Characteristics of Children Attending Asthma Camp in Nevada

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Abstract
The purpose of this study was to assess asthma trigger knowledge of camp attendees and the measure of agreement between physician and parent assessment of the children's asthma severity. This study is based on cross-sectional data provided by the American Lung Association (ALA) and those children participating in summer asthma camps in Las Vegas and Reno, Nevada. Fifty-six children participated in the camp in August of 2008. The study results suggest a significant positive correlation between physician and parent assessment of asthma severity. With increasing asthma severity there was a relative increase in the number of school days missed among attendees. Trigger knowledge was low among 25.9% (n=7) of attendees, 40.7% (n= 11) had moderate trigger knowledge, and only 33% (n= 9) demonstrated adequate trigger knowledge. Asthma camp is an effective venue to improve asthma education among children and provide a clinical assessment of this condition among those that are without a current diagnosis.

Key words: Asthma, Children, Severity, Triggers

Introduction

Asthma is a chronic lung disorder in which the airways inflame and narrow. Although the exact cause of asthma is unknown, agents or conditions that can cause asthma attacks have been identified as asthma triggers. Major asthma triggers include dust mites, pollen, pet dander, cigarette smoke, mold, fragrances, chemicals, exercise, air pollution and weather. Some symptoms associated with asthma are wheezing, tightness of the chest, shortness of breath and coughing (NHLBI, 2008). The lifetime and current asthma prevalence rates for children in Nevada was 11.8% and 7.1% in 2006 (BRFSS, 2006), and for adults was 13.4% and 6.9% in 2007 (ALA, 2009).

Asthma ranks within the top ten prevalent conditions causing limitation of activity. Asthma hospital care expenditures were $4.7 billion and physician services cost $3.8 billion in 2007 (ALA, 2009). The total cost in the U.S. in 2007 was $19.7 billion. According to preliminary data there were 3,563 asthma deaths in 2006 and mortality was higher in females (ALA, 2009).

The *Guidelines for Diagnosis and Treatment of Asthma* were developed in 1991 by the National Asthma Education and Prevention Program (NAEPP) and recently updated in 2007.. Unfortunately, the literature shows poor compliance with prescribing behavior by clinicians by severity as defined by the national guidelines (Moonie, 2005).

Roughly 120 asthma camps are held every year in which nearly 10,000 children participate nationwide. Welch (2007) documented substantial burden of asthma on children participating in asthma camps. The study included 1,783 participants from 24 camps across 17 states. The results suggested, on a 10-points scale, camp attendees had moderate to severe asthma as assessed by parents (μ = 4.86). Inadequately controlled asthma was seen in 37% of the children. There was improved asthma self-management in children who participated in the prior year (Welch et al., 2007). Although the Welch study had a very large sample and used standardized forms and tools, only parent assessed asthma severity was reported. Hence no comparisons could be made with parents since physician assessed severity was not collected. The impact of asthma camps on the attitudes of children and parents were found to be positive (Plante et al., 2001; Silvers et al., 1992).

Fitzpatrick (1992) studied an innovative asthma camp intervention for childhood asthma among urban blacks offered by the American Lung Association of the District of Columbia. A reduction in school absences, emergency room visits and hospitalizations by 36% to 69% was documented. This was a 3-year pilot study of children aged 5-10 with asthma in which parents or guardians were surveyed. The study had 84 participants (μ_{age} = 9.6) who were predominantly black (93%) and male (73%). The camp had educational sessions on asthma triggers, art therapy, coloring books, exercise classes, and equipment modalities. There was increased usage of new techniques such as inhalers or aerosols from 10% to 78% and breathing or warm-up exercises was incorporated by 55% of participants as assessed by follow-up interviews (Fitzpatrick et al., 1992). The results from this study assert the importance of asthma camp as a means of teaching asthma management skills.

This study is based on data provided by the American Lung Association (ALA) of children participating in summer asthma camps in Las Vegas and Reno, Nevada. In Nevada, no studies to our knowledge have been conducted to evaluate the effectiveness of attending asthma camps. The purpose of this study was to create baseline data to evaluate the efficacy of asthma camps for future

studies in Nevada and to compare it with those from other states. This was a descriptive study that evaluated the characteristics of camp attendees in Nevada in regards to gender, school days missed, trigger knowledge and asthma severity as assessed by physicians and parents. This study helps to address the following questions: 1) Is there a correlation between physician and parent assessments of asthma severity among camp attendees? 2) What is the relationship between the severity of asthma and school days missed? 3) Lastly, how knowledgeable are camp attendees of basic asthma triggers?

Methods

Information collected included age, gender, emergency contact information, healthcare provider information, camper health history, asthma history and school days missed. Data were collected on site from parents and children at the beginning of camp using a universal health history form, a comprehensive form filled out by physicians and parents. To protect the identities and personal information of the participants, the data were de-identified. Approval was obtained from the University of Nevada, Las Vegas Institutional Review Board. Raw data were collected and entered into a password protected SPSS database for analyses purposes.

The universal health history form had two classifications for documenting asthma severity of campers. The first classification is based on severity of clinical features which is filled out by the physician of the camp attendee and based off of the NIH guidelines for the treatment of asthma (NHLBI 2007). Asthma is classified as mild intermittent, mild persistent, moderate persistent or severe persistent. Asthma is said to be intermittent if the symptoms occur less than once a week with brief exacerbations and nocturnal symptoms are not seen more than twice a month. Forced expiratory volume 1 (FEV1) or peak expiratory flow (PEF) is greater than or equal to predicted 80% and PEF or FEV1 variability is less than 20%. In mild persistent asthma, symptoms occur more than once a week but less than once a day. The exacerbations may affect activity and sleep and nocturnal symptoms can be seen more than twice a month. FEV1 or PEF is greater than or equal to predicted 80%, however PEF or FEV1 variability is less than 20-30%. Moderate persistent asthma symptoms are observed with exacerbations that may affect activity and sleep and nocturnal symptoms are seen more than once a week. Guidelines recommend daily use of inhaled short acting beta2-agonists. FEV1 or PEF is 60-80% of predicted and FEV1 or PEF variability is greater than 30%. Lastly, in the case of severe persistent asthma, daily symptoms with frequent exacerbations are common. There is limitation of physical activity and frequent nocturnal asthma symptoms. FEV1 or PEF is less than or equal to 60% of predicted and FEV1 or PEF variability is greater than 30% (Koshak, 2007).

The second classification of asthma involved the use of a 10 point scale with 1 being the least and 10 the most severe asthma, while 0 indicates no asthma presence. This was filled out by both parents and the physicians.

The other two variables of interest were the parent reported number of school days missed in the past year due to asthma and trigger knowledge among camp attendees. Asthma attacks cause breathing difficulty and children often miss school causing disruption to daily activities. There were 13 triggers listed which are known most likely to cause an asthma attack. The number of triggers identified by the individual was used to divide the camp attendees in to three groups based on their knowledge of asthma triggers. If the attendees identified 1 to 4 triggers correctly they were said to have low trigger knowledge. If they identified 5 to 8 triggers they were said to have medium trigger knowledge and those who identified 9 or more were classified as having adequate trigger knowledge.

Statistical Analyses

Spearman's rho was used to assess whether parent and physician assessments of the children asthma were correlated. It was also used to assess the correlation between school days missed and asthma severity on a 10- point scale by both parents and physicians. Kendall's tau was used to assess the correlation between school days missed and asthma severity, as provided by physicians by the NHLBI scale. A descriptive analysis was done to assess the level of trigger knowledge among camp attendees. Descriptive statistics and proportions were used to analyze key demographic variables including gender, age and grade. Normality tests were initially performed on the severity level of asthma and school days missed in order to determine if parametric assumptions were satisfied.

Results

A total of 33 children participated in Las Vegas and 23 in Reno. The sample of children represented grades 1 to 9 with 53.6% being male. The age range of the children attending the camps were from 7 to 14 years (μ = 10.91, *SD =1.8*). Fifty-two attendees provided their age. Approximately 69% of the children who had given their age were 10 yrs or older (Table 1). Of the 53 participants who provided their grade level, 20 (37.7%) were 4th graders, and 62.3% in 4th grade or lower. Of the fifty-five camp attendees that documented whether they had an asthma action plan, only 8 (14.5%) reported that they were ever issued one . Of the 53 campers for whom

data were available, specialists were utilized by only 37.7% of camp attendees.

Table 1. Age Distribution among Camp Attendees

Age	Frequency n	Percent %
7	3	5.8
8	7	13.5
9	6	11.5
10	18	34.6
11	6	11.5
12	5	9.6
13	5	9.6
14	2	3.8
Total	52	100.0

Note: Mean = 10.91, Median = 10 and Mode = 10.

A total of 52 camp attendees gave details of the number of school days missed during the past year, and 50% missed 4 or more school days due to asthma (Table 2). The maximum number of school days missed by an attendee was 36. In addition, there were at least 15 children (29%) missing 7 or more days of school per year (μ = 5.42). The physician's NHLBI classification of asthma severity suggests 50% have intermittent asthma (n = 20), 27.5% have mild persistent asthma (n = 11), 12.5% have moderate persistent asthma (n = 5) and 10% have severe persistent asthma (n = 4).. These data indicate that at least 22.5% of these children experience symptoms of asthma daily which may affect daily physical activity and adequate sleep.

Table 2. School Days Missed Due to Asthma

Days Missed	Frequency n	Percent %
0	10	19.2
1	1	1.9
2	7	13.5
3	8	15.4
4	4	7.7
5	6	11.5
6	1	1.9
7	5	9.6
8	1	1.9
10	4	7.7
11	1	1.9
15	1	1.9
16	1	1.9
30	1	1.9
36	1	1.9
Total	52	100.0

Note: Mean = 5.42, Median = 3.5 and Mode = 0

The physician's assessment of the severity of asthma showed 32.5% of children scored a 2 and 57.5% of children had a rating of 3 or more on a 10-points scale. The sample size was 40 and mean asthma severity is 3.42 (Table 3). The parent's assessment of asthma severity in children attending the camp showed 20.4% of children scoring 2 on a 10-point scale and 72.2% of children having a rating of 3 or more. The sample size was 54 and mean asthma severity is 4.31 (median=4, mode=2) (Table 7). These data support the notion that differences exists among physician and parent assessments of children's asthma, especially as asthma severity increases. For example, parents identified 19 children (35%) with either a 4 or 5 on the asthma severity scale while physicians identified 8 (20%). This discrepancy not only increases the importance of physician and parent education, but also of children attending asthma camps to help them identify severity, triggers, and appropriate treatment responses.

Table 3. Asthma Severity as Assessed by Parent and Physician on a 10 Point Scale

Asthma Scale	Parent Frequency n (%)	Physician Frequency n (%)
1	4 (7.4)	4 (10)
2	11 (20.4)	13 (32.5)
3	6 (11.1)	8 (20)
4	10 (18.5)	3 (7.5)
5	9 (16.7)	5 (12.5)
6	3 (5.6)	5 (12.5)
7	5 (9.3)	1 (2.5)
8	4 (7.4)	0 (0)
9	1 (1.9)	0 (0)
10	1 (1.9)	1 (2.5)
Total	54 (100)	40 (100)

Note: 1 = least and 10 = most severe
Note: Mean = 4.31, Median = 4 and Mode = 2

Physician and parent assessed severity and school days missed were all non-normally distributed and hence non-parametric correlations were utilized (Table 4).

Table 4. Tests of Normality

	Frequency n	Percent %
Low or poor trigger knowledge	7	25.9
Moderate trigger knowledge	11	40.7
High trigger knowledge	9	33.3
Total	27	100.0

Correlation analysis between physician and parent assessments of asthma severity using Spearman's rho was 0.653 *(P* < .001). This result shows a significant positive correlation between physician and parent assessments of the asthma severity. In testing asthma severity by physician NHLBI classification and school days missed, Spearman's rho was 0.449 *(P* < 0.01).. This also shows a significant positive correlation between the two variables. Physician assessments of asthma severity (1 to 10 scale) and school days missed by the child was correlated at 0.529 *(P* < .01). Lastly, parent assessments of asthma severity (1 to 10 scale) and school days missed (or days at home in the past year due to asthma) was 0.529 *(P* < .001). These results show a significant positive correlation between school days missed and increasing asthma severity as determined by both physician and parent.

To assess trigger knowledge data from the pre-test camp form was used. Post-test data were available for less than 5% of the attendees, and hence no pre-post comparison of knowledge improvement was possible. Trigger knowledge was available for 33 children from the Las Vegas camp only. Out of 33 attendees, 27 answered the trigger knowledge questions. Descriptive analysis shows 25.9% had poor trigger knowledge, 40.7% had a moderate level of trigger knowledge and 33.3% had adequate trigger knowledge (Table 5).

Table 5. Asthma Trigger Knowledge

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Physician NHLBI	.277	36	.000	.790	36	.000
School Days Missed	.268	36	.000	.648	36	.000
Physician Assessed	.246	36	.000	.876	36	.001
Parent Assessed	.158	36	.024	.928	36	.022

Note: Scores of 1 to 4 = low or poor, 5 to 8 = moderate and 9 to 13 = high

Discussion

To our knowledge, this study was the first in Nevada to compare physician and parent asthma severity ratings among participants in a camp setting and assess baseline asthma trigger awareness. Prevalence rates of asthma vary by age and gender, and our study had a higher prevalence of young male participants (53.6%) which is the group with greatest disease burden across the nation. Only 8 (14.5%) specified having an asthma action plan out of a total of 55 participants. This suggests most physicians are not providing asthma action plans to the participants in this study in accordance with national guidelines. The National Heart Lung Blood Institute, NIH, EPR-3 report suggests providing all patients with asthma a written asthma action plan based on clinician diagnosed signs and symptoms and/or PEF ranges of persistent individuals (NAEPP and NHLBI, 2007).

Physician and parent assessments showed some interesting results among asthma camp children. In accordance with the literature (Moonie 2005), parents perceived their child's asthma severity level [μ=4.31 (n = 54)] higher compared to the physician [μ=3.42 (n = 40)]. The average parent assessment of asthma severity of 4.31 is comparable to the mean of parent reported asthma severity of 4.86 seen in the Welch study, which was also measured on a 10 point scale (Welch et al., 2007).

The study results suggest a significant positive moderate correlation between physician and parent assessments of the asthma severity. Similar results were observed in another prospective observational study by Moonie et al. (2005). In this study, 723 asthma patients (aged 1 – 85 years) in two primary care clinics showed a moderate measure of agreement between patient self-reported and primary care physician-classified asthma severity ($k = 0.48$; $P < 0.001$). It was seen that with increasing severity of asthma there was a decrease in the level of agreement (Moonie et al., 2005). It is critical that clinicians and parents agree on the severity level for long term control of the child's asthma symptoms. If the clinician does not prescribe according to the true frequency in the child's symptoms, there is less likelihood of achieving overall reduction in symptoms and disease management.

Studies in the past have shown a positive correlation between asthma and school days missed (Moonie et al., 2008; Taras et al., 2005). The Spurrier study suggests that the higher the parental perception of the child's asthma severity the greater number of school days were missed. Our study also shows a significant positive correlation between school days missed and asthma severity. The analysis of physician and parent assessments of asthma severity with school days missed showed a similar correlation coefficient value of 0.529. This suggests that as asthma severity increased, there was relative increase in the number of school days missed. There was moderate and significant positive correlation between school days missed and asthma severity. This suggests that persistent asthmatics have less agreement with their provider indicating potentially a lack of communication regarding symptom severity.

Trigger knowledge is especially useful for parents and particularly valuable for children with asthma to help prevent an asthma episode from occurring in the first place. Only one third of our study participants demonstrated adequate trigger knowledge indicating that the majority of attendees were unknowledgeable of what causes their asthma episodes. Asthma camp education may help reduce repeat attack episodes due to insufficient trigger knowledge. It is important for children to know what can trigger asthma attacks in order to prevent hospitalizations and unnecessary visits to the emergency room.

Like all studies, this project has its share of limitations. First, the sample size of this descriptive study is small and therefore cannot be generalized to other populations. Income, race and other details were not given and prevented us from examining the differences in these sub-categories or to say if these children are representative of the Nevada population. Limited analysis was possible since data from only 2008 were used. Second, there is a possibility of recall bias as parents had to remember how many school days in the past year had been missed due to asthma. Another bias that might have occurred in this study is the classification bias of asthma severity on a 10 point scale. There is no clear distinction given for the various levels of this classification and hence the assessment of severity might vary among both parents and physicians. Finally, the universal health history forms were not completely filled by all participants, leading to a smaller usable sample. The portion of the universal health history form to be filled by physicians was missing in most of the data from Reno; consequently the results were much more reflective of camp attendees from Las Vegas. The pre-camp survey form was different among both the camps; therefore we could not use data from the Reno. The trigger knowledge assessment was only possible on participants in Las Vegas which included a questionnaire on asthma triggers. There was a low return of post surveys which prevented us from comparing pre and post surveys to assess the impact of the camp on participant's asthma control and knowledge.

One strength that this study possesses is having physician diagnosed asthma report. There was a significant portion of the universal health history form which was completed by physicians. Physician assessments of asthma severity were compared to parent assessments; this is usually missing in other asthma camp related data. Lastly, this is one of the first studies in Nevada looking at the characteristics of asthma camp attendees. This will provide a baseline for future studies in Nevada. The results of this study will help look into the fact that physicians are not giving asthma action plans to the children who participated in this camp. In the future, with a higher sample size and higher return rates, pre and post survey comparisons can be made to assess the effectiveness of asthma camps in regards to asthma knowledge and management skills.

References

Akinbami, L. (2006). The State of Childhood Asthma, United **S**tates 1980-2005. Advanced Data. Available at: http://www.cdc.gov/nchs/data/ad/ad381.pdf, 2009.

American Lung Association. Trends in Asthma Morbidity and Mortality.

Asthma and Allergy Foundation of America. Available at: http://www.aafa.org/display.cfm?id=8&sub=42#_ftn10, 2009.

Asthma and Allergy Foundation of America and National Pharmaceutical Council. Ethnic Disparities in the Burden and Treatment of Asthma. Available at: https://www.aafa.org/pdfs/Disparities.PDF, 2009.

Bloom, B. & Cohen, R.A. (2007) Summary Health Statistics for U.S. Children: National Health Interview Survey, 2006. National Center for Health Statistics. Vital Health Statistics 10, 234.

Center for Disease Control and Prevention. Adult Asthma Data: Prevalence Tables and Maps. Adult Self-Reported Lifetime and Current Asthma Prevalence, 2009. Available at: http://www.cdc.gov/ASTHMA/brfss/07/brfssdata.htm, 2009.

Centers for Disease Control and Prevention. Asthma Action Plan. Available at: From http://www.cdc.gov/asthma/actionplan.html, 2009.

Fitzpatrick, S. B., Coughlin, S. S., & Chamberlin, J. (1992). Journal of the National Medical Association, 84, 233-237.

Koshak, E. A. (2007). Classification of asthma according to revised 2006 GINA: Evolution from severity to control. 2, 45-46. Available at: http://www.thoracicmedicine.org/article.asp?issn=18171737;year=2007;volume=2;issue=2;spage=45;epage=46;aulast=Koshak, 2009.

Moonie, S., Sterling, D. A., Figgs, L. W., & Castro, M. (2008). The relationship between school absence, academic performance, and asthma status. Journal of School Health, 78, 140-148.

Moonie, S. A., Strunk, R. C., Crocker, S., Curtis V., Schechtman K., & Castro M. (2005). Community Asthma Program improves appropriate prescribing in moderate to severe asthma. Journal of Asthma, 42, 281-289.

National Heart Lung and Blood Institute. Available at:http://www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma_WhatIs.html, 2009.

National Heart Lung and Blood Institute & National Asthma Education and Prevention Program. 2007 Expert Panel Report 3: Guidelines for the diagnosis and management of asthma (NIH Publication No.07-4051, 2007).

Plante, W. A., Lobato, D., & Engel, R. (2001). Review of group interventions for pediatric chronic conditions. Journal of Pediatric Psychology, 26, 435-453.

Silvers, W. S., Holbreich, M., Go, S., Morrison, M. R., Dennis, W., Marostica, T., & Buckley J. M. (1992). The Champ Camp: The Colorado Children's Asthma Camp experience. Journal of Asthma, 29, 121-135.

Spurrier, N. J., Sawyer, M. G., Straugas, R., Martin, A., Kennedy, D. & Streiner, D. (2000). Association between parental perception of children's vulnerability to illness and management of children's asthma. Pediatric Pulmonology, 29, 88–93.

U.S. Department of Health and Human Services (2006). The State of Childhood Asthma, United States, 1980-2005. Morbidity & Mortality Weekly Report, 38, 1-13.

U.S. Department of Health and Human Services (2004). National Surveillance for Asthma, United States, 1980-2004. Morbidity & Mortality Weekly Report, 56(SS08) 1-14, 18-54.

Welch, M. J., Carlson, A. M., Larson, D. & Fena, P. (2007). Clinical profile, health-related quality of life and asthma control in children attending US asthma camps. Annals of Allergy, Asthma and Immunology, 99, 496-501.