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**Implementation of a Structured Discharge Checklist for Children
Admitted to the Hospital with Acute Asthma**

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A Dissertation Submitted to The Graduate School at the University of Missouri-St.
Louis
in partial fulfillment of the requirements for the degree
Doctor of Nursing Practice with an emphasis in Pediatric Nurse Practitioner

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Advisory Committee

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Abstract

Problem: The transition process from a hospital setting to home is critical for pediatric patients and their families. However, there is no standardized process to ensure asthma discharge orders and asthma action plans are printed at the time of discharge

Methods: This observational quality improvement project utilized a pre-and-post-implementation of the Kamishibai Card (K-Card) process for pediatric discharge checklist compliance in an inpatient pediatric general medicine unit. This project used a sample of all children aged 2 years to 21 years with an asthma diagnosis admitted to the inpatient general medicine pediatric unit. This project included an education phase and an implementation phase. The QI project was performed using a plan-do-act study method to assess barriers during the implementation phase.

Results: A total of 58 patients were included in the quality improvement project (40 patients pre-implementation phase and 18 patients- post-implementation. During the pre-implementation phase, there was a home management plan of care compliance rate of 95% with November 2022 having the lowest rate of compliance at 83%. After the implementation of the K-card tool, there was an overall home management plan of care compliance rate of 89%. The result of the two-tailed paired samples *t*-test was not significant based on an alpha value of .05, $t(3) = -0.29$, $p = .790$.

Implications for Practice: K-cards may help in enhancing home management plan of care in the pediatric population with asthma by auditing the necessary discharge components set in place by the Joint Commissions Childhood Asthma Care Measure -3 (CAC-3). K-Card audit reports may be used to identify barriers to proper discharge and develop new standardized workflow strategies.

Implementation of a Structured Discharge Checklist for Children Admitted to the Hospital with Acute Asthma

Among the pediatric population in the United States, asthma-related hospital readmissions are a significant community health concern. In one study, the 30-day asthma readmission rate in the pediatric population was documented as high as 3.9% and 3-month readmission was documented as high as 9.1% (Parikh et al., 2018). Risk factors for pediatric asthma readmission include exposure to asthma triggers such as dust, outdoor air pollution, tobacco smoke, and mold; medication noncompliance for example non-usage of daily controller medication; incorrect medication; incorrect inhaler usage; absence of Asthma Action Plans (AAP); inadequate primary care follow-up; and lack of parent/guardian education (Hogan et al., 2022). Hence, a comprehensive discharge checklist focusing on these key components may help reduce readmissions among this vulnerable population of children.

Reports from the Centers for Disease Control and Prevention [CDC] (2018) estimate the prevalence of asthma among children in the United States aged 0-17 to be 1 in every 12 children or approximately 6 million total. In 2019, 64,500 children between the ages of 2 and 18 years were hospitalized with asthma as their primary diagnosis (CDC, 2022). While 40 percent of previously hospitalized children with asthma are readmitted within a year, 5 to 9 percent of children with asthma are readmitted within 3 months of discharge (Kenyon et al., 2020). Additionally, the annual hospital cost for pediatric asthma is estimated to be \$1.5 billion (CDC, 2018).

High readmission rates are an indication of the quality of care during hospitalization, at discharge, and post-discharge. The transition process from a hospital

setting to home is a critical step for pediatric patients and their families. According to Hamline et al (2018), significant complications can occur in the management of children with chronic medical conditions, including asthma, when discharge education is not focused on the comprehensive management of these complex medical conditions.

The National Institute of Health has established evidence-based practice guidelines recommending a discharge planning process consisting of asthma management education, medication education, lifestyle and environmental modifications, and primary care provider follow-ups (National Asthma Education and Prevention Program, 2020). According to Parikh et al (2021), guidelines for the management of pediatric asthma should focus on discharge education that is timely, consistent, and current. Currently, there is a standard discharge order set for patients with asthma admitted to the hospital. However, there is not currently a standardized process to check the usage of that order set as well as ensure an asthma action plan is printed and all medication reconciliation match at the time of discharge.

In children between the age of 2-21 years with mild-to-moderate asthma who are hospitalized, there are opportunities to address discharge education components to improve the quality of healthcare. The significance of this project was identified in March 2022 when the student investigator, in conjunction with the site team, identified there was a problem with not meeting the home management plan of care compliance goal of 95% as depicted in figure 1. This quality improvement project utilized the Institute for Healthcare Improvements Model for Change framework with a Plan Do Study Act (PDSA) cycle. The primary purpose of this project is to evaluate the impact of a standardized discharge checklist for children aged 2-21 years with asthma on home

compliance of management of asthma. This project aims to increase the usage of a standardized asthma discharge checklist among hospitalized pediatric patients to 90% within a 3-month time frame. The primary outcome measure of interest for this quality improvement project is the Asthma Home Management Plan of Care compliance. The secondary outcome measures for this quality improvement project included the Usage of the standardized discharge checklist by the nursing staff. For this quality improvement project, the overall study question is: On a pediatric general medicine inpatient unit, what is the impact of a standardized discharge checklist for children aged 2-21 years with an asthma diagnosis on home management plan of care compliance in a 3-month timeframe?

Literature Review

An assessment of the present literature was conducted for this topic using *PubMed*, *CINAHL*, and *Cochrane* databases. Keywords used for this literature search included *asthma*, *pediatric*, *discharge*, *readmission*, and *checklist*. Boolean operations AND and OR were used in this literature search to combine or exclude keywords, resulting in a more focused and defined review of the current literature. An initial search resulted in 4,015 articles (CINAHL:595, PubMed: 3,403, Cochrane: 36). To narrow the results, inclusion criteria were selected including studies from 2017 to 2022, inpatient or hospitalization, published in English, and ages 2 to 21 years old. In addition, exclusion criteria included publications older than five years or publications not in English. After performing the search with the inclusion and exclusion criteria applied, 84 publications were viewable. Additionally, the ancestry method was utilized after obtaining a systematic review by Parikh et al (2018). This ancestry method resulted in 4 additional articles generated. After reviewing abstracts and eliminating publications not meeting the

criteria, the final number of selected publications for this literature review was 10 articles.

Hospital discharge is one of the most vulnerable points in a patient's transition in care from the hospital to the home setting. Across the literature, an overarching theme was the importance of implementing a comprehensive discharge education bundle focused on components such as written asthma action plans, inhaler technique assessment, medication education, lifestyle modification, prompt primary care provider communication and follow-up, and in-hand medication at discharge (Dejong et al., 2020; Parikh et al., 2018; Ospina et al., 2017; Zafar et al., 2020). In 2003, the Joint Commission implemented the Childhood Asthma Care Measure -3 (CAC-3) focusing on home management of pediatric asthma. Home Management Plan of Care (HMPC) includes the following: arrangements for follow-up care; environmental control and control of other asthma triggers; method and timing of rescue actions; and use of controller medication (The Joint Commission, 2010).

Multiple studies and systemic reviews in this literature review investigated the impact individual discharge components or bundled discharge components had on readmission rates. In a quasi-experimental study, Kenyon et al (2020) implemented discharge bundles consisting of a referral to a community health program, high-risk asthma screening, follow-up with a pulmonologist, and medication filling. In this study, the average monthly number of revisits per 100 patients decreased from 8.4 to 6.3 ($p=0.02$). In another respiratory disease process, known as chronic obstructive pulmonary disease (COPD), Ospina et al (2017) conducted a systematic review to better understand discharge bundles for adults with COPD. Results from four of the studies in this review

were similar to asthma discharge bundles in reducing readmissions to the hospital (RR: 0.80; 95% CI 0.65 to 0.99) (Ospina et al., 2017).

According to Lakupoch et al (2018), written asthma action plans are a tool used to educate patients and their caregivers on the signs and symptoms of an asthma exacerbation, the steps to take to manage these episodes, and when to seek appropriate medical attention. In the study, Lakupoch et al. (2018) sought to determine whether a written asthma action plan would improve asthma management in children. Findings showed that among the 49 participants, there was a significant reduction in hospital revisits, school absence days, and admission days. Additionally, 83% of the parents had a positive interaction with the written asthma action plans and felt more comfortable managing their child's asthma after receiving the proper education (Lakupoch et al., 2018). Similarly, in a national cross-sectional online survey, Pletta et al (2020) found parents reported an increased sense of self-efficacy and understanding of asthma management when educated on asthma action plans compared to those who did not. 82% (474/564) of parents reported on a 5-point Likert scale they agreed or strongly agreed asthma action plans helped in better managing their child's asthma (Pletta et al., 2020).

Facilitating access to asthma medication was another factor for discharge management discussed throughout the literature. Many pediatric patients and families are unable to fill or obtain their discharge prescriptions. This barrier to medication puts them at an increased risk for adverse healthcare effects and hospital revisits. A recurrent theme to facilitate medication access was medication in hand at the time of discharge. Parikh et al (2018) discussed strategies to ensure patients have possession of their discharge medications at the time of discharge. These strategies included relabeling the inpatient

inhalers for home use and working with the inpatient pharmacy for patients to have their oral steroids, controller medications, and rescue inhalers in hand at the time of departure. With the use of these strategies, Parikh et al (2018) witnessed a 7% decrease (18% to 11%) in 90-day hospital care usage. In addition, Hogan et al (2021) concluded that filling all medications, including inhaled corticosteroids, oral corticosteroids, and short-acting beta agonist (albuterol) preceding discharge resulted in a significantly decreased odds of readmission by 13%.

While studies have shown that incorporating individual discharge components for asthma management at the time of departure improves hospital readmission rates, combining methods to create a discharge bundle provides comprehensive asthma education and aids in asthma management for patients and their families. Zafar et al (2020) guided a study investigating the effect a five-component discharge care bundle had on COPD readmissions. In this study, the five components consisted of a 30-day supply of rescue inhalers, standardized discharge instructions, inhaler education, a medication regime, and a 15-day primary care follow-up appointment. Results from this study showed that a more comprehensive discharge bundle was more effective in preventing hospital readmissions. The readmission rate was 26.6% among patients who received discharge instructions with 5 components compared to 44.4% for patients who received 3 or fewer discharge components (Zafar et al., 2020). In an additional analysis by Kenyon et al (2020), a 6.4 per 100 patient readmission reduction over 3 months was seen in patients who received a discharge bundle.

A tool used to sustain and encourage compliance to evidence-based practice and combine components of healthcare bundles is known as a Kamishibai card (K-cards). K-

cards are a tool used to incorporate evidence-based practices and promote communication amongst healthcare providers while assessing barriers to quality of care. Additionally, K-cards are proven to improve patient outcomes by collectively incorporating a set of 3-5 evidence-based practices into patient care. According to a study by Shea et al (2019), K-cards were effective in reducing healthcare-associated infection (HAI) by 3% when bundling evidence-based practices to reduce the risk of infection. This study also discussed the practicality of implementing K-card bundles in other healthcare practices, such as discharge checklists, to better manage health through the use of evidence-based practices.

The 10 articles selected for this literature review presented differences in patient populations, study design, and discharge components investigated. Overall, 8 of the 10 articles focused on the population of focus; the pediatric population. The other two articles (Ospina et al., 2017; Zafar et al., 2020) both reviewed discharge components related to the adult population. Another difference between the articles selected was the number of discharge components investigated. The main components reviewed included asthma management education, medication education, lifestyle and environmental modifications, and primary care provider follow-ups. 7 of the 10 articles investigated the impact of at least 3 or more discharge components on readmission rates; whereas 2 articles investigated the impact of an individual discharge component, written asthma action plans on readmission rates or caregiver perception of asthma management.

This literature review presented both strengths and limitations. One strength was the level of evidence from 4 systematic reviews, which is the highest level of evidence based on the quality of their design. This literature review also resulted in an

enhancement of overall knowledge about asthma discharge management because of the variety of study designs reviewed. Systematic reviews, cohort studies, qualitative studies, and retrospective studies were all included in the review which provided a more comprehensive understanding of the topic. In addition, a majority of the studies were generalizable and reproducible over time.

A major limitation suggested by multiple articles was how to evaluate the individual components of a discharge bundle. Evaluating multiple interventions during one time period could present confounding factors affecting the overall outcomes. An additional limitation was two of the articles examined the effects of discharge bundles on populations outside of the pediatric population. For example, Ospina et al (2017) performed a meta-analysis on the effect of discharge packages in adult patients with chronic obstructive pulmonary disease, and Zafar et al (2020) performed a quasi-experimental study evaluating the before and after effects of discharge bundle components in an emergency room for adult COPD patients. Recommendations for further studies would include sub-analyzing individual components of a discharge bundle, additional studies performed with large sample sizes, evaluating social determinants of health and socioeconomic impact on the transition from hospital to home, and finding additional studies with a focus on the pediatric population.

The Institute for Healthcare Improvements Model for Change framework with a PDSA cycle will be utilized to promote ongoing change through multiple small cycles to promote change (Coury et al., 2017). Continuous quality improvement is an important aspect of patient and caregiver education related to discharge instructions. Continuous

improvements through the PDSA allows for facilities to adjust discharge components to provide improved quality of care to both patients and their families.

The findings from this literature review confirm pediatric readmission rates are a major health concern due to mismanagement of asthma exacerbation and overall healthcare costs. Adequate education and disease management resources should be implemented to better prevent hospital readmissions from occurring. Guidelines for the management of pediatric asthma should focus on discharge education that is timely, consistent, and current. Implementation of a Kamishibai-card discharge checklist focusing on key discharge components may help reduce readmissions among children with asthma. Essential components of discharge for this population include medication education, lifestyle modifications, primary care follow-up promptly, and medication in hand at discharge. Gaps in the current literature include the diversity of the population, research methods, and data analysis. Many of the studies did not take into account the impact lower socioeconomic status and health literacy had on providing discharge education and resources to patients and their caregivers. Additionally, performing a sub-analysis of each discharge component would provide a more comprehensive collection of data. The development of a comprehensive discharge checklist focusing on these key components may help reduce readmissions among this vulnerable population of children and help caregivers better manage their child's chronic condition.

Methods

Design

This observational quality improvement project utilized a retrospective-prospective evaluation of the implementation of the Kamishibai Card (K-Card)

process for pediatric discharge checklist compliance in an inpatient pediatric general medicine unit. The K-Card is a process used for problem-solving by using visual boards or cards. This process allowed for the identification of barriers in real time, which helped navigate these barriers. The QI project was performed using a plan-do-act study method to assess barriers during the implementation phase. The pre-implementation data collection occurred from November 2022 through January 2023. The prospective implementation period data will be from February 2023 to April 2023.

Setting

This study was conducted in an inpatient general medicine pediatric unit at a pediatric academic medical center, a 402-bed hospital located in St. Louis, Missouri. The inpatient general medicine unit is a 16-bed unit.

Sample

This project used a sample of all children aged 2 years to 21 years with an asthma diagnosis admitted to the inpatient general medicine pediatric unit. The sample included those patients who are ordinarily seen and cared for in the setting where the project took place. This inpatient unit had a total of 70 patients discharged with an asthma diagnosis in 2021. Patients younger than 2 years and older than 21 years were excluded.

Procedures

During the education phase, staff education for nurses working on the site unit was performed at staff meetings. Education consisted of how to use the K-card (as shown

in Appendix A-1) and how to document the usage of the K-card (As shown in Appendix A-2).

During the project's implementation phase, asthma discharge checklist audits were performed using the K-card process. The K-card usage process included the identification of a pediatric asthma discharge, the assignment of a K-card audit by the charge nurse to the bedside nurse, the review of the discharge order and K-card checklist, and the determination if all goals have been met for discharge. A monthly visual chart of compliance (Appendix A-2) was available on the unit so staff could track their progress with the implementation. If the target goal is met, the bedside nurse marked "green" on the tracker and proceed with discharge. If the target goal is not met, the bedside nurse marked "red" on the tracker and contacted the provider to update the discharge information. Staff were encouraged to report any barriers to the implementation of the K-card.

Data Collection/Analysis

Data collected were de-identified patient information. The data was gathered and exported into Excel (shown in Appendix B). Total cases and compliance were tracked. In addition, home management plan of care compliance was tracked during the pre-and-post-implementation phases of the K-card usage. Analysis of the data includes run charts and quantitative data including compliance averages per month of implementation. Additionally, a two-tailed paired samples *t*-test was conducted to examine whether the mean difference between pre-implementation cases and post-implementation cases was significantly different from zero.

Approval Process

Approval for this clinical project was obtained from the management team of the inpatient pediatric unit on which the QI project will be implemented. Following approval from the pediatric unit, the project protocol was evaluated and approved by both the site organization and the University of Missouri-St. Louis Institutional Review Board (IRB) was obtained. The risk related to this project is minimal and no more than usual care. Funding for this project does not include any outside organizations, manufacturers, or non-profit foundations.

Results

Demographics

A total of 58 patients were included in the quality improvement project (40 patients pre-implementation phase and 18 patients- post-implementation). The sampling population included hospitalized patients with a principal asthma diagnosis and requiring being treated for an asthma exacerbation (systemic steroids and frequently scheduled albuterol, age 2 or greater). Demographic data and the profile of the study participants, including age, gender, and race, are displayed in Table 1.

Sampling Data and Statistical Analysis

When the need for a pediatric discharge tool was identified in March 2022, the home management plan of care compliance in the general medicine pediatric unit was as low as 86.7%. During the 3-month pre-implementation phase from November 2022 to January 2023, the overall compliance rate was 95% with November 2022 having the lowest rate of compliance at 83% (See Figure 2 and Table 2). These inconsistencies in compliance with the recommended discharge components drove this quality improvement project. The most commonly missed asthma discharge component during

the pre-implementation data collection included trigger control recommendations (31%) and providing the caregiver with an Asthma Action Plan (AAP) (27%). During the post-implementation phase, overall home management plan of care compliance data regarding compliant cases and total cases per month are represented in Figure 3 and Table 3. Overall, post-implementation compliance averaged 89% in the three-month period from February 2023 to April 2023.

A total of 38 out of 40 and 16 out of 18 pediatric discharge components were compliant with the home management plan of care during the pre-and-post-implementation phases. The result of the two-tailed paired samples *t*-test was not significant based on an alpha value of .05, $t(3) = -0.29$, $p = .790$, indicating the null hypothesis cannot be rejected. This finding suggests the difference in the mean of pre-implementation cases and the mean of post-implementation cases was not significantly different from zero. The results are presented in Table 4. A bar plot of the means is presented in Figure 4. Additionally, the overall usage of the K-card by the nursing staff was at a rate of 89% during the post-implementation 3-month time interval (See Figure 5).

Discussion

Asthma in the pediatric population is a major health concern and complications can occur in the management of children with asthma when discharge education is not focused on comprehensive management. There is not currently a standardized process to check the usage of that order set as well as ensure an asthma action plan is printed and all medication reconciliation match at the time of discharge.

During the pre-implementation phase, there was a home management plan of care compliance rate of 95% with November 2022 having the lowest rate of compliance at

83%. After the implementation of the K-card tool, there was an overall home management plan of care compliance rate of 89%. Additionally, the overall usage of the K-card was at a rate of 89%, which did not meet the K-card usage goal rate of 90%.

Overall, the K-card tool did not significantly impact the home management plan of care compliance in children with asthma. During the implementation phase from February 2023 to April 2023, there was a steady increase in compliance. This steady increase provided key takeaways from this quality improvement process that could be used in future projects. One finding was the importance of using a PDSA cycle. The PDSA cycle was used in the project to identify barriers when using the K-card and helped navigate through any of those barriers. Another key finding was the importance of continued education for staff members and implementing ways to educate new staff members while a quality improvement project is occurring.

Compliance was further investigated by identifying which staff member reported the discharge and in-person assessments of the reason the discharge K-card was not utilized were performed. The changes in compliance could be explained by a couple of factors. First, the compliance rate found in this quality improvement may be due to the extent of the education of the staff nurses. Since adherence to the K-card was not at the compliant level, an analysis of the root causes for nonadherence was discussed and barriers were explored. Lack of sufficient knowledge among staff members, workflow management, and occasional unavailability of supplies was identified as barriers and corrected by education, training, and conducting in-person conversations with staff and team leaders on the unit.

Pediatric asthma discharge education and management directly reflect on the hospital's quality of care. Adherence to all elements of the K-card discharge components helps to meet the Joint Commissions Childhood Asthma Care Measure -3 (CAC-3) focusing on home management of pediatric asthma. The implementation of the K-card process is an engaging activity to help the staff foster conversations about ways to improve hospital processes and reduce risks, harm, and errors in patient care.

Through this process, various recommendations for the future implementation of the usage of K-cards have surfaced. Prioritizing staff education and identifying ways to improve practice guidelines have been emphasized. Additionally, continuing to incorporate the K-cards in other general pediatric population units throughout the facility will help evaluate the process and extend staff knowledge on the appropriate pediatric asthma discharge components. Assessment of social determinants of health, including socioeconomic status, education, neighborhood and physical environment, social support networks, and access to health care should be considered in future implementations of home management plan of care.

Conclusion

From the literature review, it is clear that future quality improvement projects should continue to evaluate the effectiveness of standardized discharge interventions and emphasize the importance of standardized workflow for staff. This quality improvement project emphasized the importance of staff education and staff engagement in improving practice guidelines. K-cards provided a design for real-time follow-up and communication among the nursing staff, providers, and other interdisciplinary team members. K-cards may help in enhancing home management plan of care in the pediatric population with

asthma by auditing the necessary discharge components set in place by the Joint Commissions Childhood Asthma Care Measure -3 (CAC-3). K-Card audit reports may be used to identify barriers in proper discharge and develop new standardized workflow strategies.

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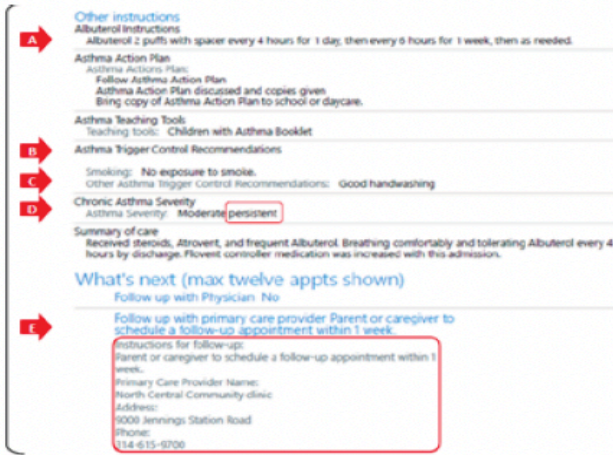


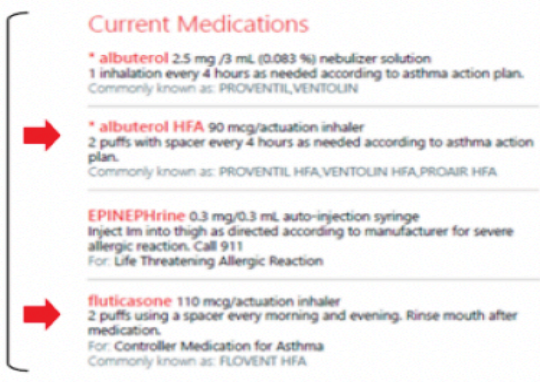







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Appendices

Appendix A-1: Structured Discharge Checklist Implementation Tools- Kamishibai Card (K-Card)

K-Card # Asthma Action Plan Cadence: At	K-Card # Asthma Action Plan Cadence: At Discharge
	
<ul style="list-style-type: none"> Asthma discharge order set complete* *Components A through E are present (see 	<p>Example 1: Asthma discharge instructions* *Located under "Other instructions" in AVS</p> 
<div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <input type="checkbox"/>  </div> <div style="text-align: center;"> <input type="checkbox"/>  </div> </div>	
<ul style="list-style-type: none"> If Asthma severity is identified as "persistent" (see Example 1, part D on back), controller* is included in the medication list (see Example 2 on back) *Common controllers: <i>Fluticasone (Flovent), budesonide (Pulmicort), budesonide-formoterol (Symbicort), etc.</i> 	<p>Example 2: Complete Medications Section</p> 
<div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <input type="checkbox"/>  </div> <div style="text-align: center;"> <input type="checkbox"/>  </div> </div>	
<ul style="list-style-type: none"> Medications listed on Asthma Action Plan match medications on After Visit Summary (AVS). If only a Limited AVS is printed, skip this step. 	
<div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <input type="checkbox"/>  </div> <div style="text-align: center;"> <input type="checkbox"/>  </div> </div>	
<ul style="list-style-type: none"> Asthma Action Plan printed with AVS 	
<div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <input type="checkbox"/>  </div> <div style="text-align: center;"> <input type="checkbox"/>  </div> </div>	
	
<p>© 2014 Children's Hospital of St. Louis. All rights reserved.</p>	<p>Note: Check the items listed on this card to assess compliance. If target goal is met insert the card into the slot with "green" side showing. If target goal is missed, please place card in slot with "red" showing and document follow up actions on board.</p>

Appendix B: Figures and Tables

Figure B1

Figure 1: Home Management Plan of Care (HMPC) compliance per Month

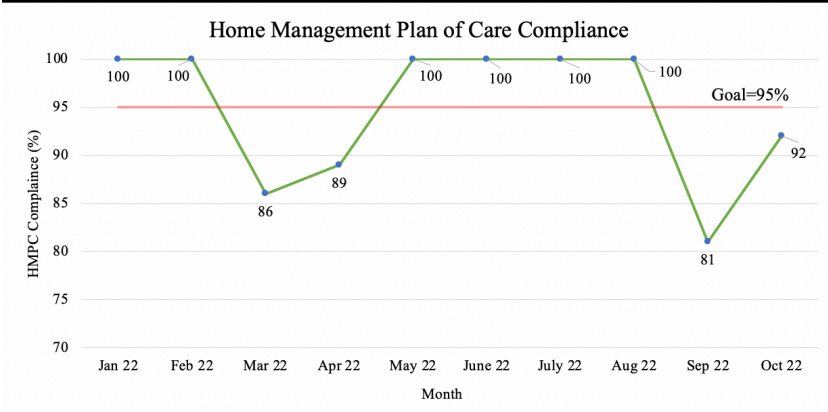


Table B1

Table 1: Demographic data of patients evaluated for HMPC compliance

Variables	Pre-Implementation	Post-Implementation
Average Age (years)	6.8	8.5
Gender		
Male	24 (60%)	12 (66.6%)
Female	16 (40%)	6 (33.3%)
Race		
African American/ Black	23 (35%)	13 (73%)
White (Non-Hispanic)	14 (23%)	5 (27%)
Hispanic	2 (4.9%)	

Figure B2

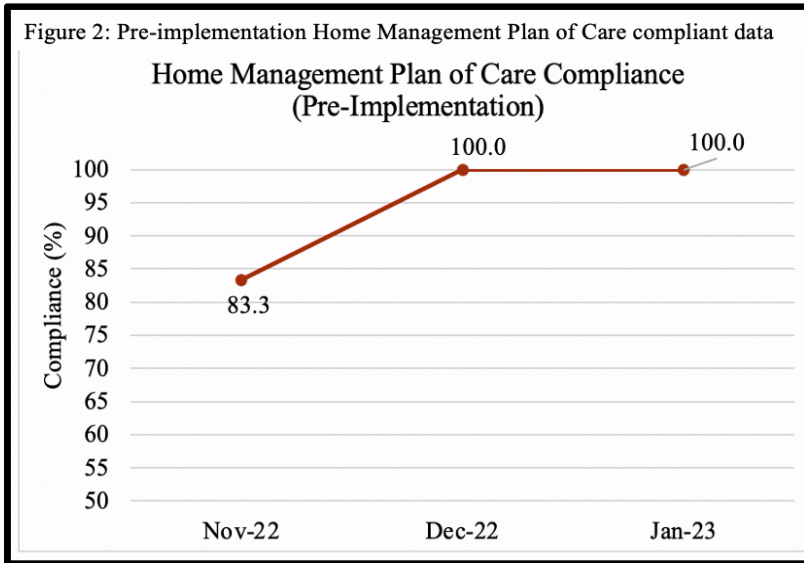


Table B2

	Nov-22	22-Dec	23-Jan
Compliant Cases	10	17	11
Total Cases	12	17	11
Compliance Rate (%)	83.3	100.0	100.0

Figure B3

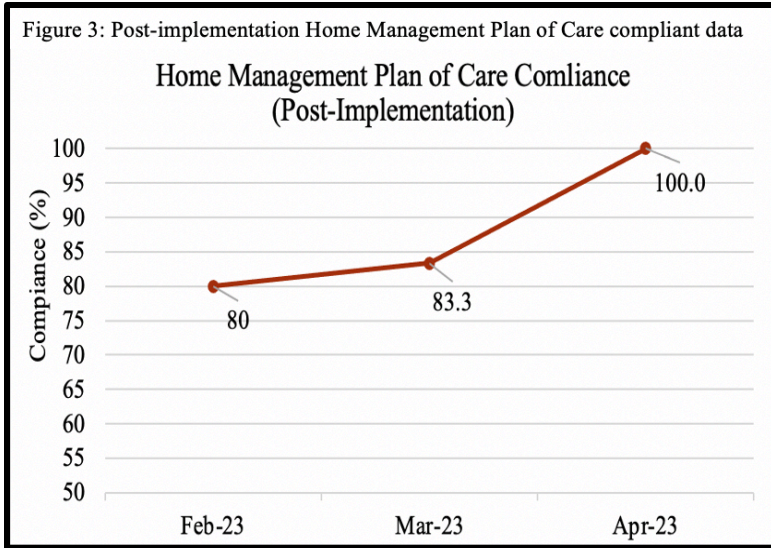


Table B3

Table 3: Post-implementation HMPC compliance data.

	Feb-23	Mar-23	Apr-23
Compliant Cases	4	5	7
Total Cases	5	6	7
Compliance Rate (%)	80.0	83.33	100.0

Figure B4

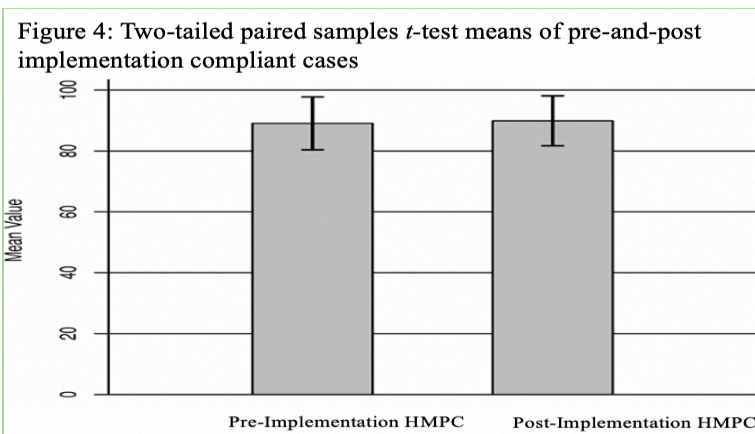


Table B4

Table 4: Two-Tailed Paired Sample *t*-test statistical analysis

Pre-implementation HMPC		Post-implementation HMPC		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
89.05	8.85	89.88	8.37	-0.29	.790	0.15

Note. N = 4. Degrees of Freedom for the *t*-statistic = 3. *d* represents Cohen's *d*.

Figure B5

Figure 5: K-card usage compliance data (*n*=18)

