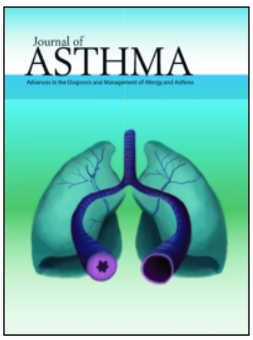

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Utilization of a patient-centered asthma passport tool in a subspecialty clinic

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ABSTRACT

Introduction: Despite available and effective tools for asthma self-assessment (Asthma Control Test, ACT) and self-management (Asthma Action Plan, AAP), they are underutilized in outpatient specialty clinics. We evaluated the impact of a patient-centered checklist, the Asthma Passport, on improving ACT and AAP utilization in clinic. *Methods*: This was a randomized, interventional quality-improvement project in which the Asthma Passport was distributed to 120 pediatric asthma patients over the duration of 16 weeks. The passport's checklist consisted of tasks to be completed by the patient/family, including completion of the ACT and AAP. We compared rates of completion of the ACT and AAP for those who received the passport versus the control group, and assessed patient/caregiver and provider satisfaction. *Results*: Based on electronic medical record data from 222 participants, the ACT completion rate was not significantly different between the passport and control groups, however, the AAP completion rate was significantly greater than control (30.0% vs. 17.7%, $p = 0.04$). When per-protocol analysis was limited to groups who completed and returned their passports, ACT and AAP completion rates were significantly greater than control (73.8% vs. 44.1% ($p = 0.002$) and 35.7% vs. 17.7% ($p = 0.04$), respectively). Nearly all participants reported high satisfaction with care, and surveyed providers viewed the passport favorably. *Conclusions*: A patient-centered checklist significantly improved the completion rate of the AAP. For patient's who completed and returned the asthma passport, the ACT completion rate was also improved. Participants and providers reported high satisfaction with the checklist, suggesting that it can effectively promote asthma self-management and self-assessment without burdening clinicians or clinic workflow.

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Introduction

Asthma is the most common chronic disease of childhood, affecting an estimated 7.1 million children in the United States. 14.2 million physician office visits were reported for asthma care in the US in 2010 [1], and asthma care costs approximately $3,300 per asthmatic per year [2]. Asthma "self-management" refers to the patient's and family's understanding of their disease, recognizing the triggers for exacerbations, knowing their medications, proper administration, identifying when they need additional therapies, and which ones to start. Supporting asthma self-management is central to the quality of asthma care and has the potential to reduce asthma morbidity and decrease costs associated with pediatric asthma [3]. Asthma self-management is a fundamental component of asthma control and is emphasized as important and necessary in national asthma guidelines [4].

The Asthma Control Test (ACT) and Asthma Action Plan (AAP) are standardized self-assessment and self-management tools, respectively, to help patients identify their degree of asthma control and assist in medication choices. The ACT is used to periodically assess asthma control by meauring impairment to determine if the goals of therapy are being achieved. Evidence suggests that higher ACT scores may be associated with lower health-care utilization and higher health-related quality of life [5]. The additive benefit of assessing asthma by the ACT at pulmonary subspecialty clinic encounters is debatable since the test was validated on expert assessment [6], however, low scores are indicative of risk of future exacerbations [7]. From a population health perspective it can be a useful screen for high-risk asthma patients. In fact, in our clinical practice, patients with low ACT scores at their clinic visit are re-contacted by a pulmonary nurse 2–4 weeks following the visit to ensure improvement in their condition or to offer further support. The AAP is an integral part of self-management and is particularly recommended for patients with moderate or severe asthma [4]. Receipt of an AAP has been linked

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to patient satisfaction with their asthma management [8], as well as their relationship with their physician [9].

The partnership between a patient, caregiver, and provider has long been recognized as a key element in effective asthma management programs [10]. Many studies have noted the important association between adherence to treatment and the quality of patient and caregiver communication with providers [11]. A positive collaboration can result in effective use of tools such as the ACT and AAP to improve a patient's self-management.

Despite the widespread availability of these asthma assessment and management tools, they are frequently underutilized in the outpatient clinic setting. Studies have found that the National Asthma Education and Prevention Program (NAEPP) recommendation that all children with asthma receive a written action plan was only followed by providers anywhere between 9% and 50% of the time [12,13]. Administration of the ACT and production of the AAP are frequently subverted by the time it takes to complete these tasks and may be omitted due to competing provider and patient priorities or other activities for the asthma visit, such as pulmonary function tests. In our clinical practice, the process for ACT has been as follows: patients and their caregivers receive a paper version of the age-appropriate ACT along with other clinic paperwork at the initial check-in for the visit. The front desk staff instructs the patient/caregiver to complete the form while waiting for the provider. Nursing staff subsequently collects the forms from providers at the completion of the visit and enters the data into the electronic medical record (EMR). The AAP is produced by the provider in the EMR, printed and reviewed with the patient. Completion rates for the ACT and AAP have been exceedingly low. Based on clinician feedback, we know that a large part of the poor completion rates were due to burdens on the treating clinician to encourage completion of the ACT, to assure that the paper copy got to the nurse for entry, and to generate the AAP at the end of the visit. Therefore, we further hypothesized that a patient-centered approach to completing the ACT and prompt to receive an AAP would improve the completion of these tasks without disrupting the flow of clinic.

In this context, we studied the implementation of a patient-centered checklist-based Asthma Passport to help patients navigate through an asthma clinic visit, specifically to improve the completion of the ACT and AAP at each visit. Additionally, the Asthma Passport was designed to highlight other important clinic visit tasks, such as reviewing medication administration technique and ensuring refills are prescribed. The primary aims were to improve utilization of the ACT and AAP by facilitating a more effective collaboration of asthma care at the clinic visit.

Methods

Study design

This quality improvement (QI) project was conducted as a randomized, stepped wedge design intervention in a single-specialty clinic for asthma patients over the duration of 16 weeks. The step-wedge study design is a form of randomized controlled crossover trial frequently used in quality initiative projects that involves sequential roll-out of an intervention over multiple time periods, with the crossover being in the direction of control → intervention. Six half-day clinic sessions that occurred weekly were included as the unit of study. Clinic sessions were randomly assigned to begin intervention based on the date and time of the recurring clinic session (e.g. Tuesday morning session was assigned to cross over from control to intervention at week 5), regardless of the providers attending the sessions. Initially, all of the clinic sessions were treated as control group and sequentially, one clinic session at a time was introduced into the intervention group at 2-week intervals until all of the clinic sessions transitioned from a control group to an intervention group. Figure 1 for a schematic representation of the study design.

Intervention

We created the Asthma Passport booklet (Supplement Figure 1) with 5 checklist-style items intended to be applicable for use in any asthma clinic. The Asthma Passport booklet was composed of nine pages (including front and back cover) which included simple instructions on the inside cover followed by five checklist-style tasks to be completed throughout the duration of the

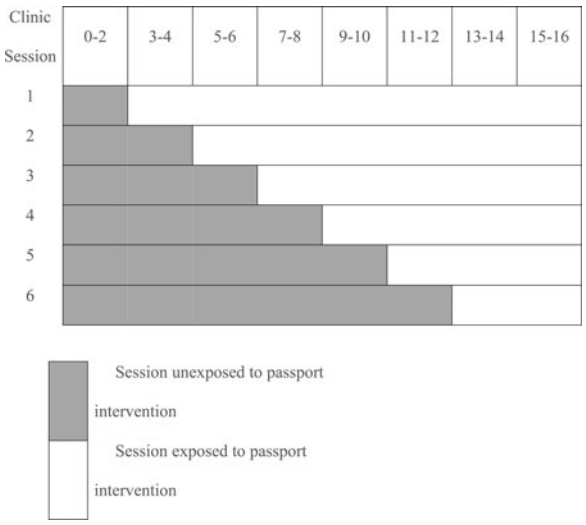

Figure 1. Schematic of asthma passport intervention by step-wedge design.

clinic visit. The tasks were as follows: "Completed an Asthma Control Test (ACT)," "Reviewed Medications and Proper Administration," "Received an Asthma Action Plan (AAP)," "Received medication refills, if needed," and "Asked Questions." Each task represented an important aspect of asthma care. The passport was translated into Spanish and was made available for Spanish-speaking patients upon request.

The intervention consisted of the Asthma Passport booklet given to caregivers at check-in by the front desk staff during their regularly scheduled clinic visit. Caregivers were encouraged to check a box for each task upon completion. Caregivers were instructed to return the passport to the clinic staff at the conclusion of the clinic visit. Additionally, caregivers from both the control group and intervention group were provided an end-of-visit satisfaction survey that captured the overall impression of the care they received during the visit and their asthma care in general.

Implementation

The intervention was designed to enhance tasks already intended to be performed during clinic encounters. Patients over the age of 4 were eligible to participate in the study, while patients with co-morbid chronic lung diseases, such as cystic fibrosis, were excluded. The study team introduced the QI project to the clinic staff prior to implementation and provided basic instructions to the front desk staff on how to distribute and collect the Asthma Passport booklets. This strategy took advantage of the workflow in the clinic that entails check-in and receipt of the ACT, medication reconciliation, clinician visit, and AAP production and review without adding substantial burden. Study staff for this QI project was intentionally not part of the clinic process in order to accurately assess sustainability of the intervention. Standard clinic procedures were followed regarding the distribution of the ACT and AAP. The ACT version used in the clinic is paper based and is provided by the front desk staff at the time of check-in. The AAP is provided by a member of the clinic team, usually a member of the nursing staff, and is reviewed with the patient and caregiver during the asthma visit. Patients and caregivers have the duration of the visit to complete the forms and provide them back to the clinic team at the conclusion of their visit.

Patients and their caregivers participating in the intervention were made aware that this was a QI project and understood that participation was voluntary, though written informed consent was not required. It was determined, based on institutional policies, that this QI project did not require submission to the Institutional Review Board (IRB) for review.

Data collection

We obtained patient characteristics and completion rates for the primary outcomes (AAP and ACT), from the Department of Medicine Healthcare Quality Data group at our institution. Data for all patients with a diagnostic code for asthma (International Classification of Diseases (ICD-9): 493.xx), who attended one of the six assigned clinic sessions during the study period, were included. Patient and provider satisfaction and itemized feedback regarding the passport content were also collected throughout the study.

Outcomes

The primary outcomes of the QI project were rate of completion of the AAP and ACT compared between intervention and control groups. The secondary outcomes of the QI project were satisfaction of the overall clinical care patients and caregivers received for their asthma ("general satisfaction"), the asthma clinic visit they just completed ("today's satisfaction"), and the Asthma Passport ("passport helpfulness"). A 5-point Likert scale (with 1 meaning not at all satisfied and 5 meaning extremely satisfied) was utilized to ask the following questions: "In general, how satisfied are you with the clinical/medical care you receive for asthma?",: "How satisfied are you with today's clinic visit?", and "Did the Asthma Passport assist in achieving your goals for your visit today?" Patients and caregivers also had an opportunity to write in items they thought should be added to or removed from the Asthma Passport.

Separately, clinicians whose clinic sessions were included in the Asthma Passport program received an online survey midway through the study period asking about their experience with the program. Specifically, it addressed whether the Asthma Passport negatively affected the length of time of the visit, whether they felt it was useful in structuring the visit, and whether they would recommend it for broad adoption in the clinic. They were also asked to write in items they thought should be added or removed from the Asthma Passport as part of the active plan-do-study-act (PDSA) cycle.

Statistical analysis

Descriptive statistics were used to characterize the cohort. Completion rates were calculated by dividing the total number of subjects with each completed outcome measure by the total number of eligible patients with 493.xx ICD-9 diagnostic codes meeting the inclusion criteria. The primary analysis followed intention to treat principle including all eligible subjects. Per-protocol analysis for the clinic sessions studied. Per-protocol analysis was

then performed restricting the intervention group to those patients who returned the passport (regardless of whether it was completed), as compared to the entire control group. A sub-group analysis was done to exclude acute asthma visits and determine the completion rates in patients with stable asthma only. Differences in proportions were expressed as odds ratios and were tested by the Fisher's exact test. Comparison of the ACT and AAP completion rate for the intervention and control sessions was used to determine the effectiveness of the QI project. While the passport included items for review of medications and request medication refill, there were no systematically assessed objective outcomes available to assess these between groups, in contrast with the AAP and ACT which are recorded in the EMR.

Responses to questions of patient satisfaction were dichotomized to reflect "satisfied" versus "neutral or dissatisfied" for the analysis in order to create clinically meaningful strata. Cross-sectional comparisons were used to determine the effect of receiving the ACT and/or the AAP on patient/caregiver satisfaction and significance determined by Fisher's exact test. Study outcomes were analyzed with the use of R: A Language and Environment for Statistical Computing, version 3.1.1 (R Foundation for Statistical Computing) and SAS version 9.4 (SAS Institute Inc., Cary, NC).

Results

A total of 222 patients with asthma were seen in the Pulmonary Clinic during the study period. One hundred twenty subjects attended an intervention clinic and 102 subjects attended a control clinic session. Of the 120 patients in the intervention group, "passports" were returned to clinic staff by 42 participants (35%). Patients' completion of the ACT and AAP was assessed from the EMR and was evaluated in regard to whether they attended a clinic session in which the passport was administered or not. Even if they did not return the passport, their data were included in the intention to treat analysis.

Table 1 lists the basic demographics of patients in both cohorts of the study.

Table 1. Select characteristics of study sample.

Demographics	Total ($N = 222$)	Control ($n = 102$)	Passport ($n = 120$)
Age, years[a]	10.7 ± 4.9	10.9 ± 5.2	10.6 ± 4.8
Female	97 (43.7%)	45 (44.1%)	52 (43.3%)
Race/ethnicity			
Caucasian	107 (48.2%)	45 (44.1%)	62 (51.7%)
Hispanic	45 (20.3%)	24 (23.5%)	21 (17.5%)
Black	34 (15.4%)	19 (18.7%)	15 (12.5%)
Other	56 (25.3%)	30 (29.5%)	26 (21.6%)
Visit type			
Routine asthma visit	202 (91.0%)	95 (93.1%)	107 (89.2%)
Exacerbation of asthma	16 (7.2%)	7 (6.9%)	9 (7.5%)

Note. [a]Plus-minus values are means ± Standard Deviation (SD).

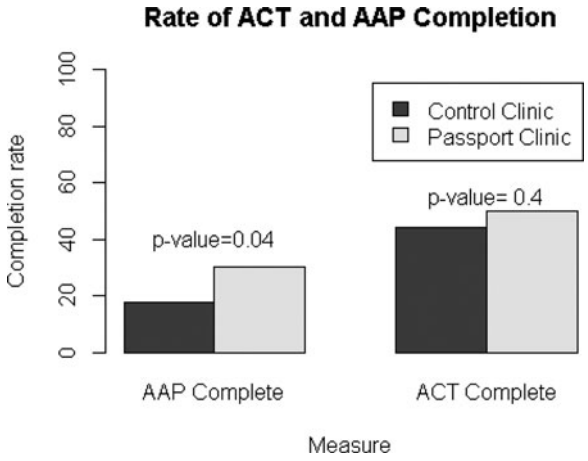

Figure 2. Comparison of completion rates of the AAP and ACT by intervention group. AAP: asthma action plan, ACT: asthma control test.

The ACT completion rate for patients in the intervention group (50%) was not significantly different compared to that (44%) from the control group (OR = 1.27, 95% CI 0.72–2.23, $p = 0.419$). The AAP completion rate for this group, however, was significantly higher in the intervention group (30.0% compared to 17.7%; OR = 1.99, 1.01–4.05, $p = 0.041$) compared to the control group. Completion rates are shown in Figure 2.

When limiting the analysis to only those who returned the completed passport ($n = 42$) as compared to the control group ($n = 102$), there was a significant difference in completion rates for both the ACT (73.8% vs 44.1%; OR = 3.54, 1.53–8.71 $p = 0.002$) and AAP (35.7% vs 17.7%; OR = 2.58, 1.05–6.27, $p = 0.028$) favoring the intervention group.

Excluding acute asthma visits did not show a markedly different effect. In patients who were in clinic for stable asthma visits, completion of the ACT in the intervention group was not significantly improved at 51.4% as compared to 42.1% in the control group (1.45, 0.80–2.64, $p = 0.206$). The AAP completion rate for this group, however, remained significantly improved—31.8% in the intervention group as compared to 18.9% in the control group (1.98, 0.99–4.09, $p = 0.052$). Overall, limiting the analysis to visits for stable asthma did not significantly improve the completion rate compared to all asthma visits.

In post-hoc analysis, we evaluated whether patients who returned the passport may have differed from those who did not. There was no difference in age, race, gender, or whether they were seen for a routine asthma visit or a visit for an asthma exacerbation between the groups. The only significant difference was that the proportion of self-reported Hispanic patients was lower in the group that returned passports than the complete passport group, which may signify the underutilization of the Spanish-translated version of the passport. While

measured patient-related factors do not seem to distinguish participants who returned the passport, one could speculate that those who did return the passport were more motivated to be involved in the process. This may explain why their levels of completion for ACT and AAP were higher.

"Reviewed asthma medications" was checked in 36/42 returned passports and "Requested medication refills" was checked in 38/42 returned passports, indicating that a large majority of patients who returned the passport completed these items.

A total of 76 participants provided answers regarding their "general satisfaction" ("In general, how satisfied are you with the clinical/medical care you receive for asthma?") and "today's satisfaction" ("How satisfied are you with today's clinic visit?"). Neither general satisfaction nor today's satisfaction were found to be significantly associated with receiving an Asthma Passport.

Of the 42 participants in the intervention group who returned their passports, 39 provided responses to the satisfaction questions and 38 provided a response to the "helpfulness" of the Asthma Passport ("Did the Asthma Passport assist in achieving your goals for your visit today?"). Of the 102 participants in the control group, 39 responded regarding their "general satisfaction" and 37 responded regarding "today's satisfaction."

Overall satisfaction reported by participants was very high. Of all respondents, 92% of participants reported being either "satisfied" or "very satisfied" for "today's satisfaction" and 95% of participants reported being either "satisfied" or "very satisfied" for "general satisfaction." Neither "general satisfaction" nor "today's satisfaction" were found to be associated with completion of an ACT (general satisfaction: $p = 1.00$, today's satisfaction = 0.51) nor an AAP (general satisfaction: $p = 0.54$, today's satisfaction: $0 = 0.54$). The majority of participants (84%) reported finding the Asthma Passport helpful in achieving their goals for the visit, though this was not significantly associated with either receiving an AAP ($p = 1.00$) or completing an ACT ($p = 0.56$).

Five of the 14 providers who attended the intervention clinics responded to the online survey. All 5 indicated that the passport added structure to their asthma clinic visits. All respondents also reported that the passport did not affect the length of their patient visits. Eighty percent responded that they would recommend the Asthma Passport be used regularly in the pulmonary clinic for all asthma patients.

Discussion

In this QI initiative we aimed to determine if a patient-centered checklist tool could improve completion rates of the ACT and AAP, essential components of asthma self-assessment and self-management, respectively. We found the implementation of the Asthma Passport at clinic visits for asthma in a subspecialty pulmonary clinic was associated with a modest but significant improvement in AAP completion rates, but not ACT completion rates. Significant improvement in AAP and ACT rates was found in the group in which receipt and return of the passport was verified, identifying a per-protocol effectiveness associated with Asthma Passport use. These findings suggest that instituting a patient-centered checklist to focus on key issues of the asthma visit, including AAP and ACT completion, may be beneficial and that more rigorous engagement of patients and staff to such a program may lead to greater success.

The use of checklists as prompts in health care is well-documented in the medical literature. In particular, medical professionals have long accepted the concept of utilizing checklists to standardize processes as a way to eliminate mistakes and improve outcomes [14]. Checklists have also been successfully used as behavioral intervention tools for health-care professionals [15] and also to improve patient/physician communication [16] and patient engagement [17]. These applications may be particularly important to chronic disease management in asthma due to the importance of communication and shared decision-making between pediatric patients, caregivers, and physicians in improving outcomes [10]. Although the importance of collaboration is well known, many barriers stand in the way of implementation, with one of the most stated reasons being physician time constraints during visits [13].

Based on these data, we chose a patient-centered checklist-based tool to test whether it could improve our outcomes. The use of a tool such as the Asthma Passport in clinic settings may act in multiple ways to improve this collaboration by not only allowing patients and caregivers to build self-efficacy to ask questions and begin discussions regarding asthma self-management, but also serving as a prompt for physicians to complete tasks such as the ACT and AAP, similar to the way a checklist may improve surgical and infection control compliance. Knowing the constraints on provider time and competing administrative tasks for completing clinic visits, we piloted the Asthma Passport as a patient-centered checklist tool rather than a provider checklist. While on the whole, it did not substantially improve attainment of goals for completion of the ACT and AAP completion rates, for those who actively engaged in the use of the passport—those who returned it at the end of the visit—there were significant improvements in both. While the approach to this QI project in our clinics was to simply offer it to the patient and encourage its use, as opposed to

mandatory checklist completion as is enforced in other realms, these findings may suggest that more rigorous enforcement of patient participation may have even greater benefit in ensuring these asthma self-management tools are completed.

Studies of initiatives to improve completion of ACTs in clinical practice have had mixed results. When they have been successful, it has typically been subsequent to multiple iterations of review and revised efforts [18]. Similar success has been found in other disease screening efforts using PDSA cycles for incorporating screening tools [19]. These iterative PDSA cycles and intensive clinic stakeholder buy-in have affected workflow. Others have utilized provider level prompts to improve guideline-based practice adherence with mixed results [20,21]. These approaches also require significant burden to the provider's workload or workflow. Even greater resource-rich interventions—adding nurse educators and selecting physician (peer) champions—has not shown benefit in uptake of guideline-based prescribing or health outcomes [22], suggesting that the intensity of intervention may not be as important as finding the best process. It is possible that if we had incorporated an iterative process of revisions to this interventions, incorporated additional provider effort to complete these tasks, or offered incentives for the completion of the ACT and AAP, the passport intervention may have had more dramatic success.

It is possible that providers and patients alike are less apt to perform an ACT or provide an AAP during acute visits for asthma exacerbations as these visits may be more focused on improving the immediate health of the patient as opposed to long-term control and management. However, restricting our data to exclude visits coded for status asthmaticus and exacerbation of asthma had little effect on either of the outcomes.

Despite some improvement in the completion rates of the ACT and AAP, the overall rates remained modest. While we explored the influence of visit acuity in relation to completion and did not find it to be a factor, other systematic or individual biases may have contributed to low success. For example, the process map for completion of the ACT involves production, distribution, completion, receipt, and entry of the form into the medical record, requiring at least 3 parties, including the patient, to be conscientious of the completion effort. While the design of the passport intervention was specifically to avoid further burden to the process, it may be that the process itself is too burdensome to benefit from an additional intervention. Furthermore, individual providers may not use the ACT or feel there is additional value to providing an AAP to patients outside of their usual assessment and anticipatory guidance regarding asthma management. In this circumstance, the culture of the individual providers practice may devalue the intervention and make utilization improvements more difficult.

Our secondary analysis showed no link between patient satisfaction of an asthma clinic visit and having completed an ACT and/or receiving an AAP. However, the overall high satisfaction of patients with their clinic visit made it difficult to find any significant improvement. Previous studies have shown a link between patient satisfaction, physician "participatory decision-making style," and receipt of a written asthma action plan [9]. Within our data, there was no relationship between ACT or AAP completion rates and patient satisfaction, however, this is likely due to satisfaction scores being high overall leaving little room for change. Alternatively, performing an ACT and receiving an AAP may not be valued by patients as contributing to their overall satisfaction with asthma care. Physician's participatory decision-making style has, in turn, found to be influenced by patient engagement behavior during clinic visits, outlining the importance of both toward creating an interactive visit [23]. Further studies are needed in order to understand whether the Asthma Passport is a good tool to encourage engagement from both parties and improve patient satisfaction and asthma management outcomes.

Finally, a survey of the providers whose patients used the passport found that the providers viewed it favorably. Providers responded that the passport did not affect the length of their patient visits, but all agreed that it added structure to their asthma clinic visits. Eighty percent responded that they would recommend the Asthma Passport be used regularly in the pulmonary clinic for all asthma patients. As a patient-centered tool, the passport appeared to provide utility to asthma care without slowing clinic flow.

There are several potential limitations to the interpretation of our findings that should be considered. First, the positive findings found in subgroup analysis may reflect the type of patient who is more likely to complete an ACT and receive an AAP at each visit, regardless of prompting by the Asthma Passport. However, the nature of the step-wedge study design should protect against spurious associations since each assigned clinic session serves as both control and intervention group during the course of the study. Second, only a small proportion of patients returned the passport at the end of the clinic visit, limiting our ability to know if and how it may have been used by patients who received but did not return the passport. Patients who received but did not utilize the passport may be more like the control group, which may explain some of the lack of associations found in the main outcome analysis. This would lead to inaccurately rejecting the hypothesis that there is utility in the Asthma Passport for improving

outcomes. Ultimately, this belies a limitation of implementing a new initiative into the pre-existing clinic workflow and this, itself, may be the subject of QI strategies. We limited our assessment to a 16-week period of assessment to assess the introduction of the Asthma Passport to clinics without the potential confounding of a learning effect by the patients. The results may differ in a larger study of longer duration in which patients, caregivers, and providers would be more accustomed to using the tool.

In conclusion, implementation of a patient-centered checklist tool, the Asthma Passport, modestly improves the completion of important asthma self-management tools, especially for patients who follow through with the passport tasks. Further efforts to ensure patient level implementation may yield even greater success. Future studies should determine how to maximize the impact of this tool.

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