Leveraging Population Health and Quality Improvement to Improve Outcomes for Frequently Hospitalized Children With Asthma

Population Health Sciences

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Over the last decade, there has been considerable focus on programs targeted at reducing the acute health care use of those with the highest health care needs. The logic here is straightforward. If we want to reduce preventable emergency department (ED) visits and hospitalizations, and their associated costs, we should focus on improving care for individuals who use the ED and hospital the most. However, the counter argument is that if we were to direct those resources to lower-risk populations we could see greater health improvements for a larger number of people.

Recent evaluations using randomized controlled trials (RCTs) of high-profile programs seeking to reduce acute care utilization in adult high-risk populations have provided mixed results for this strategy's effectiveness. Findings are also mixed in the few evaluations of programs developed for diverse pediatric populations. In this context, a multidisciplinary team of physicians, nurses, respiratory therapists, and quality improvement (QI) experts at the Children's Hospital of Philadelphia (CHOP) asked: Could a more focused program for children with frequent and potentially preventable hospitalizations for asthma be effective? And what would be the best way to evaluate such a program?

Reducing Hospitalizations for Children With Asthma

In a recent *Pediatrics* article, we describe the results of an asthma population health initiative targeting children with three or more yearly asthma hospitalizations to help answer these questions. To set the groundwork for the study, we developed an asthma registry and best practice alerts within the hospital's electronic health record (EHR) to identify children with frequent asthma hospitalizations. During a qualifying hospitalization, children received a bundle of four care transition services, including: (1) tailored inpatient education at the bedside, (2) enrollment in an asthma community health worker home visiting program (CAPP), (3) facilitated filling of discharge medications, and (4) expedited outpatient follow-up with an allergist or pulmonologist, when appropriate.

Only children who received their primary care at an affiliated CHOP practice were initially eligible for the bundle, creating a separate comparison group of children who were frequently hospitalized at CHOP but didn't receive primary care at an affiliated center. Using traditional QI methodology, we showed that the number of children revisiting for acute asthma care within 30 days of a hospital discharge decreased by 38% in the 12 month intervention period compared to the 16 months prior to the intervention.

We assessed the robustness of our results by comparing monthly revisit rates pre- and post-intervention with children not enrolled in the bundle, confirming that receiving the bundle of services was associated with fewer repeat visits to the hospital. So what made this initiative successful? And are there lessons learned for other

populations of frequently hospitalized children?

Choosing the Right Population and Intervention Components

Initiatives aimed at reducing unnecessary care for high-risk individuals often select populations of interest based on prior health care utilization or cost. One challenge with this approach is that these populations are heterogeneous and the factors driving frequent use of emergency care are multifold. Our study focused on a more discrete population defined by recurrent hospitalization for a specific condition among children. As a result, we were able to identify key drivers of frequent hospitalizations, such as insufficiently tailored care, lack of health care system navigation, issues around discharge medication access, and barriers to timely specialty follow-up, and adapt appropriate evidence-based interventions to address them.

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We tracked the adoption of these interventions and care processes every month and iteratively modified them if we were not meeting certain predefined thresholds. While these bundle components covered many of the common reasons for repeat use of emergency care, there were several children and families whose needs far exceeded what we could provide in the context of the bundle, such as housing instability and other extenuating social circumstances.

Despite this caveat, our evaluation demonstrates that the bundle of services addressed drivers of utilization sufficiently to decrease recurrent emergency care use. Going forward, it will be important to evaluate whether a similar approach can be replicated for children who frequent the hospital for other chronic conditions.

An Alternative to Randomization

The RCT is often thought of as the gold standard for determining the efficacy of an intervention and several recent commentaries have promoted greater use of this approach for improving health care delivery. While randomization is a powerful mechanism that creates unbiased control groups, traditional RCTs are not always the most feasible and efficient method for evaluating health care questions.

Patients who frequently seek acute care often have rapidly changing and varied needs. Yet, traditional RCTs have strict protocols that prevent tailoring and modifying interventions on an ongoing basis. So while an RCT allows researchers to understand the generalizable impact of an intervention, the inflexibility of RCTs may limit providers' ability to respond to patients' unanticipated needs and challenges.

Within a QI framework, on the other hand, interventions are often oriented around several different drivers of an outcome, and go through various iterations while deployed. For example, during our intervention, we noted inconsistent referral to CAPP among inpatient providers, who had difficulty finding or remembering to place this order at patient discharge. We developed and implemented clinical decision support within the EHR in the provider's workflow, which improved uptake of this bundle component. This kind of flexibility is not a feature of traditional RCTs.

Our QI approach allowed us to adapt our intervention over time, but we still wanted to use a rigorous evaluation to examine its impact. We ultimately chose a difference-in-differences analysis because it mimics the experimental design of an RCT, but uses observational data. This approach can be a powerful tool to examine an intervention's effect when the strict requirements imposed by randomization are neither feasible nor ethical, as was the case for us.

Hybrid approaches may also be promising; for example, randomized quality improvement trials combine the flexibility of quality improvement methodology along with the benefits of a control group, which is particularly pertinent to use for groups with rapidly changing needs. This strategy has been used successfully to evaluate an intervention aimed at reducing hospitalizations in pediatric populations with chronic conditions, among others.

As health care researchers, we must take these lessons from prior work in high-risk populations and design studies that are not bound to the status quo. Applying innovative research methods to assess and improve programs can better inform how we provide care for families, creating positive outcomes for children's health.

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