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ORIGINAL ARTICLE

Operating Room Within the Neonatal Intensive Care Unit—Experience of a Medical Center in Taiwan

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neonatal intensive care unit;
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Background: Most neonates who reside in the neonatal intensive care unit (NICU) and require surgery are transferred to the operating room (OR) or undergo bedside surgery. However, critically ill neonates who are transferred often encounter the risk of complications. An OR in our NICU was therefore launched in 2009. This study was to appraise the surgeries performed in the NICU OR and compare results with the traditional main OR outside the NICU.
Methods: This was a retrospective study in the NICU of a tertiary center. Retrospective chart review was conducted for all neonates who underwent surgical procedures in the NICU OR and the main OR. The information regarding baseline characteristics, surgical procedures and duration, ventilator use, hypothermia, hyperglycemia, instrument dislocations, surgically related infection or complications, and outcomes was obtained.
Results: There were a total of 65 patients in this study, 37 in the NCIU OR group and 28 in the main OR group. The presurgical mean airway pressure and the fraction of inspired oxygen (FiO_2) were comparable between the two groups, but the postsurgical FiO_2 was significantly lower in the NICU OR group (31.0%) than in the main OR group (40.9%; $p = 0.027$). Furthermore, the NICU OR group required a significantly shorter preoperation waiting time (34.4 minutes vs. 63.6 minutes, $p = 0.001$) and had a lower incidence of hypothermia than the main OR group (8.1% vs. 39.3%, $p = 0.008$). However, surgically related complications were similar between groups.

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Conclusion: The OR within the NICU may reduce the risk of complications during transportation and provide continuity of care to critically ill neonates. It also decreases the disturbance to other NICU patients during operation.

1. Introduction

Critically ill neonates in the neonatal intensive care unit (NICU) often require surgical procedures. Neonates in need of surgery are traditionally transferred to the main operation room outside the NICU. However, transferring the critically ill neonates to the OR outside the NICU risks complications. In critical patients, previous studies have shown that clinical complications may occur in up to 70% of intrahospital transports.[1–4] The possible events include hypothermia, change in variations in heart rate and blood pressure, and dislocation of vascular accesses or endotracheal tubes.[2,5] The incidence of complications may relate to the duration of transportation and the severity of the patients' symptoms.[2,4,5] For example, Vieira et al[5] demonstrated that in intrahospital NICU transports, hypothermia events developed in up to 17% of patients, and these hypothermia events were associated with prolonged transports.[5]

To avoid the adverse events during transportation, some surgical procedures, such as patent ductus arteriosus (PDA) ligation, are done at the NICU bedside, with similar results to those done in the main OR.[6,7] Surgery at the NICU bedside avoids the accident during transport, especially for critical and unstable neonates who are in use of high-frequency oscillatory ventilation, inhaled nitric oxide therapy, and even extracorporeal membrane oxygenation (ECMO).[8,9] Furthermore, performing the surgery in the NICU provides continuity of care by the same intensive care team.[7] However, there are doubts about increasing the risk of infection when performing bedside surgery.[10,11]

To solve this problem, we opened an operating room in our NICU (NICU OR) in 2009. The aim of this study was to compare the benefits and risks of performing surgery on critically ill newborns in the OR within the NICU with those of conducting surgery outside the NICU.

2. Methods

There are 25 beds in the NICU in the National Taiwan University Hospital, Taipei, Taiwan. The OR is located in the central area of the ward (Figure 1). The room area in the NCIU OR is 25 m^2, which is similar to the main OR (15—25 m^2). The NICU OR has a laminar air flow system with 15 fresh filtered air changes per hour, which is similar to that of the main OR of our hospital. Prior to surgery, the patient was transferred directly from his/her bed to the NICU OR with an overhead radiant warmer. The theater staff brought equipment to the NICU OR. The surgical team consisted of surgeons, a neonatologist, an anesthetist, an

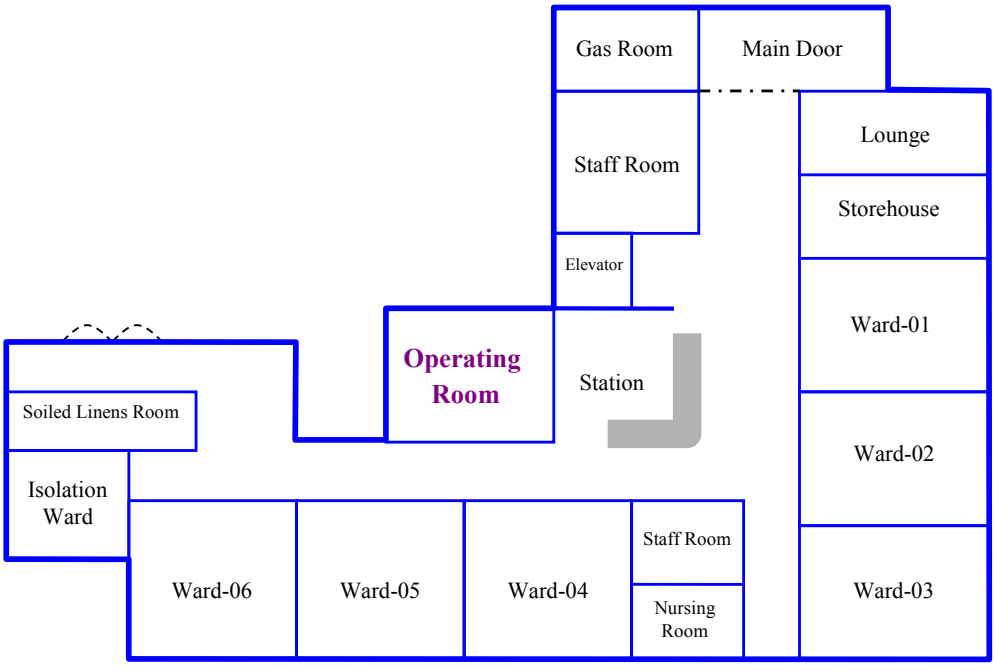

Figure 1 Floor plan of the NICU in NTUH.