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The Use of Telehealth to Improve Handoffs Between Neonatologists and Primary Care Providers for Medically Complex Infants

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Abstract

As part of the Supporting Pediatric Research Outcomes Utilizing Telehealth (SPROUT) collaboration, three institutions (University of California, Davis, Children's Hospital Colorado, and Children's Hospital of Philadelphia) sought to improve communication with primary care providers (PCPs) using telehealth. This project connected families of neonatal intensive care unit (NICU) patients, their PCPs, and their NICU team through telehealth to provide an enhanced hospital handoff. This case series reports four cases that exemplify the benefits of these enhanced hospital handoffs: Case 1: assisting with changing care plans after NICU discharge, Case 2: demonstrating physical findings, Case 3: incorporation of additional subspecialties through telehealth, Case 4: arranging care for remote patients. Although these cases demonstrate some of the potential benefits of these handoffs, further study is needed to determine acceptability of these handoffs and to see whether they impact patient outcomes.

Keywords: *pediatrics, telehealth, communications, telemedicine, neonatology, handoffs*

Introduction

The American Academy of Pediatrics considers infants discharged from the neonatal intensive care unit (NICU) to be high risk if they are preterm, have unresolved medical problems, technology dependence, or have family-related challenges.[1] Up to 50% of preterm NICU graduates are seen in the emergency department within 3 months of discharge with the highest risk of readmission within the first 2 weeks after discharge.[2,3] Although many acute issues do resolve, NICU graduates have a range of ongoing issues including growth, chronic lung disease, and neurodevelopment.[4,5] The transition of care for these infants from the neonatologist to the primary care provider (PCP) typically happens either through written discharge summary or, less frequently, by telephone handoff.

Only 64% of pediatricians surveyed recently were satisfied with the discharge summary process for neonates,[6] with over a third of them receiving an NICU discharge summary "rarely" or "sometimes." Discharge summaries are often incomplete and may fail to include information on diagnostic test results, pending tests, discharge medications, and family counseling,[7] making care coordination difficult. Finally, traditional forms of handoff may not adequately communicate unique patient physical findings or allow for detailed discussion about remaining or new health issues that arise since discharge. Such vulnerabilities decrease the ability of the medically complex patient to have a smooth transition to the home environment.

As part of the Supporting Pediatric Research Outcomes Utilizing Telehealth (SPROUT) collaboration, three institutions (University of California, Davis, Children's Hospital Colorado, and Children's Hospital of Philadelphia) sought to improve discharge communication between neonatologists and PCPs using telehealth. This case series reports four situations wherein

using telehealth to communicate discharge information was particularly valuable. Aspects most impacted by telehealth handoffs for medically complex infants include assisting with care plan changes after NICU discharge, demonstrating patient's unique physical findings to the PCP, having additional subspecialties available for questions, and improving handoff and patient care coordination across long distances.

Case 1: Assisting with Changing Care Plans After NICU Discharge

Baby J is an ex 23-week infant with a complex medical history including chronic lung disease (oxygen dependent) and transcatheter device closure of a patent ductus arteriosus. During the telehealth handoff visit, the PCP noted that Baby J had oxygen saturations in the low 80s on their home oxygen flow of 1/8 lpm. The patient appeared otherwise to be at baseline without cyanosis or increased work of breathing. The neonatologist instructed the PCP to increase the flow to 1/4 lpm with improvement in saturations to the mid-90s.

The neonatologist contacted the patient's pulmonologist during the telehealth visit and conveyed the patient status and increased oxygen requirement. After discussion, the team agreed that the baby could stay at home if continuing to do well on the higher 1/4 lpm. The pulmonologist arranged for sooner follow-up and more frequent home oxygen delivery. The PCP noted that she otherwise would have had to send the baby to the emergency department or to the hospital for admission. Baby J was able to remain at home on their new increased oxygen flow rate and did not require subsequent hospitalization.

Case 2: Demonstrating Physical Findings

Telehealth handoff was particularly useful for Baby S with a large omphalocele. The defect was treated with serial reductions and skin preparations to allow for epithelialization of the wound rather than primary abdominal closure and was eventually closed with two Alloderm patches. By discharge, there were areas of varying epithelialization that could have been misinterpreted as possible infection. A telehealth handoff between the neonatologist, mother, pediatric surgery nurse practitioner (NP), and the PCP allowed for the PCP to understand the size of the anomaly and reasoning behind the interventions performed.

The NP was also able to review the baseline appearance of the wound, the areas of which should be monitored more closely, when to call pediatric surgery, and the future surgical plan. Lastly, the NP was able to review the daily wound dressing with the mother and PCP to reduce confusion about the process.

Case 3: Incorporation of Additional Subspecialties Through Telehealth

Baby R was a 1-month-old former 35-week gestation infant transferred to a level IV NICU for persistent positive pressure requirement. After an extensive workup for interstitial lung disease including a lung biopsy and metabolic studies, Baby R was diagnosed with Hurler's disease (mucopolysaccoridoisis Type 1). With initiation of enzyme replacement and treatment for a mild cardiomyopathy, the baby was weaned to low-flow oxygen. At a discharge telehealth handoff between the family, PCP, NICU provider, and the metabolic consultant, the NICU provider highlighted the patient's unique physical findings and the numerous follow-up visits while the metabolic provider was able to discuss the baby's unusual presentation, the need for serial enzyme replacement therapies, and the long-term consequences of the disease with the PCP.

The handoff increased the PCP's comfort with managing the patient and her understanding of the timeliness required for enzyme replacements. As a result, the PCP was able to coordinate the therapies more efficiently at a local hospital. The mom felt reassured of a high-quality transition of care.

Case 4: Arranging Care for Remote Patients

Baby E was born through cesarean section for a failed induction of labor in a small rural mountain town. Shortly after birth, the baby had increased respiratory distress requiring bag mask ventilation. A chest radiograph demonstrated bowel in the right chest, consistent with a congenital diaphragmatic hernia. Subsequently, the patient was transferred to a level IV NICU for diaphragmatic repair and treatment for pulmonary hypertension. At discharge, a telehealth handoff was performed between the NICU provider, PCP, family, and surgical physician assistant (PA).

The handoff enabled the family to meet the PCP for the first time, after changing their children's PCP to a pediatrician with more experience managing medically complex disease. The PCP was able to familiarize with the baby's baseline mild tachypnea and clarify the process for home oxygen delivery that had been difficult to arrange across state lines. In addition, the PA and the PCP were able to discuss the potential for further telehealth visits for surgical follow-up due to the 11-h driving distance.

Discussion

Medically complex infants, who are discharged from the NICU, are a unique population with multiple medications, medical equipment, abnormal examinations, and subspecialty follow-ups that can be overwhelming to their PCPs and

families. Current handoff practices of written discharge summaries without person–person communication are not always adequate to convey the nuances of postdischarge management or a complex NICU course.

Telehealth handoff between the neonatologist and the receiving PCP before discharge or at the first postdischarge office visit facilitates a more dynamic dialogue allowing for provider/caregiver questions, discussion of baseline examination findings, management adjustments based on presentation, and incorporation of subspecialty providers into decision making. The mentioned cases demonstrate only a few of the benefits our hospitals have experienced in providing these handoffs. Further study is needed to determine how these telehealth handoffs impact safety, health outcomes, personal experiences, and quality of care delivery.

The PCP's acceptability of telehealth handoffs should be studied as it can require additional PCP time and coordination. However, the utility in a telehealth handoff between the neonatologist and PCP has been demonstrated in several patients, and we are continuing to study provider and caregiver experiences with telehealth handoffs.

Authors' Contributions

K.H. and J.Z. contributed to conceptualization, methodology, investigation, and writing—original draft; C.O. was involved in writing—review and editing and funding acquisition; J.C. carried out conceptualization, methodology, investigation, writing—original draft, and funding acquisition; H.S.-F. took care of conceptualization, methodology, investigation, and writing—review and editing.

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