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Ingrid Larson

Children's Mercy Hospital

Amber Hoffman

Children's Mercy Hospital

Michael Artman

Children's Mercy Hospital

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Maximizing Health Outcomes in a Medical Home for Children with Medical Complexity: The Beacon Program

Ingrid A. Larson, MBA, MSN, DNP, APRN, CPNP¹, Amber Hoffman, MD¹, and Michael Artman, MD²

The Institute for Healthcare Improvement recommends the Triple Aim framework to optimize health system performance. This framework includes improving the patient experience, improving the health of populations, and reducing the per capita cost of health care.¹ This is particularly important in the growing population of children with medical complexity (CMC), who represent only 0.4%-0.7% of the population but account for 15%-33% of all health care spending.²⁻⁶ CMC include those with multiple complex and chronic conditions. These children often need multiple specialists and medications, are dependent on technology,⁷ and have functional limitations.^{8,9} Our hospital's response to the growing CMC population was to develop a comprehensive (medical, nutritional, emotional, and psychosocial needs) primary care medical home program, focused on achieving the Triple Aim.

The Beacon Program at Children's Mercy Hospital was founded in October 2013 by a general pediatrician and a pediatric nurse practitioner. The program places the patient and family at the center of the healthcare team. The program was recognized in December 2015 by the National Committee for Quality Assurance as a level III primary care medical home for CMC and their siblings. Since inception, the program has enrolled a total of 189 CMC and 105 siblings.

The Beacon Model

We reviewed existing complex care programs as the foundation for developing our own approach to complex care. The Beacon model has 2 main programmatic arms: to provide primary care medical home services to CMC and to offer consults to community primary care providers (PCPs). The program accepts referrals only from PCPs, unless the child is new to the state, in which case a specialist is allowed to make the referral. CMC generally qualify for the program, meaning that they have multiorgan involvement, rely on medical technology, need assistance with or have limitations in performing activities of daily living, and are high utilizers of the health care system. A typical patient seen in our clinic would be a 7-year-old with a genetic syndrome, cyanotic heart disease, epilepsy with a tracheostomy tube, home ventilator, gastrostomy tube, and vagal nerve stimulator with a history of multiple prolonged hospitalizations each year. Referrals are reviewed by the team for acceptance into the program.

CMC	Children with medical complexity
ED	Emergency department
PCP	Primary care provider

The clinic uses a multidisciplinary team-based model of physicians, nurse practitioners, psychologists, nurses, social workers, and registered dietitians. Each patient has an assigned PCP, and other team members are involved as needed. A 2-hour team evaluation and a separate well-child check are performed annually, along with ad hoc visits for appointments when ill and follow-up (e.g., weight checks, hospital follow-up). Ad hoc availability of the team members is constant. The team-based care approach was designed to provide comprehensive holistic care of the patient and meet the goal of improving the patient's experience.

Beacon physicians and nurse practitioners provide direct 24/7 on-call service for families, given that most of the patient concerns lie outside of traditional pediatric illness protocols followed by nurse triage lines. The Beacon providers are often able to avoid emergency department (ED) visits by recommending home management and arranging for a clinic appointment. If a patient is sent to the ED, the Beacon provider provides a preliminary plan to the ED and remains available for consultation. Each patient also has a Pediatric Emergency Form, completed by the PCP, for use when emergency medical services is called. When a patient is admitted, the Beacon providers assist in care coordination with the inpatient team and participate in daily rounds on the patient.

Triple Aim Accomplishments

This model has resulted in achievement of the Triple Aim. Examples of improved health (based on Bright Futures) and cost savings in calendar year 2015 include the following. The percentage of Beacon patients with an annual well-child visit rose from 59% to 85%. The hemoglobin screening rate rose from 56% to 84% in Beacon patients age 2 years. The proportion of Beacon patients with asthma who were seen in the ED for treatment of an asthma exacerbation remained steady at 1%; however, the rate of admission for treatment of asthma in Beacon patients with a diagnosis of asthma decreased from 4% to 1%.

Patient satisfaction survey data (NRC Picker) remains high and has not decreased as the program has grown. Complete

¹Division of General Academic Pediatrics, Children's Mercy Hospital, Kansas City, MO; and ²Department of Pediatrics, Children's Mercy Hospital, Kansas City, MO
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cost data were available for 28 Missouri patients before and after enrollment into the Beacon Program who were covered by the Children's Mercy Integrated Care Solutions, Pediatric Care Network. These patients had at least 3 months of pre-enrollment and post-enrollment cost data available. Patients were excluded who had costs (high or low) not reflective of the true impact of the program. An example of an excluded patient would be a child who had been discharged after a 6-month admission, enrolled into the Beacon Program, and followed thereafter. In these 28 patients, the cost savings were significant. The number of emergency room visits per 1000 Beacon patients decreased by 28% (from 2662 to 1912), and the number of hospital admissions per 1000 Beacon patients decreased by 39% (from 59 to 32). The inpatient length of stay per 1000 Beacon patients decreased by 37% (from 9087 to 5702), and the per member monthly cost decreased by 21% (from \$6472 to \$5132). The total annual savings for these 28 children was \$782 975.

A Look to the Future

In 2016, the Beacon Program expanded beyond primary care to provide community consults for CMC who live more than 1 one hour from the clinic. The team consult is performed by telemedicine to supplement and support the care of the CMC by the PCP in the local community. The Beacon team remains available to the PCP for support throughout the year as a consultant, with the understanding that many rural and underserved areas have limited access to specialty team members who are available within the Beacon Program. In addition, the Beacon Program is poised to meet the requirements for the Advancing Care for Exceptional Kids Act of 2015, as a model

for a CMC medical home working within a Children's Hospital Network. ■

Reprint requests: Michael Artman, MD, Department of Pediatrics, Children's Mercy Kansas City, 2401 Gillham Rd, Kansas City, MO 64108. E-mail: martman@cmh.edu

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