Inpatient Asthma Care and Future Morbidity: A Role for Quality Improvement

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Children with asthma continue to suffer significant morbidity[1] despite improved treatment options and widely distributed best practice guidelines.[2] The best predictor of future severe asthma exacerbations is a recent asthma exacerbation.[3,4] In "Inpatient Quality Improvement Interventions for Asthma: A Meta-analysis" published this month in *Pediatrics*, Parikh et al[5] examine the impact of quality improvement (QI) initiatives conducted during inpatient asthma hospitalization on future (postdischarge) asthma morbidity. After reviewing an array of inpatient asthma interventions, they used meta-analysis to conclude that inpatient QI efforts have limited impact on postdischarge asthma outcomes. Their findings reveal the paucity of programs directed at improving postdischarge asthma control. Importantly, they identify some positive outcomes after inpatient multimodal targeted asthma QI interventions.

We applaud Parikh et al[5] for conducting this ambitious analysis, especially given the wide range of interventions, methodologies, measured outcomes, and disparate care settings wherein asthma inpatient QI was conducted. We also congratulate them for evaluating whether inpatient QI work alone has short- or long-term effects on future asthma morbidity (ie, asthma-related emergency department [ED] revisits or readmissions). We suspect some think it naïve to believe inpatient QI work alone can impact future asthma morbidity; however, until an analysis was conducted, this could only be conjecture. The analysis by Parikh et al[5] seems to codify the conclusion that inpatient QI work, as currently practiced, has limited impact on future asthma morbidity.

The authors' methods were thorough. They focused primarily on postdischarge asthma ED revisits and hospital readmissions as outcomes common to the majority of articles reviewed. They eliminated 18 articles from study because prevention of revisits and/or readmissions was not an intervention goal. Among the eliminated articles, revisits and/or readmissions were frequently balancing measures used to monitor whether hospital length of stay or cost reductions increased postdischarge morbidity.

In the 12 articles used for the meta-analysis, the authors described strategies ranging from primarily asthma education[6,7] to multicomponent interventions targeting compliance with the Joint Commission Children's Asthma Care measures.[8] Although the authors state that these studies were used to target the outcome of posthospital use, closer review reveals that 1 study was focused on developing "a cost saving algorithm,"[9] whereas another study's goal was to improve general practitioner "satisfaction with communication provided by the hospital."[10] Implementation strategies varied from randomized controlled trials of standardized interventions

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to interventions that evolved during plan-do-study-act cycles. The methodology for identifying index hospitalizations along with postintervention study intervals varied.

The resulting nonhomogeneity of the studies makes Parikh's et al[5] meta-analysis of overall inpatient asthma QI efficacy inconclusive. However, their article does reveal several important issues. Inpatient asthma QI has not been aggressively aimed at improving postdischarge asthma morbidity. Instead, QI efforts are often centered on reducing inpatient length of stay and costs. With this focus, researchers fail to address these vulnerable patients' increased risk for future asthma exacerbations or take advantage of a severe asthma episode's wake-up call to trigger change in provider and caregiver management.[11]

Parikh et al[5] point out that unidimensional inpatient interventions have little impact on subsequent asthma-related health care use. This is particularly true for projects that are focused primarily on education. Unfortunately, education alone is usually insufficient to change caregiver home management.[12] This is also true for providers; simply providing instruction regarding asthma guideline care does not guarantee practice change.[13]

The multifaceted programs reviewed by the authors had more impact. Programs that combined education with dispensing emergency oral steroid supplies or confirmed medical home follow-up improved outcomes. Inpatient care standardization that included assessment of the patient's past clinical asthma control followed by adjustment and prescription of controller medication (especially if those medications were "in hand" at discharge) was effective. Programs employing a standard QI and multidimensional care improvement strategy[8,14–16] were especially consistent in their ability to reduce ED revisits and/or rehospitalizations. The lack of impact by a multidimensional QI-based program for a group of community hospitals[17] was confounded by the small baseline numbers of readmissions. Asthma readmissions may be an insensitive outcome measure for smaller patient populations. In addition, this measure fails to fully assess the more global impact asthma has on quality of life.

The time has come to focus on asthma hospitalizations as opportunities to address ongoing asthma control for patients at high risk for future asthma morbidity. We must address the continuum of asthma care from inpatient to outpatient and home care. We should abandon unidimensional approaches and instead focus on multifaceted "bundles" of interventions. We must address both provider and caregiver contributions to asthma morbidity.[15,18,19] Outcome measures should identify not only severe attacks but also the less calamitous and more common ways asthma is detrimental to our patients and their families.[20] Finally, we believe using a standard and rigorous QI approach with multidimensional targets and tactics is more likely to get results. This approach has been effective in driving change,[14] allows for fluid adjustment in interventions to speed impact, and does not leave a portion of children behind to receive "usual care."

ABBREVIATIONS

ED: emergency department
QI: quality improvement

REFERENCES

1. Centers for Disease Control and Prevention. Most recent asthma data. Available at: www.cdc.gov/asthma/most_recent_data.htm. Accessed February 4, 2018
2. National Heart, Lung, and Blood Institute; National Asthma Education and Prevention Program. Expert panel report 3: guidelines for the diagnosis and management of asthma. Full report. 2007. Available at: https://www.nhlbi.nih.gov/sites/default/files/media/docs/asthgdln_1.pdf. Accessed August 25, 2017
3. Puranik S, Forno E, Bush A, Celedón JC. Predicting severe asthma exacerbations in children. *Am J Respir Crit Care Med*. 2017;195(7):854–859
4. Tse SM, Samson C. Time to asthma-related readmission in children admitted to the ICU for asthma. *Pediatr Crit Care Med*. 2017;18(12):1099–1105
5. Parikh K, Keller S, Ralston S. Inpatient quality improvement interventions for asthma: a meta-analysis. *Pediatrics*. 2018;141(5):e20173334
6. Davis AM, Benson M, Cooney D, Spruell B, Orelian J. A matched-cohort evaluation of a bedside asthma intervention for patients hospitalized at a large urban children's hospital. *J Urban Health*. 2011;88(suppl 1):49–60
7. Stevens CA, Wesseldine LJ, Couriel JM, Dyer AJ, Osman LM, Silverman M. Parental education and guided self-management of asthma and wheezing in the pre-school child: a randomised controlled trial. *Thorax*. 2002;57(1):39–44
8. Fassl BA, Nkoy FL, Stone BL, et al. The Joint Commission children's asthma care quality measures and asthma readmissions. *Pediatrics*. 2012;130(3):482–491
9. McDowell KM, Chatburn RL, Myers TR, O'Riordan MA, Kercsmar CM. A cost-saving algorithm for children hospitalized for status asthmaticus. *Arch Pediatr Adolesc Med*. 1998;152(10):977–984
10. Marks MK, Hynson JL, Karabatsos G. Asthma: communication between hospital and general practitioners. *J Paediatr Child Health*. 1999;35(3):251–254
11. Resnicow K, Page SE. Embracing chaos and complexity: a quantum change for public health. *Am J Public Health*. 2008;98(8):1382–1389

12. Auger KA, Kahn RS, Davis MM, Simmons JM. Pediatric asthma readmission: asthma knowledge is not enough? *J Pediatr*. 2015;166(1):101–108

13. Cloutier MM, Tennen H, Wakefield DB, Brazil K, Hall CB. Improving clinician self-efficacy does not increase asthma guideline use by primary care clinicians. *Acad Pediatr*. 2012;12(4):312–318

14. Bergert L, Patel SJ, Kimata C, Zhang G, Matthews WJ Jr. Linking patient-centered medical home and asthma measures reduces hospital readmission rates. *Pediatrics*. 2014;134(1). Available at: www.pediatrics.org/cgi/content/full/134/1/e249

15. Kercsmar CM, Beck AF, Sauers-Ford H, et al. Association of an asthma improvement collaborative with health care utilization in Medicaid-insured pediatric patients in an urban community. *JAMA Pediatr*. 2017;171(11):1072–1080

16. Krupp NL, Fiscus C, Webb R, et al. Multifaceted quality improvement initiative to decrease pediatric asthma readmissions. *J Asthma*. 2017;54(9):911–918

17. Nkoy F, Fassl B, Stone B, et al. Improving pediatric asthma care and outcomes across multiple hospitals. *Pediatrics*. 2015;136(6). Available at: www.pediatrics.org/cgi/content/full/136/6/e1602

18. Allen ED, Arcoleo K, Rowe C, Long WW. Implementation of a "real world" School-Based Asthma Therapy program targeting urban children with poorly controlled asthma [published online ahead of print November 30, 2017]. *J Asthma*. 10.1080/02770903.2017.1396472

19. Snyder DA, Thomas OW, Gleeson SP, et al. Reducing emergency department visits utilizing a primary care asthma specialty clinic in a high-risk patient population [published online ahead of print August 30, 2017]. *J Asthma*. 10.1080/02770903.2017.1369989

20. Bime C, Nguyen J, Wise RA. Measures of asthma control. *Curr Opin Pulm Med*. 2012;18(1):48–56

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