

Family-Centred Maternity and Newborn Care:  
National Guidelines

— CHAPTER 10 —

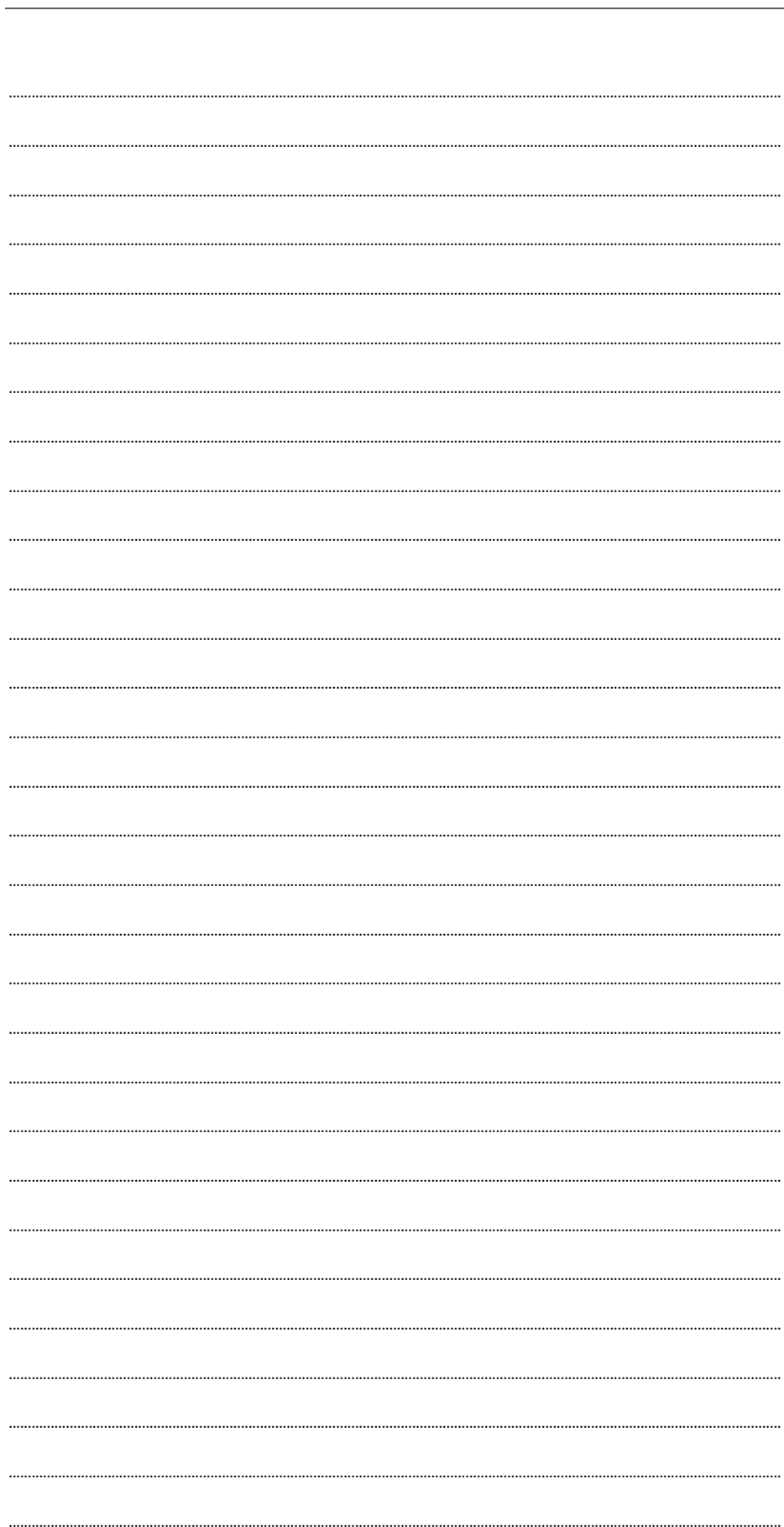
# **Facilities and Equipment**



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## Introduction

The actual physical environment of institutions providing services for women and families during the pregnancy, labour, birth, and postpartum periods greatly influences the institution's practices, as well as the experiences of families and staff. Supportive environments enable professionals and families to work together more easily. The planning process for adapting, renovating, or constructing new facilities provides an excellent opportunity to support family-centred care (Hanson et al., 1994).

It must be remembered, however, that the philosophy of care is primarily supported by the people who provide it. If changes to the physical facility are desired, they must be accompanied by efforts to alter the health care providers' behaviour, such that the latter provide support to labouring women based on family-centred maternity care principles (Hodnett, 1998). In addition, adoption of family-centred approaches to providing care should not be delayed until changes occur in the physical facility. The philosophy and attitudes inherent to family-centred care can be embraced in old or new facilities.

Certain principles are critically important to consider when planning and organizing the physical facility. They can be summarized as the need to:

- recognize that birth is a celebration and, in the majority of situations, a normal, healthy process. Women should therefore be supported in a warm, comforting one-room environment, where they can labour, give birth, spend time with their babies and be cared for, together, without the disruption of being moved from place to place, or being separated from their newborn;
- recognize that the central objective of care for women, babies, and families is to assist women to give birth to healthy babies — that is, to maximize the probability of a healthy woman giving birth to a healthy baby. Therefore, appropriate facilities and equipment should be made easily available;
- recognize that caring for women is best done in the context of their families. Therefore, families should be comfortably accommodated in the environment and feel part of the process;
- recognize that when difficulties arise, a critical objective is to help families be together as much as possible; and
- recognize that technology needs to be used appropriately.

## Planning for Design or Redesign

To design new spaces or make changes to existing areas that support family-centred programs and activities, thoughtful, collaborative planning is essential. The actual design planning, whether for new institutions or for changes to existing institutions, should emanate from the principles expressed within these organizations' mission and philosophy-of-care statements; these, in turn, should be based on the principles of family-centred care.

Three important principles should be considered in conjunction with the planning process:

- the need for a participatory approach. Build collaboration and partnership with families and involve staff in the planning process.
- the need for increased collaboration between community and institutional providers. Ensure that planning studies involve representation from a wide range of providers and consider opportunities to improve health services through integrated delivery systems.
- the need to plan for change. Build a measure of adaptability into all plans, whether long range or geared to specific facilities. The notion of changing circumstances is one of the few constants of health care.

Such planning will require a multidisciplinary team comprising parents, direct care providers, administrators, facility planners, architects, and interior designers. Support services including housekeeping and dietary are also essential to this team. This multidisciplinary team should collaborate on developing programs, as well as on planning the spaces in which those programs will occur (Hanson et al., 1994). (See Appendix 1.)

Designing or renovating spaces so that they function most successfully for all users offers administrators valuable opportunities to look beyond such basic issues as square footage, volume of usage, and modest improvements to design-oriented problems. Functional space programming offers users and administrators the chance to ask detailed questions about how the space will affect the experiences of families and staff (Hanson et al., 1994). Pertinent questions might include the following:

- Is there adequate affordable parking next to the entrance? Is the walk-in entrance clearly marked?
- How do families find their way to the unit?

- What are the first impressions of families arriving at the hospital and on the unit?
- Does the unit have private areas where families can talk to staff? Talk on the phone? Be together?
- Are there play areas for children or siblings?
- Is there a secure storage area for the family's belongings?
- Are there conference rooms, work areas, and lounges available for staff members?
- Are the surroundings warm and inviting? Is it clear that this is a place for families?

The selection of facility planners, architects, and interior designers is an important decision. Beyond assessing their skills and experience in design, the responsible officials should evaluate the sensitivity of the architects and designers to the needs of families and their way of working with clients (Johnson et al., 1991).

### **Suggestions for Existing Facilities**

For many facilities, constructing a new unit might seem to be the only sure way of creating an environment that facilitates the principles of family-centred care. However, it is possible in facilities with dated physical environments to incorporate changes that support normal birth. And in many cases, this can be done with minimal financial expenditures. The revamping naturally begins by encouraging staff members to be creative when visualizing new possibilities in existing space. Members of the community tend to view space differently and can bring fresh perspectives to changes they feel would improve the environment. For example, it is not necessary to purchase expensive new Jacuzzi tubs; hydrotherapy for pain relief in labour can be achieved by using the existing showers and tubs (these may or may not be located in the labour and birth area, but they do exist in other areas of the department and can be accessed). As well, labour triage assessment areas can be located in other combined-purpose areas. The concept of expanding the boundaries is particularly useful; women can then be encouraged to walk outside the unit and return periodically for assessment. Other items can be purchased for labour and birth areas with minimal expense, including birthing balls; birth stools; rockers; sleeping chairs for partners; and decorative items, such as curtains and paintings, that soften

the environment. Among the many other suggestions for making a facility more family-centred, without capital expenditure, are the following:

- “conventional” beds for births (labour rooms can be used for labour, birth, and recovery if no funds are available for special birthing beds);
- pictures on the walls of the unit that evoke a family-centred attitude about values. Representations might include mothers together with babies, dads and babies, families with babies, breastfeeding mothers, or beautiful term and preterm babies. Pictures and stencils at the “sibling” level do a great deal to show that little visitors are welcome;
- individual rooms named for first babies born, special people in the program, special mothers/families, and so on;
- homemade door decorations;
- window treatments or ceiling borders inspired by staff members or a group of mother volunteers;
- alternatives to the usual “nourishments” in the hospital kitchen, such as a fruit basket that could be the ongoing donation of a local grocery store;
- sibling tours, colouring books, stickers, or toy shelves arranged by age group;
- a birthday card for every new baby; and
- parking chit for new fathers/partners and discounts from the hospital cafeteria for parents.

The key to this approach is a willingness to view the space differently; the willingness to make certain relatively simple changes in the way staff members conduct their work; and, of course, the willingness to involve the families of the community.

## **Antenatal, Birth, and Postpartum Facilities**

When renovating or planning new facilities for maternal and newborn services, it is recommended that they be consolidated in one designated area. Ideally, this area would be physically arranged so as to forestall a flow of unrelated traffic through the unit. No other services should be provided in this area, nor should clients from other services be cared for in the maternal and newborn area.

The unit should be designed as a warm environment. It should be inviting to parents and provide optimum privacy and comfort for families.



It should encourage families to be together and to participate in the events of the labour, birth, and postpartum period. It should be functional in terms of providing quality care to mothers and babies. Creating a warm environment can be accomplished through the careful selection of interior colours, furnishings, finishes, and lighting. Incorporating relevant art work, murals, quilt work, and other decorative features is also helpful.

The maternal and newborn service must incorporate a number of different aspects of care in its facilities. Of course, the volume of service and care resources may at times permit the combination of some of these care aspects within a single room. The aspects of care are:

- antenatal in-hospital care for women requiring stabilization or hospitalization before labour;
- a triage area for women who are not yet in active labour, or who need to be observed to determine whether labour has actually begun; and
- labour, birth, and postpartum care of mothers and babies.

It is recommended that hospitals move away from the multitransfer system, whereby women labour in one room, give birth in another room, “recover” in a third, and then are transferred to a postpartum/nursery unit. Not only is this system disruptive for women and families, it can result in a net loss of continuity of care; it also represents a poor use of human, physical, and financial resources, while portraying birth as a medical event, rather than a healthy process.

It is therefore recommended that a woman labour, give birth, and spend at least her first postpartum hours in the same room. This single-room approach is best achieved in a labour/birth/recovery/postpartum (LBRP) system. Hence, it is recommended that all new facilities be built with LBRPs. However, it is recognized that existing facilities may have to continue using labour/birth/recovery (LBR) rooms — that is, single rooms where women labour, give birth, and recover — before being transferred to a combined mother/infant postpartum care unit. Nonetheless, the goal should be *a complete hospital stay in one room*.

It is further recommended that women in active labour, after being evaluated in a triage/preadmission area, should be admitted to a combined LBR or LBRP room. If both mother and baby are healthy, they stay either in the LBRP room following birth and then are discharged home, or are moved from the LBR to a combined mother/baby postpartum unit.

If a cesarean birth is necessary, the woman is transferred to an operative/cesarean birth room for the birth, and then returns to the LBRP/LBR unit. It is recognized that women need a recovery period during which time they are closely monitored. This recovery time should be spent with the baby, and can occur in the operative/cesarean birth room. The operative/cesarean birth room and recovery area should be located within the maternal and newborn care area.

## **Key Components of the Labour and Birth Unit**

### **TRIAGE/PREADMISSION/EARLY LABOUR LOUNGE**

Women should initially be seen and evaluated in the triage/preadmission area. If they are in labour, they can be admitted to an LBRP or LBR room. If their labour is in a very early stage, they can either return home, providing home is close and the trip is feasible (this depends on distance, weather, time of day, and availability of transportation), or remain in the labour lounge. If this preadmission area is excluded from the maternal/newborn suite, women are often admitted to LBR or LBRP rooms for evaluation. Unfortunately, this step can result in increased interventions and poor use of resources (McNiven et al., 1998) (see Chapter 5).

### **ROOMS FOR LABOUR, BIRTH, RECOVERY, AND POSTPARTUM PERIODS**

Single-room, comprehensive maternal and newborn care can be provided to women in labour without any identifiable risk factors, as well as women with identified risk factors. Each room should be equipped for all types of birth, except cesarean births or births requiring general anaesthesia. All LBRP rooms should be located close to the operative birth room(s) (see section Operative Birth Room on page 12).

### **THE LBR OR LBRP ROOM**

Both the LBR and LBRP rooms are private, ideally with a private toilet, shower/tub, and a storage area for basic equipment. A window with an outside view is essential in an LBRP room. Each room contains a birthing bed or a regular, comfortable bed that facilitates care during labour and birth. If necessary, the bed should be easily transportable to the room for operative births.

The workable size of an LBR or LBRP room is approximately 5 metres (16 feet) × 5 metres (16 feet) — for a total size of 25 square metres (256

square feet) — excluding the toilet and tub/shower. At the foot of the bed, there should be a minimum of 1.5 metres (5 feet) of clear space. With single occupancy, there should be adequate space in the room to move around freely and allow easy access to the bed. The design of the room should facilitate a health care provider's recording tasks during the labour, birth, and postpartum periods. The design of an LBR or LBRP room should support the privacy of the mother during labour and birth.

It is suggested that the room be outfitted with certain specific items to make it comfortable and functional for the woman and her family. Recommended items include:

- a bassinet;
- a comfortable bed, chair or sofa for support people;
- a glider or rocker;
- a chair for the health care provider;
- a birth mirror;
- a privacy curtain;
- an over-bed table;
- a bedside cabinet;
- a grab bar, and a bench or chair in the shower;
- a laundry hamper (to be brought in when required);
- a locker (closed) space for personal belongings;
- a wall clock with a second hand;
- a tape/CD player and/or radio (for music); and
- a television.

As well, a VCR should be available for educational purposes, either in the room or on the unit. Even though additional fees for television use may be charged to women and their families, it is important that all women have access to the available educational programming. When planning new facilities, or renovating, administrators should consider making bathtubs (preferably whirlpools) available, as well as showers.

Each LBR/LBRP room needs separate oxygen, air, and suction facilities for the mother and baby. Easily accessible gas outlets (this may include nitrous oxide) and wall-mounted equipment are required as well, although they may be covered. There should be both natural and indirect lighting for labour, with an adequate light source available for special treatments. There should be six duplex wall-mounted electrical outlets for the mother's area, and six for the infant's area. An additional outlet is required for a

portable x-ray machine. Depending on the building code, other outlets may be required as well. Naturally, there must be an appropriate emergency power source and smoke detectors.

All rooms need a telephone with an outside line, a nursing call system with data outlets, and emergency buzzers in the vicinity of both bed and bathroom.

Appendix 2 lists the equipment recommended for the LBR or LBRP rooms. The document *National Guidelines for Neonatal Resuscitation* (CICH, 1994) outlines the recommended equipment for neonatal resuscitation.

### **OPERATIVE BIRTH ROOM**

The operative birth room is used for cesarean births, for other situations of risk to the mother and/or baby, or when a complication is expected or experienced. In keeping with infection control guidelines, birth/operating rooms should be located in a restricted area in the same locale, or adjacent to, the birth rooms. The operative birth rooms should be at least 37 square metres (400 square feet) in size, with an adjacent scrub area. The room may have a bed with stirrups and retractable base, or a birthing bed. There should be separate wall suction and oxygen for mother and baby. Space for resuscitation and other care of the baby should, conceptually, be a separate part of the operative birth room, or provided in a room immediately adjacent (see next section, Infant Resuscitation Area). Any room functioning as an operative birth room should contain, or have immediately available, all the equipment deemed necessary for the birth area, plus that listed in Appendix 2.

Following an operative birth, it is preferable for the mother and newborn to return to the birth room to recover from anesthesia. The recovery area should be situated and designed to facilitate nursing staff observation of both the woman and baby.

### **INFANT RESUSCITATION AREA**

The purpose of this area is, when needed, to facilitate the resuscitation and stabilization of newborn babies. Resuscitation usually occurs in the birth room, although at times a nearby room may be designated. If resuscitation takes place in the birth room, the area should be large enough to allow for proper resuscitation of the infant without interference in the mother's care. The room temperature should be kept between 22° and 26° C. A radiant warmer with a servo control should be in place.

A resuscitation area should be planned as an area separate from that used for the mother's care, but, if located within a birth room, have at least 3.7 net square metres (40 net square feet) of floor space. A separate resuscitation room should have a floor space of approximately 14 net square metres (150 net square feet). The area should have adequate suction, oxygen, and compressed air outlets to enable resuscitation of twins; and at least six electrical outlets for each baby. A separate resuscitation room should also have an electrical outlet to accommodate a portable x-ray machine.

#### **POSTPARTUM MOTHER/BABY ROOMS**

One of the important objectives of postpartum care is to enable mother and baby to be together. As discussed in Chapter 6, in combined mother/baby care, one nurse cares for both the mother and infant. With this type of care, it is expected that the mother and infant will not be separated. The nurse is expected to provide the necessary care and assistance in the mother and baby's room, rather than in a central nursery area.

It is recommended that private rooms be used for postpartum mother/baby care. The arrangement of the square footage should permit adequate circulation around the beds of the mother and baby. These rooms should create an environment in which the mother can effectively begin the process of caring for herself and her baby. Newborn security is best achieved when mothers and babies room together.

It is recommended that there be clearance of at least 1.2 metres (4 feet) between all beds and at least 1 metre (3 feet) between the side of any bed and any adjacent wall (for a minimum of 9 square metres [100 square feet] per bed). If multiple-bed rooms are used, sufficient space is required to enable each bed to be moved in or out of the room without the other furniture being shifted. As well, there must be sufficient space to accommodate a bassinet by the mother's bedside and the necessary supplies to care for the newborn. In a multiple-bed room, privacy screening for each bed is required.

Each mother/baby room should have:

- a comfortable bed for the mother;
- a self-contained bassinet with a capacity for a 24-hour supply of infant needs;
- an over-bed table;
- a bedside cabinet;

- an armchair/rocking chair and a footstool (helpful for promoting proper positioning and breastfeeding comfort);
- a locker for clothing and suitcases;
- an over-bed light;
- an oxygen outlet and vacuum suction;
- a communication system;
- storage space for supplies and laundry;
- a wall clock with a second hand;
- a telephone outlet with an outside line; and
- a television for educational programming.

Each room should have hand-washing facilities. A toilet and shower should be located in, or adjacent to, each room. There should be a refrigerator and freezer for the storage of expressed milk.

#### **NURSERY**

It is now expected that because separation of mother and infant will no longer occur and the nurse provides mother/baby care in their room; therefore, not every postnatal unit will need a full-sized nursery. However, a small holding nursery will still be required for those babies who, for various reasons, are unable to remain constantly with their mothers or must remain after their mother's discharge.

A holding nursery should be able to accommodate up to 25 percent of the infants on the unit at any given time. Nurseries usually house a treatment area. The bassinets should be encircled by a 1 metre (3 foot) border of space, measured from the edge of one bassinet to the edge of the neighbouring bassinet. Each bassinet needs an overall floor area of at least 2.8 square metres (30 square feet).

The holding nursery should have the following features:

- a designated work area for examination and minor procedures;
- a charting area; and
- clear glass partitions between the nursery and the nurses' work centre to permit maximum visual surveillance by staff members.

As well, there should be sufficient access to daylight (outdoor windows) or artificial simulated daylight within the nursery to permit observation of the newborn's colour. Moreover, nursery walls should be painted a colour that

minimizes any distortion of the newborn's colour (i.e. the walls should not be painted yellow or blue).

Each nursery needs to have the following:

- self-contained bassinets, each with a capacity for a 24-hour supply of infant needs;
- one hand-washing sink, with wrist- or foot-action blades, for every four to six newborns;
- one oxygen outlet for every five to six neonatal stations;
- one suction outlet for every five to six neonatal stations;
- a wall clock with a second hand;
- rocking chairs;
- clean laundry storage;
- a designated space in the utility room for soiled diapers, laundry, and used supplies;
- a designated storage space for the newborn's equipment (either in the nursery or elsewhere in the unit);
- one duplex wall-mounted electrical outlet for every two stations (electrical outlets to power portable x-ray machines are recommended as well); and
- an appropriate emergency power source.

A listing of the equipment necessary for the nursery is found in Appendix 2.

During the first hours after birth, when observation and assessment of the mother and infant are so important, the infants should ideally be with their mothers. However, infants requiring special observation or medical intervention should be provided with a small transition/sick infant nursery, which can be part of the small holding nursery. The capacity required depends on the number of births and the length of stay in the observation area. It is recommended that the transition nursery have at least 3.7 net square metres (40 net square feet) for each baby. This sick infant nursery should be located near or adjacent to the birth room. It should contain emergency resuscitation equipment and piped gases (oxygen and suction).

## SUPPORT AREAS

A number of support areas, integral to the functioning of maternal and newborn facilities, are recommended. In many circumstances, they are shared by staff and family members. These areas are described in Appendix 3.

## Additional Features in Level II and Level III Facilities

The *Level II* labour and birth areas should have the facilities and equipment described above, as well as the following features:

- equipment and facilities to monitor fetal heart rates electronically (SOGC, 1995); and
- a special care nursery.

*Level III* labour and birth areas should have the facilities and equipment described for Levels I and II, as well as the following features:

- the capability to function as an intensive care area for the handling of obstetrical and medical complications of pregnancy;
- obstetrical bed(s), to be used for invasive monitoring on the labour floor;
- one operative birth room for a hospital expecting 1000 births per year; and
- neonatal intensive care.

As well, both Level II and III labour and birth areas should have a dedicated, portable ultrasound unit on the labour floor.

When a newborn is admitted to the neonatal intensive care unit (NICU), family members experience enormous stress. Parents of infants born prematurely or sick are thrust precipitately into their new parenting roles and into unfamiliar territory. Parents frequently report feeling extraneous in the high-technology settings, helpless to comfort their infant or to affect the environment. These families have a great need for support, information, and comfort (Johnson et al., 1991). Family-centred policies, programs, and practices that exist elsewhere in the facility must be integrated as part of the critical care setting.

The parents' presence is a crucial factor to both their infant's and their own health and well-being. Not only must staff attitudes and unit policies and practices ensure that families are welcome at all times, but the families



must be assigned a comfortable space in the unit as well as a pleasant place to rest and sleep. To evaluate the service provided, a number of questions need to be addressed. They are summarized in Table 10.1.

**Table 10.1 Evaluating a Family-Centred Intensive Care or Special Care Nursery**

- Are families' first impressions of the unit positive?
- Do the environment and design present this unit as a caring place, a place for children and families?
- Are inappropriate, overwhelming stimuli minimized?
- Are maximum efforts made to control noise?
- Is the lighting comfortable for babies and care providers? Does the lighting encourage normal diurnal rhythms?
- Is there adequate, accessible work space around the baby for staff members to provide care efficiently?
- Is there space around the baby for family members to provide care and nurturing comfortably? Are there comfortable places for parents (e.g. rocking chairs)?
- Is there a separate room giving families private space (for day-to-day interactions, for special situations, for breastfeeding, and for meetings with health professionals)?
- Are families encouraged to make their baby's immediate environment as homelike as possible?
- Are telephones, rest rooms with diaper-changing areas, breastfeeding rooms, water fountains, and food services nearby and easy to find?
- Are there secure places for families to hang coats and store other personal belongings?
- Is there a comfortable space near the unit in which parents can sleep?
- Is there space and support for families to learn and practise new caregiving skills?
- Are there facilities for families to room-in with their babies before discharge? Is there a care-by-parent unit? (Swanson, 1998).
- Are parents informed about their region's resources?

Adapted from: Johnson et al., *Caring for Children and Families: Guidelines for Hospitals*. 1991, p. 416.

The NICU environment, and the approach to caregiving, should follow principles that encourage *developmentally supportive care*. This multifaceted approach to care has been designed to create and maintain a developmentally supportive environment; provide age-appropriate sensory input; and protect the infant from inappropriate, excessive, and stressful stimulation. Based on the synactive theory of development, it recognizes that infants communicate their needs through behaviour and that each infant's needs must be assessed individually (Als, 1982; Als et al., 1986, 1994).

Individualized care protocols that fall under the rubric “developmentally supportive” include:

- structuring the physical environment to reduce light and noise levels;
- clustering and sequencing caregiving interventions;
- positioning and bundling of infants;
- involving parents and siblings in care;
- assuring multidisciplinary consistency; and
- providing individualized infant and family care (PEPEO, 1996).

The overall goal of developmentally supportive care is to optimize the development of premature infants and their long-term well-being and adaptation to the extrauterine environment.

The 10th Canadian Ross Conference in Paediatrics, *Optimizing the Neonatal Intensive Care Environment* (CPS, 1995), made a number of recommendations, based on the available scientific information, to facilitate the provision of developmentally supportive care in the NICU. Tables 10.2, 10.3, and 10.4 present its recommendations with regard to environmental light, environmental sound, and infant-sensitive developmental care.

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**Table 10.2 Guidelines for Environmental Light in Neonatal Intensive Care Units**

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- Ambient light levels should be monitored in NICUs to ensure compliance with currently recommended workplace standards.
- Minimum light levels that permit NICU staff members to carry out their work safely and effectively should be established.
- Light levels at the infant’s face (i.e. in the incubator, the overhead warmer, or the crib) should be measured.
- Ambient non-therapeutic blue wave-length light (<500 nm) should be minimized in the NICU environment.
- Ambient light levels in the NICU should allow for the experience of infant day-night cycling, especially as the time for discharge home approaches.
- Individualized light sources should be used for each infant in the NICU.

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Adapted from: Canadian Paediatric Society, *Optimizing the Neonatal Intensive Care Environment. Report on the Tenth Canadian Ross Conference in Paediatrics*, GCI Communications, Ed., Montréal, Abbott Laboratories, 1995.

**Table 10.3 Guidelines for Environmental Sound in Neonatal Intensive Care Units**

- Each NICU should monitor its sound levels annually, for at least a 24-hour period, and more often if changes emerge in noise levels or nursery design.
- As reductions in environmental sound levels are unlikely to have deleterious effects, NICUs should examine measures to reduce sound levels, including modification of physical facilities and equipment, staff scheduling, and activities. The noise level in the NICU environment should always be less than 65 to 79 decibels.
- Noise levels in NICUs should always be less than those inherent to occupational health standards for adults.
- When usual noise levels are exceeded (e.g. in helicopter transport), safe and effective ways to shield infants' ears should be employed.
- Although environmental noise levels should be moderated, potentially beneficial sounds, such as the voice of a parent, should not be discouraged.

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Adapted from: Canadian Paediatric Society, *Optimizing the Neonatal Intensive Care Environment. Report on the Tenth Canadian Ross Conference in Paediatrics*, GCI Communications, Ed., Montréal, Abbott Laboratories, 1995.

**Table 10.4 Guidelines for Infant-Sensitive Developmental Care**

- The concepts of "infant-sensitive family-centred care" take into account the infant's:
  - clinical status
  - behaviour
  - temperament
  - environment
  - development
  - family
  - attention to positive and negative stimuli (including hazards and pain).
- Caregiver compatibility and consistency of caregiver are also considered.
- The above concepts should be introduced into all staff training programs.
- Improved communication between families and caregivers should be encouraged.
- Systems should be set up to promote consistency and continuity of care by reducing the number of caregivers.
- Systems should be set up to encourage assessment of the infant's behaviour, in order to develop individualized care plans, reduce stress responses (in the infant as well as the parents), and promote optimal development.
- Cooperation should be encouraged between caregivers, researchers, and industry to promote infant-friendly equipment.

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Adapted from: Canadian Paediatric Society, *Optimizing the Neonatal Intensive Care Environment. Report on the Tenth Canadian Ross Conference in Paediatrics*, GCI Communications, Ed., Montréal, Abbott Laboratories, 1995.

In many situations, mothers are discharged from the hospital before their newborns and must travel long distances to be with them. Systems must be developed to meet the needs of parents and their newborns under these circumstances. For example, parents may need rooms in the hospital, in

adjacent facilities outside the hospital provided by the hospital, or in other lodgings nearby; as well, the baby may have to be transferred to a facility close to home as soon as possible (CPS, 1995).

Important family space needs to be incorporated into the NICU. A quiet room, or transition room, where parents and infants can have extended private time together is very important. Comfortable furniture; direct, private access to sink and toilet facilities; a telephone with linkages to the staff; sufficient electrical and gas outlets — all are necessary. It is also important to have a room in which to breastfeed and use a breast pump.

Care-by-parent units are desirable to facilitate the parents' caring for their baby before discharge. The goal of such a unit is to encourage parents to take over the care of their infant at the earliest possible stage, thereby building their own confidence and competence. Parents should be given a role in all planning and decision making concerning their babies' care. Moreover, facilities must be made available should they choose to stay around the clock. Criteria for acceptance in the care-by-parent unit, based on the baby's health and well-being, need development as well (Swanson, 1998).

### **Space and Equipment Requirements for Levels II and III Nurseries**

Level II nurseries, which should be close to the birth area and away from general hospital traffic, need the nursery facilities and equipment described in the earlier section, Nursery. They should also have sufficient radiant heaters and/or incubators for maintaining body temperature, as well as infusion pumps, cardiopulmonary monitors, and equipment for ventilatory assistance.

Infants needing intermediate care require an estimated 8 square metres (86 square feet) of floor space for every infant station, with 1.2 metres (4 feet) of space between incubators, bassinets, or radiant heaters and aisles that measure 1.5 metres (5 feet) wide. Each infant station also needs eight electrical outlets, two oxygen outlets, as well as two air and two suction outlets. In addition, the area needs a special outlet to power portable x-ray machines. All electrical outlets should be connected to both regular and auxiliary power. All equipment and supplies for resuscitation should be immediately available, perhaps conveniently placed on an emergency cart. The equipment requirements for babies requiring Level II care are found

in Appendix 2. There should be sufficient space to allow for charting at the bedside.

In Level III facilities, the neonatal intensive care area should be adjacent to the labour and birth unit in those hospitals with labour and birth facilities. The care area should have the facilities and equipment designated for Level II. As well, there should be 1.8 metres (6 feet) between incubators or overhead warmers, and aisle widths of 2.4 metres (8 feet). Each neonate requires a total area of 12 square metres (130 square feet). Each station requires 12 to 16 electrical outlets, 2 to 4 oxygen outlets, 2 to 4 suction outlets, and 2 to 4 compressed air outlets. All Level II and III nurseries should have a detailed plan in the event of emergency evacuation, specifying equipment and personnel requirements. The equipment requirements for babies requiring Level III care are found in Appendix 2.

## **Bed Needs for Labour and Birth Facilities**

Historically, the calculation of the number of rooms needed for all phases of the birth process involved a simple ratio based on number of births, average length of stay, and accepted occupancy level. However, today, each birth service should thoroughly analyse the functions, philosophies, and projections that will dictate the type and quantity of rooms needed.

One planning method involves careful analysis of the activities occurring in each type of room. For example, LBR and LBRP rooms should not routinely be used to accommodate care such as outpatient testing, when another room can provide a more appropriate setting. Private rooms are recommended for the entire birth process through discharge.

When planning the number of LBR and/or LBRP rooms, an analysis of the present patterns of care should be reviewed. Analysis would take into account the projected birth rate; the projected cesarean birth rate; occupancy projections that address “peaks and valleys” in the census; the numbers and types of births with complications; the surrounding facilities for transfer; and the expected length of stay for women during the labour, birth, and postpartum periods. Questions to be discussed would include the following:

- How many annual births can be maximally accommodated?
- How long do women using the antepartum, intrapartum, postpartum, and ambulatory services stay?

- What are the current and projected rates for scheduled and unscheduled cesarean births?
- What are the acceptable occupancy rates for the various levels of rooms?
- What levels of peak occupancy are expected and what is their frequency?
- What regional partnerships are in place to replace care unavailable in one specific facility? How many women and infants will be transferred for care? How many women and infants will be admitted from other facilities?

Once the data have been accumulated, the following normative formula can be used to calculate the number of rooms needed by type of room:

$$\frac{\text{Number of client episodes} \\ \text{(consider all activities in this room)} \times \text{overall length of stay}}{365 \text{ days} \times \text{percentage occupancy for this room type}}$$

Note: The number of client episodes (cases or activities) is used rather than the number of births.

## Environmental Controls and Engineering

Established guidelines exist for regulating acceptable levels of air change, lighting, and noise from other rooms. Guidelines need to be carefully applied to make the environment more family-centred. The woman should be able to control the environment of the birth area — the temperature, and the levels of lighting and sound.

A number of codes and standards apply to maternal and newborn facilities. Reference should be made to the National Building Code; the applicable provincial building codes; and the standards of the Canadian Standards Association (CSA).

### Thermal Environment, Ventilation, and Air Conditioning

Hospital engineers should monitor all environmental conditions. The optimal temperature suggested for birth facilities ranges between 22° and 26°C. Relative humidity needs to be maintained between 30 and 60 percent. To cope with the anesthetic gases in use, birth rooms have traditionally required the same number of air changes per hour as surgical suites (16 to 20), if nitrous oxide is used.

Many factors, however, impinge on the recommended guidelines and need to be taken into account. These factors need to be discussed with the consulting mechanical engineers — the ultimate goal being the comfort of the mother and baby. For example, whereas during the birth process higher lighting levels and increased numbers of people raise the heat load in the room, after birth the activities and hence the heat loads slow down.

### **Electrical Service**

The CSA standards provide guidelines for both the supply and format of the power. Emergency power is needed for the essential equipment required by babies in Level II and III nurseries and in birth and operative birth rooms. A debate centres on the necessity of isolated power: although generally not required in birth rooms, isolated power is needed in the NICU and operative birth rooms when invasive procedures are carried out that include electrical equipment. Local building and electrical codes can be used to determine emergency lighting requirements.

### **Communications**

In today's hospitals, as in the wider world, the demands of the communications system are ever-growing. Data lines are necessary to accommodate electronic networks. Intercoms may be part of the telephone system or operate as an independent entity. Emergency call systems should be incorporated into the development of communications systems. Telephones, routinely used by staff and family members, are particularly needed during emergencies.

### **Acoustics**

Control of noise is important in birth facilities. The following guidelines should be applied to decrease noise:

- Install sound attenuation blankets in all partitions.
- Outfit all partitions to underside of deck.
- Outfit solid core doors with rubber gaskets.
- Install fans or sound systems within birth room to mask other sounds.
- Use sound-absorbent materials and/or surfaces designed to break up sound reflections, wherever possible.
- Outfit mechanical equipment with vibration isolation/absorption.
- Consider installing piped-in music.

## **Selection of Appropriate Materials and Finishes**

The choice of appropriate materials and finishes can cut long-term costs.

The following questions should be considered during the selection process:

- What cleaning processes and equipment are presently in use?
- What is the cost per square foot of installation and operational cleaning?  
For example, is there staff available to spot clean carpets or fabric upholstery?
- What is the durability and lifespan of the materials? Can the materials stand up to the high frequency of the cleaning required in birth rooms? Will the materials retain their visual appearance after the frequent cleaning?
- Are the materials resistant to the cleaning products and processes used?
- Are the materials resistant to the staining from chemicals used in the birth process?
- Will the combination of materials chosen create an appropriate atmosphere, conducive to the birth process, yet still be esthetically appealing?

Specific criteria related to the selection of flooring, wall, and ceiling material are found in Appendix 4.



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## APPENDIX 1

## The Planning Process

### TERMINOLOGY AND PLANNING PROCESSES

The following general definitions for several key components of the planning process indicate how they relate to maternal and newborn care. These definitions may vary by province or territory.

*Role study:* Defines the role of the organization and, in broad terms, the range of services to be provided. The role of maternal/newborn care services is typically identified in this stage or when a regional plan (i.e. Level I, II or III) is developed. It should include the number of beds, bassinets, and staff members by specialty.

*Strategic plan:* Has generally replaced the role study, although it has similar components. It defines the organization's mission, vision, strategic directions, and goals.

*Master program:* Provides an assessment, for each hospital department, of the implications of the hospital's future directions apropos the departmental scope of service, workload/activity, and facility requirements in terms of major room elements and departmental square footage.

The ability of the organization to accommodate facility changes to support family-centred care is explored during the master program stage. In this stage, the current and future scope of services is identified and, depending on provincial/territorial requirements, the resources (e.g. staffing) and facility requirements are also identified.

*Master plan:* Describes and graphically illustrates the implications of the master program for facilities development and provides a strategy for the continued use and the redevelopment or expansion of the buildings.

In the master or conceptual plan stage, the future location, general configuration, and accessibility of projected maternal and newborn care services are described as a component of the building. At this broader stage, it is essential to consider maternal and newborn care within the context of other hospital services and building constraints.

*Functional program:* Describes in detail a proposed health care activity, outlines its operational systems, and estimates the resources (e.g. staffing,

facilities) required for a single functional element or an entire facility. This stage, as an essential prelude to a capital project, serves as a link between operational planning and implementation.

Once a capital project is approved, a functional program for maternal and newborn care services is developed. The functional program details the proposed functions, operational procedures, activity, staffing, design considerations and room elements, the size of each room or space, and the gross area for each department or functional area. The functional program is the basis for architectural/building and other subsequent planning; it is also a means of communicating intentions within the hospital and to outside bodies. In several provinces, the architectural or space program is prepared separately.

#### **ARCHITECTURAL OR DESIGN PROCESS**

Once all of the above components are in place, the architectural or design process begins. The design process has six major components: predesign; conceptual design; design development; working drawings; tender; and construction. The six must be done in order and all depend upon the previous components being completed.

During the *predesign stage*, the functional program is confirmed and the existing facilities are reviewed. All key players are involved, including staff and families. Next, the budget is outlined, the project team is organized, and the members' individual responsibilities are detailed. Finally, the project schedule is drawn up.

The *conceptual design stage* involves the development of a schematic design report for the unit. This report includes preliminary concepts for space, mechanical, and electrical systems; cost estimates; and preliminary specifications of construction materials. Alternative schemes should be developed and considered. Staffing requirements related to sketch plans must be created and reviewed and operational budgets developed.

The objective of *design development* is to develop a detailed design of all elements (functions, rooms) of the unit. The detailed design takes into account the occupants, layout, function, privacy, accessibility, permanent furniture and equipment needs, materials and finishes, storage needs, safety, lighting, medical gases, and the power and emergency power requirements. All elements, for each function, should be discussed with user groups.

The final *working drawings* and specifications define the project to a level of detail such that it can be competitively tendered and constructed. Completeness and accuracy of the documentation reduce confusion and ensure that what was desired is built. They also lower unforeseen costs.

The hospital and architect then *tender* the project to approved bidders and select the *construction* team.

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Adapted from: Agnew Peckham Health Care Consultants and Parkin Architects.

## APPENDIX 2

## Equipment Required for Different Facilities

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### Equipment Needed for Labour, Birth, Recovery, and Postpartum Room

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*Some of this equipment can be stored outside the room, and brought in when needed.*

- Hand-held ultrasound monitor (e.g. Doptone, underwater Dopplers)
- Thermometer
- Sphygmomanometer
- Stethoscope and fetoscope
- Examination gloves, lubricants
- Intravenous equipment
- A drug cart for anesthetics, epidurals, and emergency use
- A cart containing
  - sterile basins and instruments
  - instrument tray (instruments for normal vaginal birth, repair of lacerations, and/or episiotomy; instruments for the management of obstetrical emergencies)
  - linen, gowns, etc.
- Antiseptic scrub solution
- Oxygen equipment (nasal cannula, masks)
- Peripads and underpads
- Catheterization tray
- Equipment for speculum exam
- A radiant warmer for the newborn
- Instrument and worktables
- Mayo stand
- Basin stands
- An accessible examination light
- A stool for the attendant
- Access to a scale for weighing babies
- Transport incubator and equipment
- Equipment for instrumental birth

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### Equipment Needed for Operative Birth Room

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*(in addition to that required for birth room)*

- Obstetrical forceps
- A vacuum extractor
- Local anesthetic sets
- Drugs — analgesics, oxytocics
- Equipment for anesthetics management (refer to Canadian Anaesthetists Society, anaesthetics guidelines)
- Equipment available to perform a D. and C.

**Equipment Needed for Normal Newborn Nurseries**

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- Equipment for emergency resuscitation of the newborn (see CICH, 1994)
- An incubator
- Infant drugs (as per National Resuscitation Program guidelines)
- Volume expander (as per National Resuscitation Program guidelines)
- A pediatric stethoscope
- Infant scales
- An examining lamp
- A radiant warmer
- Pulse oximeter
- Oxygen analyzer

## APPENDIX 3

## Support Areas Needed for Antepartum, Labour, Birth, and Postpartum Facilities

*The following support areas are required for antepartum, labour, birth, and postpartum facilities:*

- Room for family use, private areas for breastfeeding
- Administration office
- Nurses' station
- Charting area
- Conference room
- Education area for staff and family members, with easy access to resource materials
- Staff lounge, locker rooms, and on-call sleep rooms
- Examination and treatment room(s)
- Secure area for storage of medications
- Instrument clean-up area
- Area and equipment for bedpan cleansing
- Central whirlpool bath/shower (if not in each room)
- Kitchen for families and staff
- Storage area
- Utility room for clean and soiled clothing and bedding
- Scrub area
- Library for families and staff

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### Equipment Needed for Babies Requiring Level II/III Care

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#### *At Each Bedside*

- Incubator, radiant warmer, cot, crib<sup>1</sup>
- Stethoscope
- Cardiorespiratory monitor ( $\pm$  invasive blood pressure)
- Suction equipment, including catheters
- Bag and mask for ventilation
- Storage cupboard/cart/drawer for supplies (e.g. glucose indicator strips) and personal use items, including items provided by parents

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#### *On Each Unit<sup>1</sup>*

- Phototherapy units
- Portable warming lamp
- Procedure lights (unless at each bedside)
- Ventilators, oxygen blenders



- Oxygen analyzers, pulse oximeters, transcutaneous PO<sub>2</sub>
- Transcutaneous/end tidal CO<sub>2</sub> monitors
- Portable O<sub>2</sub> for emergency evacuation
- Transport incubators (and equipment)
- Intravenous pumps
- Ophthalmoscope, otoscope, transilluminating light
- Infant scales, scales for weighing diapers
- Electric breastpumps, freezer for milk
- Refrigerator for medications
- Resuscitation cart
- Equipment for individual hand-bagging (in the event of gas pressure failure or emergency evacuation)
- Procedure trays and equipment (e.g. for intravascular access, chest tubes)
- Manuals and educational material for parents and staff
- Blood gas analyzer (on unit or close, for 5-minute results)
- Storage carts, procedure tables, as required

In addition, spare equipment should be readily available.

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<sup>1</sup> Specific numbers to depend on population mix

## APPENDIX 4

## Criteria for Selection of Materials

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**Table A4.1 Criteria for Selecting Flooring and Base Materials**

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- Water resistance and absorption factors
- Slip-resistance and safety factors
- Comfort for staff who stand for long periods of time
- Comfort for patients — warmth
- Cleanliness and appearance of cleanliness (stains convey an inappropriate image)
- Visual appeal
- Durability
- Resistance to damage and marking by equipment and carts

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**Table A4.2 Criteria for Selecting Wall Material**

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- Colour — ability of staff to assess patient's skin colour (especially newborn)
- Cleanability, see comments in Table 1
- Visual appeal/aesthetics
- Cost
- Resistance to damage by carts and equipment (consider wall rails and bumpers)
- Reflectance of light — glossy finishes can create glare that is harmful to newborn eyes; very matte finishes in dark colours will absorb too much light and increase the need for artificial light sources
- Pattern vs. solid colours

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**Table A4.3 Criteria for Selecting Ceiling Material**

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- Sound absorption
  - Odour absorption/cleanability
  - Integration of lighting and mechanical equipment into ceiling grid
  - Cost
  - Colour/light reflectance
  - Visual appeal
  - Ease of access for repairs to equipment in the ceiling space
-