COMMENTARY

Complication Versus Consequence: Defining Device-Related Outcomes in Children With Medical Complexity

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In the current issue of *Hospital Pediatrics*, Nackers et al[1] retrospectively reviewed nearly 500 encounters in 98 children with medical complexity (CMC) to identify factors that predicted device-related complications. Results demonstrated that nearly 1 in 3 emergency department visits and nearly 1 in 5 hospitalizations were associated with device complications, proportions that are higher than the 10% seen in previous studies.[2] Central venous catheters and feeding tubes (both primary gastrostomy tubes and nasoenteral tubes) accounted for 25% of all emergency department visits. Although certain device types were associated with increased likelihood for emergency department or hospitalizations, no patient, family, or other clinical factors were associated with the device-related outcomes. The authors are commended for overcoming some of the major challenges in studying device-related complications, including developing a rigorous device complication scale for outcome assessment and obtaining a high level of interrater reliability among those reviewing charts.

Given the rising rates of technology use in CMC, improving identification of technology-related outcomes is important. One challenge in studying device-related outcomes is creating consistent definitions about what constitutes a device complication. Some events are clearly a true device complication, such as a ventriculoperitoneal shunt becoming disconnected, causing signs of increased intracranial pressure or a ventilator malfunctions in a patient with chronic respiratory failure. Other complications identified by the authors may be expected consequences of having existing devices; for example, bacterial tracheitis in a patient with preexisting tracheostomy or fever evaluation in the setting of a central venous catheter. Differentiating between outcomes due to device complications versus outcomes due to consequences of having a device may help target interventions to minimize urgent hospital use. As the authors suggest, the next steps in the care of CMC with devices include improving prevention strategies and developing risk stratification for suspected bacterial infections to minimize device-related urgent health care use.

Notwithstanding this limitation, Nackers et al[1] provide CMC researchers a framework for assessing additional outcomes to evaluate programs that care for CMC, given that previous randomized controlled trials have revealed conflicting results when the impact of complex care programs and intensive case management on total costs or hospital use was examined.[3,4] As outcomes research in CMC matures and alterative reimbursement models are introduced,[5] CMC researchers need to not only examine traditional outcomes, such as costs and urgent hospital use but develop "reliable and valid approaches to assign preventability to these encounters."[1] For those that are

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potentially preventable, continual reassessment of the need for specific devices and early transition from temporary to more permanent devices (eg, nasogastric tubes to gastrostomy tubes) may decrease unanticipated visits.

Additionally, results from this study further reveal the burden that families and patients face when children require technologies to support their lives. Potential additional outcomes include the impact of unanticipated device-related health care use on family and caregivers financial, mental, and physical health status.[6–10] Regardless of how one defines a device complication, as pediatric hospitalists and others who care for CMC, we must continue to incorporate discussions about device-related complications (and the potential consequences of decisions to place medical devices) into shared decision-making with families and others who care for this growing patient population.

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