



KEY POINT SUMMARY

OBJECTIVES

This study investigates how a floorplan that connects delivery rooms with neonatal intensive care units influences morbidity, mortality, and duration of hospitalization of neonates.

New architectural design of delivery room reduces morbidity in preterm neonates: a prospective cohort study

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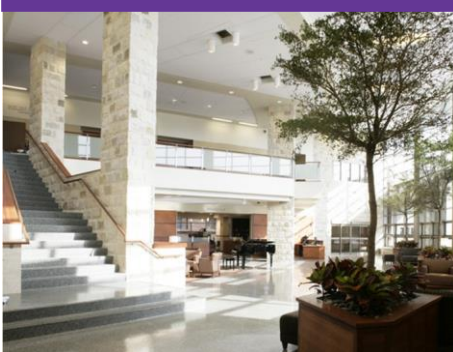
Key Concepts/Context

A multidisciplinary committee of experts from different healthcare and architectural organizations has suggested that the delivery room (DR) should be connected to a neonatal intensive care unit (NICU) via a pass-through door. Linking these two spaces could allow for improved response to potential complications during the first minutes of neonatal life, while also optimizing use of economic and human resources.

Methods

Two cohorts of preterm neonates (aged less than 32 weeks of gestational age) were observed over a two-year period. Cohort 1 featured 56 neonates who received care in a “conventional DR”, initially being cared for in a resuscitation area within the DR before being transferred to an NICU room located on a different floor of the hospital. Cohort 2 featured 50 neonates who received care in the “new conceptual DR”, where birth was assisted directly in the NICU that was connected to the DR by a pass-through door. Demographic and clinical characteristics of all neonates in both cohorts were similar.

Cohort 1 was observed over the course of 1 January 2008 until 31 March 2009. Cohort 2 was observed from 1 April 2009 to December 2009 in the same hospital after it underwent architectural renovation, which connected the DR and NICU in accordance with the newly suggested standards. The equipment used for the stabilization of neonates after birth was similar for both cohorts. Following initial stabilization, neonates in cohort 1 were transferred to the NICU in a neonatal incubator equipped with a mechanical ventilator, while neonates in cohort 2 received respiratory support through mechanical ventilation immediately after birth as appropriate.



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This study's primary measure was morbidity in the form of at least one of several potential complications stemming from prematurity. Secondary measures were mortality and duration of hospitalization. All data on participant characteristics and biometrics within the first 60 minutes of life were collected by researchers who were unaware of the study's aim or design. All data comparisons between the two cohorts were statistically analyzed using SPSS version 19.0.

Findings

Overall morbidity was higher in cohort 1 compared to cohort 2. The occurrence of moderate hypothermia within the first hour of life was considerably more prevalent in cohort 1 (57.1%) when compared with cohort 2 (24%). Use of uninterrupted, non-invasive ventilation during the first 30 minutes of life was more frequent in cohort 2. In terms of mortality rates, no difference was found between the two cohorts. In terms of length of hospitalization among surviving neonates, the median duration was similar between both cohorts (51 days in cohort 1, 53 days in cohort 2). Multivariate analysis found that morbidity was associated with body weight at birth as well as cohort assignment.

The results of this study demonstrate that having a NICU directly adjacent or connected to the DR may significantly benefit preterm neonates by optimizing assistance during the first minutes of life and reducing instances of destabilization. Resuscitation equipment, which may be needed quickly after birth, can be more readily available through close proximity; this is a more viable alternative as opposed to buying more equipment. Additionally, morbidity and mortality rates are generally higher among immature neonates who need to be transported; this design would help avoid transportation complications, such as shifts in atmospheric temperature which could contribute to the risk of hypothermia.

Limitations

The authors note that the design of this study was not randomized, and that a relatively small number of patients were enrolled in the study overall. It is also noted that the restricted use of prenatal steroids may have affected final neonatal outcomes, even though the use of prenatal steroids was similar between both cohorts. Mothers involved in this study may have been receiving different qualities of care prior to delivery.



Design Implications

Results from this study suggest that creating floorplans that connect delivery rooms and neonatal intensive care units via a pass-through door or other similar designs may help prevent a significant amount of morbidity complications among neonatal patients, while also being economically and logistically more solvent.

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