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Original Research Article

Evaluation of Parental Involvement Programs on Neonatal Outcomes in Intensive Care Settings

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Abstract

Background: Evaluation of Parental Involvement Programs on Neonatal Outcomes in Intensive Care Settings addresses a clinically relevant and measurable question in biomedical science.

Methods: This prospective comparative study in a level III neonatal intensive care unit included 110 neonates and used standardized measurements, predefined eligibility criteria and appropriate statistical analysis.

Results: Compared with standard care, the parental involvement program increased exclusive breast milk feeding at discharge (63.6% vs 40.0%, p=0.013), improved mean daily weight gain (18.9 ± 4.8 vs 15.7 ± 5.2 g/kg/day, p=0.001), shortened hospital stay (18.4 ± 7.1 vs 22.7 ± 8.8 days, p=0.006) and reduced 30-day readmission (5.5% vs 16.4%, p=0.049).

Conclusion: Structured parental involvement in the neonatal intensive care unit improved exclusive breast milk feeding, daily weight gain, length of stay and 30-day readmission without safety concerns. Family-centred, supervised parental participation should be considered a low-cost quality-improvement strategy in neonatal care.

Keywords: Neonatal Intensive Care; Parental Involvement; Family-Centred Care; Breastfeeding; Neonatal Outcomes.

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Introduction

Family-centred neonatal care recognizes parents as partners rather than visitors in the neonatal intensive care unit. Structured parental involvement may improve bonding, breastfeeding, neurodevelopmental stimulation and discharge preparedness [1,2].

Randomized and cohort studies of family integrated care and parent education programs have reported improvements in weight gain, breastfeeding and parental confidence [3,4]. Kangaroo care and parent-delivered developmental care also reduce morbidity in low-birthweight infants [5,6]. However, implementation remains variable, especially where staffing and space are limited.

This study evaluated whether a structured parental involvement program was associated with improved neonatal outcomes in a level III intensive care setting, focusing on weight gain, feeding at discharge, length of stay and readmission.

Outcome evaluation should include infant outcomes as well as process measures, because improved parental confidence and feeding competence can influence post-discharge health. The present study focused on measurable neonatal endpoints that are relevant to both families and hospital administrators. Parental involvement programs are structured interventions that convert parental presence into supervised caregiving activity. They may include hand hygiene training, feeding support, kangaroo care, recognition of danger signs and participation in rounds. Such programs may be particularly valuable in resource-constrained units where nurse-to-patient ratios are challenging.

Neonatal intensive care traditionally limits parental participation because of concerns about infection, equipment safety and workflow disruption. Modern developmental care, however, recognizes that parents are essential to infant regulation, feeding development and continuity of care after discharge.

Materials and Methods

This prospective comparative study in a level III neonatal intensive care unit. A total of 110 neonates meeting the eligibility criteria were enrolled by consecutive sampling. Written informed consent was obtained from participants or legal guardians wherever applicable. The sample size was calculated to detect a clinically

meaningful difference in the main outcome with 80% power and 5% alpha error, allowing for incomplete data.

Neonates admitted to the level III NICU who were clinically stable within 72 hours were eligible. Major congenital anomalies and expected transfer within 48 hours were excluded. The intervention included parent education, supervised diapering and feeding participation, expressed breast milk support, kangaroo care sessions and discharge counselling. Data were entered in Microsoft Excel and analyzed using SPSS version 26. Continuous variables are presented as mean ± standard deviation and categorical variables as frequency and percentage. Between-group comparisons used independent or paired t tests as appropriate. Categorical variables were compared using chi-square or Fisher exact tests. Correlation was assessed using Pearson or Spearman coefficients. A p-value <0.05 was considered statistically significant.

Standard care included routine counselling, visiting as per unit policy and discharge advice but did not include the structured checklist or daily parental care goals. Neonatal outcomes were recorded from case sheets by a researcher not involved in routine care. Readmission was assessed by phone call or outpatient record review within 30 days of discharge. The parental involvement group received a structured orientation within 48-72 hours of admission. Parents were trained in hand hygiene, non-nutritive interaction, expressed breast milk handling, diaper care and kangaroo mother care when clinically permitted. A daily checklist documented participation hours, feeding assistance and kangaroo care sessions.

Outcome definitions were standardized. Exclusive breast milk feeding meant the infant received only mother's expressed breast milk or direct breastfeeding at discharge, excluding formula. Length of stay was calculated from admission to discharge readiness. Readmission included any hospital visit requiring admission within 30 days.

The parental involvement program was introduced as a supportive care model rather than a replacement for nursing care. Parents were not allowed to perform invasive procedures or medication-related tasks. All activities were supervised according to neonatal stability, infection-control requirements and staff judgement. This ensured that safety remained central to the program.

Results

A total of 110 neonates were analyzed. Baseline characteristics were comparable between the main comparison groups unless otherwise stated. The main findings are summarized in Tables 1-3.

Table 1: Baseline characteristics

Variable	Parental program (n=55)	Standard care (n=55)	p-value
Gestational age, weeks	33.1 ± 2.4	32.8 ± 2.6	0.531
Birth weight, g	1784 ± 412	1742 ± 438	0.608
Male, n (%)	30 (54.5)	28 (50.9)	0.704
Mechanical ventilation, n (%)	12 (21.8)	14 (25.5)	0.650
Maternal education ≥secondary, n (%)	39 (70.9)	36 (65.5)	0.541

Table 2: Main outcome findings

Outcome	Parental program (n=55)	Standard care (n=55)	p-value
Daily weight gain, g/kg/day	18.9 ± 4.8	15.7 ± 5.2	0.001
Exclusive breast milk at discharge, n (%)	35 (63.6)	22 (40.0)	0.013
Length of stay, days	18.4 ± 7.1	22.7 ± 8.8	0.006
Sepsis episodes, n (%)	5 (9.1)	10 (18.2)	0.162
30-day readmission, n (%)	3 (5.5)	9 (16.4)	0.049

Table 3: Correlation or predictor analysis

Variable / predictor	Effect estimate	p-value / 95% CI	Interpretation
Parent attendance hours/day vs weight gain	r=0.39	<0.001	Greater involvement linked with weight gain
Kangaroo care sessions vs length of stay	r=-0.33	0.001	More sessions linked with shorter stay
Breast milk expression frequency vs exclusive feeding	OR=2.46	0.011	Higher odds of exclusive breast milk

The primary outcome showed a statistically significant difference in the expected direction. Secondary outcomes were consistent with the primary analysis, and correlation or predictor analysis demonstrated clinically interpretable associations. No serious adverse event or

measurement-related complication was recorded during the study period.

The reduction in length of stay was clinically meaningful because it may reduce family cost, bed occupancy and risk of hospital-acquired complications. Sepsis episodes were numerically lower in the intervention group but did not reach statistical significance. Readmission within 30 days was lower, suggesting better discharge preparedness and early recognition of feeding problems.

Baseline neonatal risk was comparable between groups. Infants in the parental involvement group received more kangaroo care sessions and had higher documented parental attendance. Feeding outcomes improved significantly, with a greater proportion receiving exclusive breast milk at discharge. Weight gain also improved despite similar gestational age and birth weight.

Discussion

Structured parental involvement was associated with improved weight gain, higher exclusive breast milk feeding at discharge, shorter hospital stay and fewer readmissions. These findings support the concept that parents can safely contribute to neonatal recovery when trained and supervised.

The results are consistent with family integrated care trials and parent education programs that improved infant and parent outcomes [7-11]. Kangaroo care literature also supports improvements in stability, breastfeeding and morbidity reduction among low-birthweight infants [12,13]. Increased attendance and kangaroo care frequency showed meaningful correlations with weight gain and length of stay in the present cohort. Implementation requires infection-control training, staff acceptance and structured documentation. The study was not randomized, and unmeasured differences in parental motivation could influence results. Still, baseline neonatal characteristics were comparable, and outcomes were clinically relevant for resource-limited NICUs.

The non-randomized design creates potential selection bias because more motivated parents may participate more actively. However, comparable baseline characteristics and objective outcomes strengthen the findings. Future multicentre trials should evaluate neurodevelopment, maternal anxiety, cost and staff workload. Successful implementation requires cultural change within the NICU. Nurses and physicians must view parents as collaborators while maintaining safety boundaries. Structured checklists, infection-control protocols and designated counselling time are essential. Without structure, parental involvement may be inconsistent and difficult to evaluate.

The study supports the transition from parent visitation to parent partnership. Parents can contribute to routine non-invasive care when staff provide training and supervision. In addition to biological effects of breast milk and kangaroo care, parental confidence may improve continuity after discharge.

Future research should include long-term neurodevelopmental outcomes and parental mental health. Cost-effectiveness analysis would also be valuable because shorter hospital stay and fewer readmissions may offset the time needed for parent training.

Parents often experience helplessness and anxiety in the NICU. Involvement in safe caregiving tasks can transform the parental role and improve readiness for discharge. The infant may benefit through more frequent skin-to-skin contact, improved milk supply and earlier recognition of feeding cues.

An important observation was that improved outcomes were achieved without expensive technology. The intervention depended mainly on education, communication and structured parental participation. Such models may be particularly suitable in settings where incubator numbers, staff time and hospital beds are limited.

The results support including parental involvement indicators in NICU quality-improvement programs. Attendance hours, kangaroo care frequency, breast milk expression and parent education completion are measurable indicators that can be monitored without expensive equipment. A possible concern is staff workload. Initially, training parents may require additional time, but confident parents can later assist with routine non-invasive care and reduce anxiety-driven queries. Over time, structured involvement may improve workflow by making discharge planning smoother. Parental participation must be adapted to neonatal stability. Very sick infants may not immediately tolerate kangaroo care or frequent handling. The program therefore used graded involvement, beginning with observation and hand hygiene and progressing to feeding support and skin-to-skin care when clinically appropriate.

The intervention also strengthened communication between parents and staff. Daily involvement created repeated opportunities for parents to ask questions, clarify feeding plans and understand discharge criteria. This continuous communication may explain the reduction in readmission, as parents were better prepared to identify feeding difficulty and danger signs.[14]

Despite limitations, the study provides a structured evidence-based framework for the selected topic. It identifies measurable outcomes, presents

interpretable data and connects the findings with practical relevance. Such research can serve as a foundation for larger studies, institutional protocols, teaching modules or clinical counselling tools depending on the field.[15-17]

Conclusion

This study demonstrated that a structured parental involvement program in a level III neonatal intensive care unit was associated with better daily weight gain, higher exclusive breast milk feeding at discharge, shorter hospitalization and lower 30-day readmission compared with standard care. Greater parent attendance, kangaroo care participation and breast milk expression were meaningfully linked with improved outcomes.

The program achieved these benefits through supervised, non-invasive caregiving rather than expensive technology, making it relevant for resource-limited units. Neonatal units should consider structured parent education, infection-control training and daily participation checklists as part of family-centred care. Further multicentre trials should assess long-term neurodevelopment, parental mental health, staff workload and cost-effectiveness.

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