

Increasing Childhood Asthma Care Appointments on a Mobile Asthma Van

The Journal of School Nursing
1-11
© The Author(s) 2019
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1059840519857143
journals.sagepub.com/home/jsn



Lindsay A. Green, DNP, APRN, FNP-BC, CEN^{1,2} ,
and Sarah H. Ailey, PhD, RN, CNE, PHNA-BC³

Abstract

Children in two communities of a large city in the Midwestern United States have higher rates of asthma than other areas of the city. The communities have barriers to accessing care, including high rates of unemployment and being uninsured and undocumented. A mobile van provides no-cost asthma care to children at schools in these communities, but use of these services has decreased more than 50% over the past 5 years. School nurses have the potential to improve asthma outcomes by collaborating with health-care providers. The purpose of the program was to increase the number of appointments scheduled and attended on the asthma van at both schools. For this program, we (a) implemented an unaccompanied minor consent, (b) enhanced care coordination, and (c) improved a respiratory health survey tool. Results showed an increased number of appointments scheduled and attended on the asthma van. The program was successful even though community-specific barriers existed.

Keywords

school nurses, asthma, chronic diseases, elementary, policies/procedures, school-based clinics, quality improvement, mobile clinics

Asthma is the most common chronic childhood disease and affects 6 million children of 0–17 years in the United States (American Academy of Allergy, Asthma, and Immunology [AAAAI], 2018; Zahran, Bailey, Damon, Garbe, & Breyse, 2018). Asthma is one of the leading causes of school absenteeism and accounts for 13.8 million missed days of school annually (Environmental Protection Agency, 2018). Children's academic achievement is affected after missing 10% of school, which is linked to poor adult health outcomes (National Collaborative on Education and Health, 2015). Childhood asthma can also lead to decreased physical ability, weight gain, anxiety, depression, and death (O'Byrne et al., 2013).

Children in two communities of a large city in the Midwestern United States have higher rates of asthma than in other areas of the city (Illinois Department of Public Health [IDPH], 2016; Rush University Medical Center [RUMC], 2013). The two communities will be referred to as Community A and Community B. The rate of childhood asthma in Community A is more than 20% and is 12.5% in Community B, compared to a national rate of 8.4% and state rate of 9.1% in 2015 for all ethnicities of children less than 18 years (Centers for Disease Control and Prevention [CDC], 2015, 2017a; RUMC, 2013).

A mobile care organization provides no-cost asthma care via an asthma van to one elementary school in

Community A and one elementary school in Community B, in addition to approximately 40 other public schools in the city (Mobile Care Chicago [MCC], 2017a). The two communities have many risk factors for developing asthma, such as secondhand smoke exposure, low income, urban living environments, and race and ethnicity of Black and Hispanic (AAAAI, 2018; Zahran et al., 2018). Even though the asthma van provides necessary specialty care to at risk children at Community A School and Community B School, use decreased over the past 5 years. From 2012 to 2016, at Community A School, the number of appointments scheduled decreased 50% and appointments attended decreased 59%. During the same time at Community B School, the number of appointments scheduled decreased 60% and appointments attended decreased 64% (Mobile Care Foundation [MCF],

¹ Crossing Healthcare, Decatur, IL, USA

² Department of Family Practice, Crossing Healthcare, Decatur II, Chicago, IL, USA

³ Department of Community and Mental Health Nursing, Rush University, Chicago, IL, USA

Corresponding Author:

Lindsay A. Green, DNP, APRN, FNP-BC, CEN, Crossing Healthcare, Decatur, IL 62521, USA.

Email: lindsaygreen1647@gmail.com

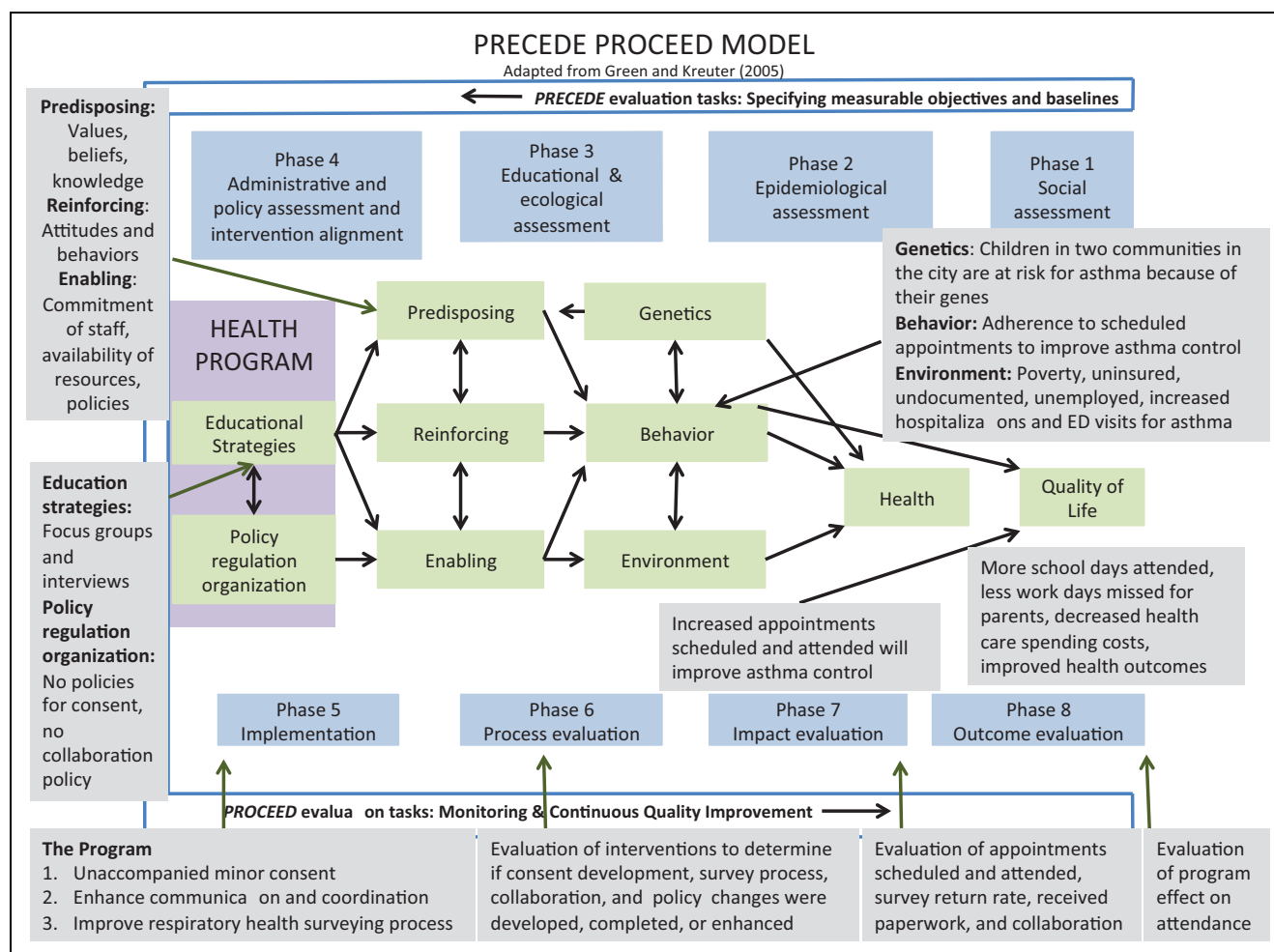


Figure 1. Project plan based on the PRECEDE–PROCEED model.

2016b). The purpose of the quality improvement program was to develop and implement strategies to increase the number of appointments scheduled and number and percentage of appointments attended on the asthma van at these two school locations. We used the PRECEDE–PROCEED model (PPM) developed by Green and Kreuter (2005) to guide assessment of the environmental context and develop, implement, and evaluate the program for the asthma van at both elementary schools. The PPM is a planning framework divided into two parts, termed *precede* and *proceed*. The first portion, *PRECEDE*, consists of four planning phases including social assessment, epidemiological assessment, educational and ecological assessment, and administrative and policy assessment (Crosby, DiClemente, & Salazar, 2013). The second portion, *PROCEED*, consists of four subsequent evaluation phases including implementation, process evaluation, impact evaluation, and outcome evaluation (Crosby et al., 2013). The phases of the PPM are well known and have been used in numerous publications. For the applied PPM, see Figure 1.

Literature Review

Literature was searched to explore benefits of care coordination, find examples of mobile clinics to compare with the asthma van, and identify strategies to increase the number of appointments scheduled and number and percentage of appointments attended. Databases searched were CINAHL, PubMed, and SCOPUS. Search terms included *mobile care*, *asthma*, *school*, *school nursing*, *care coordination*, *case management*, and with and without the term *child*. Variations of these terms were also used in the search process as well as mesh terms. These search terms were chosen because they pertained to school health and mobile clinics and identified the importance and applicability of care coordination in this setting and population. Only records from 2012 to 2017 were kept with the exclusion of two historic articles from a successful mobile clinic to make comparisons and glean information for the asthma van program. Fifty-five articles were identified and eight research articles were kept due to their relevance to the population and problem. Out of the eight articles kept, two articles were systematic reviews

and/or meta-analysis, three were quantitative studies, two were qualitative studies, and one policy statement. Articles that were eliminated were greater than 5 years old, did not meet all search terms, or lacked relevance to the problem. Sources other than the databases were not used. Themes found include care coordination, role of school nurses, mobile care processes, and strategies to improve appointment attendance.

Care Coordination

Care coordination is a core component of the health delivery system that provides high-quality care while also achieving efficiency by promoting care coordination between individuals involved in patient outcomes (AHRQ, 2016; Turchi & Antonelli, 2014). Turchi and Antonelli (2014) state that care coordination in primary care pediatric practice is associated with decreased emergency department (ED) visits and unplanned hospitalizations, as well as decreased unnecessary office visits and improved patient satisfaction (AHRQ, 2016; Turchi & Antonelli, 2014). When individuals miss their asthma appointment, it affects the quality and continuity of patient care (DuMontier, Rindfleisch, Pruszyński, & Frey, 2013).

Role of School Nurses

Many studies discuss the importance of school nurses in identifying asthma and collaborating with health-care providers. School nurses are in a convenient setting that allows them to refer students to medical care, identify ways to improve the school environment to decrease asthma triggers, and provide asthma education (CDC, 2017b). The school nurse has a crucial role in identifying students with asthma and, as a case manager, can facilitate collaboration and communication among the school, family, and health-care providers (Moricca et al., 2012). Strong collaboration and commitment between the community-based provider and school nurse is fundamental to a project's success (Moricca et al., 2012). Literature consistently showed that when school nurses communicated with community organizations and health-care members, the health needs of students were more easily met and access to care and asthma control was improved (Cheung et al., 2015; Leroy, Wallin, & Lee, 2017).

Comparison With Mobile Units

Many mobile clinics provide asthma care to children in underserved areas throughout the United States. One successful mobile asthma unit in another state has many similarities to the asthma van as well as some differences (Jones et al., 2005). The out-of-state asthma unit embraced a strong foundation in care coordination, as evidenced by collaboration with school nurses and quarterly evaluation of student attendance rates (Jones et al., 2005). The unit also used school nurses to bring the students to clinic from school, used a standard approach to survey children with asthma,

and provided care to middle- and high-school children without a guardian present, if the guardian had provided consent to treat (Jones et al., 2005).

Strategies

Strategies found in the literature to improve appointment attendance included using written consents to provide medical services to unaccompanied minors, partnering with community organizations, giving reminder telephone calls to guardians, improving student education, and enhancing care coordination (Jones et al., 2005; Leroy et al., 2017; Lin & Wu, 2014; Turchi & Antonelli, 2014). It is important to use strategies in a multimodal, multilevel effort to increase motivation and knowledge about the importance of preventative asthma care to improve appointments scheduled and attended (Eakin et al., 2012). A strategy to improve asthma screening included using a simple and effective screening tool (Moricca et al., 2012).

The above literature findings were used to aid in program development. Specifically, we found that care coordination is essential between those involved in patient care, school nurses play an important role in collaborating with health-care providers and project success, consents have been useful in other mobile care programs as well as partnering with community organizations, and asthma screening can be improved with a simple tool.

Aims

The aim of the program was to create a multifaceted asthma van program guided by the PPM, overcome barriers to accessing asthma care from providers on the asthma van, and ultimately increase the number of appointments scheduled and attended on the asthma van at two inner-city school locations.

Method

The design of the program was quality improvement. Information was sent to the institutional review board (IRB) at Rush University, which agreed that it was quality improvement and was exempt from IRB review.

We used the elements of the PPM to guide the planning and implementation of the asthma van program. For the PPM constructs and related activities, see Table 1.

Social and Epidemiologic Assessment

The PPM framework was used to conduct a social assessment, which identified the asthma van as a nonprofit mobile unit that provides no-cost asthma, dental, and children's health care at school locations throughout the large city used in this program (MCC, 2017a). Children aged 6 months to 18 years receive services from the asthma van at the two schools, and children who are not school-aged or do not attend the schools but live in the community may receive

Table 1. PRECEDE–PROCEED Model Constructs and Related Activities.

PRECEDE–PROCEED Model Constructs	Related Activities
Phase 1: Social assessment	Assessed social factors of the asthma van
Phase 2: Epidemiological assessment	Assessed city, state, and local health association data for both communities
Phase 3: Educational and ecological assessment	Assessed education and ecological factors of both communities
Phase 4: Administrative and policy assessment and intervention alignment	Interviewed school nurses, school staff, and asthma van staff
Phase 5: Implementation	Developed multifactorial program including: (a) develop and implement unaccompanied minor consent, (b) enhance care coordination and communication, and (c) improve respiratory health survey screening process
Phase 6: Process evaluation	Evaluated interventions to determine whether consent development, communication, and survey processes were enhanced
Phase 7: Impact evaluation	Evaluated appointments scheduled and attended, survey return rate, received asthma action plans, and collaboration efforts
Phase 8: Outcome evaluation	Evaluated program effect on attendance

Note. Adapted from Green and Kreuter (2005).

care. The mobile clinic receives funding from a health-care organization, a research grant, various foundations, individual donors, and Medicaid reimbursements (M. Seimer, personal communication, December 14, 2017). Children receiving asthma services speak English and Spanish, and asthma van staff members are Caucasian and Hispanic who also speak English and Spanish but not all staff members are bilingual.

Epidemiological, behavioral, genetic, and environmental factors were assessed using city, state, and local health association data. Both communities are composed of large populations with race and ethnicity of mainly Hispanic or Latino and Black (Chicago Metropolitan Agency for Planning [CMAP] 2017a, 2017b). In the state, Latin American immigrants make up most of the undocumented population with lesser portions of Asian and European immigrants (Tsao, 2014). Immigrant rates are important because literature shows that immigrants have many barriers to accessing care

Table 2. Epidemiological Comparisons Between Communities A and B.

	Community A	Community B
Total population	34,410	55,011
Population of children 0–12 years old	6,387	11,882
Race		
Hispanic or Latino	82%	52%
Black	4%	42%
White	12%	5%
Asian	2%	0.5%
Undocumented immigrant rate	NA	23%
Childhood poverty level 6–11 years old	49%	45%
HP2020 childhood emergency department rate	>148.8 per 10,000	49.7–99.2 per 10,000

and underutilize health-care services (Hacker, Anies, Folb, & Zallman, 2015).

In 2017, more than a third of children aged 6–11 years in the state and both communities lived in poverty (Illinois Action for Children, 2017a, 2017b). Children who live in poor households have a higher prevalence of asthma than children who live in higher income households (IDPH, 2016). Childhood asthma ED visits and hospitalization rates in the two communities are 2–3 times higher than the Healthy People 2020 objectives, which may indicate poor asthma control and increased risk of negative outcomes of asthma (Dirksen & Prachand, 2016; Zahran et al., 2018). Asthma van students have better asthma control; in fiscal year 2016 (June 1 to July 30), 97% of students who received care on the asthma van at all school locations did not have an asthma-related ED visit or hospitalization and 85% were at or below the national average for school absenteeism (MCF, 2016a). For epidemiologic comparisons between the communities, see Table 2.

Educational and Ecological Assessment

In 2015, 65–69% of individuals in both communities received a high school diploma or higher compared to 85% in the total city (CMAP, 2017a, 2017b). This factor increases the risk of decreased asthma management for children (Standards Subcommittee of the Asthma Disparities Workgroup, 2016). Community B individuals have lower rates of health-care insurance compared with individuals in the city and the United States (RUMC, 2016). In Community B, 33.1% of individuals do not have health-care insurance compared with the 19.6% in the city and 13.3% in the United States (RUMC, 2016).

Environmental factors such as exposure to secondhand cigarette smoke, marijuana smoke, and home allergens are known risk factors for asthma and are more prevalent in disadvantaged communities such as Communities A and B

(IDPH, 2013; Wilson, 2016). Rats, mice, and cockroaches are examples of home allergens that are more prevalent in poverty-stricken areas (Camacho-Rivera, Kawachi, Bennett, & Subramanian, 2014). Cockroach exposure is a potent allergen and is detrimental to children with asthma (Camacho-Rivera et al., 2014). One study showed that Hispanic households in high-poverty urban neighborhoods had higher levels of cockroaches than non-Hispanic households (Camacho-Rivera et al., 2014). According to the American Lung Association (2016), the city of focus for the program was the 21st most ozone-polluted city in the United States in 2015. In addition, Community B historically had high levels of air pollution caused in part by a coal-fired power plant and smelting plant (Guzzardi, 2011). Due to high rates of air pollution, an air quality-monitoring device was placed at Community B School (Guzzardi, 2011). According to the Illinois Environmental Protection Agency Quality Reports (2015), throughout the state of Illinois where 64 other air quality monitors are placed, Community B School had the highest level of cadmium, which is a toxic particulate matter that can exacerbate asthma.

Administrative and Policy Assessment

To assess reasons for missed appointments, phone interviews were conducted with guardians of students who receive services from the asthma van. Forty-two percent of guardians interviewed reported that work interfered with their scheduled appointment. In-person interviews were conducted with five school nurses and school faculty from both schools in the program and other schools served by the asthma van. School faculty consisted of a case manager, principal, the director of the city's public schools, and a school counselor. Nurses and faculty were asked the following questions: (1) Do you know how asthma surveys are distributed and collected? (2) Do you wish communication and care coordination could be improved with asthma van staff? (3) Do you receive asthma action plans? (4) Are you aware of any barriers with appointment attendance? and (5) Do you have any suggestions to improve no show rates on the asthma van? Interview results showed (1) staff was aware of asthma van surveys being distributed but was not sure how they were collected, and there was a lack of consistency in using surveys at various school locations to screen for asthma; (2) the majority of staff expressed a lack of communication between school nurses and asthma van staff; (3) school nurses stated they were not receiving asthma action plans, (4) staff stated some barriers for students attending appointments may include guardians work schedules, decreased knowledge about asthma van services, and a decline in public school enrollment; and (5) recommendations for improving no show rates included treating students without guardians' present and promoting awareness of the asthma van.

Due to the report of inconsistency in using surveys to identify children with asthma, the survey return rate at both schools was analyzed. Results showed the survey return rate in 2016 was 29% at Community A School and 39% at Community B School.

Public school attendance was further assessed due to school staff reporting a decline of student enrollment. The city's public school enrollment declined over the past 12 years and decreased 5.3% from 2015 to 2017 (Cherone & Ali, 2017; Friedman, 2017). Factors contributing to the decline include a declining birth rate, an overall statewide reduction in students, and out-migration of families in certain areas of the city (Friedman, 2017).

In-person interviews with five asthma van staff members revealed lack of collaboration with local respiratory health organizations and subjective reports of increasing rates of appointment absenteeism and a decreasing number of students attending asthma van appointments. Asthma van staff was not aware if there had been any changes in attendance since the implementation of the Affordable Care Act (ACA).

Before implementation of the ACA in 2010, both school sites had less students scheduled for appointments compared with succeeding years but the percentage of students that attended their appointment was higher (MCF, 2016b). The increased number of appointments scheduled since implementation of the ACA emphasizes that there is a continued need for the asthma van in these communities, despite changes in health-care reform.

Based on interview findings and literature, we developed a multifactorial program that entailed three parts: (a) develop and implement an unaccompanied minor consent (UMC); (b) enhance care coordination and communication among asthma van staff, school nurses, and a local respiratory health organization; and (c) improve the current respiratory health survey screening process used to identify children with asthma at the two schools.

In the subsequent text, we discuss the components of the PPM framework and program.

Unaccompanied Minor Consent

The aim of the UMC was to improve asthma van attendance by having students permitted to be seen and treated during the school day without a guardian present. The UMC has been used successfully by other asthma vans in literature reviews and was also recommended by school nurses based on the perceived barriers in the community. Asthma van staff interviews were conducted to aid in how the UMC was developed. Staff agreed that the consent should be bilingual and written in simple language; the guardian must be available by phone to discuss the status of the child's care and require a guardian and witness signature. It was determined that school staff or asthma van staff could sign as a witness. The asthma van provider then worked with the director of operations to develop the UMC. The UMC is an additional

document to the asthma van's consent to medical services that every guardian is required to sign. The UMC specifies that guardians agree to the provider caring for their child without their presence, and the guardian must be available by phone on the day the child is seen on the asthma van. Consent development involved determining eligibility and recruitment.

Eligibility. The program coordinator collaborated with the asthma van provider to determine eligibility criteria for the UMC. Students were eligible if they had their first appointment with the clinic, attended the school site, and had been absent from at least one appointment in the past 3 months. A spreadsheet with student attendance information was reviewed to identify eligibility.

Recruitment. Once eligibility had been determined, guardians were called on the phone, notified of the service, and given the choice to be part of the UMC process. For guardians agreeable to the service, verbal consent was obtained over the phone, and written consent was obtained when guardians presented to school to pick up their children. This method was chosen because the asthma van is not present daily at schools to obtain and collect consents. School staff including school nurses, a security officer, and a school counselor between the two school locations agreed to bring children from the classroom to their appointment as well as return children to the classroom after their appointment. Since school nurses are not present at the two school locations daily, it was necessary to ensure students had an escort to their appointment so a workflow policy was created.

Workflow policy. The security officer was a trusted individual at School A, who had more availability to bring children to the asthma van than other staff members. The security officer also assisted in distributing and collecting asthma surveys and helped to schedule the van at the school. The principal played a key role in the logistics of the program and approved online surveys.

The new policy included that when it was time for a student's appointment, the asthma van staff would make a phone call to the school nurse or main office and school staff would bring the student from the classroom to the asthma van. After the appointment was completed, asthma van staff would call the staff member again and the student was escorted from the appointment back to the classroom. The decision of whether to call the school nurse or main office would depend on whether the nurse was present at school that day. School staff did not need additional training because they did not attend the appointment. Costs included in the development of the consent included opportunity costs of employed staff, which were losses in work productivity and in-kind support from the asthma van staff to print consent forms.

Evaluation. The policy was evaluated through staff and determining the number of UMCs obtained.

Results of UMC

In person and telephone discussions with asthma van and school staff indicated satisfaction with production of the consent and willingness of school nurses to collaborate with the van staff to assist children in attending appointments. However, implementation of the UMC was not as successful as expected because only three students were identified as candidates over a 10-month time frame. The limited number of students selected was influenced by the following factors: inability to contact guardians, new students not having their first appointment, some students did not attend either school; and staff turnover led to two new providers assigned to Community A and B Schools, which delayed implementation efforts.

Communication and Collaboration

Improvements to the team approach were made to enhance care coordination. The team consisted of the program coordinator, nurse practitioner, medical assistant, director of patient services on the asthma van, staff at a local respiratory health association, school nurses, and school support staff.

Procedure. Research shows that collaboration with community organizations helps improve attendance so a local respiratory health organization was sought out (Leroy et al., 2017). The organization chosen is active in research, advocacy, and community programs regarding respiratory health and provides educational asthma programs for children in the school setting (Respiratory Health Association [RHA], 2018). This collaborative effort could allow for more children with asthma to be identified, educated, and treated.

Many studies show that collaboration with school nurses improves access to care so the asthma van team collaborated with school staff at Community A School and Community B School, including the school nurse, school counselor, security officer, and principals (Cheung et al., 2015; Leroy et al., 2017). These staff members consisted of all individuals involved in the quality improvement program at the two schools. School staff members had diverse roles so each individual was important to the success of the program. For example, the school nurse and school counselor had long-standing relationships with students and their family members, which was helpful to identify children with asthma and discuss potential barriers to children seeking treatment. School nurses requested to receive asthma action plans on an annual basis and a roster of students who attended their asthma appointment at each school visit, so a workflow policy was created.

Workflow policy. To ensure school staff received asthma action plans and patient rosters, a workflow policy was developed with staff input. A focus group was held to develop the policy and determined that the provider will make a copy of the asthma action plan and give two copies to the guardian. The guardian was responsible to provide one copy to the school nurse. The student roster was hand delivered by the medical assistant to the school office at the end of the clinic day where staff could obtain the roster.

To improve the program's chances of success, it was important to seek low-cost methods to advertise and develop a low-commitment plan for collaboration between asthma van staff, school nurses, and the local respiratory health association (Respiratory Health Association, 2018).

Measure. Interviews were conducted to measure collaboration efforts. Meetings between asthma van staff and staff at the respiratory health organization were counted. The percentage of asthma action plans and student rosters received by school nurses was calculated to analyze whether collaboration was successful.

Results. Collaboration efforts were successful with the respiratory health organization, as indicated by the two meetings held, which met the objective. Additionally, the asthma van staff and respiratory health organization staff agreed to collaborate and promote one another throughout mutual public schools.

School nurses at Community A School and Community B School reported receiving asthma action plans and student rosters more than 75% of the time, which met the objective. Nurses remained eager to assist asthma van staff in identifying children with asthma and increasing appointment attendance.

Respiratory Health Survey Process

The aim was to improve the respiratory health survey process, an annual screening of all students with a short, self-administered, take-home paper respiratory health survey filled out by guardians. At both schools, this is used to identify children who may have asthma.

Procedure. Changes were made to the current process since literature supports the use of a simple and effective tool to improve asthma screening (Moricca et al., 2012). First, a multiple-choice, fill-in-the-blank electronic survey was created in English and Spanish using an online survey tool. The electronic survey created was identical to the paper survey distributed to children at both school locations, which has been effective in the past. Next, a survey tip sheet for teachers at both schools was developed based on the results of a focus group with asthma van staff. The survey tip sheet provided information regarding when to distribute and where to return surveys, and a contact phone number was

given for questions. Lastly, an information sheet was developed based on the results of the focus group to inform guardians about the online option and directions to access the survey. The information sheet was stapled to every paper survey distributed to children at the two school locations. Staff at both schools placed links to the survey on school and social media websites.

The asthma van team communicated with school staff regarding the most opportune time to distribute and collect surveys. A packet of 100 paper surveys with attached information sheets and a survey tip sheet for each teacher was delivered to Community A School 4 weeks after the start of school to distribute to new students only. Five months later, 788 surveys were provided to the school to survey all 718 students for asthma. A packet of 300 paper surveys with attached information sheets and a survey tip sheet for each teacher was delivered to Community B School 1 week after school started to survey all 267 students. Colored fliers were also developed to market the asthma van and placed in public areas at each school location.

Measure. Interviews were conducted to measure whether the survey process was enhanced. To determine whether the survey return rate increased, the percent change was calculated from pre- and postintervention. Survey counts were double-checked with a second counter to ensure reliability.

Results. At School A, 143 surveys were returned out of 788 surveys delivered, and 5 surveys were completed online, which is a 19% return rate and did not meet or exceed the baseline return rate of 29%. At School B, 94 surveys were returned out of 300 delivered and 1 survey was completed using the online survey tool, which is a 32% return rate and did not meet or exceed the baseline return rate of 39%. There was a discrepancy in the number of surveys returned at one school. Limitations of the online tool include that at Community B School, paper surveys were passed out 3 weeks before information about an online survey was distributed to guardians. In addition, teachers did not receive the information sheet that discussed steps to streamline the survey process. These components may account for the low online survey response and paper survey response from Community B School. As well, the surveys were to be distributed at the beginning of the school year among other required paperwork in anticipation of a better return rate. However, school staff was busy at the start of the year, which led to a delay in dispensing surveys, and incentives were not approved for students who returned surveys. Another drawback is that subscription for the online survey is costly for the asthma van organization. Lastly, the two communities may not have access or limited availability of Internet services to complete online surveys. Developing a timeline of when surveys can be distributed and identifying incentives for returned surveys prior to the start of the school year is a recommendation to improve return rates.

Table 3. Results for School A and School B From 2012 to 2018.

Year	Appointments Scheduled	No Shows	Cancellations	Total Percent of No Shows and Cancellations	Appointments Attended
Data for School A from 2012 to 2018					
2012	148	42 (28.38%)	14 (9.46%)	37.84	62.16%
2013	116	27 (23.28%)	10 (8.62%)	31.90	68.10%
2014	117	36 (30.77%)	11 (9.40%)	40.17	59.83%
2015	119	31 (26.05%)	17 (14.29%)	40.34	59.66%
2016	74	25 (33.78%)	11 (14.86%)	48.65	51.35%
2017	94	31 (32.98%)	10 (10.64%)	43.62	56.38%
October 1, 2015 to December 31, 2016	91	29 (31.87%)	16 (17.58%)	49.45	50.55%
January 1, 2017 to March 31, 2018	105	33 (31.43%)	12 (11.43%)	42.86	57.14%
Data for School B from 2012 to 2018					
2012	175	35 (20.00%)	20 (11.43%)	31.43	68.57%
2013	148	16 (10.81%)	18 (12.16%)	22.97	77.03%
2014	110	15 (13.64%)	14 (12.73%)	26.36	73.03%
2015	90	15 (16.67%)	12 (13.33%)	30.00	70.00%
2016	70	19 (27.14%)	8 (11.43%)	38.30	61.43%
2017	69	7 (10.14%)	11 (15.94%)	26.09	73.91%
October 1, 2015 to December 31, 2016	94	24 (25.53%)	12 (12.77%)	38.30	61.70%
January 1, 2017 to March 31, 2018	93	14 (15.05%)	12 (12.90%)	27.96	72.04%

Note. Data from October 1, 2015, to December 31, 2016, were collected over a 15-month time frame before program implementation, and data from January 1, 2017 to March 31, 2018, were collected over a 15-month time frame after program implementation.

Ethically, individuals had the right to self-determination by understanding that they did not have to complete surveys or attend appointments. Additionally, student information was kept confidential and only shared with asthma van staff who was involved with student care.

Results

The results of the UMC development, communication and collaboration efforts, and respiratory health survey process improvements were analyzed along with the asthma van's appointment summary log to determine whether the asthma van overcame barriers and reached the aim of the program. The appointment summary log data were analyzed over two similar 15-month time frames before program implementation and after program implementation to determine whether the number of appointments scheduled and the number and percentage of appointments attended increased from baseline data at School A and School B. From January 2017 to March 2018, at School A, 105 appointments were scheduled and 60 students attended their appointment, which represents 57% of appointments attended compared with 50% of appointments attended from October 2015 to December 2016 (MCF, 2017). From January 2017 to March 2018, at School B, 93 appointments were scheduled and 67 students attended their appointment, which represents 72% of appointments attended compared with 61% of appointments attended from October 2015 to December 2016 (MCF, 2017). These data show the number and percentage of appointments attended increased at both schools. The number of appointments scheduled increased at School A and the

number of appointments scheduled at School B decreased by one appointment (see Table 3).

During fiscal year 2017, 97% of students who received care on the asthma van at all school locations in the city did not have an asthma-related ED visit or hospitalization that did not change from fiscal year 2016 (MCC, 2016, 2017b). Also during fiscal year 2017, 99% of children who received care on the asthma van at all school locations were at or below the national average for asthma-related school absenteeism, an increase from 85% in 2016 (MCC, 2016, 2017b). Results of the program in 2017 continued to show that children who receive care on the asthma van had improved asthma control even though other factors were involved.

Discussion

The program developed, implemented, and evaluated a multifactorial approach to improve the use of an asthma van at two schools in two communities that have higher rates of asthma than other areas of the United States and the same state (IDPH, 2016; RUMC, 2013). The purpose of the program was to increase the number of appointments scheduled and number and percentage of appointments attended on the asthma van at Community A School and Community B School.

This work showed that a multifactorial approach improved the number and percentage of students appointments scheduled at both schools and in the number of appointments attended at one school. The UMC was developed but not distributed to a large enough number of students to make a significant difference in attendance rates.

Enhancements to the respiratory health survey process did not improve the survey return rate. Collaboration and communication improved between asthma van staff and school nurses and between asthma van staff and the local respiratory health association. Overall, an increased awareness of the program factored into the results. The program mainly utilized opportunity costs and in-kind support for printing information sheets for guardians and purchasing an online survey tool subscription.

A general potential limitation is that immigration status may be a factor in students' enrollment in asthma services. Community-specific barriers existed that interfered with students attending their appointment that may be different in other settings and environments. It would be beneficial to look into barriers guardians experience regarding survey completion and to identify how many students receive asthma care from a primary care provider. Communication and collaboration between asthma van staff and school nurses imposed a challenge due to the schedules of each organization.

Sustainability plans were made to continuously identify students eligible for the UMC and a protocol for sending students to the ED was developed. New asthma providers and school staff were introduced, and a conversation was held regarding continued collaboration with school nurses and staff and the local respiratory health organization. Findings were that school staff agreed to continue collaborating for the following school year and requested to receive respiratory health surveys in the summer so they can distribute them earlier. The respiratory health organization and van staff made plans to continue collaboration efforts.

School Nursing Implications

The program would not have been successful without the collaboration of school nurses and staff. School nurse and staff willingness to answer interview questions gave insight on communication and collaboration issues, barriers that students may be facing, system issues, and suggestions on how to improve attendance rates, which aided in the development of the program. Additionally, school staff assistance allowed the UMC process to be implemented as well as piloting improvements to the asthma survey to identify children with asthma. The van's partnership with the local school staff allowed for specialty care to be delivered to children in neighborhoods where they otherwise may not receive asthma management.

Future recommendations would be for school nurses to continue communicating and collaborating with health-care providers to aid in identifying children with asthma and increasing appointment attendance for specialty care. These efforts improve childhood asthma and also allow for public schools to increase their funding by having improved attendance when asthma is under control. Findings from this program can be implemented in other settings that have

similar challenges. The PPM can be a transferable model for school nurses interested in developing a program or initiating research for quality improvement. Tracking school sick days due to asthma would help determine whether future asthma programs increase school attendance.

Acknowledgments

The authors would like to acknowledge Karen Batty at Rush University for critiquing the project prior to developing a manuscript and providing insight regarding childhood asthma and school nursing. They would like to acknowledge Carol Remen, NP, who worked on the asthma van and assisted with program development, coordination, and collaboration, and Matt Siemer, executive director with the asthma van who assisted with collaboration efforts and project coordination.

Author Contributions

The manuscript was drafted by Lindsay Green while Sarah Ailey co-contributed to the conception of the manuscript, acquisition and analysis of data, and critical revision of the drafts. Both authors gave final approval on the text and agree to be accountable for all aspects of work ensuring integrity and accuracy.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Lindsay A. Green, DNP, APRN, FNP-BC, CEN  <https://orcid.org/0000-0002-3918-683X>

References

- American Academy of Allergy, Asthma, and Immunology. (2018). *Pediatric asthma definition*. Retrieved from <https://www.aaaai.org/conditions-and-treatments/conditions-dictionary/Pediatric-Asthma>
- Agency for Healthcare Research and Quality. (2016). *Care coordination*. Retrieved from <https://www.ahrq.gov/professionals/prevention-chronic-care/improve/coordination/index.html>
- American Lung Association. (2016). *State of the air 2016*. Retrieved from www.lung.org/assets/documents/healthy-air/state-of-the-air/sota-2016-full.pdf
- Camacho-Rivera, M., Kawachi, I., Bennett, G., & Subramanian, S. (2014). Associations of neighborhood concentrated poverty, neighborhood racial/ethnic composition, and indoor allergen exposures: A cross sectional analysis of Los Angeles households, 2006–2008. *Journal of Urban Health*, 91, 661–676. doi:10.1007/s11524-014-9872-9
- Centers for Disease Control and Prevention. (2015). *Asthma-related missed school days among children aged 5–17 years*. Retrieved from https://www.cdc.gov/asthma/asthma_stats/missing_days.htm

- Centers for Disease Control and Prevention. (2017a). *Most recent asthma data*. Retrieved from https://www.cdc.gov/asthma/most_recent_data.htm
- Centers for Disease Control and Prevention. (2017b). *Strategies for addressing asthma in schools*. Retrieved from https://www.cdc.gov/asthma/pdfs/strategies_for_addressing_asthma_in_schools_508.pdf
- Cherone, H., & Ali, T. (2017). *CPS enrollment down nearly 10,000 students since last year, officials say*. Retrieved from <https://www.dnainfo.com/chicago/20171020/andersonville/cps-enrollment-drops-by-nearly-10000-students-officials>
- Cheung, K., Rasberry, C. N., Dunville, R. L., Buckley, R., Cook, D., Daniels, B., & Robin, L. (2015). A multicomponent school-based asthma management program: Enhancing connections to clinical care. *The Journal of School Health*, 85, 135–140. doi:10.1111/josh.12226
- Chicago Metropolitan Agency for Planning. (2017a). *Community data snapshot: Humboldt Park*. Retrieved from <http://www.cmap.illinois.gov/documents/10180/126764/Humboldt+Park.pdf>
- Chicago Metropolitan Agency for Planning. (2017b). *Community data snapshot: Lower west side*. Retrieved from <http://www.cmap.illinois.gov/documents/10180/126764/Lower+West+Side.pdf>
- Crosby, R. A., DiClemente, R. J., & Salazar, L. F. (2013). The precede-proceed planning model. In R. J. DiClemente L. F. Salazar & R. A. Crosby (Eds.), *Health behavior theory for public health: Principles, foundations and applications* (13th ed., pp. 45–64). Burlington, MA: Jones & Bartlett.
- Dirksen, J., & Prachand, N. (2016). *Healthy Chicago 2.0: Partnering to improve health equity 2016–2020*. Retrieved from https://www.cityofchicago.org/content/dam/city/depts/cdph/CDPH/Healthy%20Chicago/HealthyChicago_CHA_4102017.pdf
- DuMontier, C., Rindfleisch, K., Pruszyński, J., & Frey, J., III. (2013). A multi-method intervention to reduce no-shows in an urban residency clinic. *Family Medicine*, 45, 634–641. Retrieved from <https://www.ncbi.nlm.nih.gov.ezproxy.rush.edu/pubmed/?term=A+multi-method+intervention+to+reduce+no-shows+in+an+urban+residency+clinic>
- Eakin, E. N., Rand, S., Bilderback, A., Bollinger, M. E., Butz, A., Kandasamy, V., & Riekert, K. (2012). Asthma in head start children: Effects of Breathmobile and family communication on asthma outcomes. *Journal of Allergy and Clinical Immunology*, 129, 664–670. doi:10.1016/j.jaci.2011.10.013
- Environmental Protection Agency. (2018). *Managing asthma in the school environment*. Retrieved from <https://www.epa.gov/iaq-schools/managing-asthma-school-environment>
- Friedman, B. (2017). *Enrollment down, per-pupil spending inches up in new CPS budgets*. Retrieved from <https://chicagotonight.wttw.com/2017/07/20/enrollment-down-pupil-spending-inches-new-cps-budgets>
- Green, L. W., & Kreuter, M. W. (2005). A framework for planning. In L. W. Green & M. W. Kreuter (Eds.), *Health program planning: An educational and ecological approach* (pp. 1–28). Boston, MA: McGraw-Hill.
- Guzzardi, W. (2011). *Pollution: Pilsen students protest coal plants and smelter after grim air quality report*. Retrieved from https://www.huffingtonpost.com/2011/06/16/chicago-pollution-pilsen-n_878241.html
- Hacker, K., Anies, M., Folb, B., & Zallman, L. (2015). Barriers to health care for undocumented immigrants: A literature review. *Risk Management Healthcare Policy*, 8, 175–183. doi:10.2147/RMHP.S70173
- Illinois Action for Children. (2017a). *Population and poverty data by Chicago community area, updated December 2017*. Retrieved from <http://www.actforchildren.org/wp-content/uploads/2018/01/Census-Data-by-Chicago-Community-Area-2017.pdf>
- Illinois Action for Children. (2017b). *Population and poverty data by Cook County municipality, updated December 2017*. Retrieved from <http://www.actforchildren.org/wp-content/uploads/2018/01/Census-Data-by-Cook-Municipality-2017.pdf>
- Illinois Department of Public Health. (2013). *The burden of asthma in Illinois, 2010–2011*. Retrieved from www.dph.illinois.gov/sites/default/files/publications/ilburdenasthmaaugust2013r.pdf
- Illinois Department of Public Health. (2016). *Illinois childhood asthma surveillance report, 2011–2014*. Retrieved from www.dph.illinois.gov/sites/default/files/publications/publicationsowh2016-il-childhood-asthma-surveillance-report_0.pdf
- Illinois Environmental Protection Agency. (2015). *Illinois air quality report*. Retrieved from <http://www.epa.illinois.gov/topics/air-quality/air-quality-reports/2015/index>
- Jones, C., Clement, L., Hanley-Lopez, J., Morphew, T., Yat Choi Kwong, K., Lifson, F., . . . Guterman, J. (2005). The Breathmobile program: Structure, implementation, and evolution of a large-scale, urban, pediatric asthma disease management program. *Disease Management*, 8, 205–222. Retrieved from <http://online.liebertpub.com.ezproxy.rush.edu/doi/abs/10.1089/dis.2005.8.205>
- Leroy, Z., Wallin, R., & Lee, S. (2017). The role of school health services in addressing the needs of students with chronic health conditions. *The Journal of School Nursing*, 33, 64–72. Retrieved from <http://journals.sagepub.com.ezproxy.rush.edu/doi/abs/10.1177/1059840516678909>
- Lin, H., & Wu, X. (2014). Intervention strategies for improving patient adherence to follow-up in the era of mobile information technology: A systematic review and meta-analysis. *PLoS One*, 9, e104266. doi:10.1371/journal.pone.0104266
- Mobile Care Chicago. (2016). *Mobile care Chicago children's medical care—2016 annual report*. Chicago, IL: Author.
- Mobile Care Chicago. (2017a). *Mission*. Retrieved from <https://mobilecarechicago.org/about-us-2/mission/>
- Mobile Care Chicago. (2017b). *Mobile care Chicago children's medical care—2017 annual report*. Chicago, IL: Author.
- Mobile Care Foundation. (2016a). *Report: Patient demographic data*. Chicago, IL: Author.
- Mobile Care Foundation. (2016b). *2011–2016 Appointment summary*. Chicago, IL: Author.

- Mobile Care Foundation. (2017). *2017 Appointment summary fiscal year 17–18*. Chicago, IL: Author.
- Moricca, M. L., Grasska, M. A., Marthaler, M. B., Morphey, T., Weismuller, P. C., & Galant, S. P. (2012). School asthma screening and case management: Attendance and learning outcomes. *The Journal of School Nursing, 29*, 104–112. doi:10.1177/1059840512452668
- National Collaborative on Education and Health. (2015). *Brief on chronic absenteeism and school health*. Retrieved from <https://healthyschoolscampaign.org/wp-content/uploads/2015/12/Chronic-Absenteeism-Background-Paper.pdf>
- O'Byrne, P., Pederson, S., Schatz, M., Thoren, A., Eklholm, E., Carlsson, L. G., & Busse, W. (2013). The poorly explored impact of uncontrolled asthma. *Chest, 143*, 511–523. doi:10.1378/chest.12-0412
- Respiratory Health Association. (2018). *Our mission*. Retrieved from <https://lungchicago.org/about-us/our-mission/>
- Rush University Medical Center. (2013). *Rush University Medical Center Community Health Needs Assessment*. Retrieved from <https://www.rush.edu/sites/default/files/pdf/CHNAReportFinal.pdf>
- Rush University Medical Center. (2016). *Rush Community Health Needs Assessment report*. Retrieved from <https://www.rush.edu/sites/default/files/rush-chna-2016.pdf>
- Standards Subcommittee of the Asthma Disparities Workgroup. (2016). *Measures to identify and track racial disparities in childhood asthma: Asthma disparities workgroup subcommittee recommendations*. Retrieved from https://www.cdc.gov/asthma/pdfs/Racial_Disparities_in_Childhood_Asthma.pdf
- Tsao, F. (2014). *Illinois undocumented immigrant population: A summary of recent research by Rob Paral and Associates*. Retrieved from www.icirr.org/content/documents/Illinois_undocumented_report.pdf
- Turchi, M. R., & Antonelli, C. R. (2014). Policy statement: Patient and family-centered care coordination: A framework for integrating care for children and youth across multiple systems. *Pediatrics, 133*, 1451–1460. doi:10.1542/peds.2014-0318
- Wilson, K. (2016). Secondhand marijuana smoke is not benign. *Journal of the American Heart Association, 5*, 1–2. doi:10.1161/JAHA.116.004004
- Zahran, H. S., Bailey, C. M., Damon, S. A., Garbe, P. L., & Breyse, P. N. (2018). Vital signs: Asthma in children—United States, 2001–2016. *Morbidity and Mortality Weekly Report, 67*, 149–155. doi:10.15585/mmwr.mm6705e1

Author Biographies

Lindsay A. Green, DNP, APRN, FNP-BC, CEN, is a family nurse practitioner in the Department of Family Practice at Crossing Healthcare.

Sarah H. Ailey, PhD, RN, CNE, PHNA-BC is a professor in the Department of Community and Mental Health Nursing at Rush University.