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REGULAR ARTICLE

Empowerment programme for parents of extremely premature infants significantly reduced length of stay and readmission rates

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ABSTRACT

Aim: Extremely premature infants experience long hospitalisation and high readmission rates within 30 days of discharge. This quality control investigation retrospectively explored the impact of the Creating Opportunities for Parent Empowerment (COPE©) programme on these rates in an all referral, Level-IV small baby intensive care unit setting.

Methods: The parents of 303 extremely premature infants participated in the study. Of those, 135 were admitted before the implementation of COPE© and served as baseline historical controls, and the remaining 168 neonates received the intervention. Length of stay and readmission rates were analysed using parametric and nonparametric tests. Additional analyses were used to compare the two groups in terms of gestational age, birthweight and other acuity measures.

Results: Neonates who received COPE© required significantly reduced lengths of stay than the control neonates (COPE© 127.1 ± 55.8 days vs. control 139.6 ± 61.9 days, $p < 0.05$) and significantly lower readmission rates (COPE© 23.9% vs. control 13.2%, $p = 0.05$).

Conclusion: The COPE© programme promoted active parental engagement in the unit and significantly reduced hospital stays and readmission rates. Future interventions should identify the specific components of the programme that support the parents of extremely premature infants during the various phases of hospitalisation.

INTRODUCTION

Neonatal intensive care units (NICU) have made considerable environmental and functional improvements to reduce the complications and stressors of hospitalisation (1–5). Unfortunately, NICU patients continue to have high rates of impaired development and their families often suffer significant disruption. COPE© (6) is an evidence-based intervention that recognises the critical role of parents in neonatal development and the necessity of minimising hospital length of stay. Through this programme, parents are encouraged to take an active role in their baby's care and are educated in how to effectively engage in dyadic interaction with their neonate.

The COPE© programme was designed for, and tested on, premature infants remaining in their delivery hospital, with an average gestational age of 31 weeks. As a result, little is known about the effects of this programme on extremely preterm infants of less than 27 weeks' gestational age in a level-IV, all referral NICU. These patients represent the highest-risk population for all complications of prematurity and consume a vastly disproportionate share of paediatric healthcare expenses (7,8). This quality control study retrospectively investigated the impact of a low-cost (9) family empowerment intervention on the length of stay and readmission rates of extremely premature infants in an all referral, level-IV small baby ICU.

Abbreviation
NICU, Neonatal Intensive Care Unit.

PATIENTS AND METHODS

This study was approved by the Institutional Review Board of Nationwide Children's Hospital. The Board allowed a

Key notes

- Extremely premature infants experience long hospitalisations and high readmission rates within 30 days of discharge.
- The Creating Opportunities for Parent Empowerment (COPE©) programme promoted parental engagement in units caring for extremely premature infants and significantly reduced length of stay and readmission rates.
- Future investigations should explore how each specific component of the COPE© programme can be used to support parents of extremely premature infants at different time points during their hospitalisation.

waiver of consent for this study for impracticability of obtaining consent from subjects who were no longer in hospital.

The context

The study took place in the small baby ICU, a self-contained subsection of our level-IV, all referral neonatal intensive care unit (NICU) at the Nationwide Children's Hospital in Columbus, Ohio. The small baby ICU is an open pod area containing ten bed spaces that is housed within a larger 55-bed acute care NICU. Recliners are offered to parents at the bedside as well as individual bins to hold educational or personal items. The small baby ICU is staffed by a centralised team of nurses who provide protocol-driven care (10–12) to neonates born at a gestational age of less than 27 completed weeks. The Nationwide Children's Hospital NICU is an all referral unit. All extremely premature patients are born outside the unit and are transported to the small baby ICU for definitive care of complications of prematurity, including necrotising enterocolitis, sepsis, surgical issues, brain injury, etc. Parental visitation and engagement are encouraged. However, no formalised, comprehensive system or developmental programme exists to support this process.

Methods

A quantitative descriptive design was used to compare two groups of extremely premature infants, those admitted between January 2008 and December 2009 and those admitted between January 2010 and December 2012 when the COPE programme was initiated in the small baby ICU for all new admissions. The COPE© programme is a tool that is designed to help parents learn about the NICU environment, understand how their premature baby may look or act and identify ways that they can support their baby's development. The programme costs approximately $286 for each infant during the hospital stay, $136.00 for materials (9) and $150.00 for personnel costs. It is administered through a spiral-bound booklet divided into four sections known as Phases. Each Phase corresponds to a time period during hospitalisation. Phase 1 covers 2–4 days after admission, Phase 2 covers 4–8 days after admission, Phase 3 covers the seven-day period before discharge, and Phase 4 covers 1–2 weeks after discharge. Content in the booklet addresses what the NICU may look or sound-like, acknowledges that it is a distressing time for parents and encourages parents to engage in activities such as logging in developmental milestones, writing about their baby and taking pictures to document growth. Because the programme was not intended for extremely premature infants who are transported from outside hospitals, and who experience greater lengths of stay, adaptation in the timing of the phases was necessary. However, the sequence did not change.

Using the COPE© protocol (6), during Phase 1 of the programme, all families received the prepackaged booklet within the first week of admission, with the majority (approximately 75%) of these encounters being in a face-to-face format. During this initial session, the COPE© Director (the Small Baby Clinical Leader) or the COPE© Assistant (an Educational Psychologist assigned to the unit) provided a brief overview of the programme and used the booklet to acknowledge the emotional rollercoaster that occurs during a NICU hospitalisation and to emphasise the necessity for parents to be engaged with their infant. Contact information for support was also offered. Follow-up phone calls were made to the families during Phase 2, between weeks two and three of admission and Phase 3, which occurred 2 weeks before anticipated discharge. These calls addressed any questions that the parents may have had and encouraged them to read and use the information. A final phone call was made shortly after discharge to help parents make the transition into Phase 4. Phone calls followed a basic script, which included questions that asked whether specific activities were helpful, what barriers might have prohibited them from fully participating in the programme and any suggestions for improvements or modifications. All phases were administered and monitored by the COPE© Director of the unit or the COPE© Assistant. Nurses were aware of programme implementation, but were not required to administer the programme.

Data collection

Data were gathered throughout each patient's length of stay and placed in a designated small baby database for analysis. Data points included date of admission, age at admission, date of discharge, status of discharge, readmission date (if applicable), gestational age, birthweight, days of intermittent positive pressure ventilation, presence or absence of necrotising enterocolitis, presence or absence of fungal sepsis, presence or absence of bacterial infection and presence or absence of intraventricular haemorrhage. Readmissions within 30 days of discharge were used for comparison purposes. Responses from phone calls and mode of initial delivery, whether it involved a face-to-face conversation or if materials were left at the bedside, were also recorded.

Analyses

Data analyses were performed using IBM SPSS version 19 (Armonk, NY, USA). Descriptive statistics were used to create a profile of each group – the historical control group and the intervention group. Nonparametric (Mann–Whitney) tests compared groups on length of stay and readmission rates. Additional nonparametric and parametric (independent samples *t*-tests) tests, where appropriate, were used to compare groups on each of the acuity variables listed in the previous section.

RESULTS

A total of 303 neonates and their parents participated in the study, with 135 in the control group and 168 in the COPE© group. As illustrated in Table 1, there were no significant differences in the mean gestational age or the mean weight

Table 1 There were no significant differences between groups in gestational age, birthweight or admit day of life. The groups also did not differ significantly in days of intermittent positive pressure ventilation, presence of necrotising enterocolitis, fungal infection, coagulase negative staphylococcus aureus infection and intraventricular haemorrhage and percentage of Medicaid insurance. COPE© patients demonstrated a significantly reduced length of stay and rate of readmission

	No-COPE® (n = 135)	COPE® (n = 168)	p-value
Gestational age (weeks)	24.6 ± 1.0	24.7 ± 1.0	0.41
Birthweight (grams)	721 ± 161	731 ± 168	0.62
Admit day of life	15.9 ± 19.6	16.8 ± 16.3	0.72
Mortality (%)	21.8	16.8	0.20
Intermittent positive pressure ventilation (days)	47.3 ± 43.4	43.7 ± 33.9	0.54
Necrotising enterocolitis (%)	15.8	17.9	0.86
Sepsis (% of coagulase negative *Staphylococcus aureus* infection)	18.5	10.7	0.07
Fungal infection (%)	9.2	7.8	0.80
Intraventricular haemorrhage (%)	48.7	51.8	0.68
Medicaid insurance (%)	75	64	0.27
Length of stay (days)	139.6 ± 61.9	127.1 ± 55.8	*<0.05*
Rate of readmission (%)	23.9	13.2	*0.05*

The p values that are presented in italic form are those that were significant at 0.05

at birth between the groups. There were also no significant differences between the groups in days of intermittent positive pressure ventilation, presence of necrotising enterocolitis, presence of coagulase negative staphylococcus aureus infection, and presence of intraventricular haemorrhage or days of life of admission. Groups did not differ in mortality or in the percentage utilising Medicaid insurance (Table 1).

There was a significant difference in length of stay between the two groups, (COPE© 127 ± 56 days vs. NO-COPE 140 ± 62 days, $p < 0.05$). In addition, the COPE© group had a significantly decreased rate of readmission compared with the control group (13.2% vs. 23.7%, $p = 0.05$) (Table 1). Figure 1 demonstrates the annual readmission rates during the course of this study and demonstrates the dramatic decrease following implementation of COPE© in 2010. Additionally, phone logs indicated that the majority of parents felt the programme was worthwhile with Phases 1 and 2 being the most utilised parts of the book.

DISCUSSION

The benefits of family-centred care in the NICU are well established (13). Active parental presence in the NICU improves neonatal stress (14,15), advances neonatal self-regulatory capacity (16,17) and impacts subsequent short and longer term neurodevelopment outcomes (18–20). While our length of stay results were consistent with the literature (9), we were surprised that our findings included both a reduction in length of stay and readmission rates. The

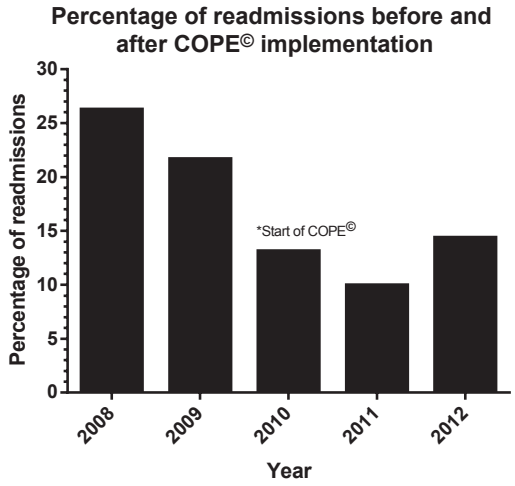

Figure 1 Readmission rates before and after the implementation of the COPE© programme.

primary goal of the COPE© programme implementation in our unit was to support our hospital administration's goal for each departmental unit to individually implement a family-centred care initiative. Multiple studies have investigated the factors that affect parental presence in the NICU (21–23). However, we have only recently begun to understand the essential nature of teaching parents to read neonatal cues and understand neonatal behaviour (24,25). A review of previous literature (26) reveals that parental understanding of their child can affect rehospitalisation after discharge. However, few, if any, studies have been conducted with extremely premature infants in an all referral NICU setting. Our supposition is that through the COPE© programme, we have been able to provide more opportunities for educating parents about the critical need for engagement in the NICU. This has, somehow, influenced parent–infant interaction, which then further translates into significant length of stay and readmission outcomes. As we did not assess parental ability to read neonatal cues, further investigation is duly warranted.

There are other possible explanations for the reductions in lengths of stay and readmission rates in this study. First, it is possible that our two groups were poorly matched, and the COPE© group was simply less ill than the control group. We attempted to control for this by including all patients admitted during each epoch, and by analysing the resulting groups for differences in known risk factors for longer hospitalisations. The fact that there were no differences in gestational age, birthweight, day of admission, length of intermittent positive pressure ventilation, and infection suggests that neither group was demonstrably sicker. In addition, we were able to include relatively large numbers of patients in each group (135 and 168), reducing the likelihood of random variation.

Second, it is possible that other aspects of medical care improved markedly during the study period and the COPE© group was simply benefitted from good timing. We believe

that this is unlikely to be the case for two reasons. First, both groups were hospitalised in the small baby ICU after it was already well established as a single unit, with well-tested guidelines and thoroughly trained staff. Indeed, we carefully track our guidelines and there were few if any substantial changes in personnel, care protocols or the NICU environment during the study period. Second, both groups had similar rates of overall survival and other rates of complications (Table 1), suggesting that medical care was relatively stable and those improvements in outcomes were more likely the result of adjunct care practices. If rates of other morbidities had improved substantially, our confidence in our findings would be significantly reduced.

The power of using the COPE© programme for extremely premature infants may be its ability to serve as a mechanism for inviting parents into the NICU setting, validating the critical role of the parent within the immediate NICU environment and educating parents about appropriate neonatal interaction for longer term effects. Although we show a significant effect of the COPE© programme, we realise that for maximum efficacy the COPE© programme likely needs to be housed within a larger medical context that recognises, values and supports the family unit (10).

CONCLUSION

Educating and empowering parents to take an active role in their premature infant's care from the day of admission using the COPE© programme appears to decrease length of stay and significantly lowers readmission rates. Our results support the notion that active family-centred care in an all referral small baby ICU can improve outcomes in extremely preterm infants. Future studies of the COPE© programme with this specialised population should focus on studying specific aspects of the programme to fully understand how parents are using each Phase as well as the programme's impact on parental ability to read neonatal cues.

DISCLOSURES

The authors have no financial or other conflicts of interest to disclose.

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