State of Connecticut
Connecticut Department of Public Health

Improved Outcomes among Clients of a Connecticut Asthma Home Visiting Program

Client referral period: September 2016-December 2020

Improved Outcomes among Clients of a Connecticut Asthma Home Visiting Program

Client referral period: September 2016-December 2020

Commissioner Manisha Juthani, MD
Connecticut Department of Public Health

Publication Date: February 2024

Prepared by:

Jessica Brockmeyer, MPH
Epidemiologist
Chronic Diseases and Injury Prevention Section
Connecticut Department of Public Health

For additional information about Improved Outcomes among Clients of a Connecticut Asthma Home Visiting Program, contact:

Connecticut Department of Public Health
Asthma Program
410 Capitol Avenue
PO Box 340308, MS# 11HLS
Hartford, CT 06134-0308
Email: dph.asthmaprogram@ct.gov
Website: http://www.ct.gov/dph/asthma

Suggested citation: Brockmeyer, J., Peng, J., Bournaki, M., & Angulo, R. (2024). Improved Outcomes among Clients of a Connecticut Asthma Home Visiting Program, Client referral period: September 2016-December 2020. Connecticut Department of Public Health, Chronic Diseases and Injury Prevention Section, Hartford, CT.

Funding provided by the Centers for Disease Control and Prevention, Grant Number: NUE1EH001374.

Acknowledgments

Connecticut Department of Public Health Executive Leadership

Manisha Juthani, MD
Commissioner

Jody Terranova, DO, MPA
Deputy Commissioner

Julie Vigil, MS, MPH, CHC, CHRC, FACHE
Branch Chief - Community, Family Health and Prevention Branch

Rosa M. Biaggi, MPH, MPA
Section Chief – Chronic Diseases and Injury Prevention Section

Amy Mirizzi, MPH, CPH
Public Health Services Manager – Chronic Disease Director

Connecticut Department of Public Health

Asthma Program Staff

Marie-Christine Bournaki, RN, PhD
Nurse Consultant

Epidemiology Unit Staff

Justin Peng, MPH
Epidemiologist 4

Jessica Brockmeyer, MPH
Epidemiologist 3

Thank you to the following people for their contributions in making this report possible:

Putting on AIRS program contracting agencies

Central Connecticut Health District
Connecticut River Area Health District
Eastern Highlands Health District
Ledge Light Health District
Middlesex Hospital
Milford Health Department
North Central District Health Department
Northeast District Department of Health
Saint Mary's Hospital
Stratford Health Department
Waterbury Health Department

Table of Contents

Appendices		Page
Appendix 1.	Asthma Control Test™ for people 12 years and older.	12
Appendix 2.	Childhood Asthma Control test for children 4 to 11 years.	13

I. Key Findings

- During 9/1/2016-12/31/2020, 1316 individuals were referred to the Putting on AIRS (POA) asthma home visiting program, of which 287 met eligibility criteria, consented to participate, and completed the full three-visit series.
- Based on self-reported data, clients completing the program experienced significant reductions in asthma emergency department (ED) visits, total ED visits plus hospitalizations, unscheduled medical appointments, missed school days, and caretaker absences from work.
- Clients who completed the program also reported significant improvement in adherence to asthma medication, self-administration skills and asthma control status.
- When client data were matched with the Connecticut Inpatient Hospitalization and Emergency Department Visit Dataset (CIHEDVD), significant decreases in CIHEDVD-based ED visits and in total ED visits plus hospitalizations were observed for those completing the POA program.
- Significant decreases in CIHEDVD-based ED visits and total ED visits plus hospitalizations were also observed for individuals referred to the POA program who did not complete any home visits.
- When comparing reductions in CIHEDVD-based ED visits among clients completing the POA program to reductions experienced by those who were referred-only, it was found that among individuals with a history of one asthma ED visit in the 12 months prior to referral, those who completed the POA program experienced a significantly greater reduction in asthma ED visits than those who were referred-only. The same was not true for those with a history of more than one asthma ED visit in the 12 months prior.

II. Introduction

Asthma is a serious public health problem, affecting an estimated 8.0% of adults and 6.5% of children nationally in 2021. Among Connecticut (CT) residents, 8.9% of children and 10.5% of adults suffer from asthma, with certain subgroups disproportionately impacted.[1] The rate of hospitalization with asthma as a primary cause among Hispanic adults in CT is four times that of non-Hispanic white adults, with children of non-Hispanic Black descent and Hispanic adults experiencing the highest asthma emergency department (ED) visit rates. Considering age alone, children less than 10 years old have the highest rate of asthma hospitalization of any age group.[2] Geographic disparity is evident as CT's five largest cities, which account for roughly 18% of the statewide total population, accounted for nearly 40% of the state's asthma-related acute healthcare charges in 2022.[2]

Quality of life is often compromised for CT adults living with asthma, with many reporting activity limitations (43%) and missed workdays (26%) due to asthma symptoms. Most (70%) have never received an asthma action plan.[3] Children with asthma are similarly impacted, reporting both activity limitations (21%) and missed school days (31%) due to symptoms. Approximately 20% have never received an asthma action plan. [4]

The Centers for Disease Control and Prevention (CDC) promotes home visits as one of several strategies proven to reduce asthma-related ED visits, hospitalizations, and healthcare costs.[5] According to the CDC's EXHALE[5] framework, effective asthma home visiting programs must integrate multiple strategies such as education on asthma self-management, adherence to an asthma action plan, identification and reduction of environmental triggers, education on reducing exposure to secondhand smoke, pollen and air pollution, and linkages of clients to needed healthcare, social and community resources.

In 2007, the Connecticut Department of Public Health Asthma Program (CAP) partnered with several regional contractors to establish an asthma home visiting and environmental intervention program called Putting on AIRS (POA). By combining patient education, medical management, and reduction/elimination of environmental triggers, the POA program aimed to improve clients' asthma control, symptom self-management, and overall quality of life. The early implementation of the POA program, delivered to children and adults with asthma, coincided with CDC's Community Preventive Services Task Force on home-based asthma programs and the publication of the Community Guide, a systematic review of asthma interventions. To align the CT asthma home visiting program with CDC's recommendations and the Healthy People's 2020 goals and objectives, the POA program was revised in 2016.

Recommendations and guidance for the revised program included:

- Target intervention to children aged 2-17 years with asthma classified as persistent moderate and severe, and with poorly controlled asthma as measured by the Asthma Control Test as ≤ 19.
- High-risk children with asthma are at greater risk for asthma exacerbations (National Asthma Education and Prevention Program- NAEPP, 2007), and should receive individual home-based intervention.
- Per CDC (2015), at least two (2) home visits are critical , while more than four (4) home visits can lead to greater improvement (Health resources in Action literature review for the CT Asthma Program, 2015).
- Community Health Workers with specialized asthma education can effectively conduct home visits.

III. Intervention

In September of 2016, the CAP worked with regional POA contractors to expand and formalize the services offered by POA. Since that time, the POA program consists of three home visits, an environmental assessment, and a six-month follow-up call, during which clients receive intensive asthma management, education, and environmental support. Data obtained during home visits are collected using a set of standardized interview forms and then entered into region-specific Microsoft Access databases. The goals of the POA program continue to be reduction of acute asthma episodes, fewer asthma-related hospitalizations and ED visits, and overall improved asthma control through recognition and elimination/reduction of environmental and other asthma triggers. Eligibility is limited to residents of CT who have a family member under the age of 18 with poorly controlled asthma. Program activities are funded through a 5-year cooperative agreement with the CDC's National Asthma Control Program.

The present analysis aims to evaluate asthma-related outcomes among clients completing the POA program during 2016-2020. In doing so, it may offer input on the value of an asthma home visiting program and serve as a reference when assessing the relative effectiveness of asthma-reduction strategies.

IV. Assessment

To determine the impact of the POA program, the CAP conducted a two-part data analysis.

PART 1.

For POA clients completing the three-visit program, self-reported and contractor-observed outcomes data taken at baseline and at follow-up were examined to evaluate change over time. Specific outcomes evaluated included frequency of asthma ED visits, hospitalizations and unscheduled medical visits, days missed from work or school due to asthma symptoms, adherence to asthma control medication, self-administration skills, and asthma control status. Depending on the measure being assessed, follow-up data were collected from participants at either visit three or at the six-month follow-up call, and analysis of each measure included data from clients who responded at both baseline and follow-up. The average number of ED visits, hospitalizations, unscheduled medical visits, missed days of school, and missed days of work reported by clients at intake and at follow-up were compared using paired t-tests. Pearson chi-square tests were then performed to examine the association between outcomes in adherence to medication, self-administration skills and asthma control, and the point in time (intake or baseline) at which they were measured. Results were considered statistically significant if the p-value was less than or equal to 0.05.

Part 1 analyses were limited to records of clients aged 0-17 years old who were referred to the POA program between September 1, 2016, and December 31, 2020, found to be eligible, and completed all three home visits.

PART 2.

Client data were then matched by name and date of birth to the Connecticut Inpatient Hospitalization and Emergency Department Visit Dataset (CIHEDVD) provided by the Connecticut Hospital Association, as an alternate means of assessing change in frequency of clients' ED visits and hospitalizations over time. As one measure of asthma control is reduction or elimination of asthma ED visits, the matched analyses aimed, in part, to evaluate whether clients experienced a greater reduction than those who did not complete the program. To match CIHEDVD data with POA client data by name and date of birth, several strategies were applied. The first strategy involved concatenation of last name, first name and date of birth within each record across both databases to identify exact matches, which resulted in a portion of matched records. Subsequent concatenation strategies accounting for the transposition of last and first name, as well as common misspellings, were applied to successively reduce the number of remaining unmatched records. Client records that remained unmatched after all strategies were applied were added back into the final dataset, to be counted as individuals with no identified CIHEDVD data during the study timeframe.

Once matched with the CIHEDVD, clients were categorized as cases or controls. Clients completing all three home visits were categorized as cases (*n*=287), and clients who were referred to the program but completed no visits were categorized as controls (*n*=834). For each client, counts of ED visits and total counts of ED visits plus hospitalizations were calculated for the "pre-referral" period, defined as during the 12 months prior to referral, and the "post" period, defined as either during the 12 months post-visit 3 for cases or during the 4-16 months post-referral for controls. The "post" timeframes for each group represent roughly equivalent points in time with respect to referral date.

Cases and controls were then compared to determine if participation in the POA program was associated with larger reductions in ED visits and hospitalizations. Paired t-tests were performed to examine the difference in the average number of ED and total visits over time for both cases and controls separately, and independent t-tests were used to compare the difference in average change between cases and controls. Results were considered statistically significant if the p-value was less than or equal to 0.05.

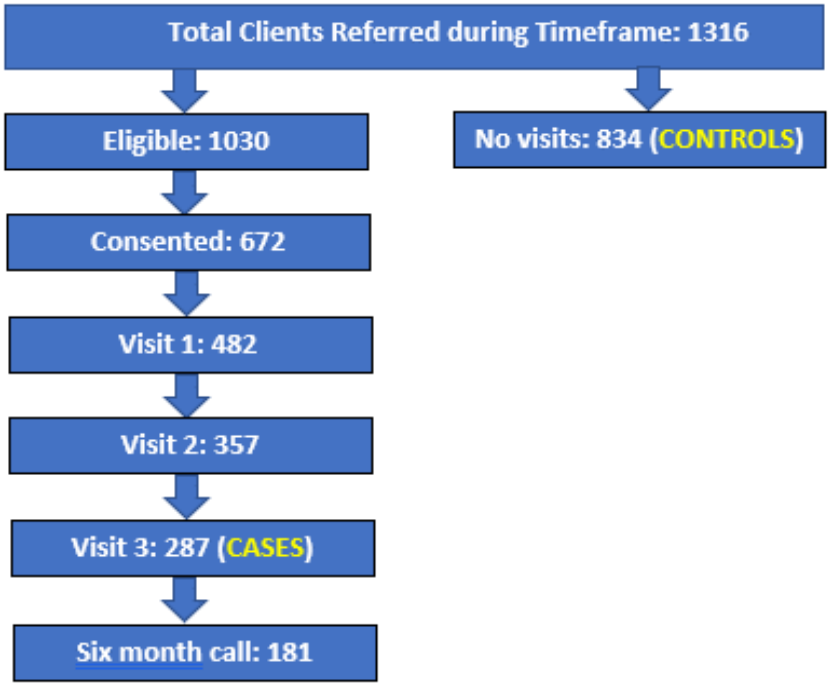
Part 2 analyses were limited to records of clients aged 0-17 years old who were referred to the POA program between September 1, 2016 and December 31, 2020, and who completed either zero or three program home visits.

POA client data were collected and managed using Microsoft Access (version 2008; Microsoft Corporation), and all data were analyzed with SAS® software (version 9.4; SAS Institute).

V. Results

Visit completion information is given in Figure 1. During 9/1/2016-12/31/2020, 1316 clients aged 0-17 years old were referred to the POA program. Of those, 1030 were found to be eligible for the program, and 672 consented to participate. Among those consenting, 482 completed visit 1, 357 completed visits 1-2 and 287 completed visits 1-3. Six-month follow-up data were obtained from 181 clients. There were 834 clients who were referred, but went on to complete no visits.

Figure 1. Putting on AIRS Visit Completion Among Clients Referred During September 1, 2016- December 31, 2020



PART 1.

Clients completing all three visits (*n*=287) reported progress in several asthma-related measures from baseline to follow-up (see Tables 1 and 2). The number reporting on each measure varied based on when follow-up data were collected, which, depending on the specific measure, could have been at visit 3, at the six-month follow-up call, or at the client's "last visit".

In the below descriptions of change in frequency of ED visits, hospitalizations, unscheduled medical visits, missed client school days and missed caregiver workdays, clients categorized as having zero or one of the given occurrences were compared against those have two or more occurrences. The categories were created to examine the change in proportion of clients moving from the higher-burden category (2 or more) to the lower-burden (0-1) category, or vice versa.

<u>ED visits (*n*=166/287 reporting)</u>

At referral, the average number of asthma ED visits was 2.1, with 55% of clients reported having either zero or one asthma ED visit during the prior six months. At the six-month follow-up call, the average number of ED visits was 0.4, with 92% of clients reported having either zero or one asthma ED visit during the prior six months. The average reported decrease in asthma ED visits from referral to follow-up was 1.7, a statistically significant decrease.

<u>Total ED visits plus hospitalizations (n=166/287 reporting)</u>

At referral, the average number of total asthma ED visits plus hospitalizations was 2.8, with 39% of clients reported having either zero or one total visit during the prior six months. At the six-month follow-up call, the average number of total visits was 0.4, with 90% of clients reported having either zero or one asthma ED visit or hospitalization during the prior six months. The average reported decrease in asthma total visits from referral to follow-up was 2.4, a statistically significant decrease.

Unscheduled medical visits (*n*=167/287 reporting)

At referral, the average number of unscheduled asthma medical visits was 4.7, with 15% of clients reported having either zero or one unscheduled asthma medical visit during the prior six months. At the six-month follow-up call, the average number of visits was 1.1, with 72% of clients reported having either zero or one unscheduled asthma medical visit during the prior six months. The average reported decrease in unscheduled asthma medical visits from referral to follow-up was 3.6, a statistically significant decrease.

Missed school days (*n*=124/287 reporting)

At referral, the average number of asthma-related missed school days was 6.3, with 14% of clients reported having either zero or one asthma-related missed school day during the prior six months. At the six-month follow-up call, the average number of asthma-related missed school days was 2.1, with 63% of clients reported having either zero or one asthma-related missed school days during the prior six months. The average reported decrease in asthma-related missed school days from referral to follow-up was 4.2, and the decrease was statistically significant.

Missed caretaker workdays (*n*=72/287 reporting)

At referral, the average number of asthma-related missed caretaker workdays was 4.2, with 32% of clients reported having either zero or one asthma-related missed caretaker workdays during the prior six months. At the six-month follow-up call, the average number of asthma-related missed caretaker workdays was 1.4, with 83% of clients reported having either zero or one asthma-related missed caretaker workdays during the prior six months. The average reported decrease in asthma-related missed caretaker workdays from referral to follow-up was 2.8, and the decrease was statistically significant.

Adherence to control medication (*n*=161/287 reporting)

At Visit 1, 48% of clients reported using their long-term control medication daily, with 52% reporting not using it regularly. At the six-month follow-up call, more clients reported using their long-term control medication daily (71%). The increase in clients reporting daily adherence to control medication was statistically significant.

Self-administration skills (*n*=278/287 reporting)

At Visit 1, 62% of clients successfully demonstrated self-administration of asthma control medication, which increased to 97% at visit 3. The increase in clients successfully self-administering their control medication was statistically significant.

Asthma control* status (*n*=282/287 reporting)

Baseline asthma control scores showed that 29% of clients were well-controlled upon enrollment, while 71% were not well-controlled. At follow-up,[†] 69% had achieved well-controlled status. The increase in clients achieving well-controlled status was statistically significant. See appendices A and B for asthma control test (ACT) questionnaires.

*Well-controlled is defined as having an ACT score >19.
[†]Based on clients' latest test scores taken during home visits.

Table 1. Self-reported outcomes in asthma-related health care visits and absences from school or work among clients referred to Putting on AIRS during September 1, 2016, through December 31, 2020, who completed the program (n=287)

Indicator/Measure	*N*	Pre-referral Mean ± SD	Follow-up Mean ± SD	Change from pre-referral to follow-up (Mean ± SD)	*P*-value[†]
Number of ED visits	166	2.06 ± 2.48	0.36 ± 0.89	-1.69 ± 2.27	**<0.0001**
Number of total* visits	166	2.83 ± 3.11	0.43 ± 1.09	-2.40 ± 2.88	**<0.0001**
Number of medical visits	167	4.70 ± 2.98	1.07 ± 1.78	-3.63 ± 3.19	**<0.0001**
Number of client days absent	124	6.31 ± 5.98	2.09 ± 3.84	-4.22 ± 5.92	**<0.0001**
Number of caretaker days absent	72	4.15 ± 7.79	1.40 ± 4.54	-2.75 ± 7.52	**0.0028**

[*]Emergency Department visits plus hospitalizations.
[†]Paired t-test.

Table 2. Self-reported and contractor-observed outcomes in asthma self-management and control status among clients referred to Putting on AIRS during September 1, 2016, through December 31, 2020, who completed the program (n=287)

Indicator/Measure	*N*	Percent at intake	Percent at follow-up	*P*-value[*]
Adherence to medication	161	47.8	71.4	**<0.0001**
Self-administration skills	278	62.2	97.1	**<0.0001**
Well-controlled status	282	29.4	69.2	**<0.0001**

[*]Pearson chi-square test.

PART 2.

Table 3 displays the change experienced by cases and controls in frequency of total ED visits plus hospitalizations, and of ED visits specifically, based on the CIHEDVD. Looking at clients categorized as cases, the average number of ED visits at intake was 0.46 vs. 0.17 at follow-up, a statistically significant decrease. The average total visits for cases decreased from 0.69 at intake to 0.21 at follow-up, also a significant change. A significant decrease in ED visits was likewise observed among controls, who went from an average of 0.45 visits at intake to 0.21 visits at

follow-up. The control group also experienced a significant decrease in total visits, going from an average of 0.68 visits at intake to 0.25 visits at follow-up.

Table 3. Change in frequency of total emergency department visits plus hospitalizations, and of emergency department visits among Putting on AIRS clients referred during September 1, 2016, through December 31, 2020, based on the Connecticut Inpatient and Emergency Department Visit Dataset

Cases[*]	N	Pre-referral Mean[§] ± SD	Follow-up Mean[¶] ± SD	Change from pre-referral to follow-up (Mean ± SD)	*P*-value[**]
ED visits	287	0.46 ± 1.09	0.17 ± 0.55	-0.29 ± 1.00	**<0.0001**
Total visits[†]	287	0.69 ± 1.50	0.21 ± 0.70	-0.48 ± 1.28	**<0.0001**
Controls[‡]	**N**	**Pre-referral Mean[§] ± SD**	**Follow-up Mean[#] ± SD**	**Change from pre-referral to follow-up (Mean ± SD)**	***P*-value[**]**
ED visits	834	0.45 ± 1.13	0.21 ± 0.69	-0.25 ± 1.08	**<0.0001**
Total[†] visits	834	0.68 ± 1.53	0.25 ± 0.83	-0.43 ± 1.37	**<0.0001**

[*]Case defined as individual referred to POA who completed all three visits.
[†]Emergency department visits plus hospitalizations.
[‡]Control defined as individual referred to POA who did not complete any visits.
[§]During the 12 months prior to referral.
[¶] During the 12 months following visit 3.
[#]During the 12-16 months following referral.
[**]Paired t-test.

The average difference in reduction in total visits (Table 4) or in ED visits specifically (Table 5) over time between cases and controls was not significant, with the following exception. When stratifying by total pre-referral ED visits, cases with one pre-referral ED visit had a larger decrease in ED visits over time (mean change = -0.79) compared to controls with one pre-referral ED visit (mean change = -0.52), a statistically significant difference (see Table 5).

Table 4. Comparison of change in frequency of total emergency department visits plus hospitalizations between Putting on AIRS case and control groups, among those referred during September 1, 2016, through December 31, 2020, based on the Connecticut Inpatient and Emergency Department Visit Dataset

Pre-referral total visits	CASES[*]				CONTROLS[†]				*P*-value[¶,#]
	N	Ave. no. visits pre-referral	Ave. no. visits post-Visit 3	Mean[‡] ± SD	*N*	Ave. no. visits pre-referral	Ave. no. visits post referral	Mean[§] ± SD	
0	201	0	0.06	0.06 ± 0.28	596	0	0.06	0.06 ± 0.31	0.9667
1	44	1.00	0.27	-0.73 ± 0.59	105	1.00	0.34	-0.66 ± 0.69	0.5303
2+	41	3.76	0.88	-2.88 ± 1.89	133	3.47	1.05	-2.42 ± 2.46	0.2168
TOTAL	286	0.69	0.21	-0.48 ± 1.29	834	0.68	0.25	-0.43 ± 1.38	0.5358

[*] Case defined as individual referred to POA who completed all three visits.
[†]Control defined as individual referred to POA who did not complete any visits.

‡ Change from pre-referral to post-visit 3.
§ Change from pre-referral to post-referral.
¶ Difference in mean change between cases and controls.
# Independent samples t-test.

Table 5. Comparison of change in frequency of emergency department visits between Putting on AIRS case and control groups, among those referred during September 1, 2016, through December 31, 2020, based on the Connecticut Inpatient and Emergency Department Visit Dataset

Pre-referral ED visits	CASES*				CONTROLS†				*P*-value¶,#
	N	Ave. no. visits pre-referral	Ave.no. visits post-Visit 3	Mean‡ ± SD	*N*	Ave. no. visits pre-referral	Ave. no. visits post referral	Mean§ ± SD	
0	219	0	0.08	0.08 ± 0.35	652	0	0.07	0.07 ± 0.33	0.6653
1	39	1.00	0.21	-0.79 ± 0.47	92	1.00	0.48	-0.52 ± 0.91	**0.0275**
2+	28	3.29	0.79	-2.50 ± 1.67	90	3.18	0.90	-2.28 ± 2.07	0.5658
TOTAL	286	0.46	0.17	-0.29 ± 1.00	834	0.45	0.21	-0.25 ± 1.08	0.5496

*Case defined as individual referred to POA who completed all three visits.
† Control defined as individual referred to POA who did not complete any visits.
‡ Change from pre-referral to post-visit 3.
§ Change from pre-referral to post-referral.
¶ Difference in mean change between cases and controls.
# Independent samples t-test.

VI. Discussion

Current findings indicate that clients who completed the three-visit POA program during the study timeframe showed significantly improved adherence to control medication, self-administration skills, and asthma control status, reported significantly fewer missed school days and missed caretaker workdays, and experienced significant reductions in asthma-related healthcare visits following program completion.

Clients categorized as both cases and controls showed significant reductions in CIHEDVD-based ED visits and in total ED visits plus hospitalizations. These reductions indicate that regardless of whether referral to POA was followed by participation in the program, all referred clients experienced some improvement in asthma control following asthma-related ED visit or hospitalization. When comparing cases with one ED visit prior to enrolling in POA to controls with one ED visit prior, the reduction in ED visits experienced by the two sub-groups was statistically significantly different with cases showing a larger reduction. The difference suggests that POA clients who visit the ED once for asthma within the 12 months prior to referral to the program may experience the highest benefit in terms of reduction in asthma ED visits.

Several limitations deserve mention. First, the loss of clients from 287 to 181 between visit 3 and six-month follow-up resulted in a 37% loss of potential data collected at six months. Second, unemployed caregivers who completed the follow-up call may not have provided information on missed workdays, resulting in additional missing responses for that measure. However, as employment status is not collected from caregivers, the attribution of missing data to unemployment cannot be made with any certainty. Third, the interpretation of the term "ED visit" may have varied among clients who self-reported and could potentially have included other unscheduled medical visits such as urgent care appointments. Fourth, the matching of POA data with the CIHEDVD may have been imperfect and/or incomplete, resulting in a potential loss of ED and hospitalization data for clients who were either mismatched or falsely handled as unmatched records. Fifth, those clients who were referred to POA but did not go on to complete any home visits, i.e., the control group, may have received some other type of asthma management or intervention following referral to the program, which led to improved asthma control, but which could not be accounted for in the current analysis. Lastly, because client outcomes data could not be compared to those of individuals with asthma who were never referred to the program, current results do not offer any insight into the program's absolute effectiveness.

VII. Conclusion

Given the continued high burden of asthma in CT and the need for services to help those impacted, further assessment of home visiting programs such as POA will be essential for understanding who may benefit most from such programs and may offer guidance on how best to target the delivery of future services. Improvements in certain aspects of the data collection and analysis process would benefit any future evaluation. Clarification of the term "ED visit" during client interview would improve the accuracy of related assessment of progress. The application of additional data matching strategies would facilitate linkage of client data with external data sources such as the CIHEDVD. Access to follow-up data for referred clients who completed no visits would inform any conclusions about the relative effectiveness of the POA program in the context of other interventions. Moreover, the absolute benefit of program participation could be better ascertained by comparing the outcomes data of clients to those of individuals with asthma who were never referred to the program, i.e. a true control group.

References

[1] Connecticut Department of Public Health. (2023) Connecticut Behavioral Risk Factor Surveillance System 2021 data. Hartford, CT: Chronic Disease Epidemiology Unit.

[2] Connecticut Department of Public Health. (2023) Connecticut Inpatient Hospitalization and Emergency Department Visit Dataset 2015-2022 data. Hartford, CT: Chronic Disease Epidemiology Unit.

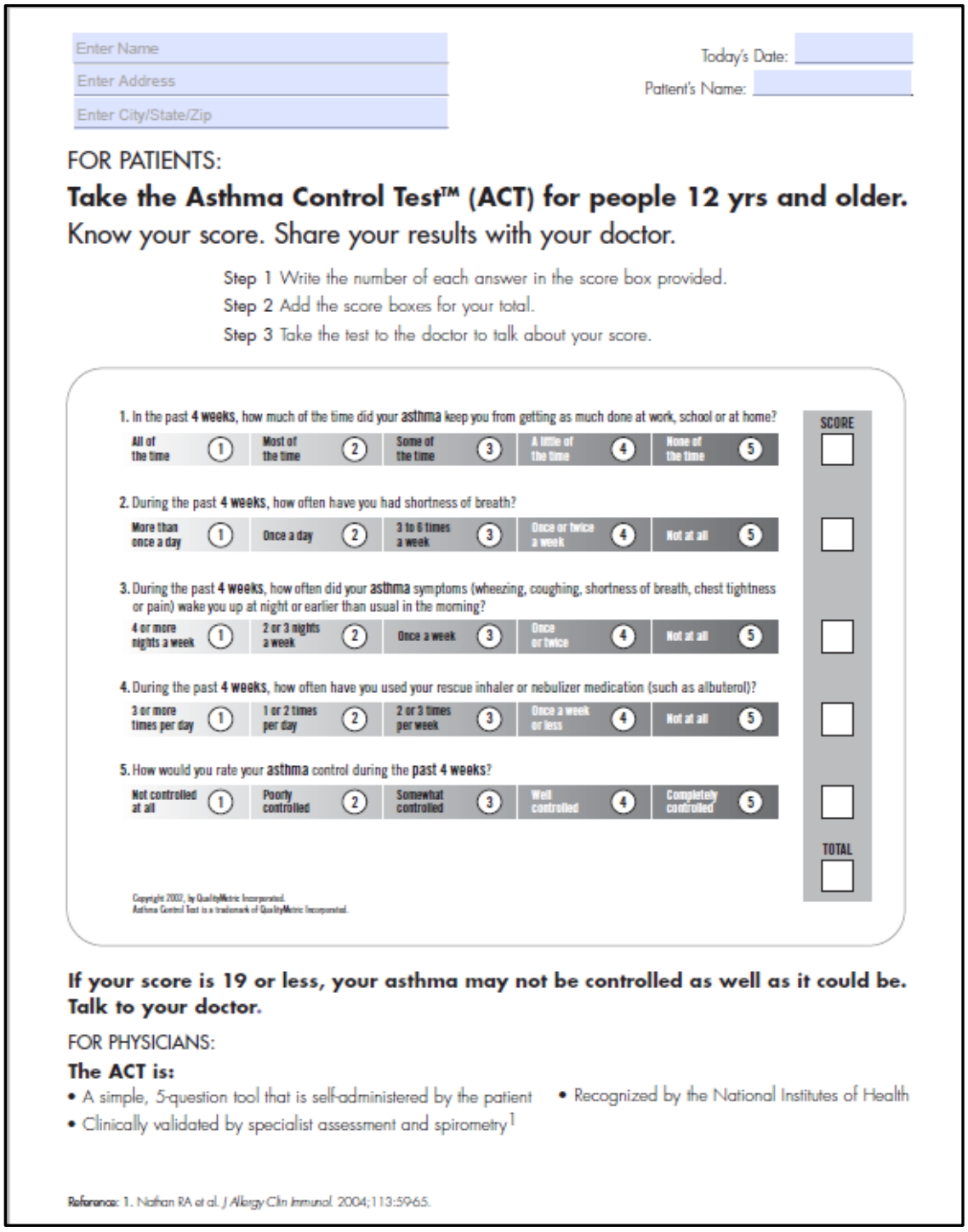
[3] Connecticut Department of Public Health. (2023) Connecticut Behavioral Risk Factor Surveillance System Adult Asthma Call-back Survey 2017-2019 data. Hartford, CT: Chronic Disease Epidemiology Unit.

[4] Connecticut Department of Public Health. (2023) Connecticut Behavioral Risk Factor Surveillance System Child Asthma Call-back Survey 2018-2020 data. Hartford, CT: Chronic Disease Epidemiology Unit.

[5] Hsu J, Sircar K, Herman E, Garbe P. (2018). EXHALE: A Technical Package to Control Asthma. Atlanta, GA: National Center for Environmental Health, Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/asthma/pdfs/EXHALE_technical_package-508.pdf.

Appendix A

This appendix shows the questionnaire administered to individuals aged 12 years and older to determine their asthma control score. The score in turn indicates how well the individual's asthma is controlled.



Enter Name
Enter Address
Enter City/State/Zip

Today's Date: _____
Patient's Name: _____

FOR PATIENTS:

Take the Asthma Control Test™ (ACT) for people 12 yrs and older.

Know your score. Share your results with your doctor.

Step 1 Write the number of each answer in the score box provided.
Step 2 Add the score boxes for your total.
Step 3 Take the test to the doctor to talk about your score.

						SCORE
1. In the past **4 weeks**, how much of the time did your **asthma** keep you from getting as much done at work, school or at home?	All of the time 1	Most of the time 2	Some of the time 3	A little of the time 4	None of the time 5	
2. During the past **4 weeks**, how often have you had shortness of breath?	More than once a day 1	Once a day 2	3 to 6 times a week 3	Once or twice a week 4	Not at all 5	
3. During the past **4 weeks**, how often did your **asthma** symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?	4 or more nights a week 1	2 or 3 nights a week 2	Once a week 3	Once or twice 4	Not at all 5	
4. During the past **4 weeks**, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?	3 or more times per day 1	1 or 2 times per day 2	2 or 3 times per week 3	Once a week or less 4	Not at all 5	
5. How would you rate your **asthma** control during the **past 4 weeks**?	Not controlled at all 1	Poorly controlled 2	Somewhat controlled 3	Well controlled 4	Completely controlled 5	
						TOTAL

Copyright 2002, by QualityMetric Incorporated.
Asthma Control Test is a trademark of QualityMetric Incorporated.

If your score is 19 or less, your asthma may not be controlled as well as it could be. Talk to your doctor.

FOR PHYSICIANS:

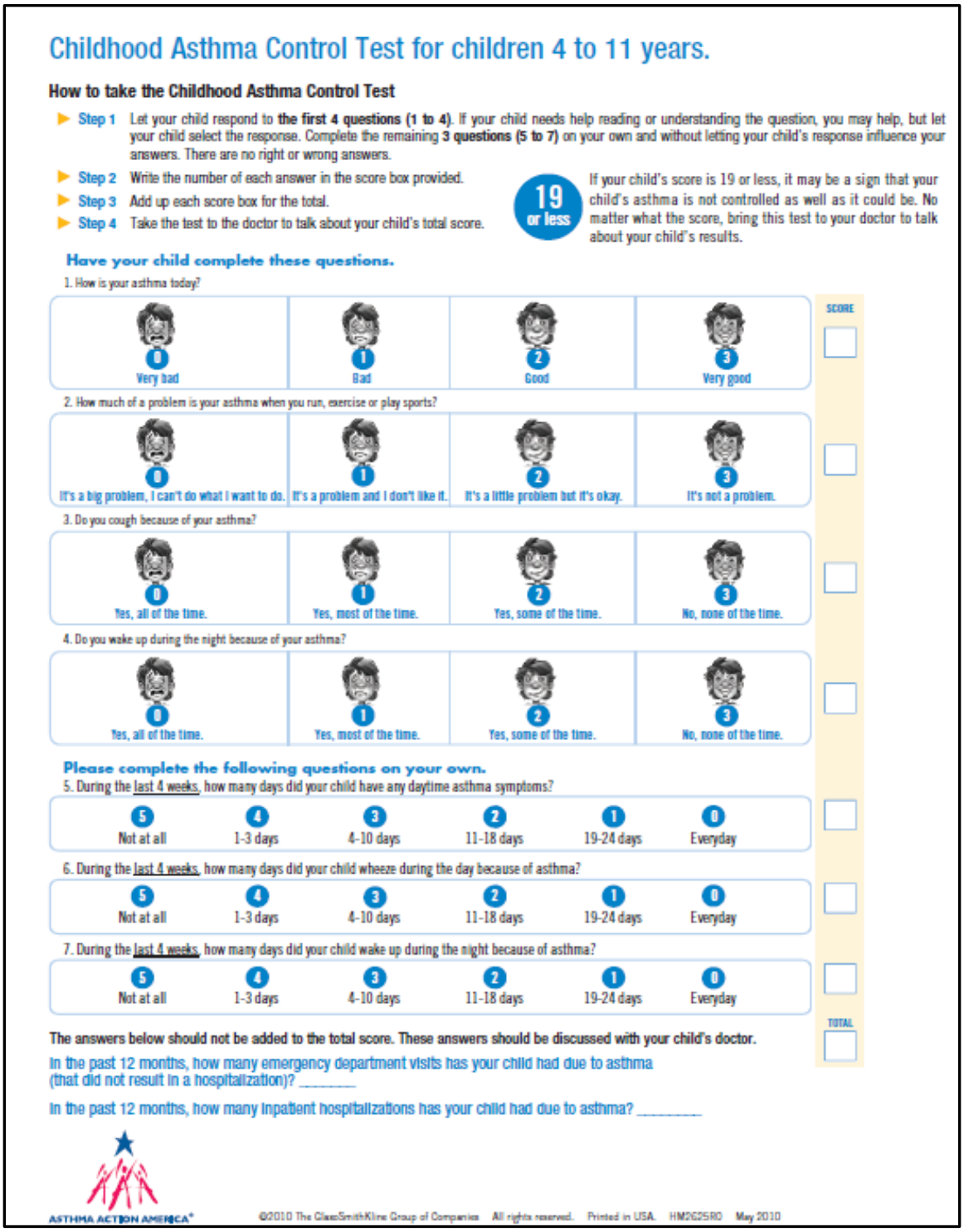
The ACT is:

- A simple, 5-question tool that is self-administered by the patient
- Clinically validated by specialist assessment and spirometry[1]
- Recognized by the National Institutes of Health

Reference: 1. Nathan RA et al. *J Allergy Clin Immunol.* 2004;113:59-65.

Appendix B

This appendix shows the questionnaire administered to children aged 4 to 11 years to determine their asthma control score. The score in turn indicates how well the child's asthma is controlled.



Childhood Asthma Control Test for children 4 to 11 years.

How to take the Childhood Asthma Control Test

- **Step 1** Let your child respond to **the first 4 questions (1 to 4)**. If your child needs help reading or understanding the question, you may help, but let your child select the response. Complete the remaining **3 questions (5 to 7)** on your own and without letting your child's response influence your answers. There are no right or wrong answers.
- **Step 2** Write the number of each answer in the score box provided.
- **Step 3** Add up each score box for the total.
- **Step 4** Take the test to the doctor to talk about your child's total score.

19 or less If your child's score is 19 or less, it may be a sign that your child's asthma is not controlled as well as it could be. No matter what the score, bring this test to your doctor to talk about your child's results.

Have your child complete these questions.

1. How is your asthma today?

0	1	2	3
Very bad	Bad	Good	Very good

2. How much of a problem is your asthma when you run, exercise or play sports?

0	1	2	3
It's a big problem, I can't do what I want to do.	It's a problem and I don't like it.	It's a little problem but it's okay.	It's not a problem.

3. Do you cough because of your asthma?

0	1	2	3
Yes, all of the time.	Yes, most of the time.	Yes, some of the time.	No, none of the time.

4. Do you wake up during the night because of your asthma?

0	1	2	3
Yes, all of the time.	Yes, most of the time.	Yes, some of the time.	No, none of the time.

Please complete the following questions on your own.

5. During the last 4 weeks, how many days did your child have any daytime asthma symptoms?

5	4	3	2	1	0
Not at all	1-3 days	4-10 days	11-18 days	19-24 days	Everyday

6. During the last 4 weeks, how many days did your child wheeze during the day because of asthma?

5	4	3	2	1	0
Not at all	1-3 days	4-10 days	11-18 days	19-24 days	Everyday

7. During the last 4 weeks, how many days did your child wake up during the night because of asthma?

5	4	3	2	1	0
Not at all	1-3 days	4-10 days	11-18 days	19-24 days	Everyday

SCORE

TOTAL

The answers below should not be added to the total score. These answers should be discussed with your child's doctor.

In the past 12 months, how many emergency department visits has your child had due to asthma (that did not result in a hospitalization)? _____

In the past 12 months, how many inpatient hospitalizations has your child had due to asthma? _____

ASTHMA ACTION AMERICA®

©2010 The GlaxoSmithKline Group of Companies All rights reserved. Printed in USA. HM262580 May 2010