CALM Evaluation
Narrative Report to MFH

May, 2014

University of Michigan
Center for Managing Chronic Disease (CMCD)

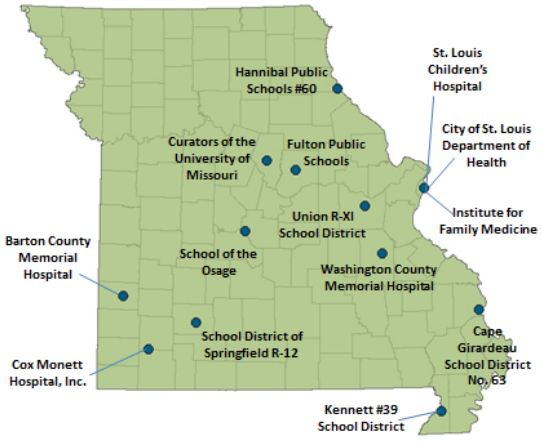
Introduction

According to the 2012 Missouri Behavioral Risk Factor Surveillance System, 10.2 percent of children under the age of 18 in Missouri are reported to have current asthma.[1] Children in Missouri experience higher rates of asthma than the national average (9.3%),[2] and while there have been significant advances in asthma management over the past decade that allow most people with asthma to live active and healthy lives, many children – in Missouri and around the country – continue to suffer.

The Childhood Asthma Linkages in Missouri (CALM) program supported community-based approaches to the management of childhood asthma; approaches that involved the use of technology, resources, collaborating partners and current research. The University of Michigan Center for Managing Chronic Disease (CMCD) worked with the CALM grantees to conduct a comprehensive evaluation of the CALM program that resulted in cross-site assessment of reach, linkages, sustainability of efforts, and asthma-related outcomes.

Grantees of the CALM project extended across 14 urban and rural sites throughout the state of Missouri (Figure 1). Project periods ranged from three to five years, and were funded beginning in 2008 (see Attachment A for timeline of CALM grants). CALM sites were based in many settings ranging from academic to clinical to school settings, and most of the programs included an emphasis on serving school-aged children in school settings. All of the sites used community-based approaches and planning interventions to improve asthma management and asthma-related health outcomes.

Figure 1. Map of CALM grantees



[1] http://health.mo.gov/data/brfss/2012_BRFSS_Key_Findings_Report.pdf
[2] http://www.cdc.gov/asthma/asthmadata.htm

CALM INTERVENTIONS

CALM grantees implemented a variety of interventions as part of their programs. All grantees included some aspect of education and training as part of the programs, and many incorporated home visits and community outreach, as well. CALM interventions included:

- **Home Visits and Environmental Assessments**
- **Student Interventions:**
  - General education
  - Targeted student education
- **Training and Education**: Nurses, physicians, school staff, coaches, etc.
- **Other Interventions:**
  - Community Outreach
  - Air Quality Intervention
  - Identification and Management Program
  - Media Outreach

REACH

Across all CALM grantees and programs, over 10,000 individuals were reached annually through CALM interventions. This number does not include individuals reached through community or media outreach interventions. The number of schools reached directly through CALM interventions was reported to be 86, as well as all of the schools in the St. Louis Public Schools system. In addition, 100 school districts have been reached through the Asthma Ready Schools program.

Over 10,000 individuals reached annually through CALM interventions

LINKAGES

CALM grantees reported linking with diverse partners in their communities in support of their CALM work. Figure 2 below illustrates the reported linkages, with larger font sizes representing more reported linkages across grantees with that particular type of partner. As is evident, the linkages most often reported were with hospitals and schools; all CALM grantees reported linking with at least one school and one clinic or hospital, with many reporting multiple such linkages.

Figure 2. Linkages reported by CALM grantees

Benefits of Linkages

Grantees reported benefits of their linkages, and a major theme seen throughout the reporting is the **improvement in the coordination of care** for children in their communities. They reported improved communication and coordination with other care providers, increased access to specialist services, care providers all using the same treatment plan, and a more rapid identification of students with asthma.

"We have created a close network [of nurses] who know to look throughout the district for students with asthma. This helps to ensure that regardless of which school they attend, they will receive the same treatment to monitor their asthma."

"Due to the educational component of this grant, the staff is much more aware of the signs and symptoms of asthma and, in turn, they know exactly who to report that to so help can be given."

Another benefit commonly reported was **increased awareness through education**: awareness of asthma symptoms, asthma treatment, and individuals with the condition. Partners grantees reported linking with to increase awareness were nurses, school staff, families, coaches, daycare providers, and physicians.

Access to resources was another theme evident in the reported benefits of linkages. Grantees reported increased access to medications for their program participants, as well as devices such as spacers and peak flow meters. Through linkages, grantees were able to access incentives for participation, as well as donations to their programs. Transportation support was also accessed, which helped spur program participation.

The pharmacy "assists us in achieving our ultimate goal of reaching out to as many asthmatic children as we can without business money hassles."

Most helpful partners – Grantees partnered with many different types of entities and individuals, and many reported that their partners assisted them with accessing supplies, spreading awareness about their programs, and reaching the populations most at need. Of all of the reported partners, grantees reported that hospitals and clinics, physicians and other clinicians, universities, schools, school nurses and health departments were the most helpful partners in helping them to achieve their work.

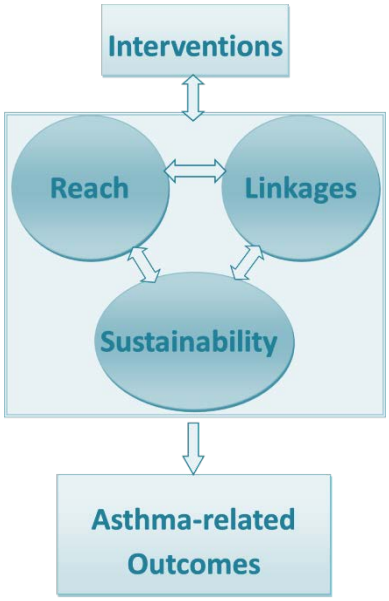
Partners needed – When asked about possible partners needed to further their work, grantees mentioned a desire to partner with physicians and other clinicians, local public health agencies, health departments, medical clinics, and insurance companies to increase the effectiveness of their programs.

Barriers to successful partnerships – Barriers identified by grantees for building successful partnerships include time constraints, lack of communication, and differing agendas and goals among stakeholders. In addition, grantees reported issues of ownership and control as being obstacles to successful partnering, such as when individuals or organizations are 'stuck in their ways' and therefore prevent progress.

Cross-Site Evaluation Methodology and Tools

All of the CALM grantees agreed on the primary elements to be included in the cross-site evaluation. The elements were based on priorities discussed at site visits, tools already in use by sites, and other potential tools that fit with the goals of the project as determined by the Missouri Foundation for Health (MFH) questions and CALM interventions. The CALM cross-site evaluation model includes elements that relate to the community-based **interventions**; the **reach** of children, families, school personnel, clinical experts and systems and others within the circles of influence; **linkages** among these will be important to develop and measure; along with **sustainability** of approaches that will determine how the work will continue and become integrated into current systems and policies. Attention to each of these elements is expected to result in change of **asthma outcomes**, especially decreases in school absences, daytime and nighttime symptoms, medication use and health care use in the CALM target population. Figure 3 provides an illustration of the CALM Cross-Site Evaluation Model.

Figure 3. CALM Cross-Site Evaluation Model



The instruments created to document and track changes in these elements at the project level were developed using tools in use by grantees and validated tools in the field of asthma, and were developed using a process that has entailed multiple rounds of feedback and pilot-testing by CALM grantees. Table 1 outlines each component of the evaluation and the reporting schedule.

Table 1. Components of the CALM Cross-Site Evaluation

Evaluation Component	How often reported
Parent/Guardian Survey	Annually, for those grantees utilizing
Interventions and Reach	Annually
Linkages	Annually
Sustainability	Annually
Success and Challenge Stories	Annually
School Attendance Data	Annually, as available
Health Care Utilization Data	Annually, as available
ACT/CACT Data	Annually, as available
Key Informant Surveys	2012
Interim Reports	Annually, to MFH

The primary instrument that was created and utilized to measure many of the CALM cross-site evaluation elements is the CALM Parent/Guardian Survey (See Attachment B for CALM Cross-Site Evaluation Tools, including the Parent/Guardian Survey).

Parent/Guardian Survey

The CALM Parent/Guardian Survey was administered by CALM grantees to parents and guardians of children who participated in their interventions. The survey collects information regarding children's asthma symptoms, medication usage, health care usage, school attendance, academic performance, extracurricular participation, in addition to the parent/guardian's confidence in managing the child's asthma, and information regarding linkages created between the parent/guardian, school and physician.

Reported Parent/Guardian Surveys

Administration of baseline surveys of the Parent/Guardian Survey began in January, 2011, with the final follow-up surveys reported in January, 2014. Baseline and first and second follow-up surveys were reported by the grantees through Qualtrics, a protected online reporting system. All data reported to the CMCD team were de-identified; grantees utilized codes to identify student participants, and grantees were responsible for maintaining lists linking student codes to student names. The surveys were administered to the parents/guardians of program participants upon the students entering into the program, first follow-up surveys were administered twelve months after baseline surveys were administered, and if time allowed, second follow-up surveys were administered twelve months after the first follow-ups. Of the 14 CALM grantees, seven utilized the Parent/Guardian Survey as part of their evaluation, and were able to report both baseline and follow-up surveys over time.

Findings from the Parent/Guardian Survey

From January, 2011, to January, 2014, 947 baseline, 450 Follow-Up 1, and 164 Follow-Up 2 Parent/Guardian Surveys were reported by CALM grantees. Analyses provided in this report will focus on data reported over all three time periods, with the primary focus on the change over time between baseline and follow-up one.

Overall baseline analyses (n=947):

- Average age: 9.3 years
- Range of ages: 3 months to 19 years
- Average age at first asthma symptoms: 3.2 years
- Average age at asthma diagnosis: 3.9 years
- Average time participating in CALM program at baseline: 7.4 months (Range 0 to 88)

Overall Baseline to Follow-Up 1 analyses (n=450):

- Average age: 9.2 years
- Range of ages: 3 months to 19 years
- Average age at first asthma symptoms: 3.2 years
- Average age at asthma diagnosis: 4.1 years
- Average time participating in CALM program at baseline: 23 months (Range 2 to 144)

Overall Baseline to Follow-Up 2 analyses (n=164):

- Average age: 8.9 years
- Range of ages: 4 months to 17 years
- Average age at first asthma symptoms: 3.2 years
- Average age at asthma diagnosis: 3.9 years
- Average time participating in CALM program at baseline: 38.8 months (Range 10 to 88)

Multivariate analyses were done to see if there were any significant differences between the groups, and no significant differences were found. That is to say, the children in the baseline sample are similar to the children in each follow-up sample, so there were not any significant differences between children CALM grantees were able to get follow-up surveys for versus children lost to follow-up. As a result, we confirm that this does not bias our analyses.

Baseline/Year 1 Follow-Up Findings of Change over Time from the CALM Parent/Guardian Survey

450 participants with both baseline and year one follow-up surveys reported between January, 2011, and January, 2014, are included in the following analyses. At follow-up, the average age of CALM participants was 9.2 years, there were slightly more male (53%) than female (47%) participants, and 69% of the participants were reported to be Caucasian (24% African American, 7% other).

One of the most significant findings from the baseline to follow-up one analyses has been the change in reported asthma symptoms over time. Daytime symptoms, nighttime awakenings, and rescue inhaler use all showed statistically significant decreases over time (Table 2).

Table 2. Changes in Asthma-Related Symptoms Over Time (n=450)

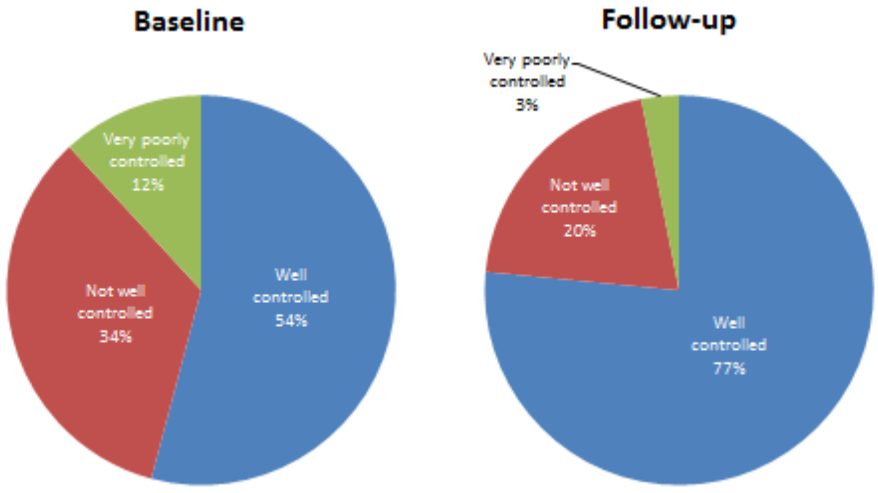
	Baseline	Follow-up	
Symptoms	**Mean ± SE**	**Mean ± SE**	***p-value***
Days experiencing symptoms in the last 4 weeks	5.50 ± 0.38	2.66 ± 0.25	*<0.0001*
Nights awakened by symptoms in the last 4 weeks	2.87 ± 0.28	1.25 ± 0.17	*<0.0001*
Rescue inhaler use			
Number of days using rescue inhaler in last 4 weeks	5.26 ± 0.42	2.71 ± 0.28	*<0.0001*

CALM program participants experienced:

- **1214 fewer symptom days**
- **681 fewer nights awakened by symptoms**

When we use these data in conjunction with the Expert Panel Review-3 (EPR3) guidelines regarding asthma control, we find that twelve months after participating in CALM interventions, children are exhibiting better asthma control. The change over time is statistically significant, with 54% of the children having well controlled asthma at baseline, and 77% having well controlled asthma at follow-up (Figure 4).

Figure 4. Change in Assessment of Asthma Control Over Time (n=450)



Change over time was significant, with p-value < 0.0001, using Bowker's test of symmetry.

Parent report of school attendance was another area of interest in assessing the positive effects of participation in CALM programs. Both the change in the number of overall days absent as well as the change in the number of days absent due to asthma were statistically different from baseline to follow-up (Table 3). Overall absenteeism decreased from 5.3 days to 4.5 days, and asthma-specific absenteeism decreased from 2 days to 1.3 days. In addition, limitation of activity due to asthma decreased significantly, with an average reported 1.6 days with limited activity due to asthma at baseline declining to 0.9 days of inactivity at follow-up. There was no statistically significant change in grades from baseline to follow-up.

Table 3. Change in School Absenteeism and Activity Limitations Over Time (n=450)

	Baseline	Follow-up	
School Absenteeism	**Mean ± SE**	**Mean ± SE**	***p-value***
Number of days absent *overall* in the last 12 months	5.31 ± 0.31	4.54 ± 0.28	*0.0381*
Number of days absent *due to asthma* over the last 12 months	1.99 ± 0.19	1.27 ± 0.15	*0.0021*
Activity Limitation			
Number of days in the past 4 weeks not active at school, home or in sports or other recreational activities because of asthma	1.60 ± 0.20	0.92 ± 0.15	*0.0033*

All healthcare utilization variables decreased from baseline to follow-up, with both emergency department visits and urgent care visits decreasing significantly. In addition, the measure of "any urgent health care visit" related to asthma showed a significant reduction; this measure integrates data from all three types of visits (emergency room visits, hospitalizations, and urgent care visits) and creates a dichotomous variable looking at whether or not the parent/guardian reported any of the three visits over the past year. A summary of the changes in health care utilization between baseline and first-year follow-up can be seen in Table 4.

Table 4. Changes in Reported Health Care Utilization Over Time (n=450)

	Baseline	Follow-up	
Asthma-related health care utilization	**Mean ± SE**	**Mean ± SE**	***p-value***
Emergency room visits in the past 12 months	0.53 ± 0.054	0.32 ± 0.041	*0.0019*
Hospitalizations in the past 12 months	0.094 ± 0.017	0.056 ± 0.012	*0.0615*
Urgent care visits in the past 12 months	1.31 ± 0.17	0.59 ± 0.086	*0.0002*
	N (%)	**N (%)**	***p-value***
Any urgent health care visit due to asthma in the past 12 months	238 (52.9%)	147 (32.7%)	*<0.0001*

CALM program participants experienced:

- **92 fewer emergency department visits**
- **17 fewer hospitalizations**
- **317 fewer urgent care visits**

Other significant findings

- 16% increase in the number of parents and guardians reporting that their children have **Asthma Action Plans** (from 245 to 317)

- 7% increase in the number of parents and guardians reporting feeling VERY CONFIDENT in **managing their child's asthma** (from 332 to 365)

- 4% decrease in the number of children reportedly using **short acting beta agonist** every day (from 28 to 12).

There were no significant changes over time regarding:

- Whether or not a child had seen a specialist in the previous 12 months
- Whether or not a child has a PCP
- Overall distribution of grades
- Knowledge of who's in charge of handling asthma-related concerns at child's school, and the ease of contacting this person
- Perception of communication between parent and child's school about asthma
- Perception of communication between school and child's doctor
- Medications (aside from use of SABA reported above)

As is evident from the analyses shared above, overall, participation in the CALM program was correlated with increased health outcomes for hundreds of children in Missouri. What of the children in each specific CALM community? How did their outcomes differ from children in other CALM communities? Site-specific analyses of the Parent/Guardian Survey data showed that five of the six grantees who utilized the survey demonstrated statistically significant changes over time in asthma-related health outcomes; three were found to have multiple significant changes over time. One grantee, Springfield Public Schools, had one negative outcome from their survey data, with a significant increase in the number of asthma-related urgent care visits. However, the overall number of any health care visit due to asthma significantly decreased for the Springfield children, so the overall health care utilization decreased over time. Table 5 illustrates the grantee specific findings from baseline to follow-up one. Programs that demonstrated positive results but which were not statistically significant might have been underpowered to demonstrate statistically significant effects, and thus overall change in these categories is difficult to determine.

Table 5. Grantee Specific Significant Findings from the Parent/Guardian Survey

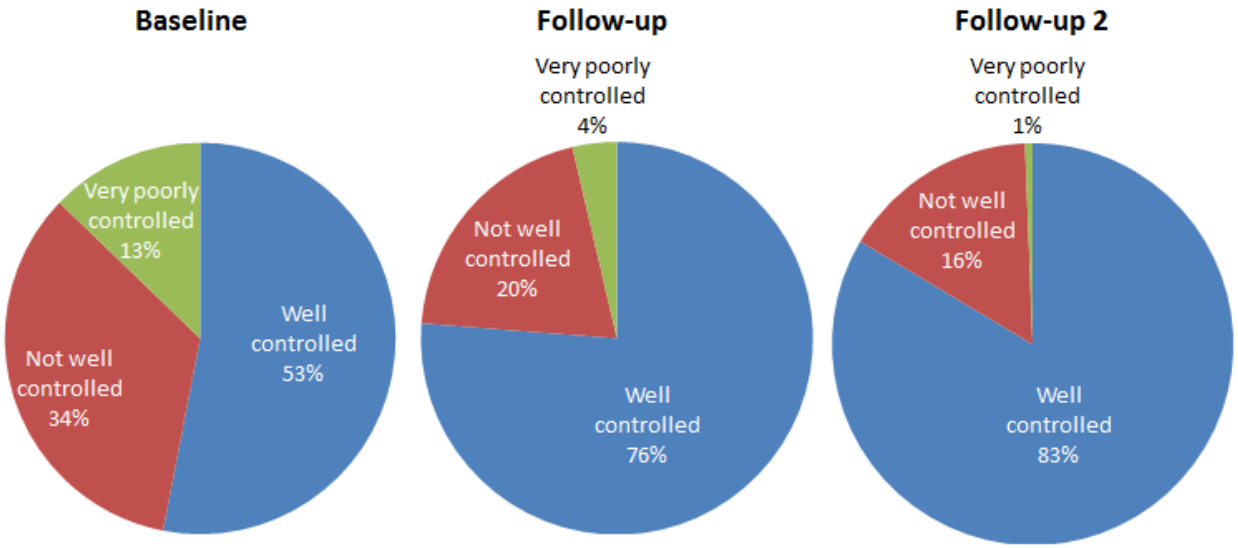
Outcome	Barton County MH (n=81)	Cox Monett (n=28)	Dept of Health (n=37)	Kennett Schools (n=133)	School of the Osage (n=26)	Springfield (n=56)	Washington County MH (n=50)	Overall (n=450)
Daytime symptoms	X	+	-	X	+	+	X	X
Nighttime awakenings	X	-	+	+	+	+	X	X
Rescue inhaler use	X	+	-	X	+	+	X	X
Overall school absenteeism	+	+	+	+	+	-	+	X
Asthma specific absenteeism	X	+	+	X	+	+	=	X
Activity limitation due to asthma	X	+	-	-	+	+	X	X
Asthma related ED visits	+	+	+	+	+	+	+	X
Asthma-related hospitalizations	+	+	+	+	=	+	=	+
Asthma-related urgent care visits	X	+	+	+	X	O	+	X
Any asthma-related urgent health care visit	X	+	+	X	+	X	+	X
Asthma action plan	X	X	=	-	=	+	X	X
Level of asthma control	X	+	-	X	+	+	X	X

X Significant positive change over time
\+ Positive change over time, not significant
= Stayed the same over time
\- Negative change over time, not significant
O Significant negative change over time

Baseline/Year 1/Year 2 Follow-Up Findings of
Change over Time from the CALM Parent/Guardian Survey

164 participants for whom were reported baseline, follow-up one, and follow-up two surveys are included in the two year analyses of outcomes. After two years of participation in CALM interventions, parents and guardians continued to report improved asthma-related health outcomes. Daytime symptoms, nighttime awakenings, rescue inhaler use, health care utilization – all outcomes either maintained their initial declines at year one follow-up or further decreased to year two. When the change in level of asthma control over the two years was determined, it was found that after two years there was a further improvement of asthma control in the group. As the number of children three surveys were reported for was a little more than 1/3 the number of the baseline to follow-up one group, the numbers at baseline and follow-up one differ slightly from the analyses reported above. See Figure 5.

Figure 5. Change over Time in Level of Asthma Control Across Three Time Periods – All Sites (n=164)



Michigan Asthma Adjustment

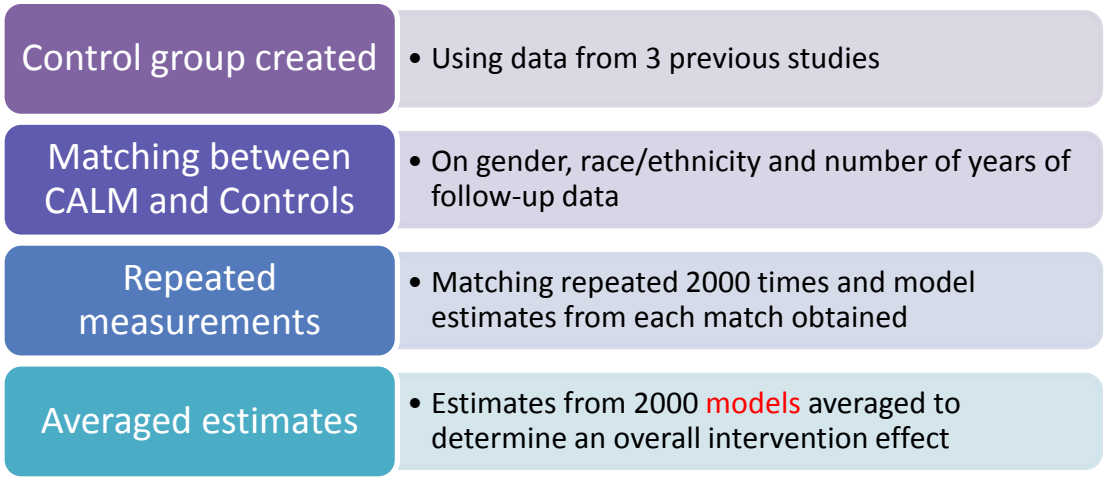
In general, asthma symptoms improve naturally as children age. In studies where there are no or minimal comparison group data, it is important to correct for this improvement to understand the true impact of the asthma interventions. The Michigan Asthma Adjustment is an algorithm created from existing data on children with asthma that can be applied to correct for natural improvement of asthma using race/ethnicity, gender and

age. Applying this adjustment to our analyses allows us to see if the intervention had a positive effect on improving outcomes, over and above the natural improvement seen in children over time.[3]

With children's health programs such as CALM, it isn't feasible – or often, ethical – to randomly assign children to treatment or control groups. The development of a comparison group for CALM was attempted, as the School District of Springfield team was able to collect data from parents and guardians of children with asthma in the Springfield School District who were not participating in the targeted CALM intervention. This comparison group included 124 surveys, with a mean age of 9.2 years. Unfortunately, analyses comparing the two Springfield study groups at baseline identified several statistically significant group differences, and further analyses using matched pairs was impossible, as demographic data for all children were not available to evaluators. As a result, there was neither control nor comparison group for the CALM intervention group. In situations such as these, given the natural improvement over time, the effects of interventions are often overestimated.

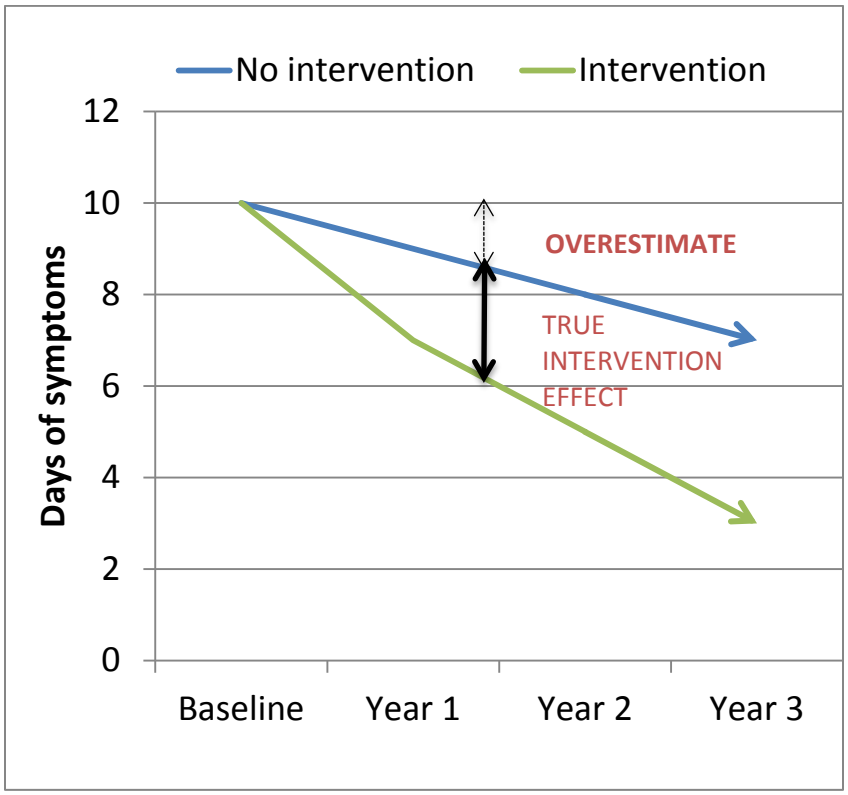
The Michigan Asthma Adjustment creates mock comparison groups utilizing data from three controlled trials of children with asthma, children not participating in any asthma interventions. Data from these trials show that symptoms in children under the age of 10 declined about 20% each year without targeted intervention. Figure 6 outlines the basic components of the Adjustment, and Figure 7 illustrates an example of the overestimation of impact of intervention can occur without adjusting for natural improvement over time.

Figure 6. The Michigan Asthma Adjustment



[3] Ko YA, Song PX, Clark NM. Declines with age in childhood asthma symptoms and health care use. An adjustment for evaluations. Ann Am Thorac Soc. 2014 Jan;11(1):54-62.

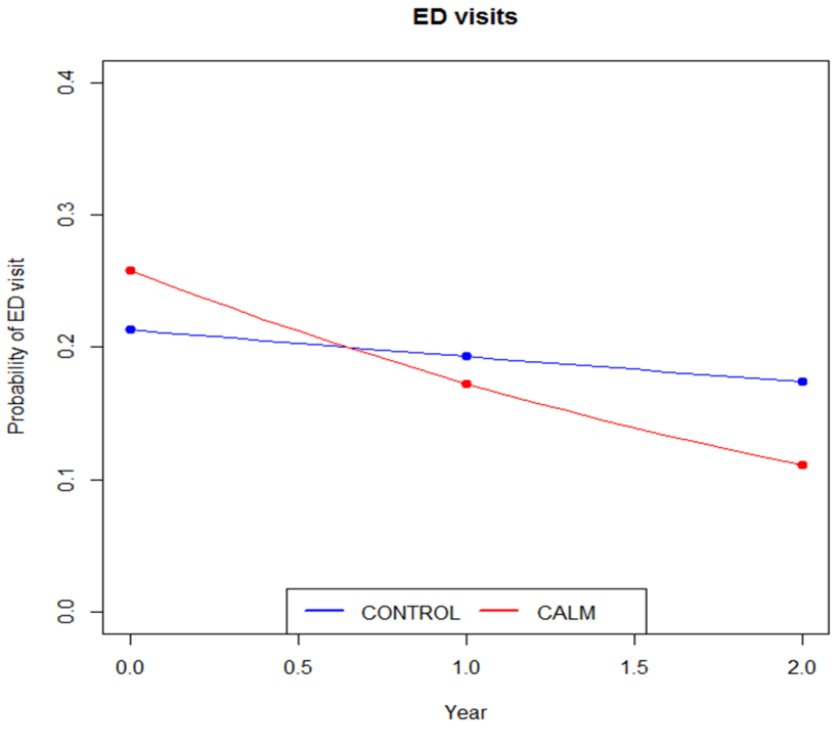
Figure 7. Overestimation of impact of interventions



When unadjusted for the natural effect of asthma improving over time, the average change in day symptoms, night symptoms and ER visits were significantly better in the CALM children versus controls. However, when applying the Michigan Asthma Adjustment, only the average change in Emergency Department visits in the past year was significantly better in the CALM children versus controls.

Figure 8 shows the probability of a child reporting an Emergency Department visit in the past 12 months, for both the control group and the CALM group. As is evident from the graph, the CALM group starts out with a higher probability of an ED visit, and ends with a significantly lower probability of an ED visit. Thus, given the use of the Adjustment with the CALM data, it was clear that the CALM program had a significant positive impact on reduction of Emergency Department visits for children participating in the interventions.

Figure 8.



Additional Outcomes Analyses

In addition to reporting Parent/Guardian Surveys, a number of CALM grantees were able to access and report additional outcomes data related to their program participants. Scores from the Asthma Control Test and Childhood Asthma Control Test, as well as health care utilization data, were additional data sources available to CALM grantees, and results of analyses of these data sources are shared below.

Asthma Control Test/Childhood Asthma Control Test

There are two versions of the asthma control test depending on age: children ages 4-11 are administered the Childhood Asthma Control Test (CACT), and children aged 12 and up and adults are administered the Asthma Control Test (ACT). Both the CACT and ACT scores are calculated as a sum of responses to questions about asthma symptoms to assess a patient's level of asthma control. For both tests, a score of 19 or below indicates asthma that is out of control.

CALM grantees who utilize the ACT and CACT in their work with children often use it as part of their regular routine, regularly administering it when needed to assess level of asthma control. As a result, the grantees reported scores before, during, and after the children's participation in the CALM program. In order to assess the impact of the CALM interventions on ACT and CACT scores, and by extension the level of asthma control, we determined scores within one month of administration of the CALM Parent/Guardian Surveys, as that is the approximate time of the beginning of the CALM program.

Table 6 shows the Baseline ACT and C-ACT scores, those scores reported from one month before to one month after administration of the baseline CALM Parent/Guardian Survey, as well as a sample of follow-up surveys, administered at time periods roughly equaling 6, 12, 18, 24, 30, and 36 months following baseline. As the numbers of children for which follow up surveys were reported fall off precipitously after the first follow up, we look to those numbers to indicate whether or not change over time occurred, visible via the ACT and C-ACT scores. The baseline average scores for both the ACT and C-ACT are lower than the first follow-up, which indicates positive progression over time, but it is difficult to ascertain significance with such small numbers of follow-up administrations of the tests.

Table 6. Means of ACT and C-ACT scores aligned with timing of CALM Parent/Guardian Survey Baseline

	ACT score PG survey taken within 1 month (N=207)			**C-ACT score** PG survey taken within 1 month (N=111)		
	N	**Mean (SD)**	Range	N	**Mean (SD)**	Range
Baseline	207	**18.82 (4.52)**	(7,27)	111	**17.45 (5.85)**	(3,27)
4-7 months	27	**20.74 (4.42)**	(12,27)	6	**24.83 (2.04)**	(21,27)
10-13 months	8	**21.88 (3.23)**	(16,25)	8	**24.75 (2.49)**	(20,27)
16-19 months	1	**21.00**		2	**17.50 (9.19)**	(11,24)
22-25 months	2	**15.50 (6.36)**	(11,20)	1	**23.00**	
28-31 months	6	**21.50 (4.93)**	(12,25)			
34-37 months	1	**24.00**				

Health Care Utilization

Two CALM grantees reported health care utilization as part of their evaluation data: Washington County Memorial Hospital and Barton County Memorial Hospital. The data reported included hospitalizations and emergency department visits. However, there were only four hospitalizations reported over all years for all children, so the two types of visits were combined into one.

Because the children participated in the CALM interventions over the time span of a school year and not a calendar year, claims were counted from September 1 to August 31 for each year. The first school year the child was enrolled in the CALM program is considered "YEAR 1" and the school year that was "YEAR 1" varied by subject. Any health care claims from before September 1 of "YEAR 1" are considered "Before CALM" visits. Before CALM, 56.9% of subjects had at least one emergency department or hospital visit. In subsequent years, the percentage of students who had emergency room or hospital visits decreased. By "Year 3", the percentage of those who had at least one emergency department or hospital visit dropped to 43.1%. Year 4 reflected an increase in the percentage who visited the hospital; however, this could have been the result of a small sample size (n=27). The percentage of students who had more than 5 visits had a steady decrease from "Before CALM" to "Year 3" (Table 7). While year four shows a slight increase in percentage with more than five visits, the sample size is very small and not statistically significant.

Table 7. Health Care Utilization

Number of Emergency Department Visits or Hospitalizations						
	Total	No visits	1 visit	2-3 visits	4-5 visits	More than 5 visits*
		N(%)	N(%)	N(%)	N(%)	N(%)
Before CALM	225	97 (43.1%)	29 (12.9%)	53 (23.6%)	26 (11.6%)	20 (8.9%)
Year 1	225	109 (48.4%)	44 (19.6%)	48 (21.3%)	16 (7.1%)	8 (3.6%)
Year 2	187	96 (51.3%)	47 (25.1%)	25 (13.4%)	14 (7.5%)	5 (2.7%)
Year 3	109	62 (56.9%)	29 (26.6%)	8 (7.3%)	7 (6.4%)	3 (2.8%)
Year 4	27	12 (44.4%)	7 (25.9%)	6 (22.2%)	0 (0%)	2 (7.4%)

*The maximum number of reported visits in one year was 28.

Between Site Analyses

In addition to analyses conducted across all of the CALM programs, the CMCD team looked at whether or not there were any significant between group differences.

Analyses conducted between CALM programs included a look at whether or not the following factors had an impact on outcomes for children in the programs:

- School nurse involvement
- Parent involvement
- PCP involvement
- Home visits

None of the above factors could be teased apart from the others to look at on a component, independent level. This is a direct result of the comprehensive nature of the CALM programs, wherein all programs have school nurse involvement, some degree of parent and PCP involvement, and a majority of the grantees incorporate home visits into their work.

As there were multiple grantee types funded through CALM, the CMCD team also wanted to discover whether or not differences in outcomes were evident between the grantee types. Grouping the grantees into Schools/University and Clinics/Hospitals, analyses were conducted to determine differences between survey results between the groups. It was discovered that the two groups differed significantly at Baseline, and this was thought to be a direct result of the different recruitment methods utilized by the grantees. A majority of the children recruited by hospital and clinic programs were recruited through the hospital setting, which would necessitate some type of asthma-related medical event to have taken place. Conversely, school recruitment was generally either through parent identification of asthma, school nurse identification of asthma symptoms, or through general education. Children included in the survey sample for the hospitals and clinics were much sicker at baseline, with higher levels of symptoms, rescue inhaler use, and health care utilization. As a result, looking at change over time differences between the two groups was comparing dissimilar groups, and did not enhance our analyses beyond the understanding of the group differences at baseline.

Grantee Successes

CALM grantees reported diverse successes related to their programs, from individual level successes such as improvement in asthma management and asthma-related health outcomes for children in their programs to community level successes such as school district policy changes. Multiple qualitative data sources were reviewed to create themes that emerged across the grantees. Themes are outlined below, along with specific examples from grantees.

Increased awareness through education – Grantees stated that the education of nurses, school staff, families, coaches, daycare providers and physicians resulted in increased awareness about asthma, including the symptoms and the proper care of asthma.

Improved asthma management and asthma-related health outcomes for children
Grantees reported experiencing successes in asthma management outcomes as a result of their CALM programs. While we have data from the Parent/Guardian Survey illustrating such positive outcomes, many of these successes were reported by grantees who were unable to report survey data, and so these reported successes serve to underscore the quantitative data we have as part of the evaluation.

Examples of such successes include the following:

- Improvements in school performance and decreases in missed school days
- Decreases in emergency department visits and hospitalizations
- Improvements in self-management skills
- Decreases in asthma daytime and nighttime symptoms

Increased involvement of and participation by school nurses in program implementation
Grantees reported successes related to increasing the participation of school nurses in asthma interventions. Nurses increased their involvement with parents and students, creating stronger relationships between schools and families. School nurses assisted CALM grantees with close monitoring of students with asthma, resulting in better asthma health outcomes for the children.

Increased parent involvement and program attendance
Grantees were able to create avenues for increased parent involvement in the CALM interventions, through Asthma Fun Nights, which allowed for interactions between providers and families in a fun and low-stress environment. Another opportunity created was through parent involvement in the asthma camps and academies; there was a high level of interest in participation by families, as there were many resources provided to families in need, in environments that were fun and educational.

Improved Continuity of Care
Grantees cited several successful approaches for improving the continuity of care for children with asthma including more rapidly and consistently identifying students with asthma and improving communication and coordination of services. In addition, grantees cited increasing access to specialist services and encouraging all care providers to use the same treatment plan as leading to improvements in children's overall care.

Enhanced communication and sustainable asthma care practices across schools, families, and physicians
Successes in enhanced communication and sustainable care practices across care givers included the creation of mini consent forms included on Asthma Action Plans, and the creation of a school to clinic communication tool.

Another type of reported success in this area related to the adoption of asthma improvement programs across various settings of care. This was brought about through the establishment of strong partnerships and the development of diverse asthma workforce across the state. In addition, networking and trainings across various stakeholders, networks, and disciplines all support the sustainment of the CALM work past the funding period.

Policy and Practice Changes

Policy and practice changes were realized by grantees at multiple levels. Fifty policy and practice changes were reported by CALM grantees; of these, 21 were policy changes and 29 were practice changes. Of the total 50 reported changes, 27 were school-based changes, with 12 policy changes and 15 practice changes.

School-Based Policy and Practice Changes

School-based policy and practice changes reported were found to fall within 2 themes: those supporting sustainability of Improved Care for Children with Asthma and those supporting sustainability of Improved Communication between Caregivers and Health Care Providers. Under these 2 main themes, the following sub-themes emerged (reported policy and practice changes often encompassed multiple themes).

Changes supporting sustainability of Improved Care for Children with Asthma included the following subthemes across the 14 programs:

- Asthma action plan creation, revision, and/or sharing.
- Changes in the way students with asthma are assessed and/or monitored.
- Increasing access to asthma medications and/or ensuring students are prescribed and taking medications per the National Heart, Lung, and Blood Institute's (NHLBI) EPR-3 guidelines.
- Training or education of students, school nurses, and/or other school staff.
- Reduction of environmental asthma triggers.
- Promoting EPR-3 guidelines.

Changes supporting sustainability of Improved Communication between Caregivers and Health Care Providers included the following sub-themes across the 14 programs:

- Communication with child's primary care physician.
- Communication with child's parent/guardian.

A majority of the school-based policy changes were reported by school grantees and were changes in the way students with asthma are assessed and/or monitored. Examples of these policy changes included:

- A policy now documented in the health policy manual that describes the procedure for assessing children with asthma at regular intervals, based on illness severity. Students assessed to have poorly controlled asthma are monitored at the beginning of each school day, while students with better asthma control are monitored on a weekly basis.
- A policy included in the school nurse manual regarding the use of metered dose inhaler technique check with In-Check Dial—a tool to assess and coach inhalation technique—when assessing children with asthma. Proper inhalation technique is critical to assure inhaled medication is deposited in the lungs.
- A policy outlining the use of a new asthma assessment form, which is documented in the school nurse procedure manual. The new form promotes EPR-3 guidelines and standardizes care across nurses in the school district.
- A policy regarding a new communication tool used by the school nurses when communicating assessment findings with primary care physicians of children with asthma, which is outlined in the school nurse handbook. The tool encourages care based on EPR-3 guidelines, and provides for more consistent care across providers.

School-based grantees and grantees based in other settings enacted a number of policy changes regarding the creation, revision, and sharing of asthma action plans in the school setting, including:

- A new school board policy implementing standardized asthma action plans for all students with asthma in the district.
- A new district-wide policy requiring students with asthma to have up-to-date asthma action plans on file at the schools.
- The creation of a new asthma action plan including parental consent that enables schools and clinics to communicate with primary care providers, in use now across the school district.

Many of the changes enacted by the hospital-based grantees were practice changes involving asthma education and/or training. Examples of these practice changes include:

- Training of school nurses by hospital-based asthma educator regarding the use of peak flow meters and assessment of asthma severity—while not included in formal job responsibilities, it is an ongoing practice.
- Hospital-based asthma educator is provided regular time by school administration to implement asthma education with youth at high risk of having poorly controlled asthma.
- Hospital-based asthma educator provides annual asthma education to school staff, with active support of school administration.

Other Policy and Practice Changes

There were several policy and practice changes unrelated to school policies that came about during the course of the CALM programs. There is large variation in the types of other changes that have occurred, and their scope ranges from having an impact on individual children participating in a YMCA program to community-wide impact on use of public parks.

Reported by school sites

Policy Changes

- Respiratory Therapists in training at a local technology center now get course credit for their work with the CALM projects
- Financial assistance for filling asthma inhaler prescriptions has been expanded through partnering with local pharmacies and pharmaceutical companies

Practice Changes

- A local medical doctor has been providing asthma education to schools
- Informational asthma meetings were hosted by a school and a regional hospital fostering collaboration between parents, the hospital, and the school

Reported by hospital sites

Policy Changes

- A city-wide smoking ban in parks was implemented and reported by one of the hospital-based sites
- Emergency room protocols were altered
- Asthma education is now included before hospital discharge for any patients with asthma
- All children with asthma attending any camp at the YMCA is required to have an Asthma Action Plan on file

Practice changes

- There are now two certified asthma educators on staff at one of the hospital sites
- Brief asthma education is now included in CPR/ACLS classes

These changes fostered linkages between within communities, hospitals, and other institutions which will help lead to sustainability of the programs beyond the grant funding.

Grantee Challenges

Challenges in implementing CALM programs were reported by grantees, and after analyses of the multiple data sources, the following themes were found to be evident across the challenges.

Parental involvement
Grantees reported challenges involving parents in their programs, from attending family events, to responding to data and program requests, to participating in smoking cessation programs. In addition to the challenge of integrating parents into the programs, grantees reported dysfunctional family dynamics as impediments to their programmatic success. There was evidence of a lack of consistency in care and asthma management across divorced parents, as well as blasé attitudes about the seriousness of the asthma symptoms exhibited by their children.

Some of the ways grantees reported overcoming these challenges included increasing opportunities for involvement and communication with parents, making data and program requests easier for parents to respond to, and increasing the education to and training of the parents regarding asthma care and management.

Buy-in by physicians and other partners
Grantees reported challenges in working with physicians and other community partners due to a lack of buy-in of these partners. They either did not understand the benefits the programs provided to the community or there was a lack of trust of the program providers.

Some of the ways grantees reported overcoming these challenges was through increased education and training, increased opportunities for communication with partners, sharing of evaluation data illustrating positive outcomes of program, and bringing in outside expertise to provide more information to the community about the program and its benefits. Many grantees reported the importance of physician training and education to increasing the program buy-in; the Asthma Ready Communities team provided assistance to many grantees in this way.

Other challenges
Grantees reported other challenges in their program implementation: scheduling conflicts with schools, lack of interest in support groups, low levels of medication adherence by children, and the challenge of building relationships with school nurses and administration. Near the end of the grants, a commonly reported challenge was creating sustainability for their programs.

Unique Site-Specific Outcomes from CALM Grantees

Asthma-Ready Clinics and Schools
The University of Missouri Asthma Ready® Communities (ARC) program had a widespread impact on the work of the other CALM grantees, and continues to have a large impact on the work being done in Missouri around asthma. ARC provides standardized, evidence-based educational programs for children with asthma, families and health professionals. Asthma Ready is “a designation indicating that the facility has participated in asthma training, has the resources and is committed to delivering appropriate services, maintaining communication

standards, and conducting quality improvement efforts to ensure best practices for the care of children with asthma."[4]

CALM grantees that have received Asthma-Ready certification include the following schools – Springfield, School of the Osage, and Kennett – and the following hospitals and clinics – Cox Monett Hospital, Jordan Valley Health Center, Barton County Memorial Hospital, and Washington County Memorial Hospital.

Asthma Control Monitor© developed by ARC
The Asthma Control Monitor provides decision support for physicians and nurse practitioners caring for children who have asthma. The innovative monitor would allow integration of school or community asthma assessment data with claims data to identify risk and impairment in children between clinic visits. This approach holds real potential to avert asthma crises by earlier identification and intervention to reach children whose asthma is not well controlled.

Asthma Academies
A number of grantees facilitated Asthma Academies for children in their programs – Barton County Memorial Hospital, Cox Monett Hospital, and Springfield School District are three who integrated the academies into their work. The Asthma Ready Communities team worked to provide expertise at academies, as well. These academies allowed for children and their parents to meet with specialists for assessment and care. As oftentimes in rural areas families have very little or no access to specialist care for asthma, these academies provided a valuable service in areas of high need.

Asthma Camp
The Washington County Memorial Hospital team facilitated an asthma camp for children with asthma in their community. The camp was fully funded by donations, which allowed for widespread participation, and took place at a local YMCA, with fun activities, asthma education, and trainings.

AFSL Asthma Home Assessment Workbook (AHAW)
The Asthma Friendly St. Louis team created an Asthma Home Assessment Workbook, which was distributed to families in the St. Louis area, and which was also utilized by other organizations working with families in the area of asthma.

CDC Evaluation Study
CDC put out a nationwide call for recommendations of strong school-based asthma management programs, emphasizing programs that linked students to clinical care. After conducting evaluability assessments in a few areas of interest, the CDC team the Kennett Public Schools program for the evaluation study. The study found that the students in Kennett had significantly better controlled asthma than students in the comparison community.

[4] http://asthmaready.org/

Dissemination of Findings

CALM article in Journal of School Health
In December, 2013, an article regarding the CALM evaluation was published in the Journal of School Health titled: "Sustaining School-Based Asthma Interventions through Policy and Practice Change."
Authors from the Center for Managing Chronic Disease shared findings from the CALM evaluation related to policy and practice changes reported by the CALM grantees that helped sustain program outcomes for children in their communities.
[Carpenter LM, Lachance L, Wilkin M, Clark NM. Sustaining school-based asthma interventions through policy and practice change. J Sch Health. 2013; 83: 859-866]

CALM conference presentations
CALM evaluation findings have been shared in many national venues, most recently at the 2013 American Evaluation Association annual conference and at the American Public Health Association annual conference.

American Evaluation Association
In October, 2013, Laurie Carpenter and Maggie Wilkin of the Center for Managing Chronic Disease presented two CALM posters at the 2013 American Evaluation Association Annual Conference: The Michigan Asthma Adjustment: Adjusting evaluation findings to account for natural improvement of asthma symptoms over time; and Linking the school, family, and clinic: improving continuity of care for children with asthma.

American Public Health Association
In November, 2013, Laurie Carpenter of the Center for Managing Chronic Disease presented at the American Public Health Association Annual Conference a poster entitled "Creating Linkages to Assess Asthma Outcomes for Vulnerable Children." She shared information about the CALM project, the CALM grantees, the Cross-Site Evaluation elements, and preliminary findings from the Parent/Guardian Survey.

Technical Assistance for Evaluation

The CMCD team has provided much in the way of technical assistance to the CALM grantees to assist with collecting and reporting data for the Cross-Site Evaluation in addition to helping with evaluation issues specific to the sites.

Technical assistance took place during site visits, and through telephone and email correspondence. The following are examples of ways in which the CMCD team provided evaluation technical assistance to the CALM grantees over the life of the project.

Technical Assistance Related to the Parent/Guardian Survey

Administration of the Parent/Guardian Survey. Related to administration of the survey, the CMCD team assisted grantees in thinking of ways to involve other project staff and stakeholders in collecting and reporting data, including school nurses and other school personnel. In addition, the CMCD team helped grantees

incorporate administration of the survey into their interventions, as many of the grantees were already conducting in-person or telephone interviews. Also, to assist with following up with parents and guardians for the follow-up surveys, the CMCD team regularly distributed tables to the grantees that included all surveys reported and the dates for follow-up.

Utilizing the online Qualtrics reporting system. While the online Qualtrics reporting system was reported to be extremely user-friendly by many grantees, there were a number of users who required additional assistance to access the system and report surveys. The CMCD team was very responsive to these requests and assisted grantees in successfully reporting their data.

Online reporting of the Parent/Guardian Survey. As stated above, some of the grantees required assistance in using the online Qualtrics reporting system. In addition to providing assistance in utilizing the system, the CMCD team offered to input survey data into the system for grantees when it was helpful and feasible to do so. Three grantees took advantage of this assistance, sending to CMCD de-identified surveys for inclusion in the Qualtrics database.

Spanish translation of the Self-Administered Parent/Guardian Survey and Cover Letter. A grantee working in a community with a growing number of Spanish-speaking families requested a Spanish translation of the Parent/Guardian Survey for use with parents and guardians of children in their asthma program. The CMCD worked with an online translation program and then with a local bilingual researcher to review the drafted translated document.

Technical Assistance Related to General Evaluation Issues

Bi-monthly email updates. Every other month, the CMCD team sent out email updates to all CALM grantees, with information related to upcoming events, evaluation timelines, site-specific reminders and questions, and evaluation data follow-up and clarification questions. For those grantees administering surveys, with each email, the CMCD team sent a list of all surveys that were to be administered, and the date of expected administration.

Tracking Students and Exposure over Time. Tracking students and exposure of students to interventions is another area in which the CMCD team assisted the grantees. While many of the grantees tracked some data related to the students in their interventions, it was oftentimes not a well-managed or very effective process. The CMCD team helped the grantees develop student codes to use in the evaluation, develop forms for tracking students and exposure to interventions, and determine plans for linking all aspects of the program, the evaluation, and the children in the interventions.

Conclusion

The comprehensive evaluation of the CALM program has resulted in cross-site assessment of reach, linkages, sustainability of efforts, and asthma-related outcomes. The CALM program, implemented by 14 grantees, has proven to reduce symptoms, school absenteeism, and health care utilization, through a comprehensive intervention that includes targeted and general student education, education and training for all care providers working with children with asthma, home visits and assessments, and other community outreach work that increases the visibility of programs and awareness of asthma in the community.

What has changed for children with asthma as a result of CALM? CALM grantees reported an increase in positive health outcomes for children with asthma in their communities, an increase in sharing and collaboration among health professionals and organizations, and increased involvement of children, schools and school nurses in their CALM programs. Grantees also reported significant improvements among community members, school staff, and clinicians as a result of the CALM work. Parents, children, and school nurses were found to be more knowledgeable about how to manage asthma and decrease asthmatic episodes. Increased training and health literacy education was also found among health professionals. Finally, grantees noted an increase in the number of children in the schools who have an Asthma Action Plan.

What has had the biggest impact on children with asthma in the CALM work? Grantees stated that providing tools and education to caretakers of children about triggers and symptoms of asthma was crucial for improving the health of children. Grantees also noted that helping participants and families become educated about asthma, and helping them to feel better about themselves resulted in the improved health of children and families in the community. Finally, grantees noted the huge benefits associated with home visits and assessments for improved health outcomes.

The CALM grantees, supported by the funding from the Missouri Foundation for Health, have made a huge positive impact on the health of children with asthma across the state, and have raised awareness among families, schools, clinics, and beyond.