

# The Centrality of Complexity in Children's Longitudinal Health Care Spending

Matthew M. Davis, MD, MAPP

How much health care will a child use in a given year? This question has profound implications for children and families, often in the context of acute illness and also in efforts to prevent disease with anticipatory guidance and preventive strategies such as routine vaccination. For children with chronic health conditions, anticipating health care utilization often has an additional double-sided layer of meaning: families hope that their children will have access to all the health care they need, while also hoping that their needs will be less than they expect.

The health and emotional dimensions of anticipating children's health care utilization are further colored with economic considerations. This is certainly the case at the family level, where parents often struggle to cope with the costs of health care not fully covered by private insurers or public programs. Economic concerns also strongly influence decisions by payers such as Medicaid and by health care providers such as hospitals and health systems.

Among such stakeholders, there has been strong interest in trying to identify children who are likely to have high health care utilization, for purposes of implementing care coordination and other interventions based on published evidence. For instance, an outpatient-based medical home program at a children's hospital, focusing on children with multiple chronic conditions and offering care coordination during hospitalizations, was found to reduce hospitalization

frequency and shorten hospital stays while increasing outpatient encounter frequency, with an overall savings compared with management of the same children before the intervention.<sup>1</sup> An analysis of national Medicaid spending for children with medical complexity indicated that reductions in hospital lengths of stay would have the greatest potential for cost offsets that could support intensification of primary care-based case coordination, compared with other approaches such as reducing readmissions after hospital discharge and frequency of emergency services encounters that do not result in hospital admission.<sup>2</sup>

In this issue of *Pediatrics*, Agrawal et al share analyses that stand out from the majority of previous peer-reviewed articles regarding children with medical complexity because they offer a longitudinal, rather than cross-sectional, examination of the patterns of health care utilization and expenditures.<sup>3</sup> Using Medicaid records from 10 states, they first identified children whose expenditures fell in the highest 5% in the index year (2010). Next, they characterized patterns of utilization and spending for those same children who were continuously enrolled in Medicaid over 3 subsequent years, classifying the pattern of spending as persistent (in the top 5% for all years), intermittent (top 5% for at least 1 subsequent year), or transient (not in the top 5% for any subsequent year).

The findings of Agrawal et al in this unique cohort include intuitively

*Division of Academic General Pediatrics; Mary Ann and J. Milburn Smith Child Health Research Program; Stanley Manne Children's Research Institute; Ann and Robert H. Lurie Children's Hospital; and Department of Pediatrics, Northwestern Feinberg School of Medicine, Chicago, Illinois*

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Address correspondence to Matthew M. Davis, MD, MAPP, Ann and Robert H. Lurie Children's Hospital, 225 E. Chicago Ave, Chicago, IL 60611. E-mail: mmdavis@luriechildrens.org

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familiar themes and also fresh insights that often come with analyses of longitudinal data. Clinicians will not be surprised that children with persistently high expenditures in this sample were more likely to be adolescents than toddler-age children, to have  $\geq 6$  chronic conditions, and to have complex conditions involving the respiratory tract or neuromuscular disorders that often require long-term technological support to manage children's daily needs.

On the other hand, the authors found that only one-third of children in the group with the top 5% of expenditures in the index year had persistently high expenditures throughout all 4 years of study. More than one-half of children never returned to the top 5% in spending, and the remaining children had high spending only intermittently. They also found that having a hospitalization or an emergency department visit in the index year was associated with a lower likelihood of subsequent persistently high spending. Instead, the likelihood of persistently high expenditures for children in the persistent group was related to receipt of mental health care and home health care in the index year. Moreover, the widest differences in the distribution of health care expenditures in specific settings for children with persistently high spending versus their peers were related to home health, specialty outpatient care, and pharmaceuticals.

These findings likely reflect the centrality of medical complexity in the costs of health care over time for children in the Medicaid program. Mental health comorbidities frequently complicate management of physical health concerns. The challenges of coordinating care across multiple subspecialties are often idiosyncratic and institution-specific, related to clinical personnel and clinical settings, rather than

uniform. Progressively expensive medications, especially for children whose multiple and severe conditions may prompt their clinicians to prescribe medications that are often more costly, and also for children with orphan diseases, raise concerns that resonate deeply with the public. Home health care for children frequently corresponds to reliance on technologies (eg, mechanical ventilators) that indicate the severity of a child's condition and frequently co-occur with other disorders.

By comparison, hospitalizations and emergency department visits are comparatively nonspecific signals of acute health care needs for children, although they are often the target of published interventions to reduce health care spending among children.<sup>1,2,4</sup> In fact, the findings of Agrawal et al suggest that, among children with high health care expenditures, acute unscheduled care may sometimes signal a clinically necessary intervention that can lead to helpful changes in management and subsequently lower costs of care for more than half of children with previously high spending.<sup>3</sup> Should longitudinal cost trajectories therefore be used to inform a new class of interventions to support management of children with medical complexity?

To answer this question, subsequent research must answer 3 additional questions. First, what is the contribution of infants and their complex illnesses to the pattern of expenditures for Medicaid nationally? The absence of infants in the initial cohort considered by Agrawal et al is a limitation of their study, given that median annual health care expenditures per person for infants on Medicaid are higher than for any other child age group.\* Consideration of infants is highly relevant for longitudinal assessments of complex

\*Author's estimates from the annual Medical Expenditure Panel Survey ([http://meps.ahrq.gov/mepsweb/data\\_stats/MEPSnetHC/datasource](http://meps.ahrq.gov/mepsweb/data_stats/MEPSnetHC/datasource)).

illness for children, given the origins of many conditions in infancy, often attributable to inherited disorders and perinatal conditions such as low birth weight and related complications.

Second, what factors are associated with marked increases in health care spending—that is, when a child with previously low spending experiences health events that necessitate health care with corresponding expenditures in the top 5%? The study by Agrawal et al, which began with a cohort of children with the highest spending, does not address this question. Yet their finding that only one-third of children remain in the highest spending group over time prompts the question: who “replaces” those who are only intermittently or transiently in the high spending group over time? Insights into this question may assist clinicians in helping children and families avert marked progressions in complexity (eg, related to polypharmacy) before they transpire.

Third, what is the nature of mental health services use for children on Medicaid whose expenditures are persistently highest? The widely used pediatric complex chronic conditions classification system, pioneered by Feudtner et al in 2000<sup>5</sup> and recently updated for the *International Classification of Diseases, 10th Revision*,<sup>6</sup> does not include a category for mental health conditions. This makes it difficult to see with analytic clarity whether there are particular conditions (eg, affective disorders, anxiety) that complicate management of children's other complex needs. There is growing national awareness of the value of integrating behavioral health and physical health services for adults and children, and future efforts to manage complex care will do well to consider mental health as well as physical health in their programmatic approaches.

In sum, a longitudinal analysis of children's health care utilization

and spending while on Medicaid offers fresh insights and raises new questions about how best to provide supportive coordinated care and mitigate rising costs over time. Understanding specific aspects of complexity such as the impact of infancy, risks for newly intensified care needs, and the role of mental health comorbidities will likely enrich our collective understanding of longitudinal trends in spending. Although illness acuity will always demand our clinical attention, there is growing evidence that illness complexity demands our programmatic attention as well.

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