BRIEF REPORT

Development of a New Care Model for Hospitalized Children With Medical Complexity

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ABSTRACT

Children with medical complexity are a rapidly growing inpatient population with frequent, lengthy, and costly hospitalizations. During hospitalization, these patients require care coordination among multiple subspecialties and their outpatient medical homes. At a large freestanding children's hospital, a new inpatient model of care was developed in an effort to consistently provide coordinated, family-centered, and efficient care. In addition to expanding the multidisciplinary team to include a pharmacist, dietician, and social worker, the team redesign included: (1) medication reconciliation rounds, (2) care coordination rounds, and (3) multidisciplinary weekly handoff with outpatient providers. During weekly medication reconciliation rounds, the team pharmacist reviews each patient's current medications with the team. In care coordination rounds, the team collaborates with unit care managers to identify discharge needs and complete discharge tasks. Finally, at the end of the week, the outgoing hospital medicine attending physician hands off patient care to the incoming attending with input from the team's pharmacist, dietician, and social worker. Families and providers noted improvements in care coordination with the new care model. Remaining challenges include balancing resident autonomy and attending supervision, as well as supporting providers in delivering care that can be emotionally challenging. Aspects of this care model could be tested and adapted at other hospitals that care for children with medical complexity. Additionally, future work should study the impact of inpatient complex care models on patient health outcomes and experience.

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Children with medical complexity, a growing inpatient population, have chronic, multisystem diseases requiring many medications and subspecialists.[1,2] This group includes children with neurologic impairment (eg, static encephalopathy, epilepsy) and children assisted by medical technology (eg, enteral feeding tube, tracheostomy). These children are at increased risk for lengthy and costly hospitalizations,[2,3] medical errors when hospitalized,[4] and readmissions.[5] Although the approach of outpatient complex care programs to comprehensive care coordination has been well-described in the literature,[6–10] inpatient complex care models are poorly described.

At Cincinnati Children's Hospital Medical Center, a complex care outpatient clinic has served as a medical home to children with medical complexity for nearly 2 decades. Once admitted, however, these children were distributed among 5 pediatric hospital medicine (HM) teams alongside high-turnover general pediatric patients. Multidisciplinary support from pharmacists, dieticians, and social workers was available, but they assisted other teams and were rarely present for rounds. Coordinated and efficient care was not consistently provided to these high-risk patients. To address this challenge, the HM service developed a dedicated complex care team in July 2013 to provide comprehensive inpatient care to children with medical complexity.

This article describes the development and implementation of a new care model for hospitalized children with medical complexity and summarizes feedback from key stakeholders, including trainees, providers, nurses, and families.

METHODS

Setting

The new care model was implemented at a large, urban, pediatric academic hospital with >600 beds. Annually, 7000 patients are admitted to the HM service; >500 children have neurologic impairment and/or medical technology assistance.

Description of Team Structure

Providing coordinated care for medically complex children required substantial changes to team composition and core processes. Admission criteria, inclusive of all patients who receive primary care in the outpatient complex care clinics and through palliative care, were designed to assist in team placement. A single nursing unit was designated as the primary complex care unit, allowing nurses to develop expertise in the care of complex patients. The daily provider team consists of an HM attending, senior resident, 2 interns, 1 to 2 medical students, and 2 advanced practice registered nurses (APRNs). Each APRN serves on the complex care team 16 weeks per year, providing continuity between months and content expertise. Due to available resident coverage and the desire to deliver safe, family-centered care, the team has a maximum capacity of 10 patients at a time. If the team is at capacity when an eligible patient is admitted, the patient is admitted to another HM team and transferred to the complex care team when there is capacity. In addition to the provider team, the weekday multidisciplinary team participating in bedside, family-centered rounds includes 3 new dedicated members: a pharmacist due to the high risk of medical errors, a dietician to help manage enteral feeds and total parenteral nutrition, and a social worker to emotionally support the family and identify available financial and community-based resources.

In addition to the expanded team, new aspects of the inpatient care model included: (1) medication reconciliation rounds, (2) care coordination rounds, and (3) multidisciplinary weekly handoff with outpatient providers.

Medication Reconciliation Rounds

In addition to medication reconciliation on admission, transfer, and discharge, the team pharmacist reviews each patient's current medications with the team once a week. Inpatient medications are compared with home prescription and nonprescription medications with immediate reconciliation of discrepancies. The pharmacist also advises the team on discontinuing medications that patients no longer require (eg, narcotics for pain control), switching from intravenous to enteral medications when appropriate, entering end dates for planned antibiotic courses to ensure patients only receive necessary doses, and confirming the correct route of administration. Many patients have >20 medications; the pharmacist typically makes at least 1 suggestion about medication management per patient each session. At discharge, the pharmacist completes the discharge medication reconciliation with the team, identifying dosing and medication changes, and prompting medication education for the patient and family.

Care Coordination Rounds With Needs Assessment

The multidisciplinary team meets with unit care managers once weekly after family-centered rounds for care coordination rounds. Unit care managers are responsible for identifying and communicating discharge needs with the team, coordinating the completion of discharge tasks, such as new referrals for home health care or durable medical equipment, reinstituting existing outpatient services, and scheduling follow-up appointments.[11] Because care managers are unit-based and cover other teams, they are unable to consistently attend rounds each day. Care coordination rounds serve as a scheduled touchpoint to ensure proactive planning for discharge throughout a patient's stay, with additional communication occurring as needed.

During care coordination rounds, the team reviews each patient's discharge goals, outlining tasks to be completed before discharge.[12] To facilitate this discussion, discharge goals are listed and updated in the electronic health record.[13] Additionally, a needs assessment tool was designed to guide 8 key aspects of discharge planning: home health care visits, durable medical equipment, medications, follow-up, private duty nursing, family concerns, family education (eg, on medical technology), and transportation.[12] The completion of the needs assessment tool begins on admission and is reviewed regularly with care managers throughout the patient's hospitalization to facilitate completion of tasks before discharge.

Multidisciplinary Weekly Handoff

On Friday afternoons, the outgoing and oncoming attending physicians hand off patient care with input from the residents, APRNs, pharmacist, dietician, and social worker. Team members from the outpatient complex care clinics also attend. Although the primary goal is a clear and complete handoff to the oncoming attending physician, the inclusion of outpatient providers affords an invaluable perspective of previous illnesses, family stressors, and longitudinal goals. In addition, the inpatient team can update and involve the outpatient providers in management decisions, discharge goals, and the hospital-to-home transition.

Data Collection and Analysis

One year after formation of the inpatient complex care team, quantitative and qualitative data were collected from residents, attending physicians, APRNs, bedside nurses, and families. Resident feedback was obtained via an end-of-rotation survey. Attending physicians and APRNs participated in a facilitated focus group during a retreat. Floor nurses completed a 1-time survey. Over 1 month, feedback from admitted families was collected through 1-on-1 interviews by team leadership. Representative quotes were identified and discussed among the study team.

RESULTS

Resident Perspective

In their end-of-rotation feedback, residents had mixed views on the implementation of the complex care team. On one hand, it was perceived as being "integral to pediatric training" and an "efficient" way to provide care, with the benefit of learning more about specific roles of other team members. One resident commented that working with the multidisciplinary team is "the epitome of care coordination." However, residents noted limited access to multidisciplinary staff, especially unit care managers, on weekends as a particular challenge. Residents also expressed frustrations of coordinating multiple subspecialists with perceived loss of primary decision-making: "Many [patients have] subspecialists following and … often you are following their recommendations rather than being the primary provider." Additionally, residents highlighted the emotional toil of the team: "It can be very emotionally draining—specifically, ethical discussions where the medical team had different views than the parents' wishes."

Attending and APRN Perspective

In a focus group, attending physicians and APRNs felt the dedicated team makes the care of complex patients easier and more rewarding than the previous model. Structured meetings were noted to simplify and address the complex needs of these high-risk patients. Communication and care coordination with the families, outpatient primary care providers, and multiple subspecialists were viewed as strengths. Attending physicians noted 2-week blocks of service to be "emotionally exhausting and time intensive." The group articulated a need for more support and resiliency training, particularly around difficult conversations and ethical dilemmas.

Nursing Perspective

Fifty-one percent of the nurses ($n = 23/45$) responded to the nursing unit survey. Implementation of the complex care team was well received by nurses (Table 1). Nursing respondents positively rated the approachability and collaborative nature of the team. They also felt more comfortable taking care of this patient population with the new care team model. Although the majority of nurses felt they had the appropriate amount of resources to care for complex care patients, 26% still felt that resources were inadequate. One nurse commented on feeling "overwhelmed with the volume of complex care patients at a time on the unit as the acuity level of the complex care patient requires a large amount of time to provide the complex care and meet the needs of the families."

Family Perspective

In interviews, family feedback was positive. One mother stated that the complex care service formation is "the best thing that has happened to my daughter." Families also praised team efficiency and coordination of multiple services: "I feel like things get done faster now," and "You said you talked to my pediatricians in complex care clinic and the rehab doctors, but I didn't believe it until I saw you round together. This makes me feel great." One parent compared the care model to the previous model, stating: "They understand and connect with us. In the past, I felt like the team wasn't able to meet the complex needs of this patient population."

DISCUSSION

Since July 2013, the new inpatient complex care team model has targeted the complexities of care delivery and facilitated integration of a multidisciplinary team. The care model includes medication reconciliation, care coordination rounds, and weekly handoff with primary care

TABLE 1 Electronic Survey Feedback Results From Bedside Nurses

Item	Strongly Disagree% (*n*)	Disagree% (*n*)	Undecided% (*n*)	Agree% (*n*)	Strongly Agree% (*n*)
More resources than before complex care team	0 (0)	0 (0)	43 (10)	48 (11)	9 (2)
More comfortable providing care than before complex care	0 (0)	9 (2)	39 (9)	52 (12)	0 (0)
Complex care team members are approachable and work well with other disciplines	0 (0)	0 (0)	23 (5)	59 (13)	18 (4)
Have the appropriate amount of staff/resources to care for complex care patients	9 (2)	17 (4)	35 (8)	39 (9)	0 (0)

Response rate of 51% of all bedside nurses.

providers. The data speak to early successes in the efficient coordination of previously disorganized resources. Importantly, families note benefits of coordination and appreciate the new care team model. However challenges remain, including maintaining resident autonomy and supporting providers on this emotionally challenging but rewarding service.

In a recent national survey of hospitalists, lack of time to address the intense needs of families was identified as a barrier to caring for medically complex children.[14] Our inpatient team addresses these concerns and targets the rigorous tasks of care coordination identified by Adame et al[14]: coordinating care with subspecialists and the medical home, sharing information with families and the health care team, care planning to minimize errors, and discharge planning to ensure safety and accessibility. Yet, work is needed to better leverage the expertise of the unit care managers to help coordinate complex needs, particularly on weekends.

Despite our success in improving care coordination and family experience, our trainees continue to express frustration with the "lack of patient ownership," including decision-making authority and autonomy. This challenge was recently noted in a focus group of complex care pediatric educators.[15] Another challenge learners may face is the "visceral sense of being 'overwhelmed'" by the medical complexities of these children.[15] In addition to feeling overwhelmed by medical complexity, our residents highlighted their struggle with addressing patients' psychosocial and behavioral needs, particularly when the medical team and parents have different goals.[15] Not only did learners struggle with complexity, bedside nurses also became overwhelmed with the needs of these patients. In response, the nurse to patient staffing ratio for the unit was decreased from 4:1 to 3:1. Similarly, due to feedback, attending service time was changed from 2-week to 1-week blocks.

Additional targets for continued improvement include: (1) restructuring daily family-centered rounds and documentation to increase efficiency and better address patients' longitudinal plans, (2) maximizing the educational experience for learners and bedside providers while building confidence to care for this population, (3) leveraging care management to support resource needs, (4) proactively and routinely instituting multidisciplinary care conferences with families to formulate plans aligned with families' goals, and (5) designing interventions to support provider skills in conflict resolution and resilience. Future work will also focus on assessing the impact of team implementation on patient outcomes, including length of stay, readmissions, cost of care, and patient/family experience.

CONCLUSIONS

A multidisciplinary team dedicated to the management of hospitalized children with medical complexity can provide coordinated care to address the unique needs of this growing population. To date, broad stakeholder feedback reveals improved coordination and efficiency of care, but additional innovation and research is needed to address outcomes (eg, length of stay, cost of care, readmission rates, patient/family experience, provider experience/burnout) that are important to patients, families, learners, and providers.

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