 1 reported neurodevelopment (1 reported Griffith quotients, 1 reported Bayley Scales of Infant and Toddler Development, third edition [BSID-III]). No serious adverse events were reported. (Full details

are provided in GRADE Table A.1a, in the Web Supplement.³)

- **Mortality:** For KMC compared with conventional newborn care, high-certainty evidence from 12 trials of 10 505 participants suggests a decrease in all-cause mortality at discharge, at 40 weeks postmenstrual age (PMA; i.e. the baby's age when counted from the first day of the mother's last menstrual period before pregnancy – see Glossary) or at 28 days of age (relative risk [RR] 0.68, 95% confidence interval [CI] 0.53 to 0.86). High-certainty evidence from four trials of 8031 participants suggests a decrease in all-cause mortality at 6 months of age (RR 0.75, 95% CI 0.62 to 0.92).
- **Morbidity:** Moderate-certainty evidence from nine trials of 9847 participants suggests a decrease in severe infection or sepsis at 40 weeks PMA or at 28 days after birth (RR 0.85, 95% CI 0.79 to 0.92). Moderate-certainty evidence from 11 trials of 1169 participants suggests a decrease in hypothermia at discharge, at 40 weeks PMA or at 28 days after birth (RR 0.32, 95% CI 0.19 to 0.53).
- **Growth:** Low-certainty evidence from 11 trials of 1198 participants suggests an increase in weight gain (in grams per day) at 28 days after birth (mean difference [MD] 4.08, 95% CI 2.30 to 5.86).
- **Neurodevelopment:** Very-low-certainty evidence from one trial of 579 participants suggests little or no effect on Griffith quotients for psychomotor development (all subscales) at 12 months corrected age (i.e. the chronological age [age since birth or “postnatal age”] minus the number of weeks or months born preterm –

³ Available online: <https://apps.who.int/iris/bitstream/handle/10665/363699/9789240060050-eng.pdf>

see Glossary) (MD 1.05, 95% CI -0.75 to 2.85). Very-low-certainty evidence from one trial of 516 participants suggests little or no effect on cognitive neurodevelopment at 12 months of age using the BSID-III (MD 0.21, 95% CI -1.84 to 2.27) and other neurodevelopment measures (language, motor).

Other outcomes

There was an increase in exclusive breastfeeding at discharge, at 40 weeks PMA or at 28 days of age (RR 1.48, 95% CI 1.44 to 1.52; 9 trials, 9983 participants) and at 1-3 months follow-up (RR 1.39, 95% CI 0.99 to 1.97; 7 trials, 8139 participants). There was an increase in any breastfeeding at discharge, at 40 weeks PMA or at 28 days of age (RR 1.15, 95% CI 1.07 to 1.23; 12 studies, 10 146 participants) and at three months follow-up (RR 1.03; 95% CI 1.02 to 1.04; $I^2 = 70\%$; 7 studies, 8463 participants). There was also a decrease in the length of hospital stay (MD -0.39 days, 95% CI -0.79 to 0.0; 12 studies, 1214 participants).

Subgroup analyses

Subgroup differences for morbidity, growth and neurodevelopmental outcomes could not be assessed as there were insufficient studies. For all-cause mortality, no subgroup differences were seen for setting (health-care facility, community), gestational age (mean gestational age < 34 weeks, ≥ 34 weeks), birth weight (birth or enrolment weight < 2.0 kg, ≥ 2.0 kg) or daily duration of KMC achieved (< 8 hours/day, 8-16 hours/day and > 16 hours/day), although the analysis for daily duration of less than 8 hours was limited by small sample size and imprecision.

Effectiveness: Comparison 2 - KMC initiated early versus later

Sources and characteristics of the evidence

For the second comparison of KMC initiated early (< 24 hours after birth) versus KMC initiated late (≥ 24 hours after birth), the effectiveness evidence was derived from a systematic review of four RCTs totalling 3603 infants (41). One study was from a high-income country (Sweden), two were from low-income countries (Gambia and Madagascar) and one was a multicountry study conducted in Ghana, India, Malawi, Nigeria and the United Republic of Tanzania. All studies were conducted in health-care facilities. Two studies enrolled babies irrespective of clinical stability, while one study enrolled only stable infants and one study enrolled only unstable babies. KMC was started as soon after birth as possible in all studies. The mean age at initiation of KMC was

1.3 hours, 13.6 hours and 19 hours after birth in three studies, while one study did not report the age of initiation of KMC. The duration of KMC was less than 8 hours in one study, more than 16 hours in two studies and not reported in one study.

Critical outcomes

For the comparison of KMC initiated early compared with KMC initiated late, three trials reported all-cause mortality, three reported morbidity (2 reported severe infection, 3 hypothermia), one reported growth (weight gain) and none reported neurodevelopment outcomes. (Full details are provided in GRADE Table A.1b, in the Web Supplement.)

- **Mortality:** High-certainty evidence from three trials of 3533 participants suggests a decrease in all-cause mortality by 28 days of age (RR 0.78, 95% CI 0.66 to 0.92).
- **Morbidity:** Low-certainty evidence from two trials of 3415 participants suggests a decrease in the risk of sepsis by 28 days (RR 0.85, 95% CI 0.76 to 0.96). High-certainty evidence from three trials of 3513 participants suggests a decrease in the risk of hypothermia by discharge or 28 days (RR 0.74, 95% CI 0.61 to 0.90).
- **Growth:** Low-certainty evidence from one trial of 204 participants suggests little or no effect on weight gain by 28 days follow-up (measured in grams per day) (MD 2.20, 95% CI -5.26 to 0.86).

Other outcomes

There was an increase in exclusive breastfeeding (EBF) by hospital discharge (RR 1.12, 95% CI 1.07 to 1.16; 3 trials, 3464 participants). There was little or no effect on EBF by 28 days of age (RR 1.01, 95% CI 0.98 to 1.04; 3 trials, 2841 participants). There was a decrease in length of hospital stay (in days) (MD -0.30, 95% CI -0.31 to -0.29; 3 studies, 3498 participants).

Subgroup analyses

Differences for morbidity, growth and neurodevelopment could not be assessed as there were insufficient studies. For all-cause mortality, no subgroup differences were seen for setting (facility, community), gestational age (mean gestational age < 34 weeks, ≥ 34 weeks), birth or enrolment weight (< 2.0 kg, ≥ 2.0 kg) or daily duration of KMC (< 8 hours/day, 8-16 hours/day and > 16 hours/day).

Values and acceptability

The systematic review about what matters to families about the care of the preterm or LBW infant (see

Table 1.1) reported that families want to be involved in delivering care to infants and want to take an active role in deciding what interventions are given to infants, including skin-to-skin contact and feeding (14). A systematic review of caregivers' perspectives on KMC reported that social support, access to care and cultural norms were important drivers of family perceptions, practices, attitudes and values about KMC (38). Important elements included: services free of charge for users; support from health workers; parents allowed unlimited visiting hours at the health-care facility; a private, quiet space in the hospital to provide KMC; and involvement of fathers and partners. Another synthesis of qualitative studies suggested that providing KMC can be restorative as well as energy-draining for mothers, fathers and partners (37).

Resources required and implementation considerations

Organization of care

KMC can be implemented at home and at all levels of newborn care (primary, secondary and tertiary) (42). Health services should ensure family involvement in the care of their preterm or LBW infant, irrespective of the infant's clinical condition. This should include a policy of "zero separation" between families and their preterm or LBW infant. This needs close collaboration between families and newborn and maternity care providers. Health-care facilities should ensure that families have access to beds, food, bathing and toilet facilities throughout the infant's hospital stay.

KMC is ideally initiated immediately after birth, or after initial resuscitation if that is needed. When it is not possible for the mother to provide KMC, other family members should provide it. To prepare for this situation, family members should be identified before delivery, counselled and allowed access to maternity and newborn care areas. If the infant needs to be transferred to a special or intensive care unit, the infant should be transported safely in KMC with the mother or another family member.

Choice of the best location for further management should be guided by the clinical condition of the infant. Stable larger infants could receive KMC in postnatal wards, while smaller ones could receive KMC in special care units (e.g. "step down" units, special care nurseries), and infants with complications could receive KMC in intensive care units. Many babies who need special or intensive care (e.g. level

2 or 3 care) are often separated from their mothers, although KMC is essential for these babies. Units that care for preterm babies and mothers with zero separation are needed (e.g. maternal-neonatal intensive care units [M-NICU] [43] or "couplet care" units [44]).

Health-care facilities should provide support so that mothers and families can continue KMC at home after discharge. All preterm and LBW infants must be followed up after discharge, ideally through home visits.

Preterm or LBW infants born at home should receive immediate KMC if they do not have danger signs, and should be transferred to a health-care facility if needed.

Infrastructure, equipment and supplies

A binder may help to keep the infant in skin-to-skin contact with the mother's or caregiver's chest. The infant should also have a warm hat, socks and a diaper/nappy. The mother or caregiver should wear whatever is comfortable, provided the clothes accommodate the baby.

Other arrangements can also make the baby and mother more comfortable, e.g. reclining beds and chairs. Other equipment and supplies needed are the same as for other newborn and maternal care, including a thermometer suitable for measuring body temperature down to 35°C.

If M-NICUs or couplet care units are used, they should have all the infrastructure, equipment and supplies that NICUs have for small or sick babies and that maternity wards have for mothers. For babies, this includes continuous positive airway pressure (CPAP) machines, pulse oximeters and radiant warmers or incubators if the infant is not in KMC. For mothers, this includes adult beds and an examination area where she can receive the health care she needs.

Workforce, training, supervision and monitoring

Health workers at all levels can provide KMC support to mothers and families. Training includes helping mothers keep infants in skin-to-skin contact, helping them with breastfeeding, and providing other neonatal care. Health workers should record the duration of KMC provided per day in a clinical register (or in home-based records in the community) and should monitor this on a regular basis.

Scale-up

KMC should be scaled up as an integrated intervention within programmes, not as a stand-alone programme. Scaling up means ensuring all preterm and LBW babies receive KMC across the whole country and across all countries. It needs multiple high-intensity (i.e. high-frequency and quality) interventions in the different domains described above (i.e. organization of care, health workforce, and infrastructure, equipment and supplies), but it also needs leadership and governance, financing, and health information systems.

- Leadership and governance can include: high-level leadership from national and subnational policy-makers, programme managers and facility directors; policies to enable zero separation; licensing standards for health-care facilities; pre-service education of health workers; and engagement with professional organizations.
- Health financing can include: dedicated line items in national budgets for KMC and expanded health insurance that includes KMC.

- Health information systems can include: monitoring of coverage and quality of KMC in routine health systems in health-care facilities and at the district and national levels.
- More detailed guidance on scaling up based on the results of implementation research (43,45-50) is being developed and will be published separately.

Feasibility and equity

Facility-based studies have shown that KMC can be provided to small babies, for more than 8 hours per day, and that it can be initiated immediately after birth irrespective of clinical stability (39,43,45,46). These studies were conducted in poor, remote and urban communities in “real world pragmatic” settings (40,51). However, community-initiated KMC and KMC for unstable babies have not been implemented outside research settings and global coverage remains low (52,53).

Summary of judgements

| | Comparison 1: KMC vs conventional newborn care (A.1a) | Comparison 2: Immediate KMC vs later KMC (A.1b) |
|-------------------------------------|--|--|
| Justification | <ul style="list-style-type: none"> ▪ Evidence of large benefits: decreased mortality (<i>high-certainty evidence</i>), decreased infection (<i>moderate-certainty evidence</i>), decreased hypothermia (<i>moderate-certainty evidence</i>), increased weight gain (<i>low-certainty evidence</i>) and increased breastfeeding (<i>very-low-certainty evidence</i>) ▪ No evidence of harms | <ul style="list-style-type: none"> ▪ Evidence of large benefits: decreased mortality (<i>high-certainty evidence</i>), decreased hypothermia (<i>high-certainty evidence</i>), decreased infections and increased weight gain (<i>low-certainty evidence</i>) ▪ No evidence of harms |
| Evidence-to-Decision summary | | |
| Benefits | Large | Large |
| Harms | Trivial or none | Trivial or none |
| Certainty | Moderate | Moderate |
| Balance | Favours KMC | Favours immediate KMC |
| Values | No uncertainty or variability about outcomes | No uncertainty or variability about outcomes |
| Acceptability | Varies | Varies |
| Resources | Low to moderate | Low to moderate |
| Feasibility | Probably feasible | Probably feasible |
| Equity | Probably equitable | Probably equitable |