Original Article

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Paediatrics Section

Standardising Neonatal Nursing Handover: Impact of a Quality Improvement Project in a Tertiary Care NICU

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ABSTRACT

Introduction: A properly written nursing handover is important to avoid medication errors and to improve patient safety outcomes, as well as daily decision-making. There is variation in handover policies across intensive care units, wards, operating theatres, and during transport. Improper handover can adversely impact patient care, leading to therapeutic misadventures, complications, prolonged hospital stays, and even mortality.

Aim: To create and implement a structured handover protocol in the neonatal intensive care unit through a quality initiative approach.

Materials and Methods: An observational Quality Improvement (QI) study was conducted in the Department of Neonatology, Sanjay Gandhi Postgrdauate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India, from January 2021 to March 2021. The QI team included the nurse-in-charge, staff nurses, resident doctors, and the physician-in-charge of the unit. A total of 33 healthcare professionals (7 members of the QI team and 26 nursing staff) participated in the study. The root cause analysis of improper handover was performed first by a team of doctors and nurses using fishbone analysis. A written checklist was created, and various change ideas were tested through sequential Plan-Do-Study-Act (PDSA) cycles.

Results: Nursing handover compliance during the first, second, and third months was 86.75%, 94.17%, and 92.55%, respectively, after PDSA cycles. Overall, nursing handover compliance of 90% was achieved.

Conclusion: A QI approach improved nursing handover in our unit. Having a standardised policy and checklist helps improve nursing handover, and implementation of the policy can be addressed through a QI approach.

Keywords: Checklist, Neonatal intensive care unit, Written handover

INTRODUCTION

In 1999, the landmark report "To Err Is Human" was released by the Institute of Medicine, reporting that nearly 100,000 lives a year are lost in the US due to preventable medical errors [1]. Although we do not have this data in Indian settings, improper and incomplete handover is a common safety problem ubiquitous to multiple care settings. Very small neonates are particularly vulnerable to medication errors due to their small size and physiological immaturity. The factors that can lead to errors in patient care and compromise patient safety may arise at the levels of prescription, documentation, transcription, dispensing, administration, and monitoring [2]. Improper communication and handover may be significant factors responsible for these errors and can result in extended hospital stays [3-5]. To improve the quality of care, the communication between providers must improve. There are many points at which patient care is handed over to someone else, such as when the baby is transferred from one unit to another, transferred to critical care after surgical procedures, and during shift changes [6]. There is considerable variation in handover practices among nursing staff, including telephonic, verbal, and written handover [7]. The variation in perception is related to several factors, including adequacy, organisation, relevance, nursing charts, and ease of following the information [8]. Thus, a structured written handover is important to improve the quality of patient care and safety. The implementation of a structured policy to improve nursing handover would require teamwork; therefore, a QI initiative strategy can be helpful for the same.

One example of such a QI tool is Evidence-based Practice for Improving Quality (EPIQ), a 10-step protocol developed by the University of Alberta, Canada [9]. The EPIQ is a structured, multidisciplinary QI initiative, primarily in neonatal intensive care units. It empowers care teams to use local data and proven evidence through iterative cycles to target specific outcomes. It was co-developed by the Canadian Neonatal Network (CNN) and the Evidence-based Practice Centre at Mount Sinai Hospital, Toronto. It has contributed to approximately 25% improvement in survival without major morbidity among very preterm infants in participating Canadian NICUs [10].

The present study aimed to create and implement a structured handover protocol in the neonatal intensive care unit through a quality initiative approach.

MATERIALS AND METHODS

An observational QI study was conducted in the Department of Neonatology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India. from January 2021 to March 2021. The study was approved by the Institutional Ethics Committee (PGI/BE/2342/2020 dated 12th December 2020). This QI was done as per the QI project EPIQ [9,10].

Inclusion criteria: The study participants included 33 healthcare professionals (7 members of the QI team and 26 nursing staff).

Study Procedure

The neonatal unit is a 20-bed unit with a nurse-to-patient ratio of 1:2 to 1:3. Before the study, there was no existing system of standardised nursing handover. The nursing staff assigned to two to three neonates previously did not wait for the incoming shift to arrive to provide a structured handover of patient care. Instead, one outgoing staff member would provide a verbal summary with limited details based on personal understanding. To address the issue of "improper

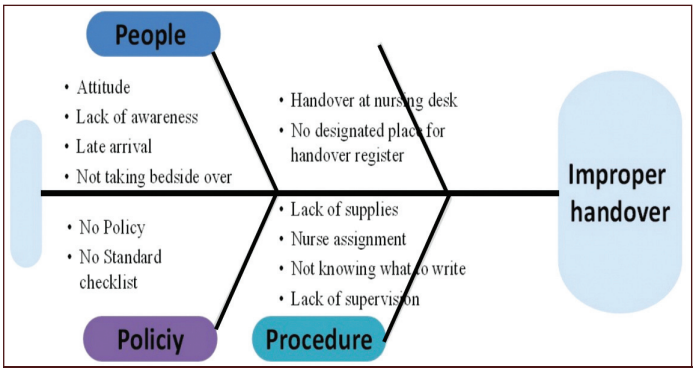
nursing handover," authors prioritised it for QI, assessing factors such as impact, feasibility, affordability, and manageability. The first step was to identify the root causes using the "5 Whys" tool [Table/Fig-1].

[Table/Fig-1]: "5 Whys" tool for improper handover.

Subsequently, in Step 2, a team including doctors and nurses was formed, and the roles of the team members were assigned. The Force-field Analysis was performed to identify driving and restraining factors for the identified problem of improper nursing handover [Table/Fig-2]. The key reasons identified included: the absence of standardised policies or procedures, late staff arrivals, an inadequate nurse-to-patient ratio, a lack of awareness regarding the importance of handover, and reliance solely on verbal handover systems. In Step 3, the team utilised a fishbone diagram to identify root causes, focusing on factors related to individuals, policies, locations, and procedures. These were deemed manageable issues that could be addressed to improve the handover process [Table/Fig-3].

Driving forces	Restraining forces
Good practice	Resistance to change
Improved care/less errors	Busy schedules
Appropriate education	Lack of awareness
Supervision	Lack of supplies
Professionalism	Lack of staff

[Table/Fig-2]: Force field analysis.

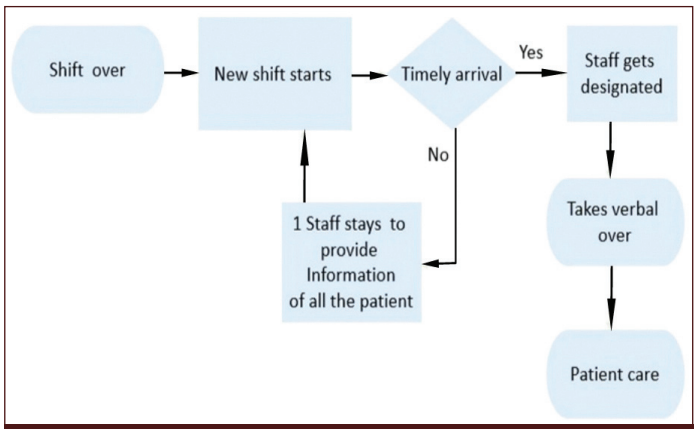


[Table/Fig-3]: Fishbone analysis for improper handover.

The most important factor identified was the absence of a standardised policy and a structured checklist for handover, along with a lack of supervision. The change ideas [Table/Fig-4] were subjected to a priority check for feasibility to be implemented first in Step 4. The feasibility scoring for the change ideas was as follows: Score 1 for "not feasible," score 2 for "maybe or cannot decide," and score 3 for "feasible." Priority was given to the change ideas based on the aggregate score. The next step was process mapping to implement the change idea, i.e., the overall flow of handover during a shift change in detail [Table/Fig-5]. This process mapping focused on the importance of timely staff arrival and effective bedside one-to-one written handovers. If staff arrived late, the remaining team members were tasked with ensuring proper handovers.

Interventions proposed	Checklist	Making of standardised policy	Lack of supervision
Is in your control (Stays in your group)?	3	3	3
Is impactful (Benefits many people)?	3	2	3
Is manageable (How many people spending how much time)?	2	2	2
Is affordable (In terms of time, effort and money)?	2	3	2
Is measurable (Source, time, place and method are convenient)?	3	3	2
Aggregate score	13	13	12

[Table/Fig-4]: Prioritising the change ideas.
Documention of the feasibility of "change ideas" (1=no; 2=maybe; 3=yes)



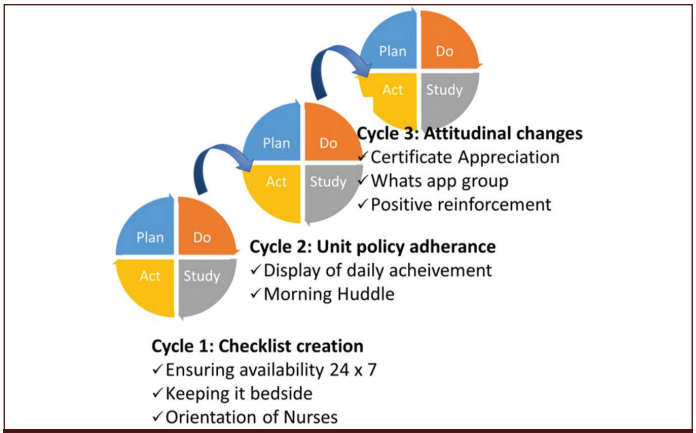
[Table/Fig-5]: Process mapping.

In Step 6, the team developed process and outcome indicators aligned with the change ideas—a process checklist and an outcome measure for handover quality. By Step 7, the aim statement was defined after team discussions: "to implement a proper written handover in the NICU by 70% across all three shifts over three months."

Step 8 involved engaging all team members, particularly nursing staff and the nurse in charge. The NICU staff were introduced to the QI initiative and invited to participate after informed consent. Subsequently, change ideas were implemented and assessed through PDSA cycles, detailed in [Table/Fig-6].

Initially, there was no structured written handover, so the baseline was set at 0 percent. Completion was measured daily by the percentage of checklist items checked off during each shift.

PDSA cycle 1: Checklist Creation and Implementation. The checklist was developed through discussions among nurses and doctors, minimizing duplicated information. It was pretested, taking an average of five minutes to complete. It included four sections: medications, concerns, ongoing care, and pending work, each scoring 0.25, with a complete checklist scoring 1. A 100% score was awarded if all components were completed for every baby in a shift. The averages were displayed daily to encourage staff.



[Table/Fig-6]: Plan-Do-Study-Act (PDSA) cycle.

PDSA cycle 2: Staff Motivation. The daily handover completion percentage was displayed in the unit, with feedback and appreciation shared during morning huddles, discussing any missed items.

PDSA cycle 3: Encouraging Attitudinal Change. A "Best Nurse" certificate was awarded weekly, and a WhatsApp group was formed for positive reinforcement within the team.

This QI study focused on the NICU of the hospital, involving the nursing staff. The team consisted of four doctors and three nurses, with all 18 nursing staff members agreeing to participate. Sample sizes in such studies usually range from 30 to 500, depending on the research question [11].

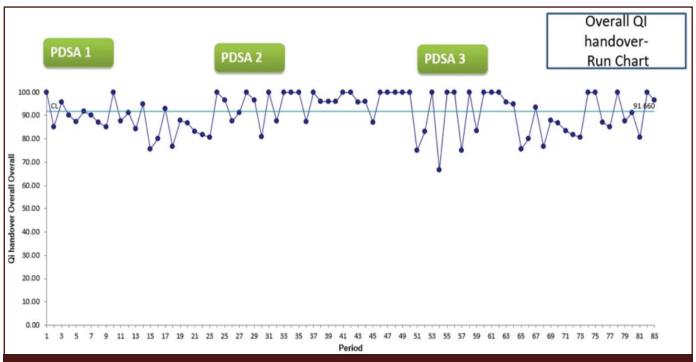
Nursing staff took part in daily morning huddles for feedback and suggestions. They were recognised as "Best Nurse of the Week" based on participation, and additional motivation came from daily run chart analysis and social media updates on our successes.

STATISTICAL ANALYSIS

The statistical analysis was performed using QIMacros® software for Excel. The graphical display for the time trend of handover checklist completion was done with run charts.

RESULTS

A total of 33 participants were involved in the QI project. During the initial PDSA cycle, moderate variability was noted, suggesting early-stage implementation challenges. Subsequent cycles (PDSA 2 and PDSA 3) demonstrated improved consistency, with reduced variation and higher median completion rates. Across all periods, the percentage of completed QI handovers consistently remained above 80%, with several intervals approaching or reaching 100% compliance. Notable fluctuations were observed throughout the timeline, yet no sustained downward trends were evident, indicating overall stability and high adherence to the handover protocol [Table/Fig-7].



[Table/Fig-7]: Run chart.

The written nursing handover compliance during the first, second, and third months was 86.75%, 94.17%, and 92.55%, respectively, after the PDSA cycles. Overall, nursing handover compliance reached 90% [Table/Fig-8].

Variables	1st month (%)	2nd month (%)	3rd month (%)
Morning	80.25	100	95.83
Evening	90	93.66	91.4
Night shift	90	88.86	90.4
Overall	86.75	94.17	92.55

[Table/Fig-8]: Handover compliance percentage.

DISCUSSION

In the systematic review of the literature on nursing handoff, the primary barriers to effective handover were identified as an unstandardised approach to handover communication, equipment-related issues, environmental hindrances, complex patient profiles, and high caseloads [4]. Challenges observed at the nursing level included high turnover rates among nurses, elevated patient-to-nurse ratios, limited time availability, fragmented team dynamics, and a lack of team cohesiveness [4,12]. The integration of verbal, written, and technologically supported electronic handoff methods has been found to be more effective [13].

Common structured nursing handoff tools include SBAR (Situation, Background, Assessment, and Recommendation for Action), I-PASS (Illness severity, Patient summary, Action list, Situation awareness and contingency planning, Synthesis by receiver), and ISBAR (Introduction, Situation, Background, and Assessment) [14]. Recommendations for improving nursing handoff practices encompass enhancement of communication skills, process standardisation, staff training, technological adoption, active staff involvement, and effective leadership [15].

Effective handovers help minimise information loss, particularly when supported by structured checklists. They emphasise pertinent clinical details, follow a standardised format to ensure consistency, allocate time for questions, and incorporate face-to-face interaction to strengthen communication [5,16,17]. Although handovers are essential for maintaining continuity of care, the specific impact of handovers on clinical outcomes remains unclear. In the NICU setting, inadequate handovers can result in preventable errors, with potential consequences for infants, families, staff morale, team cohesion, and the reputation of the unit.

A systematic review of QI projects focused on nursing handovers revealed that most initiatives employed either standardised communication tools or patient-participation bedside handover methods [18]. In the present project, a comprehensive checklist was utilised, encompassing various parameters related to nursing assignments. The checklist was completed manually. In several QI projects, it was observed that electronic sign-off reports were easier to complete [19,20].

In a study conducted by Casey MH et al., the implementation of an electronic medical record–integrated handoff system led to faster completion of sign-off reports, with satisfaction rates increasing from 16.7% to 100% [21]. In the present study, handover practices between shifts were analysed, with response rates ranging from 0% to 70%. In a QI study by Kresch MJ et al., handover completion from the critical care transport team to the NICU medical team improved from 95% to 100% [22]. Opportunities for improving handover practices exist not only at the nursing level but also at the resident level, as demonstrated in the multicentre I-PASS study,

which reported a 23% reduction in medical error rates following the intervention [23]. The Safe Transitions and Euthermia in the Perioperative Period in Infants and Neonates (STEPP-IN) multicentre QI collaborative aimed at standardising postoperative handoffs resulted in a 73.2% and 49.4% reduction in communication failures specific to respiratory and all other causes, respectively [24].

Limitation(s)

A limitation of the present study was its exclusive focus on process measures of nursing handover rather than outcome measures. Important outcome indicators for such studies would include patient safety metrics such as the percentage of medication errors, adverse reactions, and missed feedings. Another limitation was that the quality of handover was assessed solely based on percentage completion. This approach was adopted as an objective method for evaluating the adequacy of nursing handovers. Additionally, bedside handover practices were evaluated.

CONCLUSION(S)

Nursing handover can be improved by addressing human factors and by having a checklist and a standardised policy. A standardised policy and checklist help improve nursing handover, and implementation can be addressed through a QI approach.

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