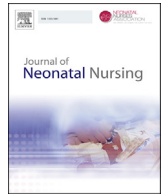




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## Original Article

# Traditional open bay neonatal intensive care units can be redesigned to better suit family centered care application

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## ABSTRACT

The current study investigated several Jordanian NICUs suitability for implementing Family Centered Care in light of its physical design. It involved direct observation of NICUs within seven Jordanian private and public hospitals in the presence of department heads. Structured interviews of 10 items were also conducted with nurses who agreed to participate in their workplace. The main outcome measures included in the interviews were unit design and regulations/policies. Descriptive statistics were employed taking into consideration comments of participants and observations by the researcher. This study asserted the role of the design in hindering the application of FCC in NICUs. More than two thirds of participants indicated unsuitability of their NICUs for FCC. However, with nurses' willingness to play their part in any proposed reformation, these units can become better equipped to apply FCC principles. Future NICUs require shifting from traditional open bay to a family centered closed unit model.

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## 1. Background

Family Centered Care (FCC) is regarded by the majority of experts as the ideal approach and an important element in pediatric units (The American Academy of Pediatrics, 2012). All definitions of FCC generally circle around the same ideal of placing the child and family in the centre of care. The Institute for Patient- and Family-Centered Care in Australia (2014) defined FCC as "... an approach to the planning, delivery, and evaluation of health care that is grounded in mutually beneficial partnerships among health care providers, patients, and families". The American Academy of Pediatrics (2012) stated that FCC is a necessary component of clinical decision-making, and that families should collaborate with health care professionals in all aspects of care, allowing them to participate to the level they choose. Multiple benefits of FCC have been reported for both children and families (Abuidhail et al., 2016; Petersen et al., 2004). However, many barriers could hinder the best implementation of FCC including a mismatch between theory and practice (Shields et al., 2012; Al-Motlaq and Shields, 2017). The tension between the resources available to early intervention and the ideals of best practice was a major difficulty experienced when providing FCC in the natural environment (Fults, 2011).

Facilities that are committed to develop and to provide ongoing support to families including respecting their decisions should provide a welcoming atmosphere that encourages families to interact freely with the caring process (Groothuis and Merode, 2007). This includes well designed units which allow easier adoption of FCC (MedModel, 2017). Although considered a challenge in NICUs, modern day units' physical design and policies are rapidly evolving. Studies showed some patterning with the close units being superlative to the open bay units (Domanico et al., 2011). One study found that accommodating the same number of neonates with the single family room design requires doubling the original space of the open bay unit (Domanico et al., 2010). However, a second study (Carter et al., 2008) showed parents' positive experience of transitioning from multi-patient ward into a private room facility. Policies, on the other hand, that are flexible culturally competent and responsive to family needs have improved quality and safety of care, decreased costs and parental stress, and improved satisfaction (Meert et al., 2013; Toivonen et al., 2017). Therefore, a restrictive unit design with rigid policy makes it hard for parents to positively contribute to the caring process of their children, besides the increased potential for medical mistakes (Mahmood et al., 2011). From an architectural view, flexibility of the building to adapt to new insights about treatment is therefore essential (Groothuis and Merode, 2007). It is also essential that patients and families participate in the design of unit's

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environment in order to reduce their stress and accommodate their needs (Hutton, 2005). Therefore, understanding differences across units can help policy makers identify areas of relatively weak policies and target them for intervention supporting efforts to promote FCC. Evidence from developed countries showed positive outcomes for adopting family friendly practices (Voos and Park, 2014) while evidence is progressively emerging from developing countries with positive awareness of its importance. In Jordan, previous studies didn't reflect a good application of FCC in NICUs (Al-Motlaq et al., 2017; Abuidhail et al., 2016) though showed high parental satisfaction with its design and considered it suitable for their visits. Researchers attributed the limited application of FCC to the traditional open bay design found in these units and attributed their high level of satisfaction to a lack of awareness (Al-Motlaq et al., 2017). Previous studies mainly showed families preference to have the option to be present (Davidson et al., 2017). Having established the importance of units design in hindering the application of FCC, the purpose of the current study was to evaluate if NICUs in Jordan were suitable for implementing FCC and if the physical design is related to that.

### 1.1. Standards for NICU design

Many professionals including architects, interior designers, medical and nursing staff, and others involved in the planning of NICUs can benefit from a set of standards outlining the best NICU design based on clinical experience and research. In the report of the *Seventh Consensus Conference on Newborn ICU Design (2007)* held in Florida and recommended later by White et al. (2013), it was recommended that NICUs should be configured to individualize the care-giving environment and services for each infant and family. The report also asserted the need for a family support space immediately adjacent to the NICU that is used as family lounge and storage with toilet facilities, besides rooms provided for lactation support and consultation. Another report by Laing et al. (2004) stated that an NICU design is governed by a number of factors including size of population served; intensity of neonatal care anticipated; relationship with other services; the model of care; and available finance. Because a layout cannot be adapted very easily and only at high cost, it's important to build it in a way which supports health care strategy but also takes future circumstances into account (Groothuis and Merode, 2007). The design targeted by the current study could come in different forms including individual bedroom for each infant and family which allow continuous electronic monitoring of all parameters. Another form includes one large room (open bay) espousing several infants with the advantage of unrestricted observation of all infants but hindered by increased noise levels and being perceived by parents as impersonal. Other forms include in between design where two or four babies are espoused in a single room.

In Jordan, the vast majority of NICUs are designed traditionally as open bay, and mainly attached to maternity units. Bureaucracy, lack of resources and traditional practice could have played a role in this trend of NICU designs. Saving a few reports supported by the United Nations Children's Fund (UNICEF), the Higher Population Council and Ministry of Health in Jordan, very limited literature was found that details the context of neonatal care in the country. With all three health sectors (public, private and military) making the services that provide neonatal care, reports on neonatal care in Jordan is limited to neonatal characteristics including mortality rates and causes of hospitalization. Jordan has a total fertility rate of 3.5 per woman (Department of Statistics, 2017). Despite a progressive decline in national neonatal mortality rates between 1990 and 2013, mortality rate remains high with 50% of children in Jordan who died in 2013 under the age of five years were neonates

(The United Nations Inter-agency Group for Child Mortality Estimation, 2014). The percentage of low birth weight newborns in Jordan was 13% with a 12% mortality rate among those neonates (The United Nations Children's Fund (2014). A comprehensive study conducted in 18 hospitals in Jordan (Batieha et al., 2016) showed that 79% of all neonatal deaths occurred in the first week of life, 37% of these deaths were preventable and 59% possibly preventable with only 37.3% of these deaths received optimal medical care. Researchers found that the hospital setting, and inadequate antenatal visits were among the factors associated with neonatal mortality hence providing optimal neonatal care was an important determinant of neonatal survival. In the guidelines for FCC in NICUs developed by Davidson et al. (2017), it was asserted that hospitals should implement policies to promote FCC by offering open and flexible family presence.

## 2. Methods

To address the purpose of the study a descriptive exploratory design was employed. Approval to conduct the study was solicited from Hashemite University Review Board and a single approval from each facility. The setting of this study was seven neonatal units in seven different hospitals (4 public and 3 private hospitals) in the three main cities of Jordan (Amman, Zarqa, and Irbid). All these units were designed traditionally as open bay and espoused different numbers of children. On average, public units had higher numbers of babies. The study involved two phases. The first phase involved direct observation of NICUs to explore its designs, and investigate its policies and administrative structure. All department heads were included in the study and supported the researcher's observations of their units. These notes were used to describe the structure of the facility in which the unit is situated. The aim was to record any unused physical spaces, rooms and curves that can be simply used or rearranged for use by NICUs. The second phase included conducting structured interviews to investigate staff nurses perception of their NICU design and its relation to FCC application. The researcher used structured interviews instead of self-report to make sure the items have been well understood by participants and be able to answer all questions if raised by participants regarding interview questions on spot. Convenience sampling technique was used to recruit participants. All neonatal nurses who attended the health facilities on the time of data collection were invited to participate in the study. Participants were informed of their right to voluntarily participate and that they can withdraw from the interview at anytime. Structured interviews of 10 items were individually conducted with nurses who agreed to participate in their workplace and took less than 15 min to complete. Items of the structured interview were developed for the sake of the current study and included 5 items on the quality of the physical design of the unit and 5 items on policies pertinent to FCC. Participants were informed that their perception on the model of care is not the objective but their thoughts on the design and policies related to FCC. Direct observations were used to describe the included units while descriptive statistics (frequencies) were used to analyze nurses' responses. Given the small sample size from each setting, higher level statistics could not be performed. Valid percentage was calculated to represent the level of agreement on each item taking into consideration comments of participants and observations by the researcher.

## 3. Results

### 3.1. Neonatal units' design

NICUs were from 4 public and 3 private hospitals. With limited

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