

# Final Progress Report for Research Projects Funded by Health Research Grants

Instructions: Please complete all of the items as instructed. Do not delete instructions. Do not leave any items blank; responses must be provided for all items. If your response to an item is “None”, please specify “None” as your response. “Not applicable” is not an acceptable response for any of the items. There is no limit to the length of your response to any question. Responses should be single-spaced, no smaller than 12-point type. The report **must be completed using MS Word**. Submitted reports must be Word documents; they should not be converted to pdf format. Questions? Contact Health Research Program staff at 717-783-2548.

1. **Grantee Institution:** Duquesne University
2. **Reporting Period (start and end date of grant award period):** 1/1/2010- 6/30/2013
3. **Grant Contact Person (First Name, M.I., Last Name, Degrees):** Julie Christy, BS
4. **Grant Contact Person’s Telephone Number:** 412-396-1886
5. **Grant SAP Number:** 4100050894
6. **Project Number and Title of Research Project:** 1-Implementation of an Asthma Program to Improve Asthma Identification and Education in Children
7. **Start and End Date of Research Project:** 1/1/2010 - 6/30/2013
8. **Name of Principal Investigator for the Research Project:** Jennifer Padden Elliott, PharmD
9. **Research Project Expenses.**

9(A) Please provide the total amount of health research grant funds spent on this project for the entire duration of the grant, including indirect costs and any interest earned that was spent:

\$ 60,909.89

9(B) Provide the last names (include first initial if multiple individuals with the same last name are listed) of **all** persons who worked on this research project and were supported with health research funds. Include position titles (Principal Investigator, Graduate Assistant, Post-doctoral Fellow, etc.), percent of effort on project and total health research funds expended for the position. For multiple year projects, if percent of effort varied from year to year, report in the % of Effort column the effort by year 1, 2, 3, etc. of the project (x% Yr 1; z% Yr 2-3).

Last Name, First Name	Position Title	% of Effort on Project	Cost
Elliott, Jennifer	Principal Investigator	10%	\$9,357.00
Marcotullio, Nicole	Co-Investigator	10%	\$9,633.90
Lunney, Phil	Statistician	.5%	\$3,000.00

9(C) Provide the names of **all** persons who worked on this research project, but who *were not* supported with health research funds. Include position titles (Research Assistant, Administrative Assistant, etc.) and percent of effort on project. For multiple year projects, if percent of effort varied from year to year, report in the % of Effort column the effort by year 1, 2, 3, etc. of the project (x% Yr 1; z% Yr 2-3).

Last Name, First Name	Position Title	% of Effort on Project

9(D) Provide a list of **all** scientific equipment purchased as part of this research grant, a short description of the value (benefit) derived by the institution from this equipment, and the cost of the equipment.

Type of Scientific Equipment	Value Derived	Cost
Spirometers (X2)	Lung function screenings were conducted for 193 participants. Thirty participants were identified to have potential undiagnosed asthma and received referrals for follow-up care. Thirty-three participants with previously diagnosed asthma were identified to have potential uncontrolled asthma and referred for follow-up care. All received disease state management education.	\$3998
BP cuffs and stethoscopes	Blood pressure screenings were conducted for 228 participants. Forty-nine participants were identified to have potential undiagnosed hypertension and received referrals for follow-up care. All participants received nutrition and physical activity	\$358

	education.	
Breath Carbon Monoxide monitors (x2)	230 participants were screened to determine smoking status, which resulted in smoking cessation counseling for 38 participants who were identified as smokers.	\$1100
Scale (X2)	Scales were used to weigh participants, determine BMI and weight status. 231 participants were screened and 109 were identified to be overweight or obese and referred for follow-up care.	\$60
Stadiometer (X2)	Stadiometers were used to measure participant height, determine BMI and weight status. 231 patients were screened and 109 were identified to be overweight or obese and referred for follow-up care.	\$139.95

**10. Co-funding of Research Project during Health Research Grant Award Period.** Did this research project receive funding from any other source during the project period when it was supported by the health research grant?

Yes \_\_\_\_\_ No X \_\_\_\_\_

If yes, please indicate the source and amount of other funds:

**11. Leveraging of Additional Funds**

11(A) As a result of the health research funds provided for this research project, were you able to apply for and/or obtain funding from other sources to continue or expand the research?

Yes X \_\_\_\_\_ No \_\_\_\_\_

If yes, please list the applications submitted (column A), the funding agency (National Institutes of Health—NIH, or other source in column B), the month and year when the application was submitted (column C), and the amount of funds requested (column D). If you have received a notice that the grant will be funded, please indicate the amount of funds to be awarded (column E). If the grant was not funded, insert “not funded” in column E.

Do not include funding from your own institution or from CURE (tobacco settlement funds). Do not include grants submitted prior to the start date of the grant as shown in Question 2. If you list grants submitted within 1-6 months of the start date of this grant, add a statement below the table indicating how the data/results from this project were used to secure that grant.

A. Title of research project on grant application	B. Funding agency (check those that apply)	C. Month and Year Submitted	D. Amount of funds requested:	E. Amount of funds to be awarded:
Surveillance and Tracking of Asthma in our Region's Schoolchildren (STARS)	<input type="checkbox"/> NIH <input type="checkbox"/> Other federal (specify: _____) <input checked="" type="checkbox"/> Nonfederal source (specify: <u>Heinz Endowment</u> )	August 2013	\$500,000	\$500,000
	<input type="checkbox"/> NIH <input type="checkbox"/> Other federal (specify: _____) <input type="checkbox"/> Nonfederal source (specify: _____)		\$	\$
	<input type="checkbox"/> NIH <input type="checkbox"/> Other federal (specify: _____) <input type="checkbox"/> Nonfederal source (specify: _____)		\$	\$

11(B) Are you planning to apply for additional funding in the future to continue or expand the research?

Yes X No \_\_\_\_\_

If yes, please describe your plans:

Our collaborative research group has applied for a \$216,000 grant through the Astra Zeneca Healthcare Foundation to support one year of additional health camps. Efforts will be expanded to include personalized goal setting and monitoring of long-term outcomes.

**12. Future of Research Project.** What are the future plans for this research project?

Future research goals are to screen all elementary school children in the region for undiagnosed or uncontrolled asthma (STARS program) and to expand the current camp model to include personalized goal setting and long term follow-up.

**13. New Investigator Training and Development.** Did students participate in project supported internships or graduate or post-graduate training for at least one semester or one summer?

Yes \_\_\_\_\_ No  \_\_\_\_\_

If yes, how many students? Please specify in the tables below:

	Undergraduate	Masters	Pre-doc	Post-doc
Male				
Female				
Unknown				
<b>Total</b>				

	Undergraduate	Masters	Pre-doc	Post-doc
Hispanic				
Non-Hispanic				
Unknown				
<b>Total</b>				

	Undergraduate	Masters	Pre-doc	Post-doc
White				
Black				
Asian				
Other				
Unknown				
<b>Total</b>				

**14. Recruitment of Out-of-State Researchers.** Did you bring researchers into Pennsylvania to carry out this research project?

Yes \_\_\_\_\_ No  \_\_\_\_\_

If yes, please list the name and degree of each researcher and his/her previous affiliation:

**15. Impact on Research Capacity and Quality.** Did the health research project enhance the quality and/or capacity of research at your institution?

Yes  \_\_\_\_\_ No \_\_\_\_\_

If yes, describe how improvements in infrastructure, the addition of new investigators, and other resources have led to more and better research.

This grant helped form a successful interdisciplinary collaboration between pharmacists at Duquesne University and physicians at Allegheny Health Network. This research project has and continues to result in presentations and publications that have enhanced the schools reputation in the area of clinical and asthma research. This project has also led to a new collaboration with the School of Nursing and Psychology at Duquesne University. This collaboration will enhance the current educational interventions to include personalized goal setting and monitoring as well as additional health screenings.

**16. Collaboration, business and community involvement.**

16(A) Did the health research funds lead to collaboration with research partners outside of your institution (e.g., entire university, entire hospital system)?

Yes  No

If yes, please describe the collaborations:

This project helped form a successful research collaboration between pharmacists at Duquesne University and physicians at Allegheny Health Network. This group continues to work together on expanding the number of children who receive asthma screenings and the quality and extent of interventions provided.

16(B) Did the research project result in commercial development of any research products?

Yes  No

If yes, please describe commercial development activities that resulted from the research project:

16(C) Did the research lead to new involvement with the community?

Yes  No

If yes, please describe involvement with community groups that resulted from the research project:

Important partnerships were formed with representatives from the American Lung Association, administrators and nurses from area elementary schools and various after-school programs and community leaders in target populations. We continue to work with many of these collaborators to provide health services and educational resources to underserved individuals at increased risk for asthma and its complications.

## **17. Progress in Achieving Research Goals, Objectives and Aims.**

List the project goals, objectives and specific aims (as contained in the grant agreement). Summarize the progress made in achieving these goals, objectives and aims for the period that the project was funded (i.e., from project start date through end date). Indicate whether or not each goal/objective/aim was achieved; if something was not achieved, note the reasons why. Describe the methods used. If changes were made to the research goals/objectives/aims, methods, design or timeline since the original grant application was submitted, please describe the changes. Provide detailed results of the project. Include evidence of the data that was generated and analyzed, and provide tables, graphs, and figures of the data. List published abstracts, poster presentations and scientific meeting presentations at the end of the summary of progress; peer-reviewed publications should be listed under item 20.

This response should be a DETAILED report of the methods and findings. It is not sufficient to state that the work was completed. Insufficient information may result in an unfavorable performance review, which may jeopardize future funding. If research findings are pending publication you must still include enough detail for the expert peer reviewers to evaluate the progress during the course of the project.

Health research grants funded under the Tobacco Settlement Act will be evaluated via a performance review by an expert panel of researchers and clinicians who will assess project work using this Final Progress Report, all project Annual Reports and the project's strategic plan. After the final performance review of each project is complete, approximately 12-16 months after the end of the grant, this Final Progress Report, as well as the Final Performance Review Report containing the comments of the expert review panel, and the grantee's written response to the Final Performance Review Report, will be posted on the CURE Web site.

**There is no limit to the length of your response. Responses must be single-spaced below, no smaller than 12-point type. If you cut and paste text from a publication, be sure symbols print properly, e.g., the Greek symbol for alpha ( $\alpha$ ) and beta ( $\beta$ ) should not print as boxes ( $\square$ ) and include the appropriate citation(s). DO NOT DELETE THESE INSTRUCTIONS.**

Our collaborative research group was successful in reaching four of the six research aims, and all programmatic goals. The methods used to achieve each aim and all outcomes are presented separately for each specific aim.

Research Aims:

### **1) To identify children with uncontrolled or undiagnosed asthma**

In an effort to identify children with uncontrolled or undiagnosed asthma, we conducted three asthma camps per year, for a total of six asthma camps over two years. We also conducted two asthma screenings in the community prior to each asthma camp in an attempt to identify children suffering from undiagnosed or uncontrolled asthma in the Pittsburgh region and refer them to the

asthma camps. A total of twelve screenings and six camps were conducted over the project period.

The FYGH asthma camps were hosted at Duquesne University's A.J. Palumbo Center, a sports complex that provided adequate space for sports instruction and health education. The A.J. Palumbo center is within 1 mile of a large, predominantly African American, lower socioeconomic community; allowing easy access to those at greatest risk for asthma and its complications. Six daylong camps were offered over a period of two years, with three camps offered each summer. Each camp started at 9:00am and ended at 2:00pm. Registration was followed by health screenings and education during the morning session, a healthy lunch was provided, and the afternoon ended with sports skills instruction. Duquesne University student pharmacists developed and implemented the health education interventions, which focused on pharmacologic and non-pharmacologic management of asthma, nutrition and smoking prevention. They also performed the screening assessments, with oversight provided by pharmacist and physician faculty. Duquesne University student athletes and coaches taught basketball skills.

The camps were offered, free of cost, to all children in the Pittsburgh area and its surrounding communities. Children with and without a prior diagnosis of asthma were encouraged to attend. Inclusion criteria for this study were that the child attend one of the six FYGH asthma camps and be between 5-17 years of age. Children and caregivers were recruited through various methods. Six health screenings were held at various locations throughout the city of Pittsburgh each spring prior to the summer asthma camp series in an effort to increase identification of children with potential or uncontrolled asthma and related complications (obesity, hypertension, tobacco smoke exposure), and invite them to attend the asthma camp series. The majority of screenings were held at afterschool programs and public housing projects. Asthma, blood pressure, body mass index (BMI) and tobacco smoke exposure screenings were the only services provided at the community screening events. Fliers for camps were distributed at each screening and children and caregivers were encouraged to attend, regardless of risk, to receive additional health screenings, health education, and sports skills instruction. Other methods for camp recruitment included: mass emails at local hospitals and universities; posters and fliers distributed at pediatric practices, sports leagues, schools and churches; media releases; and advertisements in local newspapers and health bulletins. Research assistants obtained written consent and assent for participation in the study during camp registration. If children attended multiple camps, written consent and assent was required prior to each camp. Children were not restricted from participation in multiple camps. If children attended multiple camps, they were counted as separate subjects for each session.

The educational interventions and sports skills provided at each camp differed in an attempt to encourage children to attend all three camps. Other strategies utilized for sample retention included: having well-known athletes provide sports instruction (e.g. University athletes and coaches); providing free wellness screenings and counseling for caregivers (e.g. blood pressure, cholesterol, diabetes, and BMI); encouraging children with asthma to bring a friend; providing T-shirts, basketballs, backpacks, and water bottles with the asthma program's logo to increase awareness of the program; raffling off giveaways for children and caregivers (e.g. iPods® and gift cards); providing free lunch; and ultimately educating the children and caregivers on the

importance of continued asthma education and physical activity in the maintenance of their disease state.

*Asthma screening.* Children were classified as having asthma if their caregivers indicated that they had a diagnosis of asthma on the permission slip. Children were classified as not having asthma if their caregivers indicated that they did not have a diagnosis of asthma on the permission slip. Caregiver report of asthma medication use was also recorded on the permission slip.

Spirometry was used to further classify lung function using the KoKo® Legend portable spirometer. The National Heart Lung and Blood Institute's (NHLBI) Guidelines for the Diagnosis and Management of Asthma (EPR-3) states that spirometry is an essential objective measure to establish the diagnosis of asthma.<sup>1</sup> Spirometry can demonstrate obstruction and assess reversibility in patients  $\geq 5$  years of age, thus our exclusion of children less than 5 years of age. Forced Vital Capacity (FVC) is the volume of air that can forcibly be blown out after full inspiration. Forced Expiratory Volume in 1 Second (FEV<sub>1</sub>) is the maximum volume of air that can forcibly be blown out in the first second during the FVC maneuver. Along with FVC, it is considered one of the primary indicators of lung function.<sup>1</sup>

Student pharmacists received spirometry training from physician faculty prior to each camp. Two student pharmacists were in charge of spirometry at each camp, with oversight and interpretation of results provided by physician faculty. The student pharmacists calibrated the spirometers at the beginning of each camp. They also explained the purpose of the test and demonstrated proper technique to each child. Children were asked to perform the maneuver while seated and maintaining upright posture. They were required to take several practice attempts to ensure proper technique and maximal effort. Children were observed and coached by student pharmacists and physician faculty to achieve optimal technique. Flow volume curves were assessed by physician faculty, and repeat measures were conducted to obtain three acceptable and reproducible results, of which the highest FEV<sub>1</sub> and FVC were reported.

Similar to the classification system used by Abramson et al., children without a previous diagnosis of asthma and an FEV<sub>1</sub> or FEV<sub>1</sub>/FVC  $\geq 85\%$  were classified as not having asthma, whereas children without a previous diagnosis of asthma and an FEV<sub>1</sub> or FEV<sub>1</sub>/FVC  $< 85\%$  were classified as having potential asthma.<sup>2</sup>

The Asthma Therapy Assessment Questionnaire (ATAQ) for children and adolescents<sup>3</sup> was used in combination with spirometry results to further classify children with a previous diagnosis of asthma according to level of control. EPR-3 recommends the use of validated self-assessment tools, like the ATAQ, to help determine whether asthma is well controlled from the patient and family perspective.<sup>1</sup> The ATAQ for children and adolescents is a 7 item questionnaire that identifies potential problems in several categories, including symptom control, behavior, attitude, self-efficacy barriers and communication gaps.<sup>3</sup> Diette et al. found that children identified as having poor asthma control using the pediatric ATAQ had significantly higher rates of asthma-related hospitalizations, ER or urgent care visits, and doctor visits than those with good control.<sup>4</sup> The following score categories were used utilized in this study: 0= asthma is well controlled; 1-2= asthma is not well controlled; 3-7= asthma is poorly controlled. Therefore, for children with

a previous diagnosis of asthma, we classified those with an FEV<sub>1</sub> or FEV<sub>1</sub>/FVC  $\geq$  85% and an ATAQ score of 0 as controlled, an FEV<sub>1</sub> or FEV<sub>1</sub>/FVC  $<$  85% and/or an ATAQ score of 1-2 as not well controlled, and an FEV<sub>1</sub> or FEV<sub>1</sub>/FVC  $<$  85% and/or an ATAQ score of 3-7 as poorly controlled asthma. Table 1 illustrates the asthma classification system used.

**Table 1. Asthma Classification**

<b>Asthma classification</b>	<b>Caregiver report of asthma diagnosis</b>		<b>FEV<sub>1</sub> or FEV<sub>1</sub>/FVC</b>		<b>ATAQ score</b>
<b>No asthma</b>	No	+	$\geq$ 85%		-
<b>Potential asthma</b>	No	+	$<$ 85%		-
<b>Previously diagnosed asthma</b>					
<b>Controlled asthma</b>	Yes	+	$\geq$ 85%	+	0
<b>Not well controlled asthma</b>	Yes	+	$<$ 85%	$\pm$	1-2
<b>Poorly controlled asthma</b>	Yes	+	$<$ 85%	$\pm$	3-7

**Camp Outcomes:**

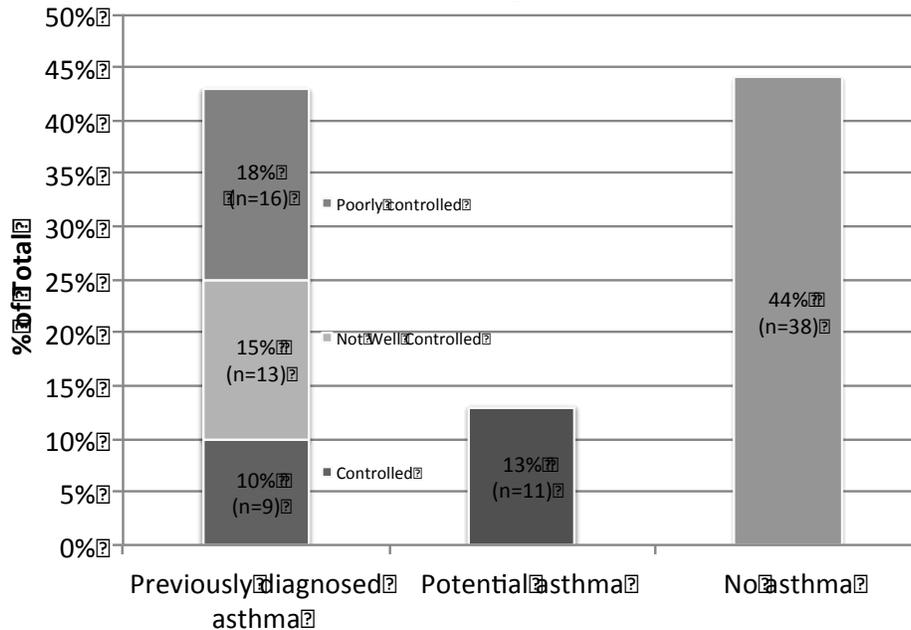
Over a two-year period, 87 subjects were enrolled from the camps. Demographic characteristics are presented in table 2.

**Table 2. Demographic Characteristics (Camps)**

<b>Characteristics</b>	<b>Mean [SD] or N [%]</b>
<b>Age</b>	9.7 [ $\pm$ 2.7]
<b>Sex</b>	
Male	54 [62%]
Female	33 [38%]
<b>Race</b>	
Black, non-Hispanic	41 [47%]
White, non-Hispanic	36 [41%]
Hispanic	4 [5%]
Other	6 [7%]

The proportion of children identified as having no asthma, potential asthma, or controlled/not well controlled/poorly controlled asthma are described in figure 1.

Figure 1. Asthma classification (Camps)



Four of the 13 subjects identified as not well controlled had both FEV<sub>1</sub> or FEV<sub>1</sub>/FVC < 85% and an ATAQ score of 1-2, whereas 9 of these subjects had FEV<sub>1</sub> or FEV<sub>1</sub>/FVC ≥ 85%, but an ATAQ score of 1-2. Six of the 16 subjects identified as poorly controlled had both FEV<sub>1</sub> or FEV<sub>1</sub>/FVC < 85% and an ATAQ score of 3-7, whereas 10 of these subjects had FEV<sub>1</sub> or FEV<sub>1</sub>/FVC ≥ 85%, but an ATAQ score of 3-7. None of the subjects identified with uncontrolled asthma had an ATAQ score of 0.

### Screening Outcomes:

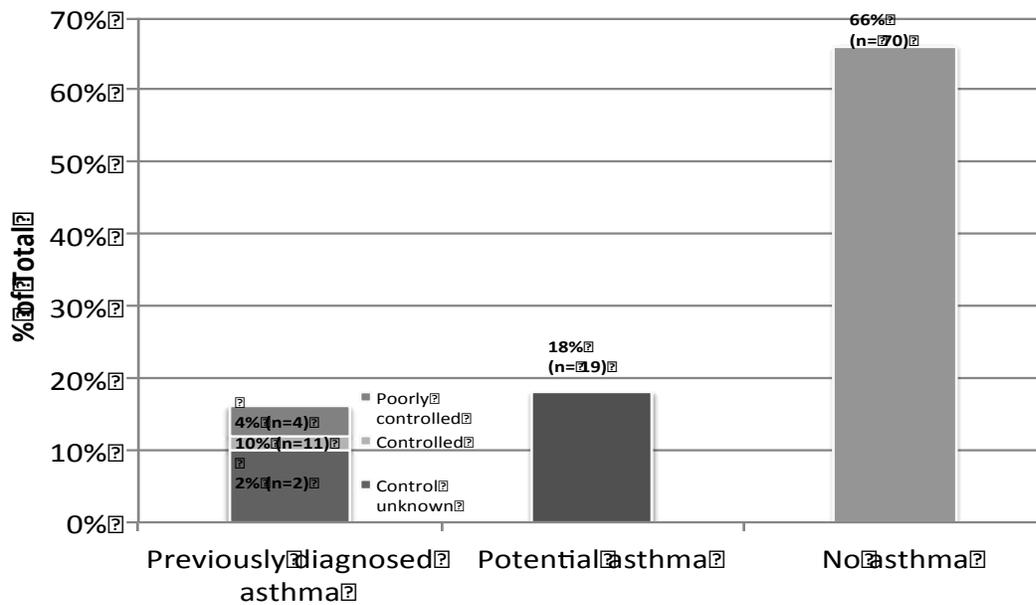
Over a two-year period, 144 subjects were enrolled from the community-based screenings. Demographic characteristics are presented in table 3.

**Table 3. Demographic Characteristics (Screenings)**

Characteristics	Mean [SD] or N [%]
<b>Sex</b>	
Male	72 [50%]
Female	72 [50%]
<b>Race</b>	
Black, non-Hispanic	128 [89%]
White, non-Hispanic	9 [6%]
Hispanic	3 [2%]
Other	4 [3%]

The proportion of children identified as having no asthma, potential asthma, or controlled/not well controlled/poorly controlled asthma are described in figure 2.

Figure 2. Asthma classification (Screenings)



**2) To determine the effectiveness of using the community-based screening method for recruiting and referring children to the Asthma Camps**

While the community-based screenings were effective for disease identification, referral and education, they were not an effective method for recruiting children for the asthma camps. We hypothesize that although the camps were located in downtown Pittsburgh, many of the children who attended the screenings lacked the transportation and/or support to attend the camps. Our current grant proposal included transportation reimbursement for families to decrease this potential barrier.

**3) To identify relationships between lung function, hypertension, and obesity in children attending the community-based screenings**

*Blood Pressure (BP) screening.* Blood pressure was measured and evaluated according to recommendations from the NHLBI’s fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. Standard pediatric blood pressure cuffs were used to measure blood pressure. The 50th, 90th, 95th, and 99th percentiles for systolic blood pressure (SBP) and diastolic blood pressure (DBP) according to height, sex, and age are given within the Fourth Report for boys and girls. The child was considered normotensive if BP was below the 90th percentile, pre-hypertensive if BP was between the 90<sup>th</sup>- 95<sup>th</sup> percentile, stage 1 hypertensive if the BP was between the 95<sup>th</sup>-99<sup>th</sup> percentile plus 5mmHg, and stage 2 hypertensive if the BP was >99<sup>th</sup> percentile plus 5mmHg.<sup>5</sup>

*BMI screening.* Weight was measured using a digital scale and height was measured via a portable stadiometer. BMI was then calculated from each child's height and weight. After BMI was calculated, it was entered into a spreadsheet that calculated percentile rankings based upon the sex specific CDC BMI-for-age ranges. BMI-for-age weight status categories and the corresponding percentiles are as follows: underweight (less than the 5<sup>th</sup> percentile); Healthy weight (5<sup>th</sup> percentile to less than the 85<sup>th</sup> percentile); overweight (85<sup>th</sup> to less than the 95<sup>th</sup> percentile); and obese (equal to or greater than the 95<sup>th</sup> percentile).<sup>6</sup>

*Tobacco smoke exposure.* Smoking status was determined by measuring exhaled carbon monoxide (CO) with the SmokeCheck® (MicroDirect) hand-held portable monitor. Exhaled CO has been used to determine smoking status in adults and adolescents.<sup>7-9</sup> SmokeCheck® monitors provided an easy, noninvasive, and immediate way of assessing a child's smoking status, thus providing a gateway to smoking cessation counseling. These monitors give patients instant visible proof of CO levels within their lungs, in parts per million (ppm), simply by blowing into the device. The following classification system was used based on recommendations from the manufacturer: COppm: 0-6=nonsmoker; 7-10=light smoker; 11-20=smoker; ≥20=heavy smoker.

Results from the BP and BMI community-based screenings are described in Figures 3 and 4.

Figure 3. Blood pressure screening results

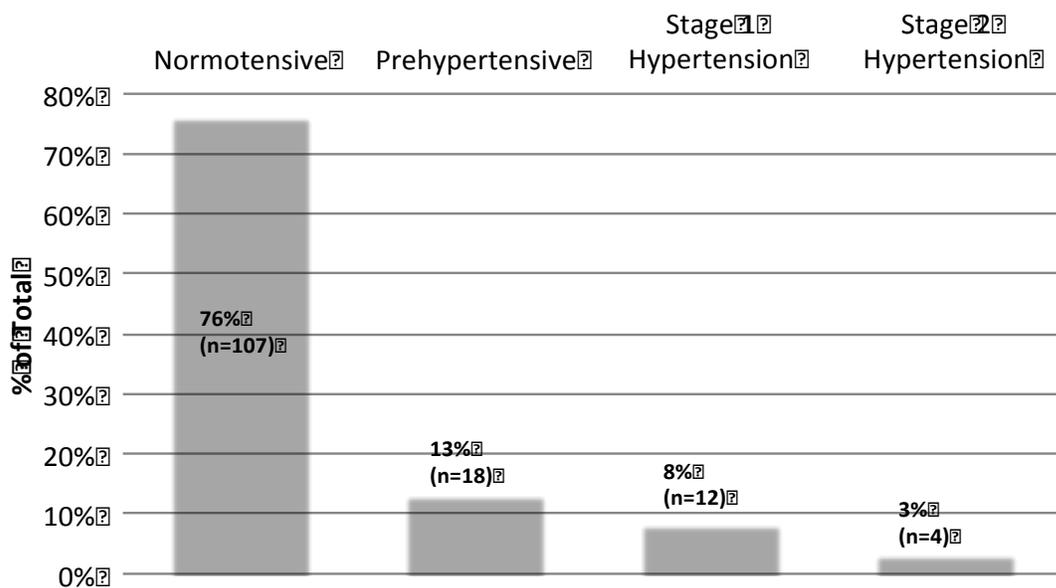
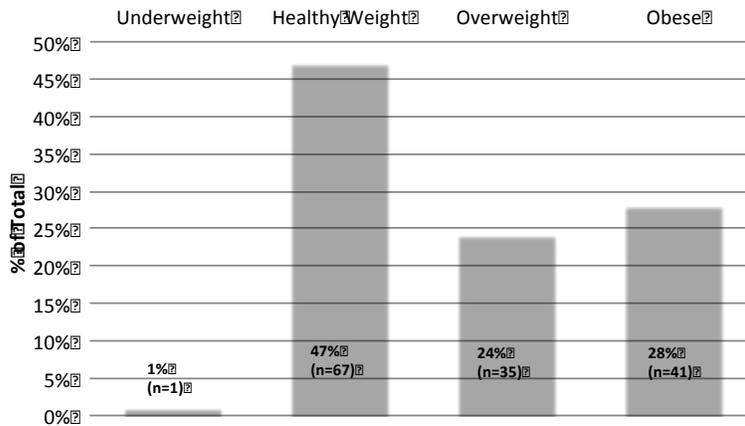


Figure 4. BMI screening results



106 children (74%) were classified as non-smokers (COppm 0-6), 1 child (1%) was classified as a light smoker (COppm 7-10), 25 children (17%) were classified as smokers (COppm 11-20) and 11 children (8%) were classified as heavy smokers (COppm  $\geq$ 20).

Two significant associations were identified in the cohort of children attending the community-based screenings. A statistically significant association was identified between blood pressure classification and weight status category. The incidence of hypertension trended directly with increasing weight ( $p < 0.001$ ). A statistically significant association was also observed between weight status category and smoking ( $p = 0.02$ ) with the proportion of heavy smokers increasing with increasing weight.

**4) To identify relationships between lung function, hypertension, obesity, asthma knowledge, and tobacco smoke exposure in children attending the community-based camps**

The same methods used in the community-based screening to measure blood pressure, BMI and tobacco smoke exposure were used in the community-based camps.

Results from the BP and BMI measurements taken at the camps are described in Figures 5 and 6.

Figure 5. Blood Pressure screening results.

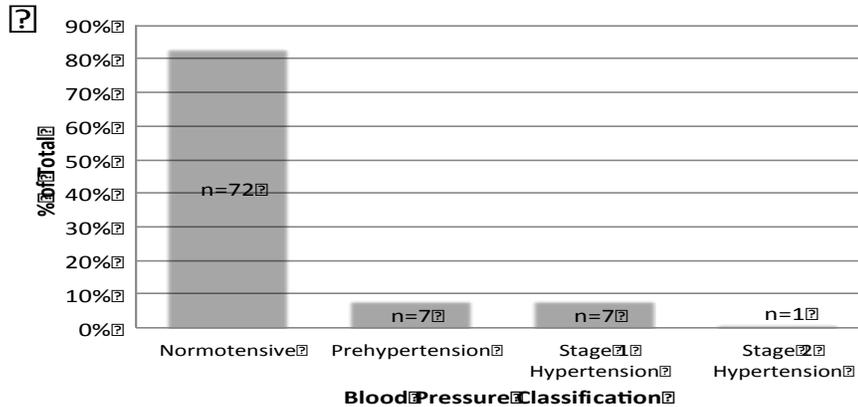
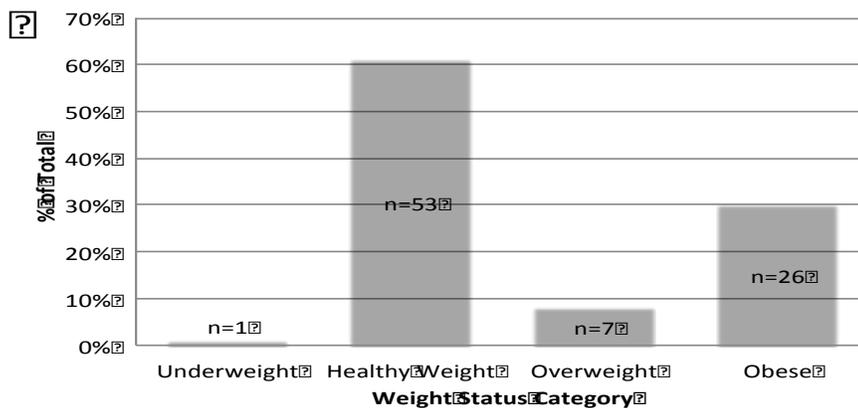


Figure 6. BMI screening results



Eighty-four children (97%) were classified as non-smokers (COppm 0-6) and 1 child (1%) was classified as a light smoker (COppm 7-10). Data was missing for two subjects, and none were classified as smokers (COppm 11-20) or heavy smokers (COppm  $\geq$ 20).

A statistically significant association was not identified between weight status category and asthma classification (previously diagnosed asthma, potential asthma or no asthma). There was, however, a statistically significant association between weight status category and asthma control (Figure 5). None of the obese subjects with previously diagnosed asthma were considered controlled, as compared to approximately 4 (67%) of the overweight and 5 (23%) of the healthy or underweight subjects. Further, the proportion of poorly controlled asthma was highest for the obese group (70%), as compared to healthy weight (36%) and overweight subjects (17%). This association was significant at the p=0.01 alpha level.

The sample size was too small to make a valid statistical comparison between blood pressure and weight status. However, only 17 (65%) obese subjects had normal blood pressure, as compared to 47 (89%) healthy weight subjects. Thirty-five percent of obese subjects had abnormal blood

pressure; 3 (12%) were classified as pre-hypertensive, 5 (19%) were Stage 1 hypertensive, and 1 (4%) was Stage 2 hypertensive. All 7 of the overweight subjects had normal blood pressure.

A correlation between pre-intervention asthma knowledge test scores and asthma control was not observed for children with previously diagnosed asthma. The association was tested using a one-way analysis of variance, which suggested that the three groups were essentially equivalent at the alpha equal to 0.05 level. Whereas we did not observe a significant correlation between pre-intervention test scores and asthma control in children, we did discover a statistically significant association between caregiver pre-intervention test scores and asthma control in their children ( $p=0.019$ ). Higher average pre-intervention test scores in caregivers were associated with 'Controlled' and 'Not well controlled' asthma in their children (mean test scores, 12.8 and 11.5, respectively), whereas lower scores (mean test score, 8.54) corresponded to 'Poorly controlled' asthma.

#### **5) To evaluate the effectiveness of the asthma education interventions on child and caregiver knowledge of asthma**

Under the guidance of pharmacist faculty and as part of an experiential education requirement, various groups of 6<sup>th</sup> year student pharmacists developed hands-on, interactive educational activities that were implemented at each camp. The involvement of multiple student pharmacists allowed for variation in educational activities, while reinforcing the same important aspects of optimal asthma management. All student-developed activities were reviewed and approved by pharmacist faculty prior to implementation at the camps. The various activities at each camp consistently targeted four aspects of optimal asthma management: avoidance of asthma triggers, compliance with asthma medication, proper inhaler technique, and the importance of an asthma action plan. Student pharmacists developed numerous innovative educational activities, such as interactive skits to teach proper inhaler technique, game shows highlighting the differences between controller and reliever medication, and a memory game of asthma triggers. Caregivers were required to attend each camp with their child and encouraged to participate in the education sessions.

The 31 question Asthma Knowledge Questionnaire developed and validated by Fitzclarence and Henry to assess caregiver knowledge of asthma<sup>10</sup> was modified for administration to children and their caregivers in a camp setting. Questions 1, 6, 7, 8, 10, 11, 17, 23, 26 and 27 were reworded and restructured to create a 15-question asthma knowledge test to assess child and caregiver knowledge of asthma. Pictorial representation was used when possible, with 'circle the above' and 'yes/no' type questions used most frequently. The questionnaire was administered to children and caregivers separately at the beginning and end of each camp to assess the effectiveness of the student pharmacist delivered asthma education intervention. Each questionnaire was administered and graded by study personnel, took roughly 10 minutes to complete, and was worth 15 possible points.

Complete pre and post- intervention asthma knowledge tests were collected for 76 children (87%) and 42 caregivers (48%) enrolled in the study. The mean difference between the pre-intervention test ( $10.37 \pm 2.74$ ) and the post-intervention test ( $12.90 \pm 2.16$ ) was  $2.5 \pm 2.45$  ( $p < 0.001$ ) when administered to children attending the camps. The mean difference between the

pre-intervention test ( $8.76.x \pm 4.3$ ) and the post-intervention test ( $8.43 \pm 4.31$ ) was  $-0.33 \pm 5.34$  ( $p=0.68$ ) when administered to caregivers attending the camps.

Our study demonstrates that student pharmacist delivered asthma education can positively impact asthma knowledge in children. The results also demonstrate the need for new programs to target the educational needs of caregivers. Caregiver asthma knowledge was strongly associated with better asthma control in children with a previous diagnosis of asthma. Additionally, the caregivers in this study had lower baseline asthma knowledge compared to the children, and were not effectively impacted or engaged in the education interventions. Further research is needed to develop comprehensive asthma education programs that meet the needs of both children and caregivers.

#### **6) To evaluate the longitudinal impact of the education interventions on clinical outcomes in children attending multiple camps**

We were unable to evaluate the longitudinal impact of the educational interventions on clinical outcomes in children attending multiple camps because we only had four children attend more than one camp. Camps were scheduled several months apart from each other with the intent of having participants attend all three camps and collecting follow-up measures at subsequent camps. We scheduled most of the camps during the summer months due to gym availability, but this made participant retention difficult because we were competing with summer sports leagues and vacations. We also think that the amount of time in between each single camp was too long. Our next camps are going to be scheduled during the school year on 3 consecutive Friday nights or Saturday mornings. We hope that these revisions to the existing model will enhance participant retention.

#### **References:**

1. EPR. Expert panel report 3: Guidelines for the diagnosis and management of asthma (EPR 2007). NIH publication number 08-5846. Bethesda, MD: U.S. Department of Health and Human Services; National Institutes of Health; National Heart, Lung, and Blood Institute; National Asthma Education and Prevention Program, 2007.
2. Abramson J, Wollan P, Kurland M, Yawn B. Feasibility of school-based spirometry screening for asthma. *J School Health*. 2003;73(4):150-153.
3. Skinner EA, Diette GB, Algatt-Bergstrom PJ, et al. The asthma therapy assessment questionnaire (ATAQ) for children and adolescents. *Disease Management*. 2004;7(4):305-313.
4. Diette GB, Sajjan SG, Skinner EA, Weiss TW, Wu AW, Markson LE. Using the pediatric asthma therapy assessment questionnaire to measure asthma control and healthcare utilization in children. *Patient* 2009;2:233-241.

5. National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics* 2004;114: 555–576.
6. About BMI for children and teens. Centers for Disease Control and Prevention web site. Available from: [http://www.cdc.gov/healthyweight/assessing/bmi/childrens\\_bmi/about\\_childrens\\_bmi.html](http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html) [last accessed 13 Sep 2012].
7. Middleton ET, Morice AH. Breath carbon monoxide as an indication of smoking habit. *Chest* 2000;117:758–763.
8. Gourgoulianis KI, Gogou E, Hamos V, et al. Indoor maternal smoking doubles adolescents' exhaled carbon monoxide. *Acta Paediatr* 2002; 91:712–713.
9. Deveci SE, Deveci F, Acik Y, et al. The measurement of exhaled carbon monoxide in healthy smokers and non-smokers. *Respir Med* 2004;98:551–556.
10. Fitzclarence CA, Henry RL. Validation of an asthma knowledge questionnaire. *Journal of Pediatric Child Health*. 1990;26:200-204.

#### **Published Abstracts**

Padden J, Marcotullio N, Gentile D, Skoner D. High Prevalence of Asthma, Obesity and Hypertension in Children from Pittsburgh's Inner-City. *The Journal of Allergy and Clinical Immunology* 2011; 127 (2): 438 [abstract] (Impact factor: 9.773)

Marcotullio N, Padden J, Gentile D, Skoner D. Association between elevated BMI and Poor Asthma Control Among Inner-City Children from the Pittsburgh Area. *The Journal of Allergy and Clinical Immunology* 2011; 127 (2): 1035 [abstract] (Impact factor: 9.773)

#### **Scientific Meeting Presentations:**

Padden J, Marcotullio N, Gentile D, Skoner D. High Prevalence of Asthma, Obesity and Hypertension in Children from Pittsburgh's Inner-City. Presented at the 2011 American Academy of Allergy, Asthma and Immunology Annual Conference in San Francisco, CA on March 18, 2011. (*international forum, competitive review*)

Marcotullio N, Padden J, Gentile D, Skoner D. Association Between Elevated BMI and Poor Asthma Control Among Inner-City Children from the Pittsburgh Area. Podium Presentation at the 2011 American Academy of Allergy, Asthma and Immunology Annual Conference in San Francisco, CA on March 22, 2011. (*international forum, competitive review*)

**18. Extent of Clinical Activities Initiated and Completed.** Items 18(A) and 18(B) should be completed for all research projects. If the project was restricted to secondary analysis of clinical data or data analysis of clinical research, then responses to 18(A) and 18(B) should be “No.”

18(A) Did you initiate a study that involved the testing of treatment, prevention or diagnostic procedures on human subjects?

Yes  
 No

18(B) Did you complete a study that involved the testing of treatment, prevention or diagnostic procedures on human subjects?

Yes  
 No

**If “Yes” to either 18(A) or 18(B), items 18(C) – (F) must also be completed.** (Do NOT complete 18(C-F) if 18(A) and 18(B) are both “No.”)

18(C) How many hospital and health care professionals were involved in the research project?

  3   Number of hospital and health care professionals involved in the research project

18(D) How many subjects were included in the study compared to targeted goals?

 307  Number of subjects originally targeted to be included in the study  
 231  Number of subjects enrolled in the study

**Note:** Studies that fall dramatically short on recruitment are encouraged to provide the details of their recruitment efforts in Item 17, Progress in Achieving Research Goals, Objectives and Aims. For example, the number of eligible subjects approached, the number that refused to participate and the reasons for refusal. Without this information it is difficult to discern whether eligibility criteria were too restrictive or the study simply did not appeal to subjects.

18(E) How many subjects were enrolled in the study by gender, ethnicity and race?

Gender:

 126  Males  
 105  Females  
       Unknown

Ethnicity:

  7   Latinos or Hispanics  
 214  Not Latinos or Hispanics  
 10  Unknown

Race:

American Indian or Alaska Native

Asian

169 Blacks or African American

Native Hawaiian or Other Pacific Islander

45 White

Other, specify: \_\_\_\_\_

17 Unknown

18(F) Where was the research study conducted? (List the county where the research study was conducted. If the treatment, prevention and diagnostic tests were offered in more than one county, list all of the counties where the research study was conducted.)

Allegheny County

**19. Human Embryonic Stem Cell Research.** Item 19(A) should be completed for all research projects. If the research project involved human embryonic stem cells, items 19(B) and 19(C) must also be completed.

19(A) Did this project involve, in any capacity, human embryonic stem cells?

Yes

No

19(B) Were these stem cell lines NIH-approved lines that were derived outside of Pennsylvania?

Yes

No

19(C) Please describe how this project involved human embryonic stem cells:

**20. Articles Submitted to Peer-Reviewed Publications.**

20(A) Identify all publications that resulted from the research performed during the funding period and that have been submitted to peer-reviewed publications. Do not list journal abstracts or presentations at professional meetings; abstract and meeting presentations should be listed at the end of item 17. **Include only those publications that acknowledge the Pennsylvania Department of Health as a funding source** (as required in the grant agreement). List the title of the journal article, the authors, the name of the peer-reviewed publication, the month and year when it was submitted, and the status of publication (submitted for publication, accepted for publication or published.). Submit an electronic copy of each publication or paper submitted for publication, listed in the table, in a PDF version 5.0.5 (or greater) format, 1,200 dpi. Filenames for each publication should include the number of the research project, the last name of the PI, and an abbreviated title of the

publication. For example, if you submit two publications for Smith (PI for Project 01), one publication for Zhang (PI for Project 03), and one publication for Bates (PI for Project 04), the filenames would be:

- Project 01 – Smith – Three cases of isolated
- Project 01 – Smith – Investigation of NEB1 deletions
- Project 03 – Zhang – Molecular profiling of aromatase
- Project 04 – Bates – Neonatal intensive care

If the publication is not available electronically, provide 5 paper copies of the publication.

**Note:** The grant agreement requires that recipients acknowledge the Pennsylvania Department of Health funding in all publications. Please ensure that all publications listed acknowledge the Department of Health funding. If a publication does not acknowledge the funding from the Commonwealth, do not list the publication.

Title of Journal Article:	Authors:	Name of Peer-reviewed Publication:	Month and Year Submitted:	Publication Status (check appropriate box below):
1. An asthma sports camp series to identify children with possible asthma and cardiovascular risk factors	Elliott JP, Marcotullio N, Skoner DP, Lunney P, Gentile DA	Journal of Asthma	October 2013	<input type="checkbox"/> Submitted <input type="checkbox"/> Accepted <input checked="" type="checkbox"/> Published
2. Impact of student pharmacist delivered asthma education on child and caregiver knowledge at an asthma camp series	Elliott JP, Marcotullio N, Skoner DP, Lunney P, Gentile DA	American Journal of Pharmaceutical Education	February 2014	<input checked="" type="checkbox"/> Submitted <input type="checkbox"/> Accepted <input type="checkbox"/> Published

20(B) Based on this project, are you planning to submit articles to peer-reviewed publications in the future?

Yes \_\_\_ X \_\_\_ No \_\_\_\_\_

If yes, please describe your plans:

Our research group is in the process of writing a manuscript to describe the community-based screening events, the demographics of the children screened, and the results of these screenings. This manuscript will be submitted to the Journal of Asthma in May.

**21. Changes in Outcome, Impact and Effectiveness Attributable to the Research Project.**

Describe the outcome, impact, and effectiveness of the research project by summarizing its impact on the incidence of disease, death from disease, stage of disease at time of diagnosis, or other relevant measures of outcome, impact or effectiveness of the research project. If there were no changes, insert “None”; do not use “Not applicable.” Responses must be single-spaced below, and no smaller than 12-point type. DO NOT DELETE THESE INSTRUCTIONS. There is no limit to the length of your response.

None

**22. Major Discoveries, New Drugs, and New Approaches for Prevention Diagnosis and Treatment.**

Describe major discoveries, new drugs, and new approaches for prevention, diagnosis and treatment that are attributable to the completed research project. If there were no major discoveries, drugs or approaches, insert “None”; do not use “Not applicable.” Responses must be single-spaced below, and no smaller than 12-point type. DO NOT DELETE THESE INSTRUCTIONS. There is no limit to the length of your response.

This project resulted in disease recognition through alternative methods of screening children at increased risk for asthma related morbidity and mortality. Community-based asthma screenings and camps were an effective means to increase disease recognition and provide educational interventions to an underserved population. Lung function screenings were conducted for 193 children and 16% were identified as having potential undiagnosed asthma and referred for follow-up care. Sixty percent of participants with previously diagnosed asthma were identified to have potential uncontrolled asthma and referred for follow-up care. All participants received disease state management education. Eighty-seven children and their caregivers attended the asthma camps and received a comprehensive evidence-based intervention to increase asthma related knowledge. This intervention significantly increased asthma related knowledge in children ( $p < 0.001$ ). This intervention did not significantly increase asthma related knowledge in adults, but we did discover a statistically significant association between caregiver baseline asthma knowledge and better asthma control in their children ( $p = 0.019$ ). These results further support the need for alternative methods of disease recognition and education.

Blood pressure screenings were conducted for 228 children and 21% were identified as having potential undiagnosed hypertension and received referrals for follow-up care. All participants received nutrition and physical activity education. 231 participants underwent BMI screening, and 47% were identified to be overweight or obese and referred for follow-up care. 230 children were screened to determine smoking status, which resulted in smoking cessation counseling for 17% who were identified as smokers.

**23. Inventions, Patents and Commercial Development Opportunities.**

23(A) Were any inventions, which may be patentable or otherwise protectable under Title 35 of the United States Code, conceived or first actually reduced to practice in the performance of work under this health research grant? Yes \_\_\_\_\_ No X

If “Yes” to 23(A), complete items a – g below for each invention. (Do NOT complete items a - g if 23(A) is “No.”)

- a. Title of Invention:
- b. Name of Inventor(s):
- c. Technical Description of Invention (describe nature, purpose, operation and physical, chemical, biological or electrical characteristics of the invention):
- d. Was a patent filed for the invention conceived or first actually reduced to practice in the performance of work under this health research grant?  
Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, indicate date patent was filed:

- e. Was a patent issued for the invention conceived or first actually reduced to practice in the performance of work under this health research grant?  
Yes \_\_\_\_\_ No \_\_\_\_\_  
If yes, indicate number of patent, title and date issued:  
Patent number:  
Title of patent:  
Date issued:

- f. Were any licenses granted for the patent obtained as a result of work performed under this health research grant? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, how many licenses were granted? \_\_\_\_\_

- g. Were any commercial development activities taken to develop the invention into a commercial product or service for manufacture or sale? Yes \_\_\_ No \_\_\_

If yes, describe the commercial development activities:

23(B) Based on the results of this project, are you planning to file for any licenses or patents, or undertake any commercial development opportunities in the future?

Yes \_\_\_\_\_ No X

If yes, please describe your plans:

**24. Key Investigator Qualifications.** Briefly describe the education, research interests and experience and professional commitments of the Principal Investigator and all other key investigators. In place of narrative you may insert the NIH biosketch form here; however, please limit each biosketch to 1-2 pages. *For Nonformula grants only – include information for only those key investigators whose biosketches were not included in the original grant application.*

NAME Jennifer Padden Elliott, PharmD	POSITION TITLE Assistant Professor of Pharmacy Practice

EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Duquesne University Mylan School of Pharmacy, Pittsburgh, PA	PharmD	05/07	Pharmacy
Trinity Health System/ Palliative Therapeutics/ Duquesne University Pharmacy Practice Residency		06/08	ASHP accredited PGY-1 Pharmacy Practice Residency

**Professional Certification:**

Pharmacist, Commonwealth of Pennsylvania  
 Pharmacist, State of Ohio  
 RPH.03227923-2

License: RP442448  
 License:

**A. Personal Statement**

Upon appointment as Clinical Assistant Professor at Duquesne University, I developed a clinical practice site at The Children’s Institute of Pittsburgh and a collaboration with Allegheny Health Network’s Division of Allergy Asthma and Immunology. The majority of my time is devoted to developing programs and practices to improve disease identification, medication utilization, patient safety, and health outcomes. My scholarship activities have developed significantly since my faculty appointment, and I have served as PI and Co-PI on four funded research projects. My research has focused on pediatric medicine, including pediatric medication delivery devices, asthma identification and education, and obesity prevention, as well as medication use and metabolic risk in patients with Prader-Willi Syndrome. These projects have resulted in national and international presentations, and several publications

## B. Peer-reviewed Publications:

1. **Padden J**, Skoner D, Hochhaus G. Pharmacokinetics and Pharmacodynamics of Inhaled Glucocorticoids. *J Asthma* 2008; 45(S1):13-24.
2. **Elliott JP**, Koerner P, Heasley J, Kamal K. Enhancing Student Learning of Pediatrics through the Use of Active Learning Strategies. *Am J Pharm Educ* 2012; 76(2).
3. **Elliott JP**, Marcotullio N, Skoner D, Lunney P, Gentile D. An asthma sports camp series to identify children with possible asthma and cardiovascular risk factors. *J Asthma*. Accepted November 14, 2013. In press.
4. Kamal KM, Chopra I, **Elliott JP**, Mattei T. Use of electronic medical records for clinical research in the management of type 2 diabetes. *Research in Social Administrative Pharmacy*. Accepted January 14, 2014. In press.

## C. Research Support

The State of Pennsylvania's C.U.R.E Program (Elliott) 2010-2012  
Implementation of an Asthma Program to Improve Asthma Identification and Education in Children.

The primary objective of this study was to identify children with undiagnosed and uncontrolled asthma and to provide recommendations for follow-up care. The secondary objective was to explore associations between asthma and cardiovascular risk such as overweightness, obesity, hypertension and tobacco smoke exposure.

Role: Principal Investigator

Duquesne University MSOP Interdisciplinary Research Grant (Elliott) 2011-2012  
Evaluation of Optimal Liquid Medication Dosing Devices.

The purpose of this study was to determine which measuring device is the most accurate and precise in delivering a standard dose of medication formulations varying in viscosity and density under ideal conditions in the laboratory setting and when used by adults in the clinical setting.

Role: Co-principal Investigator

Duquesne University Academic Learning Assessment (Koerner) 2011-2012  
Integration of Technology within the Division of Clinical, Social, and Administrative Sciences in the School of Pharmacy.

The goal of this study was to assess the value of iPad integration throughout the pharmacy curriculum

Role: Co-Investigator

Prader-Willi Syndrome Association USA (Cherpes) 2012-2013  
Metabolic risks associated with antipsychotic use in patients with Prader-Willi syndrome.

The primary objective of this study was to assess the effect of antipsychotic medications on BMI and metabolic risk in patients with Prader-Willi Syndrome.

Role: Co-Investigator