The Influence of Neonatal Nursery Design on Mothers' Interactions in the Nursery

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Objective This study examined the influence of neonatal nursery design on interactions between nurses and mothers of infants in the nursery.

Design and methods: We used a natural quasi-experimental design, using semi-structured interviews and a structured measure of mothers' and nurses' perceptions of nursing care, to compare mothers ($n = 26$ and $n = 40$) and nurses ($n = 22$ and $n = 29$) in an open-bay (OB) nursery and a single family room (SFR) nursery. Thematic analysis was used to generate key themes from the interviews.

Results: Mothers and nurses in both nursery designs talked about *Valuing interactions*; the importance of interactions between mothers and nurses. Mothers and nurses described SFRs as providing a space, *My/their room*, which enhanced mothers' sense of control and connection with the infant. SFRs were also associated with *Changing the norms of interactions* with nurses and other mothers, which created challenges in the desired quantity and quality of interactions for mothers and nurses. Nurses in the SFR nursery also reported *Enhanced interactions*, including improved confidentiality and personalized communication. Mothers in the OB nursery reported more supportive mothering actions from nurses than mothers in the SFR nursery. Both mothers and nurses in the OB nursery also talked about *Our nursery community*, which captured the value of having other nurses and mothers in the rooms.

Conclusion: Mothers and nurses perceived that the SFR nursery enhanced privacy and maternal closeness for mothers compared to the OB nursery. However, the SFR nursery design presented challenges to some interactions of value to nurses and mothers.
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Preterm birth (< 37 weeks gestation) accounts for between 5 and 18% of all births worldwide (Howson, Kinney, & Lawn, 2012) and approximately 7.4% of births in Australia (Li, McNally, Hilder, & Sullivan, 2011), with 6.2% being born with low birth weight (LBW <2500 g) (Li, Zeki, Hilder, & Sullivan, 2013). Preterm infants suffer greater risks of physical and developmental challenges than full term infants and often require admission to Special Care Nurseries (SCNs) (Roberts, Bellinger, & McCormick, 2007). The admission of an infant to the SCN affects the social and psychological adjustment of mothers (Miles, Holditch-Davis, Schwartz, & Scher, 2007; Sheeran, Jones, & Rowe, 2013), and challenges have been identified to maternal confidence, role, and coping in the nursery environment, during the transition when the infant is discharged home, and even longer term (Fenwick, Barclay, & Schmied, 2008; Hess, Teti, & Hussey-Gardner, 2004). Mothers have described the separation from their infant as the most stressful part of having a preterm baby (Lindberg & Öhrling, 2008), and they struggle to 'mother' in the hospital setting (Fenwick et al., 2008), including establishing breastfeeding. In turn, the infant's ability to develop secure attachment is affected, which may be associated with poorer child development (Eshel, Daelmans,

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Cabral de Mello, & Martines, 2006; Lee, Holditch-Davis, & Miles, 2007).

There is extensive research showing the importance of supportive relationships, underpinned by effective communication, for improving maternal wellbeing, and enhancing mother–infant closeness and maternal efficacy for parents of preterm infants (Brett, Staniszewska, Newburn, Jones, & Taylor, 2011; Cleveland, 2008; Reis, Rempel, Scott, Brady-Fryer, & Van Aerde, 2010). In the neonatal nursery environment interactions with nurses are particularly important for mothers of preterm infants, as nurses are the predominant providers of health care in the nursery, and thus tend to spend the most time with both infants and mothers (Miles, 2003; Reis et al., 2010). Supportive interactions with nurses may reduce stress in mothers and increase their maternal efficacy (Jones, Taylor, Watson, Fenwick, & Dordic, 2015). Moreover, where mothers are appropriately encouraged to assume responsibility for the care of their infant, this assists in the transition to motherhood (Fenwick, Barclay, & Schmied, 2001a; Gavey, 2007), including forming an attachment with their infant (Kowalski, Leef, Mackley, Spear, & Paul, 2006).

We know much about the qualities of effective interactions between mothers and nurses in neonatal nurseries. A number of studies have identified that mothers and fathers value clear and consistent information from nurses (Jones, Woodhouse, & Rowe, 2007; Jones et al., 2015; Kowalski et al., 2006; Reid, Bramwell, Booth, & Weindling, 2007). This information includes parenting education that, in turn, provides parents with the opportunity to practice new skills through guided participation (Cleveland, 2008; Jones et al., 2015). Effective communication also involves emotional support from nurses (Jones et al., 2015; Reid et al., 2007), and nurses using a supportive interpersonal style that demonstrates kindness, empathy, friendliness, and respect (Jones et al., 2015), and includes informal "chatting" (Fenwick, Barclay, & Schmied, 2001b; Jones et al., 2007).

The recognition of the importance of family and the need to facilitate close parent–infant interaction, in particular infant–maternal attachment, has led to key changes in neonatal nurseries over time: one ontological—the adoption of family-centered care (FCC), and the other architectural—new designs for nurseries. Both potentially influence mothers' interactions in neonatal nurseries. Over the last 20 years there has been a substantial body of work advocating for the adoption of a FCC approach (see, for example, Gooding et al., 2011; Griffin, 2006). Family-centered care means putting the family at the centre of care in an approach which is a collaborative partnership between health professionals and family. Parents are considered best placed to care for infants, and FCC values the unique contribution parents and/or families make to the infant's health and wellbeing (Griffin, 2006; Newton, 2000). There remains evidence however that many neonatal intensive care units struggle to enact these principles (Gooding et al., 2011; Griffin, 2006), particularly making this a collaborative partnership (Jones et al., 2015), and FCC may not particularly focus on infant–maternal attachment.

A further major change, that may change the nature of FCC and affect interactions for mothers in neonatal nurseries, is the change in nursery designs. The design of the neonatal nursery environments has been moving away from multi-patient open bay (OB) wards, to single family room (SFR) floor plans or pods. Research to date has found SFRs benefit both parents (mothers and fathers) and infants in neonatal nurseries. Lester et al. (2014) reported improved medical and neurobehavioral outcomes for infants cared for in SFRs compared to OB. Parents also report that SFRs provide increased privacy, space, and comfort, decreased noise and increased control over lighting, and hence a decrease in overstimulation for their infant (Carlson, Walsh, Wergin, Schwarzkopf, & Ecklund, 2006; Carter, Carter, & Bennett, 2008; Cone, Short, & Gutcher, 2010; Stevens et al., 2012). Moreover, recent research has found that the SFR was associated with increased visitation and breastfeeding by mothers, both at discharge and 4 months post-discharge (Jones, Jones, & Feary, 2016). Hogan, Jones, and Saul (2016) also reported that seeing the benefits for parents of SFRs was perceived by nurses as improving their job satisfaction and sense of personal accomplishment, despite SFRs also being associated with increased workload and isolation.

Concerns have however been raised about the impact of SFRs on parents' interactions in the nursery. Ortenstrand (2014) suggested that parents may have fewer interactions with nurses in SFRs, with potential implications for infants (behavioral, cognitive, and language development). There has been little research examining the impact of SFRs on parents' interactions in the nursery, particularly mother–nurse interactions, and the findings have been inconclusive. Domanico, Davis, Coleman, and Davis (2010) surveyed staff regarding their perceptions of care in OB and SFR nurseries, and found nurses thought an OB nursery aided their ability to support parents and coworker interactions more than the SFR design. In contrast, for parents there were almost no differences in their perceptions of interactions with nurses across the two nursery designs, but there was a lower mean for the item about interacting with other parents in the OB nursery. Harris, Shepley, White, and Kolberg (2006) also reported that the OB nursery design afforded parents with greater social interaction and incidental communication with other parents, but the SFR provided more privacy for interactions. However, it is not clear what method was used to gather these data, except that it included a survey of staff. Overall, there has been limited research focusing specifically on mothers, despite mothers being the primary caregiver for infants in the nursery. Thus, to date, there has been no detailed study of how the SFR design impacts (or not) the quantity or quality of interactions that mothers have with staff or other parents. The aim of the current study was to examine how neonatal nursery design influences interactions between mothers and nurses. We focused on mother–nurse interactions as previous research has identified nurses as the most important and most frequent source of support for mothers. We examined the