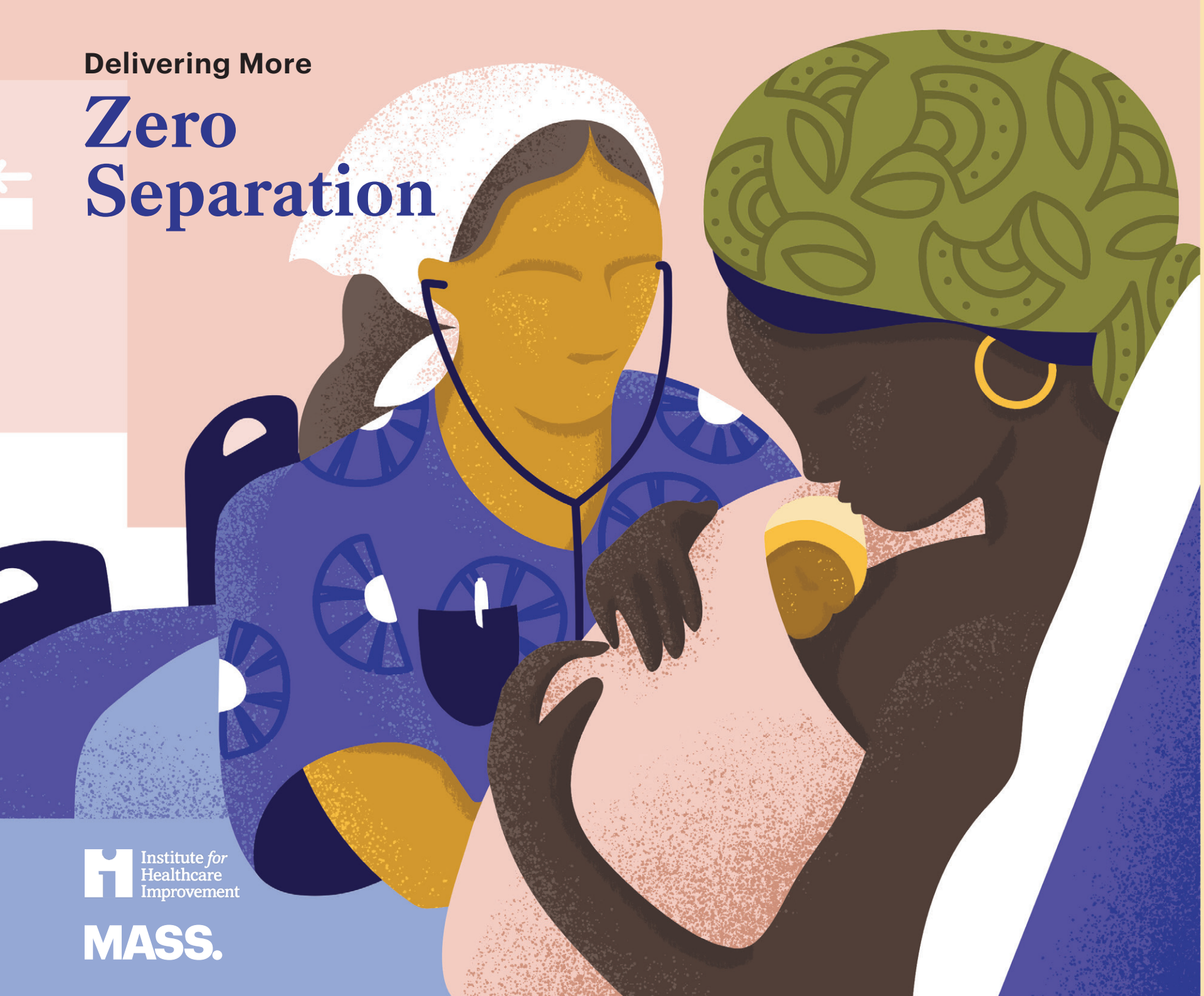
Delivering More

Zero Separation



Institute *for* Healthcare Improvement

MASS.

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The Delivering More project outlines a human-centred process to co-design ideal maternal care from the user perspective - with the aim of developing improved health facility designs that enable safe, respectful Maternal and Newborn Health (MNH) care provision and utilisation in traditionally underserved populations. With support from the Gates Foundation and the Elsa & Peter Soderberg Charitable Foundation, the project was led by the Institute for Healthcare Improvement (IHI), a not-for-profit organisation with a mission to improve health and health care worldwide. IHI partnered on the project with MASS Design Group — a nonprofit design, research, and engineering firm with extensive experience designing and implementing impact-driven health care infrastructure in LMICs.

Based on learnings from the immersions in Ethiopia and Bangladesh, we have developed a globally-applicable toolkit and a set of guiding principles for improving maternal and newborn facility design.

Project Lead

Institute for Healthcare Improvement

Project Partner

MASS.

About this Guide

This document introduces the Zero Separation care model, which prioritises keeping mothers and newborns together throughout their time in healthcare facilities. It aims to support designers, facility teams, and implementing partners with design principles and implementation considerations that enable family-centered maternal and newborn care environments.

The design principles presented in this guide are informed by global evidence and guidance, as well as engagement with healthcare providers and experts. While facility standards and guidelines vary across contexts, these principles highlight best practices and design strategies that can be adapted to a range of healthcare contexts to support the integration of Zero Separation into maternal and newborn care.

The first section of this document, 'Design Principles', outlines spatial strategies and key design considerations that enable mothers and newborns to remain together while receiving safe and high-quality care. These principles are not intended to replace local standards or government guidelines, but rather to complement them by emphasising features that support family-centered care, drawing on guidance from global organizations such as WHO and UNICEF.

The second section, 'Implementation', focuses on how these principles can be adapted and applied in different facility settings. It highlights additional considerations for designers, facility administrators, and implementing partners, including care flows, operational factors, and infrastructure requirements that influence the successful integration of Zero Separation within maternal and newborn care environments.

Zero Separation

Zero Separation is a care model that prioritizes keeping mothers and newborns together throughout their stay in healthcare facilities—including during higher-intensity care.

Based on evidence that uninterrupted contact improves health outcomes for both, this approach challenges the common practice of separating small and sick newborns (SSNs) from their mothers in neonatal intensive care units (NICUs). Instead, it advocates for continuous proximity, regardless of the newborn's condition, and aligns with WHO and UNICEF recommendations for comprehensive, family-centered newborn care.

- **IMMEDIATE KANGAROO MOTHER CARE (iKMC)**
  iKMC introduces continuous skin-to-skin contact and exclusive breastfeeding immediately after birth—even before clinical stabilization. Designed for both stable and unstable newborns, it promotes early bonding, better temperature regulation, and timely initiation of breastfeeding.
  Evidence shows that it reduces the risk of hospital-acquired infections, strengthens immunity, supports growth, and alleviates stress for both mother and baby. For iKMC to be implemented effectively, mothers and newborns must remain together in the same room.

- **KANGAROO MOTHER CARE (KMC)**
  KMC is a widely adopted practice for stable newborns and involves ongoing skin-to-skin contact and exclusive breastfeeding,which can significantly improve the survival chances of premature or low birthweight babies.

- **MOTHER-NEWBORN INTENSIVE CARE UNIT (M-NICU)**
  When newborns require advanced medical support beyond Kangaroo Mother Care (KMC), the Zero Separation model remains central. In these cases, care is provided in a Mother-Newborn Intensive Care Unit (M-NICU), a specialized space where mothers and their SSNs receive care together. Within an M-NICU, mothers act as active caregivers and integral participants in the care continuum.

Although the term "mother" is commonly used for the person providing skin-to-skin contact, alternate caregivers or surrogates can also fulfill this role. The involvement of a family member can significantly alleviate emotional, physical, and psychological stress. These care surrogates are able to provide KMC even during a newborn's transfer from the Delivery Room or OR to the newborn unit. Facilities should ensure families have access to beds, food, and bathing and toilet facilities throughout the infant's hospital stay (WHO, 2022). Surrogates are crucial for maintaining continuous KMC and achieving Zero Separation, offering support when mothers need to eat, use the bathroom, or receive care.

Design Principles

This section outlines best practices and design strategies for implementing Zero Separation within healthcare facilities. Developed through literature review and engagement with healthcare providers in Bangladesh, Ethiopia, India, and Tanzania, these principles are adaptable across global contexts despite differences in local standards and facility guidelines.

Newborn care units serve small and sick newborns (SSNs) requiring treatment beyond routine postnatal care due to prematurity, low birth weight (LBW), or other complications. These spaces range from small stabilization rooms in lower-level facilities to multi-ward departments in larger referral centers.

Newborn care units typically include one or more wards, each containing several newborn beds. To ensure high-quality care, these wards must be supported by additional spaces including: dedicated KMC areas; toilets, bathing, and dining facilities for mothers and surrogates; milk expression, milk preparation, and breastfeeding areas; donning/doffing zones; nurse stations, duty rooms, and staff break rooms; utility rooms; as well as other necessary support spaces.

To support Zero Separation, care spaces must be designed to function together. A dedicated ward is needed to enable mothers and newborns to receive continuous care, and delivery rooms must support the immediate initiation of iKMC after birth. Delivery areas should include space for waiting surrogates, as well as adequate space to safely transport newborns in the KMC position.

Detailed annotations highlight key design considerations on the following pages.

Detailed annotations highlight key design considerations in the diagrams that follow. The first diagram illustrates the design features commonly found in newborn units that are essential to support effective operation, alongside guidance and bubble diagrams to illustrate critical space adjacencies that enhance care flow for both patients and providers. The second diagram details design elements specific to wards that accommodate mothers and newborns together. Further diagrams depict support and ancillary spaces, as well as a Kangaroo Mother Care ward.

While these principles are grounded in evidence, they are often underrepresented in existing design standards and guidelines. Promoting their integration is essential to advancing high-quality, family-centered care. The following pages present design principles and best practices to guide the planning and creation of newborn care spaces.

1 HAND-WASHING

Each area within the newborn care unit should include a dedicated handwashing basin to support hygiene and infection prevention. In some settings, placing handwashing stations outside the wards may help reduce water spills and slippery floors, enhancing safety for healthcare providers, mothers, and companions. Stations should minimize spills and use non-touch mechanisms for water and soap to reduce contamination risks.

2 TEMPERA-TURE

Temperature must be carefully controlled for newborn safety. Newborn spaces should maintain air temperatures between 22–26°C (72–78°F) and relative humidity of 30–60%. Ensure uniform conditions, avoiding hot or cold spots, condensation, or direct drafts on newborn beds. Ventilation systems should suit the local climate and infrastructure. Where natural ventilation isn't feasible, mechanical systems (e.g., HVAC) are necessary. Note that while A/C units regulate temperature, most commercial models (like split units) lack HEPA filters and do not provide air exchange. Supplemental air cleaning systems are required for infection control.

3 LIGHTING

Provide natural daylight through glazed external windows to reduce heat gain/loss. Windows should be at least 0.6 meters from beds to prevent radiant heat loss. Use dimmable artificial lighting to create a comfortable environment. Task lighting should be installed at workstations, medicine prep zones, and handwashing areas, taking care to shield newborns' eyes from direct glare.

4 PROVIDER SPACES

Alongside a centralized nurse station, each ward should ideally have its own nurse outpost. Include duty rooms and changing rooms to support newborn care unit workflows and staff wellbeing.

5 DELIVERY ROOM & OR

These rooms should enable immediate skin-to-skin contact. Provide storage for KMC binders, diapers, caps, mittens, and socks. Layouts should include space to prepare mothers or surrogates to transfer newborns in KMC position. Store wheelchairs near exits for quick, safe transport of mothers and newborns.

6 MILK PREPARATION

Include a milk expression room with at least two comfortable seats for breastfeeding or pumping. A separate milk prep area should function like a small kitchen, supporting the cleaning of bottles, and preparation of formula or expressed breastmilk. It should include a refrigerator, sinks, counter space, and storage. While iKMC prioritizes direct breastfeeding, these spaces are vital for mothers who are ill, recovering, or temporarily separated from their infants.

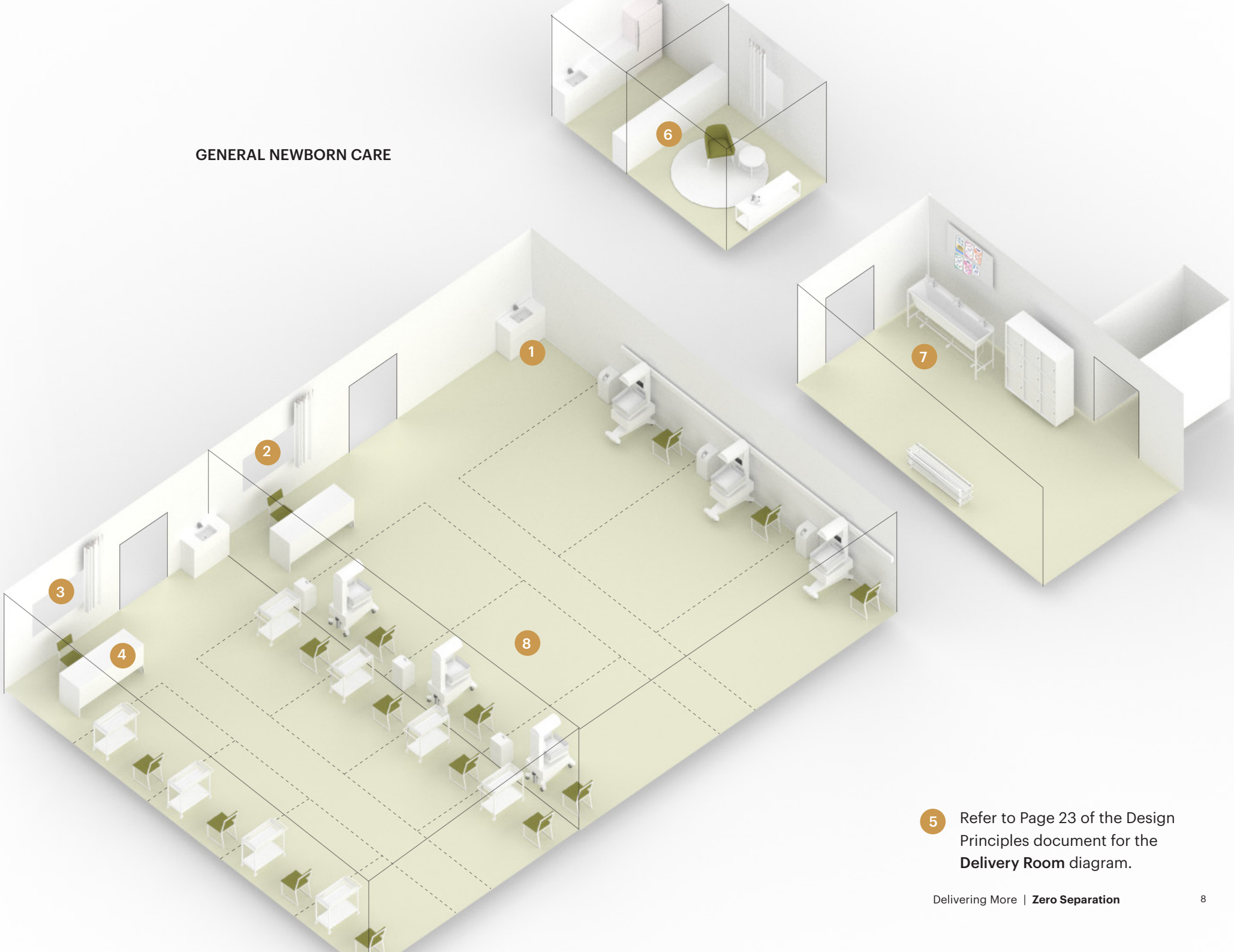
7 DONNING/ DOFFING

Designate a donning/doffing zone to separate clean and contaminated areas. Include a large handwashing sink, shoe racks, and lockers where mothers can store gowns and personal items before entering the newborn care unit.

8 NEWBORN WARD LAYOUT

Even in facilities with limited space where a dedicated M-NICU cannot be established, every effort should be made to provide a chair for mothers beside their newborns. General newborn care can be divided into low and high dependency wards. A low dependency ward may include simple bassinets, while a high dependency ward may include radiant warmers, incubators, CPAP machines, vital sign monitors, oxygen, and IVF, depending on the facility's capacity and needs. Each newborn care space should allocate between 5 and 16 m^2 per newborn, based on the level of care required. This ensures adequate room for clinical equipment and a caregiver's chair next to each incubator or radiant warmer, supporting Zero Separation practices and minimizing contact between beds.

GENERAL NEWBORN CARE



5 Refer to Page 23 of the Design Principles document for the **Delivery Room** diagram.

9 M-NICU LAYOUT

A M-NICU should be designed to adapt to varying needs and evolving care practices. The centre of the ward should be kept clear to provide sufficient space for healthcare providers to move freely and care for patients efficiently. M-NICU are generally recommended to include 8-12 beds; fewer beds may be operationally unviable, while more can become difficult to manage. This range balances the need for staff oversight with privacy and support for families. The exact number of beds should be determined by local health planners based on demand and capacity analysis.

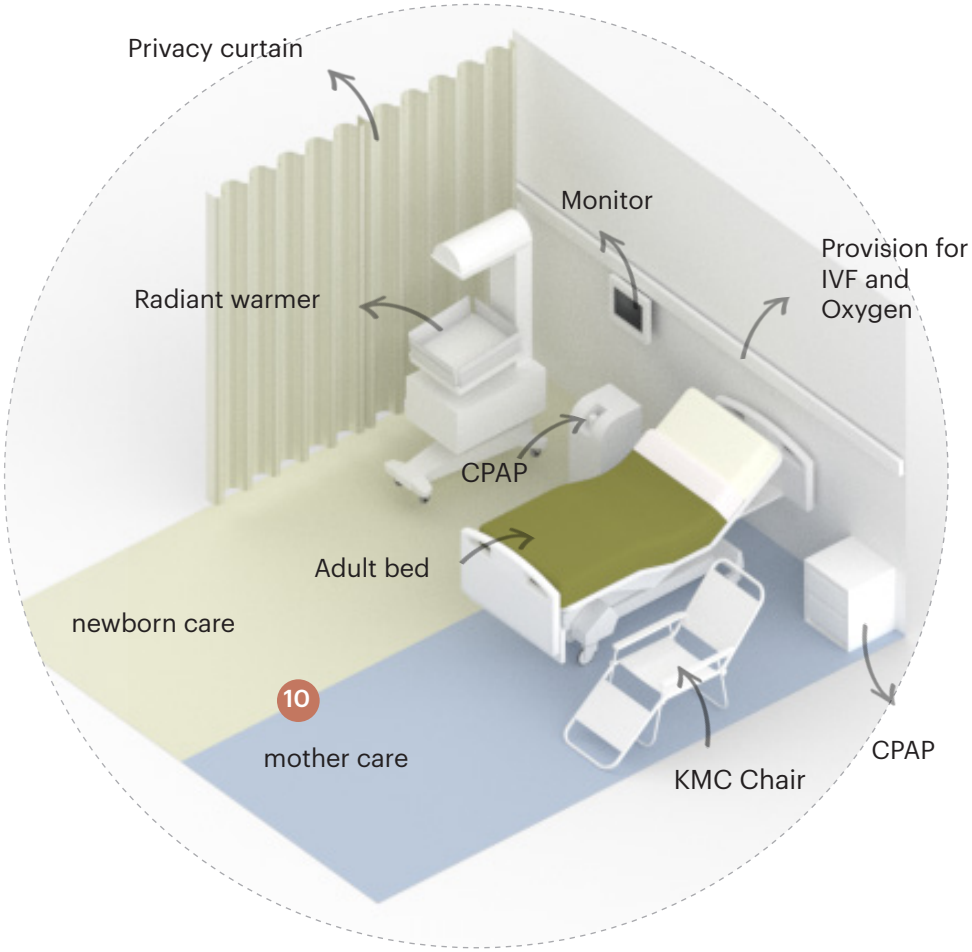
10 M-NICU BAY

Each mother-newborn pair should be provided 18-23 m², with roughly half the space dedicated to newborn care and the other half to mother care. Each bay should contain all necessary equipment including an adult bed with an adjustable backrest for skin-to-skin care, a continuous positive airway pressure (CPAP) machine, vitals monitor, a KMC chair, oxygen provision, and a radiant warmer—along with sufficient space for a provider to move and deliver care. If full rooming-in is not feasible due to space or operational constraints, a KMC chair should be provided at a minimum to ensure mothers can remain close to their newborns. These chairs reduce the burden of prolonged bed rest and offer flexibility.

11 EXAM AREA

An exam room within a newborn care unit is typically used to assess newborns and determine their acuity, particularly for incoming outborn patients. However, in many countries implementing the M-NICU model, recently delivered mothers often receive limited follow-up from obstetric providers, regardless of the type of delivery. For this reason, a dedicated space for maternal physical examinations is essential to ensure that mothers receive appropriate postpartum care.

M-NICU BAY



M-NICU WARD

12 POWER SUPPLY

Sufficient electrical outlets should be installed around the perimeter of newborn care wards, positioned according to the planned bed layout. General newborn care beds typically require 2-6 outlets each, while M-NICU bays generally need 6-8 outlets to support all essential equipment.

13 PERSONAL STORAGE

M-NICU mothers are provided with gowns. Ideally, lockers should be provided near the M-NICU entrance to allow mothers and surrogates to securely store gowns and personal belongings.

14 COOKING & DINING

This space allows mothers and surrogates to prepare food and take breaks away from the clinical environment. In many hospitals, it is a small indoor room. In facilities with larger campuses and single-story buildings, an indoor-outdoor space at the periphery of the M-NICU may be more appropriate.

15 COUNSELLING

A private counselling room is an important space required for sensitive conversations such as delivering difficult news. It can also serve many other purposes: such as conducting pre-discharge counselling, and educating families on M-NICU protocols, handwashing, and infection prevention.

16 SUPPORT SPACES

Newborn care units often lack essential support areas that are critical for maintaining quality of care. All newborn care units should provide nearby access to toilets and showers, spaces for cultural practices, dining areas, clinical storage, clean and dirty utility rooms, and a sterilisation room.

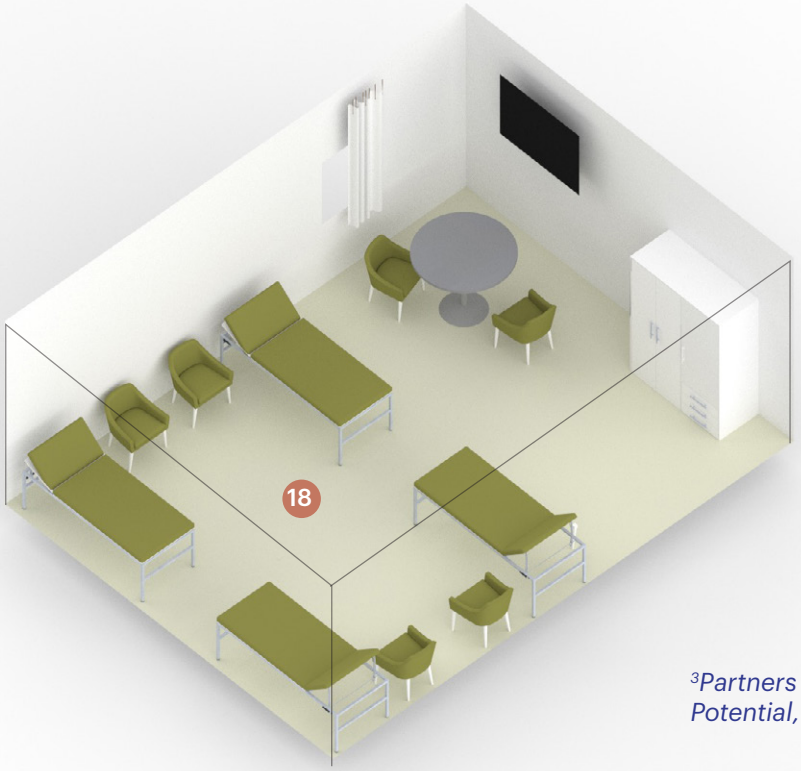
17 PRIVACY

Curtains should be installed between beds to provide privacy for mothers and surrogates. This is particularly important in cultural and religious contexts where modesty is prioritized, and when male surrogates are present in the ward.

SUPPORT & ANCILLARY SPACES

18 **KMC**

Named for the way kangaroos carry and nurse their young in a pouch, Kangaroo Mother Care (KMC) involves prolonged skin-to-skin contact between the mother (or a surrogate) and the newborn, along with breastfeeding when possible. KMC helps keep babies warm, stable, and regulated. It is highly adaptable and can be practiced alongside oxygen therapy, intravenous fluids, and even more intensive respiratory support[3]. A dedicated KMC space ensures that all mothers of preterm or low birth weight (LBW) newborns have the opportunity to engage in skin-to-skin care. The ward should include beds with adjustable reclining backrests, ergonomic reclining chairs, and storage for KMC aids. Ideally, the KMC ward should also include access to toilets, showers, and basic amenities like a television, refrigerator, cooking area, and laundry facilities to support maternal comfort and extended stays.

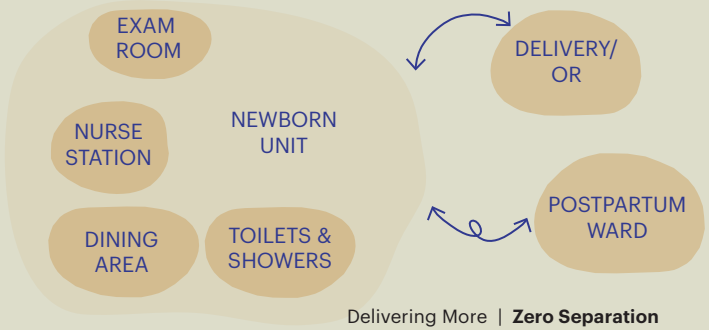


[3]*Partners of Human Potential, 2025*

Location Notes

Several programs should ideally be located adjacent to the Newborn Unit. However, designers, implementing partners, and facility teams should prioritize these adjacencies based on the specific constraints of each facility—while always centering infection control, care flows, and the comfort of newborns, mothers, and providers.

- The Newborn Care Unit should be located in close proximity to the delivery room and OR to allow safe and efficient transfer of small and sick newborns along with their mothers or surrogates immediately after birth. Shorter, protected routes reduce the risk of hypothermia.
- At facilities that admit outborn newborn patients, the layout should consider the ambulance drop-off location, ensuring a direct and efficient path for emergency deliveries and postpartum admissions to the newborn unit.
- Cooking and dining areas can be placed in the dirty zone outside the newborn unit; or alternatively within the clinical area, in a clearly demarcated clean zone, with separate entry and exit pathways. Strict hand hygiene and gowning should be enforced before entering any clinical area.
- Dedicated toilets and showers for mothers of small and sick newborns and their companions/surrogates should be located adjacent to the newborn unit, within the unit but clearly separated from clean care spaces. A separate, dedicated toilet should also be provided for clinical staff.
- Counselling and maternal exams spaces should be located near the M-NICU to support integrated, family-centered care.



Considerations for Implementation

Designers, facility teams, and implementing partners should take additional factors into account to adapt the design principles to a range of facility contexts.

CLINICAL CARE PROVISION

The Newborn Unit may be divided into separate wards to deliver care tailored to specific clinical needs. For example, in Tanzania, a High Dependency Unit (HDU) typically provides an intermediate level of care, serving as a step-down from a Neonatal Intensive Care Unit (NICU). The NICU delivers the highest level of care for critically ill or extremely premature newborns, while the HDU supports those who are stabilizing but still require close monitoring. In other settings, newborn care may be organized into inborn and outborn wards or segregated based on infection status, with distinct zones for infectious and non-infectious cases.

IDEAL CARE FLOWS & SPACE ADJACENCIES

Newborn care programs should be located in a dedicated zone within the healthcare facility, in close proximity to the delivery and operating rooms to enable safe, timely transfers.

While layouts must be adapted to local practices and existing infrastructure, the accompanying bubble diagram provides a starting point for thinking through care flows and spatial adjacencies to support Zero Separation in Level 2 Small & Sick Newborn Care ((AlignMNH; Gray, 2023). Bubble diagrams are early-stage planning tools that consist of bubbles (representing spaces) connected by lines to convey relationships.

The journey of mothers and their small or sick newborns after delivery follows a structured care pathway, emphasizing immediate Kangaroo Mother Care (iKMC) and zero separation across different care units in the M-NICU.

From birth, the goal is to ensure immediate skin-to-skin contact between mother (or surrogate) and baby, even for preterm or low birth weight (LBW) infants. Newborns receive necessary stabilization while prioritizing contact between mother and newborn, unless intensive resuscitation on a separate table or bay is required. KMC starts immediately to promote bonding, warmth, and early breastfeeding initiation at the KMC unit. Mothers remain with their newborns throughout all levels of care. They receive lactation counseling, emotional support, and guidance on the importance of continued KMC.

Newborns requiring close observation and intensive care (invasive ventilation for moderate respiratory distress, sepsis, or feeding difficulties; continuous monitoring of vitals, oxygen therapy, IV fluids, phototherapy, and stepwise initiation of oral feeds) are shifted from the delivery room or OR to the M-NICU. In the M-NICU, mothers actively participate in care with support from trained health workers. Lactation support is available to ensure early and exclusive breastfeeding, or alternative feeding methods if needed.

When the newborn meets clinical discharge criteria—such as stable vital signs, no apnoea for seven consecutive days, exclusive or adequate feeding, sustained weight gain, and the ability to maintain body temperature outside of an incubator—the mother and baby may be discharged or transitioned to a KMC unit for step-down care. Discharge tasks should include scheduling follow-up visits for weight monitoring, immunizations, and developmental assessments.

In some settings, based on ministry or health department recommendations, an additional High Dependency Unit (HDU) may be used as an interim step

between the M-NICU and KMC unit. Criteria for transfer to the HDU include normal temperature, heart rate, and oxygen saturation; oral feeding; minimal oxygen support; and no ongoing intensive interventions. As in the M-NICU, mothers in the HDU provide continuous KMC, breastfeeding and routine newborn care under nursing supervision. Nurses conduct periodic monitoring, ensuring ongoing weight gain, thermoregulation, and feeding adequacy. Mothers receive continued education on newborn care, danger signs, and support to ensure readiness for discharge.

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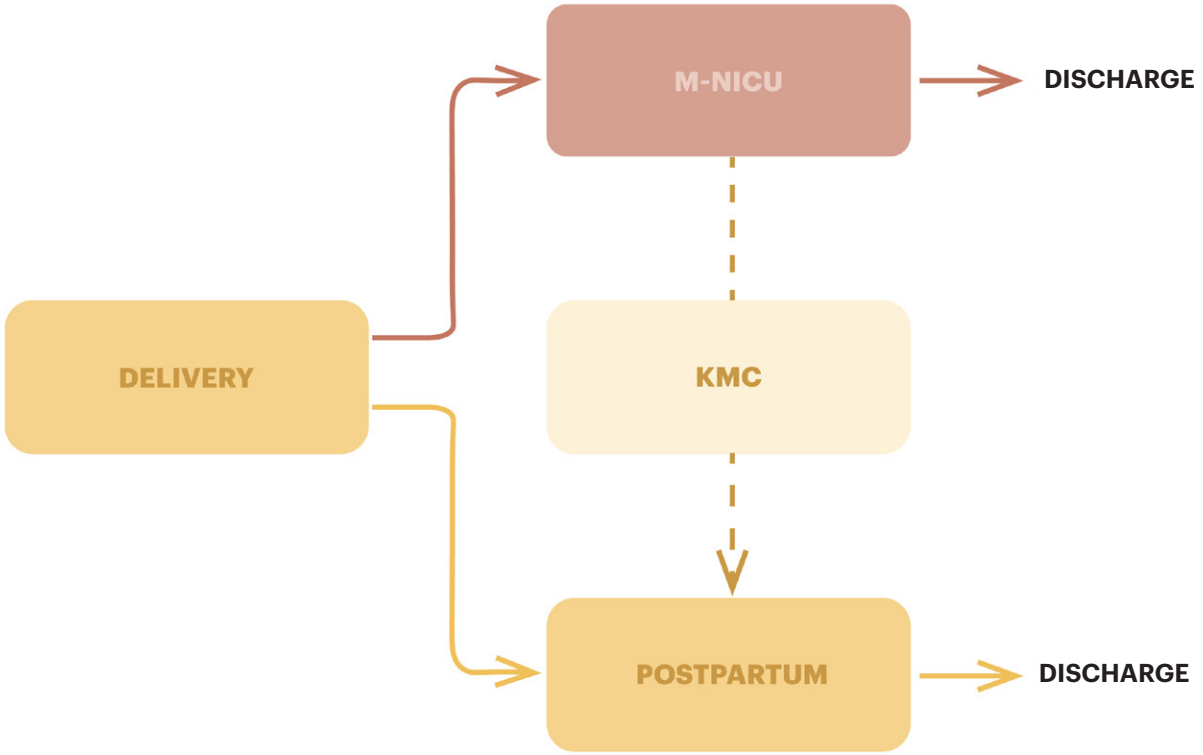

Operational Considerations

In addition to design and layout, the following clinical and operational considerations are essential for implementing Zero Separation with appropriate staffing and procedures.

PRECAUTIONS FOR INFECTION PREVENTION AND CONTROL (IPC) AT ENTRY AND EXIT:

Safe entry and exit protocols—including designated donning and doffing areas and controlled visitor access—are critical for infection prevention and control. Only one attendant or surrogate visitor should be permitted in the M-NICU at a time to ensure uninterrupted Kangaroo Mother Care (KMC) when the mother is unavailable. All visitors must be educated on proper hand hygiene before entering the unit.

TRANSPORTING SMALL NEWBORNS IN KMC POSITION FROM DELIVERY TO M-NICU:

To enable early initiation of KMC, hospital infrastructure must be planned to support the seamless transfer of newborns in the KMC position from the delivery area to the M-NICU. Without thoughtful spatial arrangements, KMC can be delayed or disrupted. The pathway should include wide, unobstructed corridors, ramps (instead of stairs), privacy screens, or designated transport routes to facilitate safe and dignified movement of the mother and baby, assisted as needed by trained staff. The distance and layout between the delivery area and the M-NICU must be designed to enable the safe and smooth transport of the baby in the KMC position, either held by the mother or assisted by trained staff. Wide, unobstructed pathways, ramps (instead of stairs), privacy screens, or designated transport corridors can significantly ease this movement.

PREPARING MOTHERS FOR M-NICU NORMS AND IPC ETIQUETTE:

Mothers, surrogates, and attendants must be oriented to the expectations and etiquette within the M-NICU. Clear communication and cooperation with healthcare providers are essential for the smooth operation of the unit. Interpersonal communication and regular updates on the newborn's condition are key to building trust and keeping families calm during clinical interventions. Counseling should be available for families in the event of adverse outcomes. With mothers present in the unit, clinical procedures may be visible to others, requiring sensitivity and discretion.

WASTE MANAGEMENT:

Effective waste management is essential to maintaining a safe M-NICU environment. Dedicated waste collection areas should allow removal of soiled materials without passing through infant care zones. Supplies should be stored in mobile trolleys outside infected zones to minimize bedside waste. Healthcare workers must be trained on waste segregation and disposal protocols as part of broader infection control efforts to enhance patient and staff safety.

INTEGRATING FAMILY CARE & THE ROLE OF SURROGATES:

When a mother is receiving care in another part of the facility, the surrogate steps in to provide support. As countries vary in their acceptance and integration of male surrogates, facility teams should consider local gender norms and privacy needs when involving male family members in caregiving.

MAINTAINING ZERO SEPARATION AT LOWER-LEVEL FACILITIES:

In low-resource settings, High Dependency Units (HDUs) may serve as an alternative to full M-NICU care due to limitations in equipment or staffing. In some contexts, the HDU functions as step-down unit that is part of the M-NICU, while in others functions as a separate care area. The HDU and M-NICU can have overlapping functions, but they are distinct in their level of care and patient needs. While both the M-NICU and HDU can provide specialized care for sick or preterm newborns, including advanced monitoring and medical support such as oxygen therapy, IV fluids, and feeding assistance; only the M-NICU offers positive pressure and artificial ventilation. The distinction in care levels depends on the healthcare system and facility setup.

Infrastructure Recommendations

Facilities aiming to implement Zero Separation must assess available resources and determine whether to pursue short-term or long-term infrastructure adjustments. The following recommendations are based on field visits to facilities in Ethiopia, Tanzania, and India. Short-term strategies may include repurposing existing or adjacent spaces to accommodate mothers and newborns in the same space. This could involve reprogramming underused rooms or reallocating space within the existing footprint to support KMC and maternal presence. Longer-term strategies may include building new structures, expanding existing facilities, or undertaking comprehensive renovations to reconfigure newborn units and implement Zero Separation holistically from the outset.

DECIDING ON AN APPROACH

A one-size-fits-all approach is rarely effective. Facilities should explore multiple strategies to accommodate Zero Separation, such as combining renovations with new construction or making better use of existing space. Before assuming that a new building is necessary, teams should assess whether current spaces are being used efficiently—repurposing existing areas can often be more cost-effective and environmentally sustainable.

- **For new construction -** Consider where to place a new building on site, prioritizing proximity to the delivery and operating room to ensure smooth patient transfers, as well as access to ambulance dropoff areas. Consider the location of adjacent buildings to preserve privacy and maintain adequate setbacks.
- **For renovation -** Identify underused spaces that can be converted and ensure they maintain key proximity to emergency drop-off points and delivery/OR areas.

PROGRAMMING

Programming is the process of defining specific spatial and operational requirements. A space program outlines the rooms, their sizes, bed numbers, and other critical information needed for the facility to function. Consult national and regional guidelines, as well as resources referenced in this document. However, be aware that prototypes and standards are not always feasible to implement within the resource limitations of facilities. A phased approach may be necessary based on available space and budget constraints.

CONSTRUCTION

When planning construction or renovation, it is important to consider the operational impact on existing services. Facilities should evaluate how construction will affect adjacent departments—especially the newborn unit—and plan measures to minimize disruption. This includes identifying whether services will need to be temporarily relocated and accounting for potential issues such as noise, dust, infection risks, and general interruptions to care delivery.

Appendix

This appendix provides additional resources and guidance to support teams in designing newborn care spaces that incorporate Zero Separation.

SIZING A NEWBORN UNIT

As a general guide for all deliveries occurring within the health facility, three beds for every 1,000 annual deliveries may be dedicated to the M-NICU. This demand is for intramural deliveries. Additionally, for newborns delivered outside the hospital (extramural and being brought to the hospital for special care, an extra allowance of 30-50 percent of the estimated beds should be considered.

For example, if a hospital conducts 3,000 deliveries per year, the number of beds required would be:

For intramural: 3/1000 X 3000= 9 beds

For extramural: 30%*9 = 3 beds

Total beds required = 12

NEWBORN UNIT LAYOUT

The World Health Organization (WHO) standards for newborn care do not specify a minimum required distance between newborn beds for Level 2 small and sick newborn care units regarding infection prevention and control (IPC). However, other sources recommend maintaining at least 1 meter (approximately 3 feet) of space between beds to reduce the risk of infection (Shea et al., 2021; CDC guidelines). Some neonatal intensive care unit design guidelines suggest larger spacing of up to 1.8 to 2.4 meters to improve safety and airflow (WHO, 2020; PMCID: PMC7150280).

FURNITURE, FIXTURES & EQUIPMENT SIZING

Items	Length	Width	Area
Mother Bed	1.98 m	0.91 m	1.81 m^2
Radiant warmer	1.19 m	0.64 m	0.76 m^2
CPAP	0.43 m	0.40 m	0.17 m^2
KMC chair	1.62 m	0.73 m	1.18 m^2
Bedside drawer	0.48 m	0.48 m	0.23 m^2

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