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Inhaled Corticosteroid Prescribing in a Pediatric Emergency Department: Sustained Success and Prescription Filling Rates

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Abstract

Objective—To determine if ICS prescribing in the pediatric emergency department (PED) can be sustained after transition from intense intervention to low intervention phase, and to determine ICS fill rates.

Methods—A QI project began in Aug 2012. Results through Feb 2014 were previously published. In Feb 2014 interventions were scaled back to determine the sustainability of QI success. Eligible patients included children age 2–17 seen in the PED for asthma between Feb 2014– Sept 2016. The primary change when moving to the low intervention phase was stopping monthly attending feedback. The primary outcome was the proportion of patients who were prescribed an ICS at time of PED discharge. The secondary objective of this study was to determine the proportion of patients who filled their ICS prescription in the 6 months following ED visit.

Results—The ICS prescribing goal was 75%. After transition to the low intervention phase, the ICS prescribing rate was maintained at a median of 79% through Sept 2016. ICS fill rate in the first 30 days following ED visit was 89%, although this quickly fell to below 40% for months 2–6.

Conclusions—ICS prescribing stayed above the goal over a 2.5-year period after transition to a low intervention phase. High ICS fill rates immediately after ED visit have been demonstrated. However, rapid decline in these rates over subsequent months suggests a need for future efforts to focus on long term ICS adherence among children with ED visits for asthma.

Keywords

quality improvement; medication adherence; ED aftercare compliance; controller medications; preventive care

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Introduction

Asthma is a common chronic condition among children and Emergency Department (ED) visits remain high.(1) Inhaled corticosteroids (ICS), the first-line recommended controller medication for persistent asthma, are effective at reducing ED visits and hospitalizations, reducing asthma symptoms and improving asthma related quality of life.(2–5) Despite this, these medications continue to be underutilized even among children with recent ED visit or hospitalization for asthma.(6, 7) This is due, at least in part, to low outpatient follow-up rates after ED visits or hospitalizations for asthma.(6–10) One strategy to improve rates of ICS adherence among children with an ED visit for asthma is to prescribe ICS at the time of ED discharge. We have previously demonstrated the cost-effectiveness of this novel approach to preventive care delivery in the acute care setting.(11)

In 2014 we published the results of our successful Quality Improvement (QI) initiative to increase the rate of ICS prescribing in our Pediatric ED (PED).(12) We increased ICS prescribing rates from a baseline median of 11% to a median of 79%. At the time of publication, we had sustained this rate for 8 consecutive months. Primary interventions during this initial study period were focused on education, monthly directed provider feedback to PED attending physicians and residents and Electronic Medical Record (EMR) tool development to prompt ICS prescribing. One limitation of our initial study is that we were not able to determine prescription fill rates. Previous research has demonstrated low rates of prescription filling after PED visits.(13–15) This knowledge led to local skepticism regarding our QI project's impact on meds-in-hand rates.

The primary objective of this study is to determine the sustainability of a QI project to maintain ICS prescribing in a PED setting after a transition to a low intensity intervention phase. Our goal ICS prescribing rate remained 75%. The secondary objective is to determine ICS prescription fill rates over the subsequent 6-month time period. We hypothesized that prescription filling rates, even in the first 30 days after ED visit, would be low (<65%), consistent with previously reported rates.(13–15)

Methods

Setting

The Medical University of South Carolina (MUSC) Children's Hospital is a tertiary care pediatric academic medical center with 186 inpatient beds and approximately 25,000 PED visits per year. There are 17 PED attending providers including physicians with board certification in Pediatrics, Pediatric Emergency Medicine, or Emergency Medicine, as well as three Pediatric Nurse Practitioners. There are three Pediatric Emergency Medicine fellows as well. The MUSC residency program has 49 pediatric residents and 8 medicine/pediatrics residents. In addition, Emergency Medicine, Family Medicine, and Anesthesia residents rotate through the PED on a monthly basis. The majority of patients treated in the PED are seen by a resident physician and an attending physician. The resident typically presents a treatment plan to the attending who then approves or modifies the plan to arrive at the final plan. There is opportunity for either the resident or attending physician to suggest ICS prescribing.

Data Collection

QI Sustainability—As detailed in our previously published paper, we utilized a Microsoft Access database of potential ICS eligible patients in real time (based on age and presenting complaint). From this list we excluded those who were less than 2 years of age, admitted to the hospital and those whose physician-assigned discharge diagnosis did not include either the term “asthma” or “reactive airway disease”. Charts were then reviewed manually for eligibility. Patients were considered eligible for an ICS if they were 2–17 years of age, received both a short-acting beta agonist treatment and systemic steroids during the ED visit and did not report ICS as a home medication. All eligible charts were reviewed monthly to determine ICS prescribing rates. The primary person responsible for chart review is a pediatric emergency medicine attending (JB). Her findings were emailed to the entire study team monthly. Subsequently, one of the pediatric residents (SA or MA) on the study team reviewed all charts noted to be failures by JB. If the secondary review contradicted the findings of the first review, the entire study team reviewed the chart to come to consensus regarding success or failure. Rates of ICS prescribing were recorded monthly on a run chart.

Claims Analysis—To determine ICS prescription filling rates, we collaborated with Select Health of South Carolina, our largest local Medicaid MCO. We made the decision to track filling rates in this subset of patients a priori because we knew we would have ready access to these claims data. We were able to track ICS filling on a monthly basis for 6 months after our ED-based intervention. Month-by-month filling data were compared between those prescribed ICS in the PED and those not prescribed ICS in the PED.

Interventions

QI Sustainability—Initial project interventions were developed and implemented with guidance from our key driver diagram and centered around education, monthly directed attending (through presentation and discussion of run chart results and kudos to prescribers at monthly division staff meetings) and resident (through monthly emails with run chart results, kudos to prescribers, and project description to incoming rotating residents) level feedback and the development of an EMR discharge order set that contained an ICS prescribing prompt.⁽¹²⁾ The primary change in the transition from high intensity intervention to low intensity intervention phase of the study was to stop monthly directed provider feedback to PED attending physicians. This change began in February 2014. Less intensive interventions were continued during the low intensity intervention phase. We have presented project updates informally at the PED faculty/staff division meeting three times, in Jan 2015, Aug 2015 and Mar 2016. We continued monthly contact via email to all residents who were scheduled to rotate through the PED in the upcoming month. This email contained a brief description of our project, our goal of 75% ICS prescribing for eligible patients and instructions on how to use the EMR discharge order set that includes a prompt to prescribe ICS. Additionally, during this low intensity intervention phase of the project a more detailed email was sent to all new interns in July of each year, introducing our project. We also continued monthly emails to the entire residency program giving “kudos” to successful prescribers from the previous month. We did not provide negative feedback to residents who failed to prescribe. We briefly experimented with directed negative feedback to providers who failed to prescribe, but this was not well-received and thus was stopped. The EMR

prompt (discharge order set) was still available for use during this low intensity intervention phase, however uptake of tool continues to be inconsistent. (Table 1)

Claims Analysis—We did not target any specific interventions to address prescription filling. We are not able to dispense ICS in the PED at the time of discharge and our hospital-based retail pharmacy is open Mon–Fri during regular business hours. The PED provides a list of local 24 hour pharmacies to patients who are discharged after hours or on the weekends. The prescribing of ICS was not accompanied by official asthma education as delivered in our inpatient units and patients inconsistently receive an asthma action plan. Asthma education, particularly that addressing medication management, is delivered by a combination of the bedside nurse, respiratory therapist, resident and attending physician. At this time PED asthma education is not standardized.

Statistical Analysis

QI Sustainability—The primary outcome was the proportion of eligible patients treated in and discharged home from the PED with an acute asthma exacerbation who were prescribed an ICS at the time of discharge. Every month the study team confers on the potential failures identified through initial chart review. To inform this decision, a secondary, more in-depth, chart review is conducted. If it is determined that there is documentation of a recommendation to start an ICS but the parent defers, wanting to speak with their PCP prior to initiation, the study team often considers these encounters to be successes rather than failures. Our team must reach consensus for this determination. A run chart with monthly prescribing rates was used to measure the effect of our interventions over time. Simple analysis of the run chart allowed us to assess for non-random patterns of improvement.(16)

Claims Analysis—The secondary outcome was the monthly proportion of ICS-eligible patients who filled their ICS script, among the subset of patients for whom we had access to claims data. We recorded filling for each 30-day period subsequent to the ED visit for 6 months.

The Medical University of South Carolina Institutional Review Board approved this study. Informed consent was waived.

Results

QI Sustainability

After achieving an ICS prescribing median of 79% through several Plan-Do-Study-Act (PDSA) cycles during the initial high intensity intervention phase of this QI project we were able to maintain goal-prescribing rates after transition to a low intensity intervention phase. Through continued chart review we determined that our ICS prescribing median over a period of 2.5 years remained at 79%, above our study goal of 75%. We did experience quite a bit of variation in ICS prescribing rates from July 2014–Jan 2015 but no significant trends were noted that would necessitate recalculating the median.(16) Interestingly, this time period correlates precisely with the Enterovirus –D68 outbreak that was associated with severe respiratory illness including wheezing children.(17) This likely affected prescribing

rates during that time. Less month to month variation is noted from Feb 2015 to current. Stopping monthly directed attending-level feedback has not resulted in a drop in ICS prescribing median. (Figure 1)

Claims Analysis

We subsequently examined ICS claims rates for the subset of our patients enrolled in Select Health of South Carolina, a Medicaid Managed Care Organization. We reviewed 598 visits over a 16-month period. Among these, there were 100 unique, ICS-eligible Select Health funded patients with an ED visit for asthma. (Figure 2) Of the 100 patients, 88 were prescribed ICS and 12 were not. This is consistent with our overall prescribing median of 79%. 89% of those who were prescribed an ICS in the PED had an ICS claim within 30 days of the PED visit. These rates quickly fell over the subsequent months. (Table 2)

Discussion

QI Sustainability

After successfully increasing our ICS prescribing median through numerous PDSA cycles, we have shown that it is possible to sustain these results even after transition to a low intervention phase. Through the continued use of resident-level monthly interventions, our PED has maintained a prescribing median of 79% over a 2.5-year period. This suggests that our residents play a crucial role in prescribing ICS in our PED setting. Additionally, our sustained rates suggest that our local PED providers are willing and able to provide preventive care, in contrast to recent national sentiment in which PED physicians describe prescribing long-term medications as being outside their role.(18, 19) This represents a significant culture shift. In our last publication, we suspected that a key intervention in improving our prescribing rates was attending level directed provider feedback as well as monthly run chart distribution to our PED attending physicians.¹² Our ability to sustain these rates without these intense interventions suggests that ICS prescribing can become a standard of care and could successfully be implemented in other PEDs. Maintaining a high ICS prescribing rate in the PED allows for patients to have better adherence to evidence based guideline recommended medications and is supported by primary care providers, many of whom will continue ICS treatment initiated by PED physicians.(20)

Claims Analysis

We were able to analyze ICS claim rates for a subset of patients funded by a local Medicaid Managed Care Organization. Over a 16-month period the ICS fill rate within 30 days of ED visit was 89% among those who received a prescription in the PED. This is higher than or consistent with previously published rates reporting overall ED aftercare compliance.(13–15) It is unclear why our fill rates are as high as they are. We do not have a hospital-based 24-hour pharmacy available to our patients. We suspect that our high fill rates may be due, in part, to the fact that these patients received their prescriptions during a high acuity episode of an asthma exacerbation and this medicine was explained as a way to prevent future exacerbations. In other words, perhaps we are successfully capitalizing on this “teachable moment”. Additionally, our emphasis is to prescribe the ICS medication preferred by the patients’ insurance plan, thus minimizing or eliminating the need for pre-authorization.

Patients insured by Medicaid do not experience any out-of-pocket costs when filling prescriptions, so it is possible that if we were able to include commercially insured patients in our claim rate analysis, the overall rate would be lower due to the often high out-of-pocket costs incurred by these families.(21) Interestingly, the 12 patients who did not receive an ICS script at the time of ED discharge also had a high rate of ICS claims within 30 days of ED visit (92%). The similarly high rate of ICS claims amongst patients who did not receive prescriptions for ICS in the PED is likely due to a multitude of factors. It is possible that the ICS-messaging patients receive is similarly effective regardless of ultimate decision to prescribe. Anecdotally, a substantial proportion of our prescribing “failures” are due to parent’s preference to discuss with primary care provider (PCP). Simply discussing controller medications in the PED may provide additional motivation for families to follow-up with their PCP and discuss the initiation of an ICS. One might argue that because the rates are so similar between the two groups, our intervention is not making a difference. We feel this is unlikely given our previous studies that have shown much lower rates of ICS claims after ED visits and hospitalizations for asthma.(6, 7)

The significant reduction in the proportion of patients with an ICS claim after the initial 30-day period is interesting and leads to potential areas of future intervention. Perhaps it is time to encourage PED providers to include several months of refills on their ICS prescriptions. Some PED providers may be hesitant to do so because they worry it will discourage PCP involvement in asthma management. Future survey research or qualitative inquiry could provide more insight into provider’s beliefs regarding including refills on PED-initiated prescriptions as well as inform our understanding of refill behavior from the parents’ perspective. It is not our wish to replace the role of the PCP as the medical home through these interventions, however we feel that we must do everything we can to improve preventive care delivery to this high risk group of children with asthma.

There are certain limitations faced in this study. The patient population included in the pharmacy claims analysis includes only a subset of our patients. We have not measured ICS fill rates in our commercially insured patients and would hypothesize that their co-pay/co-insurance/deductible may serve as a barrier to them being able to fill their prescription. We are not able to attribute patient filling behavior to our QI interventions. Future patient-targeted interventions may help to sustain high filling rates and potentially improve controller medication adherence beyond the first month after ED visit. Additionally, not all patients seen in the PED, even those deemed eligible by our study criteria, necessarily qualify for an ICS prescription given that there are many who present with a first time episode of wheezing, or their episode of wheezing may be viral-induced. Our ICS prescription goal rate of 75% is in place to allow our PED physicians room for clinical judgment in these situations. In order to combat physician hesitancy to prescribe ICS for viral-induced wheezing and for intermittent asthmatics, we continue to exclude patients younger than 2 years of age and those that do not receive a systemic steroid. For the rare patient whose parent wishes to defer the ICS decision to the PCP, we often consider this encounter a success if the discussion is documented. This may artificially inflate our success rate but we require full team consensus to deem these as successes and this only affects about 1–3 patients per month. Further, the EMR discharge order set intervention has had variable rates of adoption, and this is difficult to measure. Therefore, we are unable to

determine how big of an effect this tool may have had on our outcomes. Finally, any number of unmeasurable external factors could have contributed to our sustained success through the low-intervention phase of this project. To our knowledge, there were not any external provider educational experiences that could have influenced our results in a meaningful way. Our attending pool was relatively stable over this study period, which may have contributed to our ability to sustain success during the low-intensity intervention phase.

Future Directions

Future directions include finding ways to utilize our EMR as a means to standardize care for patients seen for an acute asthma exacerbation, including a more streamlined way to prompt the physician to prescribe an ICS at time of discharge. Our ultimate goal is to stop monthly resident-level interventions, and only provide annual education to new residents. Furthermore, we would like to analyze ICS claims for our patients enrolled in commercial insurance that likely incur out-of-pocket payments for prescriptions. We hope to work towards dispensing an ICS from the PED at the time of discharge to allow for 100% of children with asthma leaving the PED with meds-in-hand. Additionally, we hope to explore ways to measure and improve primary care provider follow up after a PED visit for an acute asthma exacerbation. This is an important step to allow appropriate transfer of care and ensure patients are monitored for response to the ICS and continued on appropriate controller medications beyond the initial month.

Conclusion

After improving our ICS prescribing rates for children with asthma in our PED using PDSA cycles, we have successfully sustained these high prescribing rates for 2.5 years after transition to a low intensity intervention phase, most notably stopping monthly feedback to attendings. Additionally, we have demonstrated high ICS fill rates of prescriptions obtained at time of PED discharge, further supporting the notion that a PED visit for an acute asthma exacerbation is an excellent opportunity to improve preventive care delivery for patients with persistent asthma.

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Abbreviations

ED	Emergency Department
ICS	Inhaled Corticosteroids
PED	Pediatric Emergency Department
QI	Quality Improvement

EMR	Electronic Medical Record
MUSC	Medical University of South Carolina

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Figure 1.
Annotated Run Chart Depicting Inhaled Corticosteroid Prescribing Rates

Figure 2.
Flow Chart Depicting Arrival at Cohort for Pharmacy Claims Analysis

Table 1

Inhaled Corticosteroid Monthly Claim Rates by ICS Prescribing

Days after PED visit	ICS claims among those with ICS Prescribed in the PED n=88	ICS claims among those with ICS not Prescribed in the PED n=12	p-value ^a
30 days	78 (89%)	10 (92%)	1.0
31–60 days	30 (34%)	4 (33%)	1.0
61–90 days	26 (30%)	2 (17%)	0.5
91–120 days	31 (35%)	3 (25%)	0.7
121–150 days	24 (27%)	3 (25%)	1.0
151–180 days	27 (31%)	7 (58%)	.06

^aFisher's Exact p-value reported for those comparisons with cell frequencies of <5, Chi-square p-value reported for those comparisons with all cell frequencies ≥ 5

Table 2

Inhaled Corticosteroid Monthly Claim Rates by ICS Prescribing

Days after PED visit	ICS claims among those with ICS Prescribed in the PED n=88
30 days	78 (89%)
31–60 days	30 (34%)
61–90 days	26 (30%)
91–120 days	31 (35%)
121–150 days	24 (27%)
151–180 days	27 (31%)