

Attachment C

Review of Published and Unpublished Literature on Children's Asthma Camps

A review of published and unpublished literature⁴ was conducted as one component of the Consortium of Children's Asthma Camps' study to determine the value of asthma camps. The extensive literature search identified 26 articles or manuscripts, written in English, between 1981 and 2001. The purpose of identifying all published articles, regardless of when published, was to: 1) capture all (or as many as possible) of the published articles regarding the impact of children's asthma camps since asthma camps' beginnings in 1967 and 2) to ensure a sufficient number of peer reviewed journal articles from which to draw conclusions.

Four articles were excluded from the literature review because they did not directly evaluate the impact of children's asthma camps. Faivelson, 1993 compared in-patient hospitalization education with in-patients who received their usual care; Ponder, 1993 described a life-threatening exacerbation at an asthma camp and the medical response; Punnett, 1993 was a retrospective descriptive design to identify what factors differentiate children in terms of their reactions to camp experiences; and Wilson, 1993 randomly assigned adult patients with asthma to a variety of educational formats, including camp.

The most common types of published articles include a detailed description of children's asthma camps (Alaniz, 1995; Alaniz, 1999; Parrish, 1980; Silvers, 1992; and Consultant, 1993); a description of volunteer staff training (Beder, 2000); and testimonials/expert opinions regarding the benefit of children's asthma camps (Seeler, 1990; Sosin, 1991; and Tinstman, 1981). Welch, 2002 and the Consortium of Children's Asthma Camps piloted a Universal Health History Form with three different camps to characterize the type of children attending camp. These descriptive journal articles did not evaluate children's asthma camps or measure outcomes.

The following is a summary, grouped according to outcome measures, of the literature identified. The chart, *Summary of Evidence Regarding Impact of Children's Asthma Camps*, illustrates the types of study designs and the reported outcomes measured.

Use of camp nursing services: Bloch, 2001 conducted a retrospective descriptive study of 156 children, ages 3-16 years, with asthma who attended a large, outdoor, non-specialty, eight-week day camp. The data retrieved from the camp nursing records indicated that 9.4% of the children had asthma. Of the children identified with asthma, 10.9% received scheduled daily asthma medication administered by camp nurses; 78.9% needed two or more doses of PRN asthma medications during camp, and 13.5% presented, at least once, to the camp nursing office during the camp season with asthma-related respiratory complaints. Of the 35 visits to the camp nursing office for acute asthma problems, 20% of those visits required the child to leave camp. A total of 765 doses of asthma medications were given (scheduled and PRN) during camp. According to Bloch, "children with asthma used an ample amount of camp nursing services (therefore) sound nursing systems and camp policies must be in place to facilitate frequent change in daily scheduled medication regimens. In addition, adequate nursing staff is necessary to meet the

⁴ These 26 articles include one national presentation and one national poster session.

needs of the children with asthma as well as the various nursing needs of other campers.” Bloch voiced concern that while many “day camps are required by local laws and accreditation agencies to have first-aid stations, they are not required to have professional nurses on site.” Since children with asthma have been shown to use an ample amount of camp nursing services, it is important to determine if a camp’s health and first-aid procedures are sufficient for children with asthma.

Parent and child asthma knowledge: Six studies indicated an increase in child and/or parent asthma-related knowledge (Brazil, 1997; Meng, 1998; Penza-Clyne, 2003; Plante, 2001; Robinson, 1985; and Weisberg, 1995). One article reported a measurable decrease in family stress related to the child’s asthma after attending a three-week out-patient children’s asthma camp (Brazil, 1997). Weisberg, 1995 reported an increase in family communication after camp.

Self-efficacy: The literature indicates mixed findings regarding the impact of asthma camps on self-efficacy. Alaniz, 1999 reported no statistically significant differences in overall asthma self-efficacy scores among 27 adolescents who attended a one-day, six-hour day camp. However, there were differences on the teens’ ability to manage asthma pre-camp and one-month follow-up on several specific questions/areas: while exercising; in the doctor’s office; breathing improperly; while afraid; and when angry. Similarly, Penza-Clyve, 2003 found that self-efficacy does not change as a function of camp. The author suggested that because the post-test is immediately at the end of camp, the children have not been confronted with opportunities to manage their asthma. Contrary to the above, Buckner, 2002-3 found that self-efficacy and resilience increased at six weeks post camp ($p < 0.05$) for 16 teens (ages 12 – 15) who participated in asthma camp.

Locus of control: There were also inconsistent findings regarding children’s asthma camps’ ability to increase a child’s locus of control (defined as a child’s willingness to take their asthma medications) (Robinson, 1985; Weisberg, 1995; and Hazzard, 1986). Robinson, 1985 found a statistically significant increase from pre-camp to immediate post-camp and three-months post-camp in the child’s locus of control. Weisberg, 1995 reported an increase from pre-camp to immediate post-camp in the child’s “mastery over asthma” (defined as a child’s feeling of control over their asthma). Hazzard, 1986 found no statistically significant differences between the control and interventions groups.

Self-esteem/Self-concept: While four studies reported a decrease in the child’s anxiety and improved attitude toward their disease (self-esteem or self-concept) after asthma camp (Brazil, 1997; Briery, 1999; Plate, 2001; and Robinson, 1985), Hazzard, 1986 found no statistically significant differences between the control and interventions groups.

Asthma management techniques: Four studies reported improved asthma-management techniques. Improvements in metered dose inhaler technique was reported by Brazil, 1997; Fitzpatrick, 1992; and Kelly, 1998. Improvements in peak flow meter technique were reported by Kelly, 1998 and Meng, 1998. Increased use of breathing/warm-up exercises was reported by Brazil, 1997 and Fitzpatrick, 1992.

Meng, 1998 reported that parents felt that their children had learned to take responsibility for their asthma management and the children had increased confidence about their self-management (this definition is very similar to self-efficacy and self-concept; however, Meng, 1998 defined them differently). Parents noted that the effects of the asthma education lasted about six-months. The parents recommended that a booster education program at the mid-year point between camps would be beneficial.

Pulmonary function: Decreased asthma symptoms were also reported after camp. Chipps, 1984 monitored the daily pulmonary function of the child with asthma during an eight-week residential summer camp for children with asthma. Overall, pulmonary function improved and symptom scores dropped during camp. Significant increases in pulmonary function occurred after the second week at camp. The author questioned whether this was due to changes in the environment or more consistent administration of medications while at camp.

Symptoms: Brazil, 1997; Chipps, 1984; and Weisberg, 1995 reported decreased asthma symptoms after children attended asthma camps. Brazil, 1997 reported this decrease in symptoms lasting a minimum of three months post-camp. Chipps, 1984 and Sekaros, 1993 both reported a decrease in exacerbations between pre and post-camp surveys.

School absences: Five studies reported decreased school absences after attending asthma camps (Brazil, 1997; Fitzpatrick, 1992; Kelly, 1998; Meng, 1998; and Sorrells, 1995). Kelly, 1998 found that school absenteeism decreased from a total camper cumulative of 266 days for the year prior to attending asthma camp to 188 days the year after asthma camp.

Health care utilization: Decreased health care utilization was identified by five authors. Kelly, 1998; Meng, 1998; Fitzpatrick, 1992; Sekaros, 1993; and Sorrells, 1995 reported a decrease in emergency department visits after attending asthma camps. Kelly, 1998 and Fitzpatrick, 1992 measured a decrease in hospitalizations after participation in asthma camps. In the most recent of these studies, Kelly, 1998, found that emergency room visits due to asthma, in the year prior to camp compared to the year following camp, decreased by 59% while asthma-related hospitalizations decreased by 83%.

Cost-savings: Only two studies measured the financial impact of children's asthma camps (Fullman, 2002 and Kelly, 1998). In comparing data collected in the year prior to and following asthma camp attendance, Kelly, 1998 found that health care utilization savings total \$2,014 per child enrolled in asthma camp. Similarly, Fullman, 2002 compared the differences between return camper and first-time camper mean scores for emergency department visits, hospitalizations, and missed school days. Based on local average costs, the total savings per child per year who attended asthma camp was \$2,618.

Discussion: The published and unpublished evidence regarding children's asthma camps indicates that asthma camps can increase parent and child asthma knowledge, increase a child's locus of control, improve their self-efficacy and attitude about their disease, improve their asthma-related behavior and pulmonary function measures, and improve their metered dose inhaler and peak flow meter technique. The literature also indicates that asthma camps decrease child's anxiety, symptoms, exacerbations, school absences, emergency department visits, and

hospitalizations. Two studies indicated cost-savings of over \$2,000 per child in the year following asthma camp participation.

Children's asthma camps achieve a high level of science-based prevention. The literature base regarding children's asthma camps was compared to the public health definition of "science-based prevention," defined as "approaches that have been developed and evaluated using scientific-processes. These programs are grounded in a clear theoretical foundation and have been carefully implemented and evaluated. The evaluation findings have been subjected to critical review by other researchers and the program has been replicated in a variety of settings with the desired results".⁵ Asthma camps also reached a level of moderate evidence-based medicine (definition of strong evidence-based medicine is several relevant, high-quality scientific studies with homogeneous results). Asthma camp studies have been successfully replicated in several settings, across multiple target populations with consideration for age, gender, race/ethnicity, and geographic context.

Several limitations of the research regarding children's asthma camps exist. First is the unknown fidelity among and between the asthma education curriculum at children's asthma camps. In other words, it is difficult to generalize the findings from individual asthma camp studies because of the variations in intensity, duration, standardization, content, and delivery format of the asthma education at children's asthma camps. Second is the lack studies utilizing control or comparison groups. The third limitation is the length of time between testing in the time-series design studies. Most time-series studies implemented post-tests immediately after camp and then at one to three months post-camp. Therefore, the long-term impact of camp on children's asthma is unknown. The design of future evaluation and research studies regarding children's asthma camps should take these limitations into consideration.

⁵ Mulhall, P and Hays, C. Research-based Prevention: A Pyramid for Effectiveness. Center for Prevention Research and Development, Institute of Government and Public Affairs, University of Illinois.

