

The Implementation and Evaluation of a County-wide Stock Inhaler for Schools Program in Pima County, Arizona

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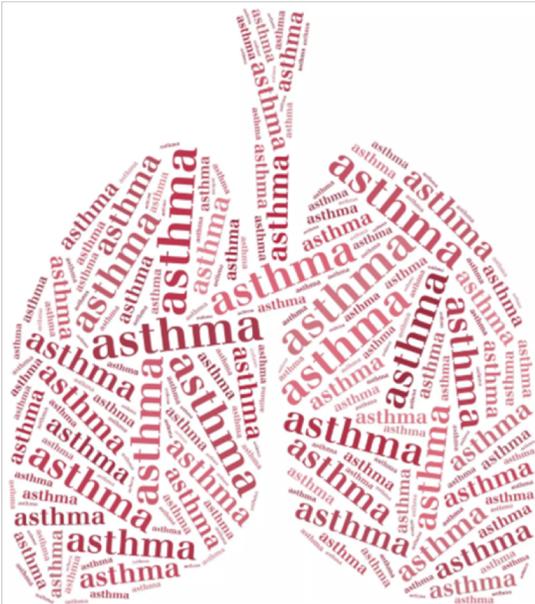
SPECIAL ACKNOWLEDGMENT

Ashley Lowe, MPH

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Pima County Stock Inhaler for Schools Program

PhD Student, Health Education/Health Promotion



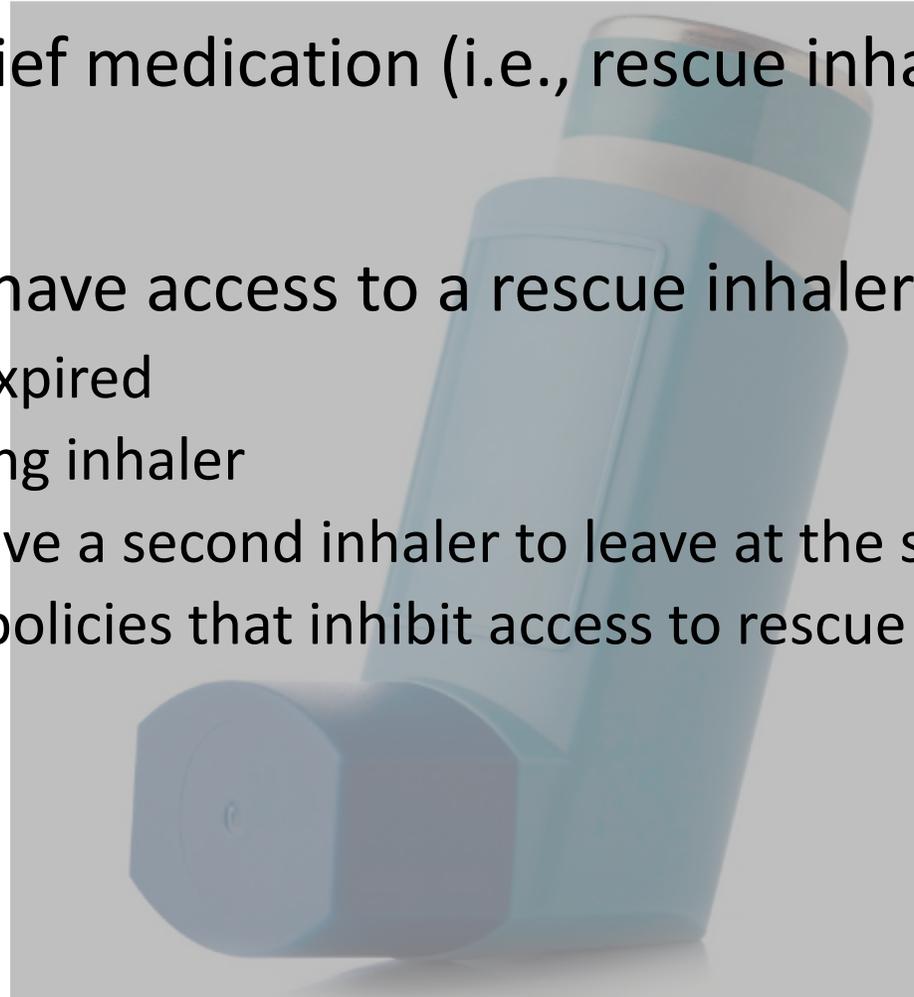
ASTHMA IN CHILDREN

- **10%** of children have asthma
- Children with asthma
 - Miss learning opportunities
 - ↑ School absenteeism
 - ↑ Emergency Department (ED) visits
 - ↑ Hospitalizations
 - EMS utilization (e.g., respiratory distress)



ASTHMA IN SCHOOLS

- Access to quick relief medication (i.e., rescue inhaler) is **necessary**
- <30% of children have access to a rescue inhaler at school
 - Inhaler is lost or expired
 - Child forgot to bring inhaler
 - Family may not have a second inhaler to leave at the school
 - School may have policies that inhibit access to rescue medication



SCHOOL “STOCK INHALER” PROGRAM

- Schools can implement a “stock inhaler” program
- Stock inhaler is a single, albuterol inhaler with a disposable valved-holding chamber (i.e., Liteaire®)
 - Shared among children in the school
 - www.ThayerMedical.com
- Stock inhaler can be quickly administered to any individual experiencing symptoms of respiratory distress
 - Potentially adverts medical emergencies / EMS utilization



STOCK INHALER LAWS

- School stock inhaler programs need stock inhaler laws
- Non-health care settings (i.e., schools) **must** have documentation
 - Medical order from a **licensed** medical provider
- Schools lack full-time licensed nurses (e.g., RN)
 - **Licensed** nurses **must** administer prescribed rescue medication to children with asthma diagnosis
 - Paperwork is often **not returned** to the school
- Health personnel range from full-time, licensed nurses to unlicensed personnel
 - **Civil liability** with administering rescue medication

HB2208

- HB2208 “Stock Inhalers for Schools”
 - Passed in Arizona on March 2017
 - 9th state to pass legislation
- Allows charter & public schools to procure, stock & administer quick relief medication for respiratory distress
- Indemnifies trained personnel for their good faith use

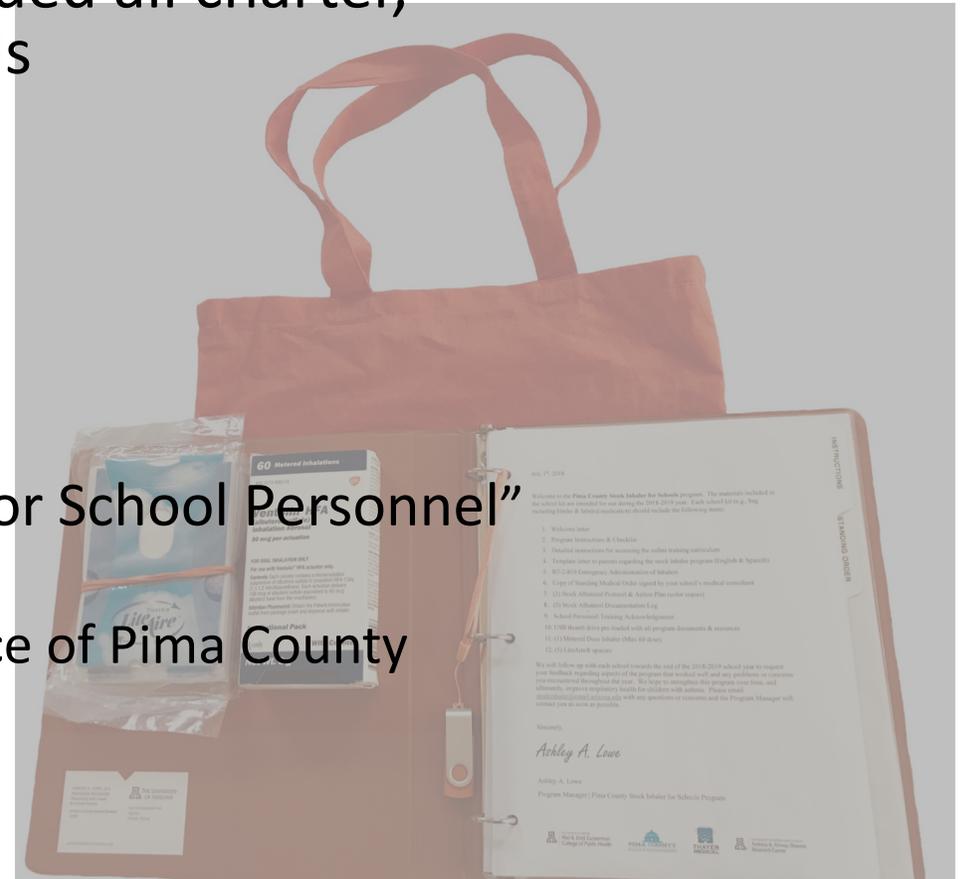


STAKEHOLDER COALITION

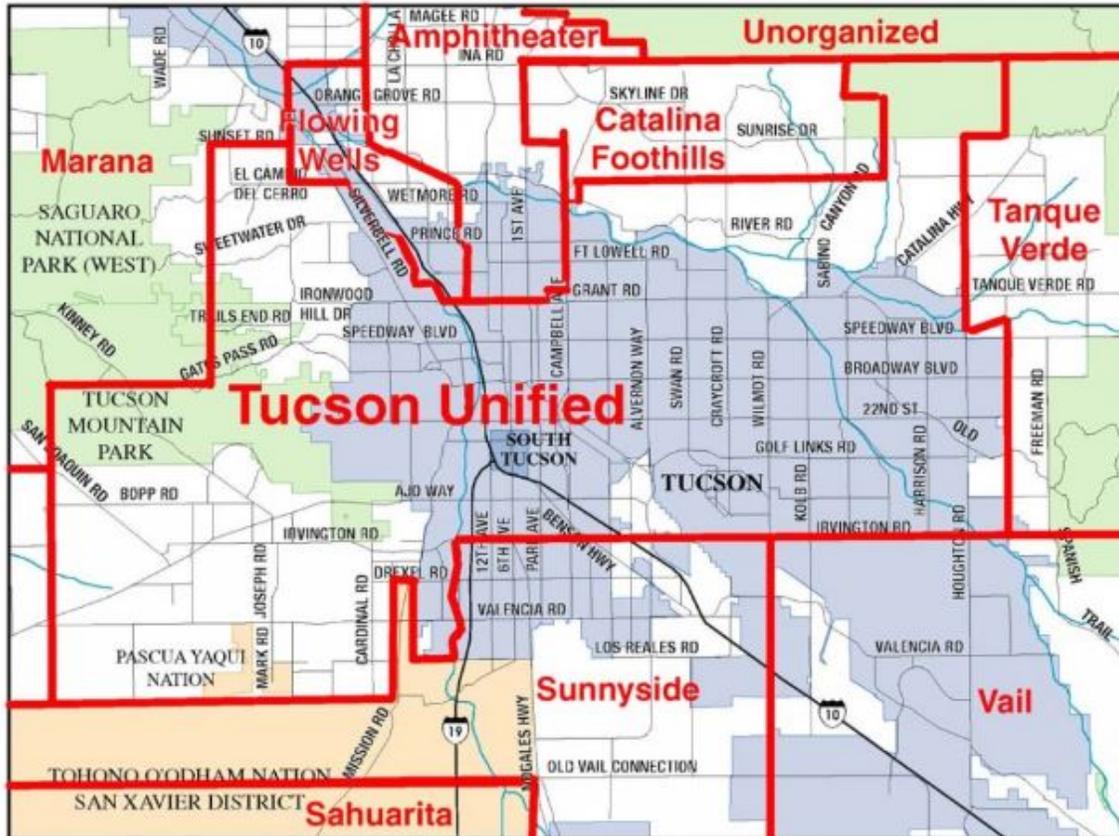
- University of Arizona Asthma & Airway Disease Research Center
 - Lynn B. Gerald, PhD, MSPH
 - Joe K. Gerald, MD, PhD
- Pima County Health Department
 - Francisco Garcia, MD, MPH
- Western Region Public Health Training Center
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 - Barbara Burkholder
- American Lung Association – Tucson
 - Donna Bryson, RN, AE-C
- Superintendent, Pima County Schools
 - Dustin Williams
- School Nurse Organization Arizona

PROGRAM DESCRIPTION

- Developed by a stakeholder coalition who provided all charter, private/parochial & public schools with materials
 - Program toolkit
 - (1) 60-dose albuterol sulfate inhaler
 - Valved-holding chambers (e.g., LiteAires®)
 - Standardized protocol
 - Documentation log
 - Template resources
 - Online training “Stock Albuterol Inhaler Training for School Personnel”
 - Technical support
 - Signed standing medical order by Chief Medical Office of Pima County
 - <https://lungresearch.arizona.edu/stockinhaler>
 - www.ThayerMedical.com



PROGRAM DESIGN & SETTING



- Implemented during 2017-2018 academic year
- All charter, private/parochial & public schools across Pima County, Arizona were eligible for enrollment

PROGRAM OUTREACH

- Systematic outreach occurred during June 2017
 - Co-authored letter
 - Pima County Health Department & Pima County Administration
 - Pima County Superintendent
 - University of Arizona
 - Community events (i.e., school resource fairs & monthly luncheons)
 - Cold-calling schools

PROGRAM ENROLLMENT

- Schools voluntarily enrolled in the program in August 2017
 - On-going program enrollment
- Enrolled schools were asked to train a minimum of 2 individuals & designate these individuals to administer stock inhaler
 - Post training assessment score $\geq 80\%$

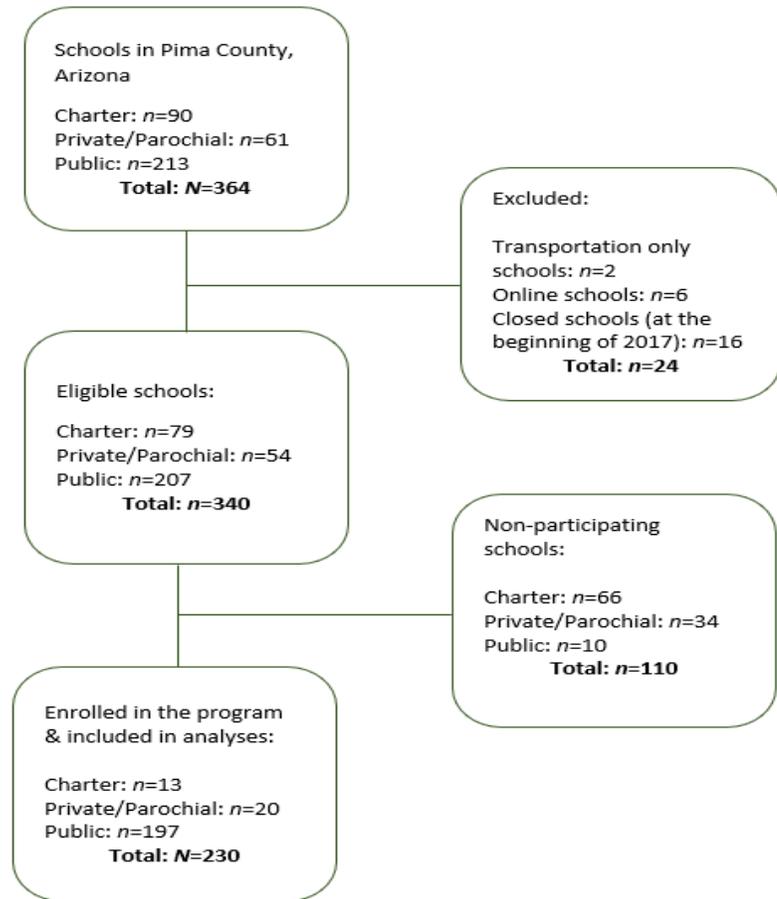
DATA COLLECTION

- Enrollment form
 - Name of school
 - Grades served
 - Nursing license status
 - No. of students
 - Demographic characteristics of students
- Staff training form & checklist
 - Completion certificate from Western Region Public Health Training Center (WRPHTC)
- Documentation log
 - School name
 - Date-of-event
 - Child's name
 - Gender
 - Race/Ethnicity
 - Previous known asthma diagnosis
 - No. of albuterol puffs given
 - Disposition status

EMAIL SURVEY & INTERVIEWS

- Trained personnel were asked to complete a 22 item survey post-implementation
 - Nursing license status
 - Satisfaction with training
 - Stock inhaler events
 - Satisfaction / dissatisfaction with program components
- One-on-one phone interviews
 - Identified through e-mail survey (Answered “Yes” to administering the stock inhaler to a child AND school approval)
 - Asked 7 open-ended questions regarding program implementation
 - Identified program barriers & facilitators

RESULTS: PROGRAM REACH



- **N=230** schools enrolled in the program during the 2017-2018 year
- **67.6%** participation rate of schools
- **134,251** children (**82%** of children)

Figure 1. Flow of participants through the Pima County Stock Inhaler for Schools Program, 2017-2018.

RESULTS: PROGRAM ADOPTION

- **67.6% (N=230)** of public, private & charter schools across Pima County, Arizona
 - 85.7% ($n=197$) public schools
 - 8.7% ($n=20$) private schools
 - 5.7% ($n=13$) charter schools
- Non-participating schools were more likely to be charter or private/parochial schools ($p=0.007$)

RESULTS: PROGRAM EFFECTIVENESS

- 152 schools (66%) reported using the stock inhaler at least one time
- 1032 stock inhaler events
 - 82% used with a student who had a known diagnosis of asthma
 - 84% returned to class
 - 12% of uses were among blacks

RESULTS: PROGRAM EFFECTIVENESS

Stock Inhaler Events	Total N=152	GRADES SERVED AT SCHOOL				P-value
		PreK-5 th /6 th n=79	6 th -8 th n=19	9 th -12 th n=22	Other n=32	
No. of stock albuterol events	1032	443	219	196	174	
No. of stock albuterol events per 1000 students per school year, mean, SD	8.9 (13.7)	9.5 (14.3)	10.8 (9.9)	8.3 (15.4)	7.1 (10.4)	0.60

RESULTS: PROGRAM EFFECTIVENESS

		TYPE OF SCHOOL			
Stock Inhaler Events	Total N=152	Charter n=5	Private/Parochial n=7	Public n=140	P-value
No. of stock albuterol events	1032	16	25	991	
No. of stock albuterol events per 1000 students per school year, mean, SD	8.9 (13.7)	4.6 (7.8)	5.6 (12.1)	9.5 (13.5)	0.24

RESULTS: PROGRAM EFFECTIVENESS

		TYPE OF SCHOOL			
Stock Inhaler Events	Total N=152	Nurse n=16	Nurse- supervised n=114	Unlicensed n=22	P-value
No. of stock albuterol events	1032	180	757	95	
No. of stock albuterol events per 1000 students per school year, mean, SD	8.9 (13.7)	7.0 (13.8)	11.8 (14.0)	3.8 (9.1)	0.0001

RESULTS: PROGRAM EFFECTIVENESS

- **Qualitative Interviews ($n=15$)**
 - Selected from a sample of 25 individuals who answered “Yes” to administering the stock inhaler AND had school approval
 - $n=8$ Registered nurses; $n=7$ Unlicensed personnel
 - **100%** felt confident administering the stock inhaler
 - Standardized protocol was easy-to-follow
 - Felt anxiety before the program, but then felt relief to have a “tool” available

RESULTS: PROGRAM IMPLEMENTATION

Table 6. Itemized program cost for the Pima County Stock Inhaler for Schools Program, 2017-2018.

Supplies	Quantity	Cost per Unit	Total Cost
60-dose albuterol	275	\$22.00	\$6,050.00
LiteAires®	2,500	\$2.95	\$7,375.00
Marketing materials	250	\$1.85	\$135.50
Business cards	1 Box	-	\$11.00
Travel (Mileage reimbursement ^a)	-	-	\$405.00
Postage	-	-	\$100.00
School kits	275	\$14.50	\$3,986.49
Copy services (Letters ^b)	275	\$4.79	\$1,317.25
Staffing (.5FTE ^c & 30% ERE ^d included)	1	-	23,400.00
Total Program Cost:			\$42,780.24
Total Program Cost Per School:			\$155.56

^aMileage Reimbursement was 44.5 cents per mile in accordance with the Arizona Department of Administration.

^bOutreach letters sent to each school in Pima County, Arizona during July 2017.

^cFTE: Full-time equivalent (.5FTE is 20 hours per week).

^dERE: Employee related expenses.

RESULTS: PROGRAM IMPLEMENTATION

- Program fidelity
 - Competition rate of the Stock Albuterol Inhaler Training for School Personnel
 - Expected $\geq n=460$ individuals to complete the training
 - **$N=206$** individuals **actually** completed training
 - Completion certificates
 - Unable to match some e-mail addresses to school personnel

RESULTS: PROGRAM MAINTENANCE

- E-mail post-implementation survey (***N=267***)
- Survey response rate = 77.6%

Most survey respondents were:

- 46-65 years-of-age (*n=160, 60.4%*)
- Female (*n=252, 95.5%*)
- White (*n=218, 81.7%*)
- Worked at a public school (*n=250, 94.7%*)
- Unlicensed personnel (*n=186, 70.5%*)

RESULTS: PROGRAM MAINTENANCE

Table 8. Web-based post-evaluation survey administered to trained personnel who participated in the Pima County Stock Inhaler for Schools Program, 2017-2018.

Question	Mean (SD) n=267 ^b	
Online training^a		
Gaining access to the online training curriculum was easy.	3.86	(1.03)
Enrolling in the Stock Albuterol Inhaler Training for School Personnel was easy.	3.85	(1.02)
The length of time the online training to complete was appropriate.	4.02	(0.87)
How confident are you with managing a respiratory emergency after completing the stock inhaler training?	4.21	(0.70)
Confidence		
Please rate how confident you felt administering the stock inhaler during the 2017-2018 academic year.	4.41	(.58)
Please rate how confident you felt using the stock inhaler protocol & action plan	4.37	(.60)
Overall satisfaction		
I would recommend this program at my school or other schools for the next academic year.	4.54	(.76)

^aOnline training curriculum: Stock Inhaler Training for School Personnel developed by the Western Region Public Health Training Center and the American Lung Association - Tucson.

^bMissing data: All missing data <5%.

RESULTS: PROGRAM MAINTENANCE

Table 10. Web-based post-evaluation survey administered to trained personnel who reported their satisfaction with the Pima County Stock Inhaler for Schools Program, 2017-2018.

Question	<i>n%</i> <i>n=267^c</i>	
Overall Satisfaction, <i>n%</i>		
<i>Do you feel the Stock Inhaler for Schools Program was beneficial to your school?</i>		
Yes	264	(93.2%)
No	4	(1.5%)
Do not know / Declined to answer	14	(5.3%)
<i>Did the stock inhaler make any positive difference in your school?</i>		
Yes	204	(77.3%)
No	19	(7.2%)
Do not know / Declined to answer	41	(15.5%)
<i>Did the stock inhaler make any negative difference in your school?</i>		
Yes	34	(12.9%)
No	196	(74.5%)
Do not know / Declined to answer	33	(12.6%)
<i>Were there any complaints from parents', other school staff, students, EMS providers or health care providers regarding the Stock Inhaler for Schools program that you are aware of?</i>		
Yes	5	(1.9%)
No	247	(93.6%)
Do not know / Declined to answer	14	(4.6%)
<i>Do you plan on continuing the Stock Inhaler for Schools Program in future years?</i>		
Yes	235	(89.7%)
No	25	(9.5%)
Do not know / Declined to answer	2	(0.8%)

^aPercentages may not add up to 100% as a result of rounding.

^bMissing data: All missing data <5%.

^cQuestions based on "Yes", "No", & "Do not know / Declined to answer".

DISCUSSION

- Barriers
 - Finding a second person to train/administer stock inhaler
 - Enrolling in online training curriculum / internet access
- Facilitators
 - Delivery of program supplies @ no cost
 - Identifying a medical consult (standing orders provided with program supplies)
 - In-person education & program presentations

TAKE HOME MESSAGE

- Stock inhaler programs increase access to rescue medication
- Access to rescue medication returns children to the classroom
- Children who return to the classroom participate in school & childhood activities
- Standardized stock inhaler protocols are effective among diverse school settings & nurse resources

NEXT STEPS

- Patterns of stock inhaler events across schools & over time
 - Increased stock inhaler usage among African American/Black children?
 - Impacts on EMS infrastructure
- Sustainability
- Expansion of Stock Inhaler laws across counties & states

THANK YOU

ROY P. DRACHMAN HALL
MEL AND ERID ZUCKERMAN COLLEGE OF PUBLIC HEALTH

QUESTIONS?

RESULTS: PROGRAM EFFECTIVENESS

Table 2. Stock inhaler events among schools enrolled in the Pima County Stock Inhaler for Schools Program, 2017-2018.

	Stock Inhaler Events	
	<i>n</i> % ^{a,b}	
Total student enrollment (Dec. 1st, 2017), <i>n</i>		134,251
Total schools that reported using the stock inhaler, <i>n</i>%	152	(66.1)
Number of stock albuterol events, <i>n</i>		1,032
Gender, <i>n</i>%		
Male	521	(52.6%)
Female	469	(47.4%)
Race, <i>n</i>%		
American Indian / Alaska Native	32	(3.1%)
Asian	10	(1.0%)
Black or African American	121	(11.7%)
Native Hawaiian / Pacific Islander	6	(0.6%)
White	426	(41.0%)
Ethnicity, <i>n</i>%		
Hispanic/Latino	480	(69.8%)
Non-Hispanic / Non-Latino	209	(30.3%)
Asthma Diagnosis, <i>n</i>%		
Known asthma diagnosis	810	(82.0%)
No known asthma diagnosis	121	(12.2%)
Do not know / Declined to answer	58	(5.8%)
Puffs administered, Mean (SD)	2.7	(1.9)
Disposition Status, <i>n</i>%		
Returned to class	772	(84.0%)
Sent home with caregiver	142	(15.4%)
Called 9-1-1 and no EMS transport	1	(0.1%)
Called 9-1-1 and transported via EMS	5	(0.5%)

^aPercentages may not add up to 100% as a result of rounding.

^bMissing data: All missing data <5% except: Race: *n*=437 (57.7%); Ethnicity: *n*=343 (33.2%); Disposition: *n*=114(11.4)%.

RESULTS: PROGRAM EFFECTIVENESS

Table 3. Stock inhaler events by grades served among schools that reported a stock inhaler use, 2017-2018.

Stock Inhaler Events	Total N=152	Grades Served at Schools								P Value
		Pre-K-5 th /6 th n=79		6 th -8 th n=19		9 th -12 th n=22		Other n=32		
No. of stock albuterol events, <i>n</i>	1,032	443		219		196		174		-
No. of stock albuterol events per 1,000 students, per school year, mean, <i>SD</i>	8.9 (13.7)	9.5 (14.3)		10.8 (9.9)		8.3 (15.4)		7.1 (10.4)		0.60
Disposition Status ^{a,b} , <i>n</i> %	915	400		196		176		143		0.04
Returned to class	769 (84.0)	329 (72.5)		176 (89.8)		152 (86.4)		112 (78.3)		-
Sent home with caregiver	140 (15.3)	68 (17.0)		19 (9.7)		23 (13.1)		30 (21.0)		-
Called 9-1-1 and no EMS transport	1 (0.1)	0 (0.0)		0 (0.0)		0 (0.0)		1 (0.7)		-
Called 9-1-1 and transported via EMS	5 (0.5)	3 (0.8)		1 (0.5)		1 (0.6)		0 (0.0)		-

^aPercentages may not add up to 100% as a result of rounding.

^bMissing data: Disposition Status: PreK-5th/6th: *n*=43 (9.7%); 6th-8th: *n*=23 (10.5%); 9th-12th: *n*=20 (10.2%); Other: *n*=31 (17.8%).

RESULTS: PROGRAM EFFECTIVENESS

Table 4. Stock inhaler events by type of school among schools that reported a stock inhaler use, 2017-2018.

Stock Inhaler Events	Total N=152	School Type				P Value		
		Charter n=5		Private/Parochial n=7			Public n=140	
No. of stock albuterol events^a, n	1,032	16		25		991		-
No. of stock albuterol events per 1,000 students, per school year, mean, SD	8.9 (13.7)	4.6 (7.8)		5.6 (12.1)		9.5 (13.5)		0.24
Disposition status^{a,b}, n%	915	13		23		879		0.59
Returned to class	769 (84.0%)	10 (76.9%)		21 (91.3%)		738 (84.0%)		-
Sent home with caregiver	140 (15.3%)	3 (23.1%)		2 (8.7%)		135 (15.4%)		-
Called 9-1-1 and no EMS transport	1 (0.1%)	0 (0%)		0 (0%)		1 (0.1%)		-
Called 9-1-1 and transported via EMS	5 (0.5%)	0 (0%)		0 (0%)		5 (0.6%)		-

^aPercentages may not add up to 100% as a result of rounding.

^bMissing data: Disposition status: Charter: n=3 (23.1%); Private/Parochial: n=2 (8.7%); Public: n=112 (11.3%).

RESULTS: PROGRAM EFFECTIVENESS

Table 5. Stock inhaler events by nursing licensure among schools that reported a stock inhaler use, 2017-2018.

Stock Inhaler Events	Total N=152	Nurse Licensure at Schools				P Value
		Nurse n=16	Nurse-supervised n=114		Unlicensed n=22	
No. of stock albuterol events, <i>n</i>	1,032	180	757		95	-
No. of stock albuterol events per 1,000 students, per school year, mean, <i>SD</i>	8.9 (13.7)	7.0 (13.8)	11.8 (14.0)		3.8 (9.1)	0.0001
Disposition Status, <i>n%</i>	915	166	667		82	0.65
Returned to class	769 (84.0)	136 (81.9)	559 (83.8)		74 (90.2)	-
Sent home with caregiver	140 (15.3)	29 (17.5)	103 (15.4)		8 (9.6)	-
Called 9-1-1 and no EMS transport	1 (0.1)	0 (0.0)	1 (0.1)		0 (0.0)	-
Called 9-1-1 and transported via EMS	5 (0.5)	1 (0.6)	4 (0.6)		0 (0.0)	-

^aPercentages may not add up to 100% as a result of rounding.

^bMissing data: Nurse: *n*=14 (7.8%); Nurse-supervised: *n*=90 (11.9%); Unlicensed *n*=13 (13.7%).

Resources Available

University of Arizona Stock Inhaler Information:

- <https://lungresearch.arizona.edu/stockinhaler>
- Stockinhaler@email.arizona.edu
- LiteAire Holding Chamber
 - www.ThayerMedical.com
- Maricopa County Resources and Contact information
 - Charlena Munoz, BSN, RN, Clinical School Health Specialist, AZ Dept. of Ed./Health and Nutrition Services,
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 - (602)542-0101.