Leveraging an Electronic Medical Record to Improve Compliance with Pediatric Asthma Care Documentation

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Abstract: Asthma is our institution's third most common admitting diagnosis with 653 admissions in 2011. The Joint Commission monitors core measures of pediatric asthma care during hospitalization: (1) were relievers given (2) were systemic corticosteroids given and (3) was the patient discharged with a complete asthma action plan (AAP). We describe the sue of three standard quality improvement (QIP) cycles to improve compliance using a computerized AAP. Our historical compliance using paper documentation averaged 32%. In Phase 1, we replaced the paper AAP form with an electronic version within our Electronic Medical Record (EMR) and improved our average compliance to 45%. In Phase 2, we identified barriers to additional improvement and modified the electronic form with soft stops and visual reminders. These modifications improved our compliance to 70%. In Phase 3, we identified remaining barriers, modified the form to include automated decision support and defaulting and improved our compliance to 90%. Using this phased QIP, we were able to achieve significant improvement in overall compliance with the core measure of providing an accurate and complete asthma action plan at the time of hospital discharge. With additional QIP cycles, we believe achievement of 100% documentation compliance for this core measure is possible.

1 INTRODUCTION

The Electronic Medical Record (EMR) provides a number of advantages over the paper record which include: 1) access to the patient record by multiple providers at multiple locations simultaneously; 2) elimination of transcription errors when using computerized order entry (COE) and other automated entry; 4) automation of tasks; 5) automation of calculations; 6) automatic dose checking; 7) automatic allergy and drug interaction checking; and 8) automatic alerting to providers for safety, compliance and best practice issues (Chaudhry, 2006).

Since asthma is a common reason for admission to hospital, the Joint Commission monitors three core measures of pediatric asthma care to assess quality of care during a hospital stay. These measures are: (1) were relievers given, (2) were systemic corticosteroids given, and (3) was the patient discharged with an accurate and complete asthma action plan (AAP). We took take advantage of several of these features of the EMR and created and electronic version of our Asthma Action Plan (core measure 3). The plan would be available in multiple sites, viewable by multiple people simultaneously, and editable by only one provider at a time. This paper describes the effect on core measure 3 compliance created by the transition from a paper asthma action plan to one created by our EMR using a standard quality improvement cycle (Lodgaard and Aasland, 2011).

2 METHODS

2.1 Joint Commission Asthma Core Measure 3

The Joint Commission core measure requires that a home management plan of care (Asthma Action Plan) document be given to patient/caregiver upon discharge from the hospital. It is measured by an audit on all patients admitted to the hospital with the discharge diagnosis of asthma. The audit evaluates whether a complete action plan was present in the chart and a copy was given to the patient/caregiver. The presence of an asthma action plan does not necessarily reduce re-admissions, but it is evidence of patient/family education (Morse, 2011).

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2.2 Population

Our population consisted of all patients, age 2 through 17 years discharged to home from Nationwide Children's Hospital (NCH) with the diagnosis of asthma. Excluded population – none.

2.3 Compliance Determination and Calculation

Compliance was determined by examining the patient chart for evidence of an asthma action plan. To be compliant the following items must be complete: 1) the form must be present in the medical record; 1) the form must be specific for each patient; 4) the form must be specific for each admission; 5) the form must be a stand-alone document; and 6) there need to be documentation that the form was given to the patient/family at discharge. In addition, the following items must be contained in the action plan: 1) asthma type and triggers; 2) reliever and controller medications including drug name, dose, frequency, and route; 3) follow-up medical contact name and phone number; and 4) follow-up information with the date and time of appointment (or time frame). All elements must be present for the plan to be considered compliant. There is no partial credit. Compliance was measured quarterly.

2.4 Evaluation of Electronic Version

We used the Plan-Do-Check-Act (PDCA) (Fig.1) Quality Improvement tool to evaluate and enhance the form. The process has uses four sequential procedures that build one upon the other. The first procedure is Plan - where an opportunity to improve is identified and plan a change is created. The second procedure is Do – the implementation phase of the process. The third procedure is Check – the analytical phase where the implementation is analysed and lessons about the implementation are learned. The fourth procedure is ACT – which produces a response to what was learned in the check procedure. Our study applied this process to the problem of Asthma Action Compliance and utilized three iterations of the process. (Gabor, 1990)

2.5 Iteration 1

Plan – Identified the barriers to compliance with the paper asthma action plan form and determined the requirements of the electronic version of the form. Do – Designed the electronic version of the form, educated our users, and implemented it in our EMR. Check – After several quarters of use, compliance was re-evaluated and users were queried concerning the usefulness of the electronic form and barriers to completion. Act – Determined what modifications were necessary to address these barriers to full compliance.

Figure 1: The Plan Do Check Act Cycle.

2.6 Iteration 2

Plan – Designed modifications to form in an effort to further improve compliance. Do – Implemented the modified form in our EMR and further educated the users. Check – After several quarters of use, compliance was re-evaluated and the users were queried concerning the usefulness of the electronic form and barriers to completion. Act – Determined what modifications were necessary to address these barriers to full compliance.

2.7 Iteration 3

Plan – Designed modifications to form in an effort to further improve compliance. Do – Implemented the modified form in our EMR and further educated the users. Check – After several quarters of use, compliance was re-evaluated and the users were queried concerning the usefulness of the electronic form and barriers to completion. Act – Determined what modifications were necessary to address these barriers to full compliance.

2.8 EMR Software and Toolkit

Our EMR software is EpicCare Inpatient/EpicCare Ambulatory supplied by Epic Systems Inc. (Verona, WI). Our medical informatics team created the Asthma Action Plan using a built-in form designer that allowed for What-You-See-Is-What-You-Get (WYSIWYG) design and discrete data storage for reporting and clinical decision support. The features

of the form that we needed for success was: 1) fully compliant with Joint Commission standards; 2) easy to create, edit, and maintain; 3) easy to read, full-color, and a single page; 4) easy for anyone to view and print; 5) easy to access reference materials; 6) easy to access home medication lists; and 7) easy to access a complete audit trail of the form

3 RESULTS

Our compliance data is shown in figure 2 and Table 1. Our highest baseline compliance using the paper asthma action plan was 32%. The electronic asthma action plan contained pick lists and check boxes for much of the data entry. It also contained hyperlinks to NIH asthma guidelines and a link to display the patient's current medication list present in the EMR. After the electronic asthma action plan was implemented, our compliance increased to 45%. Upon reviewing the compliance data, we noted continued deficiencies in the following required documentation fields: 1) asthma type, 2) asthma triggers, 3) the name and phone number of the patient's primary care physician when that provider

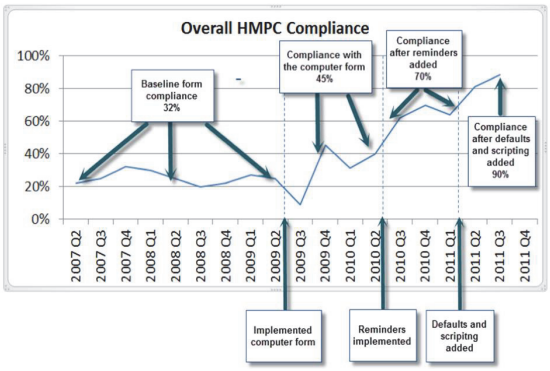

Figure 2: Compliance Over Time.

was not present within our existing database, and 4) the specific date and time (or time frame) of discharge follow-up. We added visible recommendation flags to the areas of the form where these items are entered. Users were educated and the revised form was implemented. Compliance following these changes increased from 45% to 70% with these modifications. Our compliance data is shown in figure 2.

After evaluating the compliance data following the second iteration and receiving input from the users, we identified additional barriers to compliance. This included continued poor documentation of inpatient

Table 1: Compliance changes through 3 cycles.

	Compliance
Pre QI	32%
After Iteration 1	45%
After Iteration 2	70%
After Iteration 3	90%

follow up information, placing inpatient follow up information in the outpatient forms, and complaints by users about repetitive actions. To address these issues, we enabled functionality with the form to default a standard post-discharge follow up time frame if not specified, to hide the inpatient follow up section of the form entirely when accessed from an outpatient encounter, and created quick macro buttons to populate common combinations of medication therapies for user convenience. Following the introduction of these changes, compliance rose again from 70% to 90%.

4 DISCUSSION

Based on our experience, transitioning to an electronic asthma action plan provides for functionality and access that improves overall compliance. However, merely the implementation of an electronic equivalent of the paper form within our EMR was not sufficient to substantially improve compliance. According to the users, the electronic form was somewhat easier to use than the paper version and was more readily available, but still suffered limitations and barriers to regular completion. It was easier to use because it contained pick lists for rapid documentation of items such has asthma type, asthma triggers, and medications including dose, route and frequency. It also contained useful links including one to the NIH guideless for asthma care and one to the patient's current medication list. However, these features only increased overall compliance by 13%.

Part of the PDCA cycle is to Check (evaluate what happened). Along with our audit, we discussed with the users what they found helpful with the electronic version and what improvements they would fine useful. With this feedback, we added additional functionality in the form of visual indicators to direct the user's attention to items often overlooked. The reminders did improve the compliance by 20%. However, we still were only getting the forms fully completed 70% of the time as indicated by our audit following the introduction of this additional functionality.

Using additional audits and further discussions with the users, we were able to identify items on the form that were still not being documented consistently and identified the remaining barriers to their completion. With this information, we added additional functionality in the form of automated decision support and content defaulting, which would add information automatically to selected fields if the user did not address them specifically. For example, the form was programmed to recognize when it was being accessed within an outpatient encounter and automatically hid the inpatient follow up section in that situation. Making the form function appropriately depending on whether patient encounter was in an inpatient or an outpatient setting decreased user frustration in having to ignore a section that was not relevant in that context. In addition, the form was programmed to default a standard inpatient post-discharge follow-up time interval of three days if the user failed to specify a specific date and time for the appointment. We also added quick macro buttons for users to quickly populate standard medication details, such as the standard treatment for exercised-induced asthma, with a single click. These eliminated errors introduced by manual entry and made the form easier and faster to complete, thus greatly improving user satisfaction and ultimately compliance.

We found success by using a combination of the PDCA quality improvement tool, by having the form developed primarily by clinicians within our medical informatics group to avoid the iterative steps necessary when users work directly with non-clinical analysts, and by involving our users in the 'Check' phase of the cycle. Also, repeating the PDCA cycle multiple times allowed us to refine the form rapidly so that it better met the users' needs and our ultimate goal of compliance. We are currently in our fourth PDCA cycle and are addressing the following issues: 1) additional programming to check for missing data; 2) real time reminders to update asthma action plan while discharging the patient; and 3) linking the printing of the patient's discharge instructions with the printing of the patient's updated asthma action plan.

In summary, by transitioning our paper asthma action plan to a computerized version and by using repeated cycles of the PDCA tool, were able to improve documentation compliance from 32% to 90%.

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