A Quality Improvement Project to Improve Compliance With The Joint Commission Children’s Asthma Care-3 Measure

abstract

BACKGROUND AND OBJECTIVE: Since the initiation of the Children’s Asthma Care (CAC) core measures in 2008, hospitals have struggled to achieve a high rate of compliance with the CAC-3 measure of the Home Management Plan of Care (HMPC). At inception of this project in 2009, the national average was 65% compliance, which has now increased to 80%. These rates are below the Hospital Corporation of America’s goal of 90% compliance. Our objective was to identify potential pitfalls that interfere with compliance on CAC-3 at our institution and to devise solutions to increase compliance to >90%.

METHODS: Inpatient pediatric patients at a community teaching hospital in a predominantly rural state were included in our interrupted time-series quality improvement project from 2008 to 2011. Patients were between 2 and 17 years of age with an International Classification of Diseases, Ninth Revision (ICD-9), primary diagnosis code of asthma at time of discharge. We identified potential stumbling blocks that interfered with compliance of CAC measures and then implemented repeated Plan-Do-Study-Act (PDSA) cycles to improve processes, including redesign of the HMPC form, education, and electronic documentation tied to the discharge medication reconciliation form, which is also required by The Joint Commission.

RESULTS: We started with an average quarterly compliance of 43% with CAC-3 before our PDSA cycles. We have improved our compliance after the 2 PDSA cycles to an average of 97%.

CONCLUSIONS: By linking the HMPC form to the discharge medication reconciliation form, we were able to achieve and maintain >90% compliance with CAC-3.
documented in the medical record. Hospitals have had difficulty complying with this measure; the national average for 2009 was 65%, although it has improved to 80%. Many institutions still struggle to maintain a high rate of compliance. If any 1 of the following components is missing, the measure is noncompliant:

1. Arrangements for follow-up care (including physician name, telephone number, and time frame for follow-up appointment)
2. Environmental control of triggers
3. Method and timing of rescue actions
4. Use of controller medication, including dose, frequency, and route
5. Use of reliever medication, including dose, frequency, and route

Hospital Corporation of America (HCA), the nation’s largest health care company with 163 hospitals and 110 freestanding surgery centers (http://hcahealthcare.com/about/), required their facilities to implement the CAC-3 measure with a 90% benchmark. This article outlines the process improvements implemented at 1 HCA facility to achieve this goal.

METHODS
Setting and Study Population
Wesley Medical Center (WMC) is a community teaching hospital in Wichita, Kansas. The hospital has a 34-bed pediatric unit and a 12-bed pediatric ICU. Average annual pediatric admissions exceed 3000, with ~100 pediatric asthma admissions. About 65% of the hospitalized pediatric patients are receiving Medicaid. Patients in this study were between 2 and 17 years of age with an ICD-9 primary diagnosis code of asthma at time of discharge.

There are 3 pediatric hospitalist groups (n = 6, 10, and 8) and 1 family medicine hospitalist group (n = 8), >50 private community-based pediatricians with admitting privileges, and 1 pediatric pulmonologist. Wichita has >230 family medicine physicians; however, the number admitting children to WMC is unclear. WMC is the pediatric training site for 15 categorical pediatric, 12 medicine/pediatric, and 27 family medicine residents.

Guideline and Order Development
Education regarding CAC measures began the fall of 2007 (Fig 1). A clinical nurse specialist created the HMPC form and presented CAC information to the pediatric medical staff at the annual section meeting. In January 2008, the CAC measurement was implemented. The clinical nurse specialist collected data by using paper chart reviews for patients who had a discharge diagnosis of asthma. Data were submitted quarterly to TJC. During the first quarter of 2008 (n = 24), data revealed 100% compliance with CAC-1 and CAC-2 and 0% with CAC-3.

A committee was formed to address compliance with CAC-3 and standardize inpatient asthma care according to the practice guidelines by the National Heart, Lung, and Blood Institute. The committee, including respiratory therapists, a pediatric hospitalist, and a pediatric resident, reviewed the institute’s guidelines and devised an asthma protocol and admission order set. The asthma protocol was patterned after our bronchiolitis protocol and other care algorithms that demonstrated decreased cost and length of stay. The protocol was respiratory therapy, driven with escalation and de-escalation of therapy determined by using a clinical respiratory assessment score. The standing order set was designed to address all CAC measures. The protocol and standing order

FIGURE 1 CAC PDSA time line.
set were implemented in September 2008. Our facility completed 2008 with 100% compliance for CAC-1, 97% for CAC-2, and 39% for CAC-3.

**Intended Improvement**

Despite development of the asthma protocol and order set, we remained unable to meet 90% compliance with CAC-3. We recognized more leadership, education, and process improvements were needed. With the support of the hospital administration, a quality improvement project was implemented in January 2009, led by the pediatric nursing manager, a pediatric hospitalist physician champion, and representatives from the hospital’s quality department.

To improve CAC-3 compliance, we identified key drivers: (1) revision of the HMPC form to contain the specified elements for the core measure; (2) education of providers caring for patients on the pediatric unit; and (3) documentation of HMPC components in the medical record. A final goal was to standardize this process so other institutions might benefit.

**Ethical Issues**

This project was initiated for process improvement at our institution, and all data used were publicly reported. The institutional review board determined the project was a quality improvement activity.

**PDSA Cycle 1**

**Planning the Intervention**

During the spring of 2009, the team examined the compliance rates for individual elements of the HMPC to identify where improvements could be made. Documentation of medications on the form and giving the HMPC to caregivers had the lowest rates. The team identified that the form did not provide a clear place to document medication dosing and administration or space for the follow-up physician name, telephone number, and appointment time, and that no one was specified to ensure caregivers received the form before discharge. The team decided to address these elements by using a Plan-Do-Study-Act (PDSA) format.

**Planning the Study of the Intervention**

The goal was to improve compliance with CAC-3 to ≥60% by the end of 2009. The initial steps included improving the HMPC form, assigning responsibility, and education.

The HMPC form was revised to be symptom based because literature has shown this method to be more effective than peak flow based plans. The HMPC was modified to be more user friendly and assure that all CAC-3 elements were addressed, including: (1) choice to opt out of using controller medication if not indicated; (2) check boxes for controller medications, including doses, frequency, and route; (3) option for cases in which no known triggers were identified; and (4) highlighting follow-up information. This form was implemented in July 2009.

Concurrently, roles and responsibilities were designated: form completion to physicians, distribution to nurses, and chart review to quality personnel. An extensive education effort was implemented for resident physician, family medicine physicians, hospital and community pediatricians, and nursing staff.

Resident education consisted of the physician champion describing the CAC core measures during new resident orientation with a booster session each month as new residents were assigned to the ward. The HMPC form was presented; residents were instructed to show the HMPC form to the hospitalist attending before patient discharge to ensure completion and receive feedback.

A family medicine physician, who was a member of the Pediatric Executive Committee, presented the measure and the HMPC form to the family medicine section. Pediatricians were educated by the physician champion at section meetings with the use of a PowerPoint presentation. All physicians with pediatric admitting privileges were also sent letters explaining the CAC measure and HMPC form.

Nurses were educated via PowerPoint presentation available on the intranet-based nurse training system. Face-to-face training sessions were also held. Posters regarding the process were placed in nursing break rooms, and nurses signed documentation acknowledging receipt of training. Content included the CAC core measures, the HMPC form, and its components. Nurses were instructed to review all portions of the patient’s paper chart (including physician documentation), as well as electronic nursing and medication documentation to identify any indicators of asthma. If asthma was identified, nurses were to place the HMPC in the chart. Nursing staff were taught to review the form before discharge to guarantee that the HMPC was filled out completely.

**Methods of Evaluation**

Each day the nurse manager generated a report based on primary diagnosis of asthma; in addition, nurse review of charts identified children without an admitting diagnosis who
had indicators of asthma. The HMPC was added to newly identified charts.

Data were collected by the quality department via retrospective paper chart review. Quarterly reports of compliance were distributed to the team, hospital administration, and the Pediatric Executive Committee. All charts containing fallouts of any component of the CAC measures were reviewed. A letter of noncompliance and reminder of the core measure elements was sent to the attending and resident physicians involved. The nurse champion had face-to-face meetings with the nurses involved.

**Analysis**

Percent compliance was assessed, and our first aim, increasing CAC-3 compliance to ≥60%, was achieved (Table 1, Fig 2).

**PDSA Cycle 2**

**Intended Improvement**

The next aim was to increase our compliance to ≥90% by the end of 2010.

**Planning the Intervention**

In the review of PDSA cycle 1, the documentation process was identified as problematic. The team informally surveyed noncompliant nurses and residents. The HMPC required redocumentation of elements included in other areas of the chart. Staff found this burdensome. When all chart documentation was reviewed, all necessary elements of the HMPC were present; however, these elements were not on a single form as required by TJC. Although the institution has not yet implemented an electronic health record (EHR) for physician documentation, a decision was made to push the CAC measure into electronic format in hopes that all documentation could be tied into 1 form.

To accomplish this goal, team members were added, including medical documentation and pharmacy representatives. The team met in May 2010 to work on transferring current documentation from paper charts and Meditech, our hospital’s computer information system for nursing and pharmacy documentation, to a single form meeting TJC’s requirements. The team identified many elements that were already present in the discharge medication reconciliation form, also required at discharge. Our medication reconciliation process was populated from electronic nursing documentation of home medications on admission and electronic pharmacy documentation of medications administered during the hospital stay. It was printed for the physician to complete by checking medications for the patient to continue upon dismissal. There were also instructions for follow-up care and supplies. Nursing staff then entered the physician documentation into the electronic nursing documentation and could print an instruction form for patients at discharge. Our discharge medication reconciliation form had consistently been at 100% compliance since initiation.

Because Meditech allowed creation of new screens that drew from existing data within the system, the team recommended that an electronic version

**TABLE 1** Percent Compliance With CAC-3 Measures According to Quarter, 2009–2011

<table>
<thead>
<tr>
<th>HMPC Elements</th>
<th>1Q 2009, % (n)</th>
<th>2Q 2009, % (n)</th>
<th>3Q 2009, % (n)</th>
<th>4Q 2009, % (n)</th>
<th>1Q 2010, % (n)</th>
<th>2Q 2010, % (n)</th>
<th>3Q 2010, % (n)</th>
<th>4Q 2010, % (n)</th>
<th>1Q 2011, % (n)</th>
<th>2Q 2011, % (n)</th>
<th>3Q 2011, % (n)</th>
<th>4Q 2011, % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMPC document in medical record</td>
<td>89 (18/18)</td>
<td>95 (20/21)</td>
<td>96 (26/27)</td>
<td>95 (38/38)</td>
<td>100 (25/25)</td>
<td>91 (22/22)</td>
<td>100 (18/18)</td>
<td>100 (32/32)</td>
<td>100 (24/24)</td>
<td>100 (38/38)</td>
<td>100 (28/28)</td>
<td>100 (45/45)</td>
</tr>
<tr>
<td>HMPC given to care provider</td>
<td>94 (15/16)</td>
<td>100 (20/20)</td>
<td>85 (22/26)</td>
<td>92 (33/36)</td>
<td>100 (25/25)</td>
<td>100 (20/20)</td>
<td>100 (18/18)</td>
<td>100 (32/32)</td>
<td>100 (24/24)</td>
<td>100 (38/38)</td>
<td>100 (28/28)</td>
<td>100 (45/45)</td>
</tr>
<tr>
<td>Addressed environmental triggers</td>
<td>94 (15/16)</td>
<td>90 (18/20)</td>
<td>100 (26/26)</td>
<td>100 (36/36)</td>
<td>100 (25/25)</td>
<td>100 (20/20)</td>
<td>100 (18/18)</td>
<td>100 (32/32)</td>
<td>100 (24/24)</td>
<td>100 (38/38)</td>
<td>100 (28/28)</td>
<td>100 (45/45)</td>
</tr>
<tr>
<td>Addressed the use of controllers</td>
<td>94 (15/16)</td>
<td>65 (13/20)</td>
<td>100 (26/26)</td>
<td>96 (36/36)</td>
<td>100 (25/25)</td>
<td>100 (20/20)</td>
<td>100 (18/18)</td>
<td>100 (32/32)</td>
<td>100 (24/24)</td>
<td>100 (38/38)</td>
<td>100 (28/28)</td>
<td>100 (45/45)</td>
</tr>
<tr>
<td>Addressed the use of relievers</td>
<td>75 (12/16)</td>
<td>85 (17/20)</td>
<td>100 (26/26)</td>
<td>100 (36/36)</td>
<td>100 (25/25)</td>
<td>100 (20/20)</td>
<td>100 (18/18)</td>
<td>100 (32/32)</td>
<td>100 (24/24)</td>
<td>100 (38/38)</td>
<td>100 (28/28)</td>
<td>100 (45/45)</td>
</tr>
<tr>
<td>Addressed use of rescue actions</td>
<td>75 (12/16)</td>
<td>80 (16/20)</td>
<td>100 (26/26)</td>
<td>100 (36/36)</td>
<td>100 (25/25)</td>
<td>100 (20/20)</td>
<td>100 (18/18)</td>
<td>100 (32/32)</td>
<td>100 (24/24)</td>
<td>100 (38/38)</td>
<td>100 (28/28)</td>
<td>100 (45/45)</td>
</tr>
<tr>
<td>Addressed appropriate elements of follow up</td>
<td>88 (14/16)</td>
<td>95 (19/20)</td>
<td>96 (25/26)</td>
<td>83 (30/36)</td>
<td>100 (25/25)</td>
<td>95 (19/20)</td>
<td>100 (17/18)</td>
<td>94 (32/32)</td>
<td>100 (22/24)</td>
<td>93 (38/38)</td>
<td>100 (28/28)</td>
<td>100 (45/45)</td>
</tr>
<tr>
<td>Total compliance with CAC-3</td>
<td>61 (11/18)</td>
<td>48 (10/21)</td>
<td>82 (22/27)</td>
<td>76 (29/38)</td>
<td>96 (24/25)</td>
<td>86 (19/22)</td>
<td>94 (17/18)</td>
<td>100 (32/32)</td>
<td>92 (22/24)</td>
<td>93 (38/38)</td>
<td>100 (28/28)</td>
<td>100 (45/45)</td>
</tr>
</tbody>
</table>

* Denominator adjusted for other elements to account for lack of HMPC on chart to verify elements. These data were for internal use and not reported to TJC.
of the HMPC be developed. The medical documentation representatives created an HMPC that was populated by the discharge medication reconciliation form as well as information from the nursing admission summary regarding asthma triggers.

An algorithm was developed in Meditech to identify pediatric asthma patients through the nursing assessment at admission or from prescription of bronchodilators and systemic corticosteroids. This documentation generated an asthma section as part of the discharge medication reconciliation form, with triggers populated from nursing documentation and medications populated from pharmacy documentation. The form was printed as a stand-alone form with copies generated for the chart and patient. This process was completed in June 2010. Nursing, physician, and pharmacy education began in July 2010, and the official start date was August 17, 2010.

This process was facilitated by the ability of Meditech to incorporate data from other electronic documentation onto new screens. One of the information technicians was a pharmacist, which enhanced communication between physicians and the information technology department, especially in terms of the medication documentation. Barriers to the electronic form included lack of electronic physician documentation and Meditech system upgrades that affected programming.

Methods of Evaluation
Methods of evaluation were previously stated in PDSA cycle 1.

Analysis
Percent compliance was assessed.

RESULTS
Initial improvements were seen before our first PDSA cycle, with an average quarterly compliance of 43%. The first PDSA cycle led to improvement, with average quarterly CAC-3 rates to 83% (Fig 2). In addition, compliance with individual components improved (Table 1). During the first PDSA cycle, 4 letters were sent to attending physicians regarding fallouts; 1 physician received 2 letters. No nurse was involved with >1 case.

Average quarterly compliance after the second PDSA cycle was 97%. A single fallout occurred before electronic documentation began; we had 100% compliance for 2010 after August 17.

Since that time, we have sustained compliance >90%. In first quarter 2011, we had 92% compliance ($n = 24$); 2 fallouts were attributed to a computer programming error. This error was corrected, and in the second quarter, we achieved 100% compliance ($n = 38$). With changes in medical documentation and technology to meet meaningful use requirements, the Meditech screen for documentation was recreated. In doing so, we identified a computer glitch in the third quarter of 2011 accounting for 2 fallouts (Table 1). Once corrected, we
achieved 100% compliance during the fourth quarter of 2011 (n = 45).

DISCUSSION
The purpose of this project was to improve HMPC compliance. We started at 43% compliance with CAC-3 before our PDSA cycles and improved to 97%. We identified key drivers and implemented process changes to achieve and sustain improvements. These changes were overseen and accomplished by an interdisciplinary team that grew and evolved over time to meet the necessary tasks at hand. Although difficult to quantify, we believe it is critical to look at each step of the process. For example, only by looking at each of the HMPC elements could we identify actionable items.

The first key driver was the HMPC form. The initial form was not designed properly to meet all elements of CAC-3. By revising the form to a more user-friendly document addressing all elements, we improved compliance rates.

The second key driver was the need for a multidisciplinary, mass education program that captured all physicians and residents who care for pediatric unit patients. The task was accomplished through a multitiered program targeting each audience during an appropriate venue. This effort, along with the revised HMPC form, improved compliance to 83%. The education process was sustained annually at the same venues. We believe this education effort was more successful than the original pediatric staff education because it targeted a broader audience to ensure that all potential providers were given the information and included continuous education for new providers plus annual boosters.

After education efforts were completed, physicians and residents whose patients fell out of compliance were sent a letter detailing CAC-3 and the HMPC form. Five letters were sent; however, only 1 physician received >1 letter. This finding suggests letters may be a useful follow-up tool for those who fail to comply.

The third key driver was the need for multiple documentation of the same information. This led to the creation of an electronic HMPC form in which elements could be populated by other areas of documentation, such as the discharge medication reconciliation form. Tying these forms together achieved 100% compliance with the CAC-3 measure. The process eliminated daily proactive rounding by the core team to determine if the paper forms were completed accurately.

Relation to Other Evidence
Since initiation of CAC in 2008, hospitals fared well regarding compliance with CAC-1 and CAC-2 but have struggled to achieve a high rate of compliance with CAC-3, although the rates are increasing. Pediatric hospitals averaged 40.6% compliance for the first 3 quarters of 2008, although this improved to 72.9% in the last 3 quarters of 2010. As of May 2010, the US Department of Health and Human Services Hospital Compare Web site posted a benchmark of 65% compliance with this measure. Our facility took the challenge to achieve the 90% benchmark set forth by HCA and have implemented processes to meet this goal.

With the rise in EHR implementation, studies have looked at the benefit of EHR as a means to improve documentation and adherence to treatment guidelines. A prospective cluster randomized trial in 12 ambulatory care sites revealed having a clinical decision support and toolkit within the EHR increased the number of controller medication prescriptions dispensed and asthma care plans on file.

Another study revealed that using electronic asthma action plans improved documentation and significantly increased patients discharged from the emergency department with an asthma action plan. It did not, however, look at compliance with CAC-3.

Since completion of our project, 1 article has been identified that discussed methods to sustain compliance with CAC. By developing and implementing an electronic asthma-specific “reminder and decision support” system, researchers improved compliance with CAC-3 above the national average. Although our institution does not have full EHR, we recognized the importance of electronic documentation and the ability to adhere to guidelines and sustain compliance with core measures by using EHR. Therefore, with extensive multidisciplinary involvement, we developed an electronic form that could be generated within the current infrastructure. The combination of the HMPC with the discharge medication reconciliation form ensured HMPC completion, limited the need for multiple areas of documentation, and reduced paper chart documentation.

Limitations
Limitations include: (1) our unique infrastructure; (2) difficulty attributing change to specific interventions because there is no true “baseline”; and (3) changes in residents and staffing that may have influenced results. However, our processes may
still be useful to other institutions, especially those slow to transition to EHR, if they have the ability to link the HMPC with the discharge medication reconciliation.

We did not include readmission rates or postdischarge emergency department visits in this study to determine if meeting the core measure had an effect. A study among children’s hospitals revealed no statistical difference with regard to readmission rates and postdischarge emergency department utilization based on CAC compliance rates.\textsuperscript{15} In addition, studies have found mixed results regarding the usefulness of the HMPC for families.\textsuperscript{17,18} Future studies need to determine the efficacy of meeting the core measure and its impact on follow-up compliance with the primary care physician.

CONCLUSIONS

Our process improvements demonstrated that a community hospital can achieve high compliance rates with CAC-3. We attributed our success to commitment from key players within the hospital and linkage of the HMPC with the discharge medication reconciliation form. We sustained 100% compliance with the discharge medication reconciliation form and anticipated the same with CAC-3. Although the national average has been improving, our compliance is above the national average, and we believe other sites can benefit from this knowledge.

ACKNOWLEDGMENTS

We thank M. Michele Mariscalco, MD, Kristina Froese, RN, Leasha Hughes RN, MSN, JoAnn Paul, RN, MSN, and Sandra Bartley, RN, MS, for their contributions to this project and manuscript.

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Hospital Pediatrics 2013;3;45
DOI: 10.1542/hpeds.2012-0015

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