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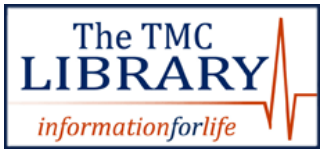


Introduction

The camp experience has been an important American tradition for 150 years. In 2012, more than 11 million youth and adults attended an estimated 12,000 day and resident camps.[1]

Day and resident camp experiences differ; a typical day camp lasts roughly six to eight hours on any given day, while resident (overnight) camps operate 24/7 during a camp session. Youth and adults live at resident camp and are therefore in personal contact with one another for a longer timeframe than is typical of the day camp experience. Day or resident camp sessions can last from one week to up to eight weeks, with the average session lasting two weeks.

Camp experiences contribute to a variety of positive youth developmental outcomes,[2,3] but camp experiences also pose a risk for youth because of exposure to injuries and illness. Injury is a leading cause of the death of children,[4,5,6] and childhood illness has a range of negative health, social, and financial impacts.[7,8] Reducing the incidence of injuries and illness at camp is central to the provision of high-quality camp experiences.

Over the past 25 years, childhood injury and illness in the United States have been substantially reduced through the concerted effort of professionals in the areas of health surveillance, intervention, and evaluation.[9,10] But the camp community has lacked both a methodology and effective benchmarks for injury and illness monitoring. By understanding the injury and illness trends within their own camp communities, program providers can implement more effective practices to better manage risk.[11]

This article describes a national, five-year camp-based illness and injury surveillance study and examines strategies for illness and injury prevention in camps that can inform healthcare in camps and in other non-formal educational settings. The goals of this study were: (1) to benchmark illness and injury incidence rates for campers and staff and (2) to identify risk factors and intervention strategies to reduce the incidence of camper and staff illness and injury.

Injury and Illness Surveillance in Camps

Collecting accurate incidence data is the first step in preventing illness and injury,[12] and national surveillance programs have demonstrated success in identifying risk factors. One of best known national surveillance systems is the US Consumer Products Safety Commission's National Electronic Injury Surveillance System (CPSC NEISS), which has collected injury data from a nationally representative probability sample of US emergency

departments since 1971. NEISS has consistently provided researchers and policy makers with high-quality injury data used to make consumer product recall decisions.

Healthy camp environments are based on intentionally monitoring the injuries and illnesses of campers and staff.[13] The American Academy of Pediatrics recently recommended that camps should have a "health record system…that documents all camper and staff illnesses and injuries and that allows for surveillance of the camp illness and injury profile".[14(p797)] This simple yet important strategy not only identifies what's really happening in camp but also provides clues to improve the health experience of the camp community.[11]

The American Camp Association (ACA) provides and accreditation program designed to educate camp owners and directors in the administration of key aspects of camp operation, particularly those related to program quality and the health and safety of campers and staff. These standards establish guidelines for needed policies, procedures, and practices.[15] Many camps look to the American Camp Association's (ACA) accreditation program for guidance regarding appropriate camp healthcare standards. One ACA standard directs camps to maintain a recordkeeping system in which information about injuries and illnesses is permanently recorded. The ACA accreditation program has encouraged basic injury and illness surveillance as part of a camp's risk management program. As a result, some camps have processes for regularly reviewing health record logs. But a lack of a reliable surveillance methodology has prevented camps as a whole from systematically monitoring adverse events for campers and staff.

Early epidemiological descriptions of camp experiences tended to describe either illnesses or injuries (not both) and were often basic reviews of camp health center records.[16,17,18] In the 1980s, the US General Accounting Office[19] attempted to characterize the existing regulations regarding health and safety at summer camps and found marked differences between states and little quantifiable information on injuries or illness. The limitations of camp surveillance studies conducted in the 1990s and 2000s included short follow-up periods and small sample sizes.[20,21,22,23,24,25] However, even with limitations these studies demonstrated that systematically monitoring adverse events among campers can successfully be used to describe illness and injury patterns, identify risk factors, and build prevention and intervention programs to reduce adverse events. Researchers and camp health professionals have recently used analyses of health center record logs to better understand

reasons why campers and staff seek care from health center staff.[26,27] Researchers have also examined injury patterns in US camps.[28]

The only known study of summer camp injuries that addressed prevention and intervention strategies was conducted in Greece.[29] The researchers developed an incident classification typology, which reflected progress in the effort to monitor and classify camp injuries and to apply monitoring results to prevention strategies. Data regarding the causes of injury were not collected in this descriptive study, however, so developing specific interventions based on the findings is difficult.

Healthcare Practices in Camps

Understanding how healthcare is provided in camp communities is important when considering camp-based injury and illness surveillance. Most camps retain on-site healthcare providers and follow recognized national camp standards for healthcare providers, which indicate that camps should have a "designated healthcare provider on-site" who is properly licensed or certified in the state where the camp is located.[15(p72)] Although benchmarking data regarding healthcare providers in US day and resident camps have not been collected, camp healthcare providers at resident camps tend to be a registered nurse (RN) and private, for-profit camps tend to have an medical doctor (MD) on site[13,30] Today's camp healthcare team is often a blended group and includes staff with emergency medical technician (EMT), wilderness first responder (WFR), or wilderness first aid (WFA) certification.[31] In instances in which the healthcare provider is not on site, the on-site camp healthcare provider may consult over the phone with registered nurses or licensed physicians who are familiar with the camp's healthcare needs.

Policy Implications of Camp Healthcare

Oversight of the camp industry currently falls under the jurisdiction of state regulators.[32] Congress has in the past considered federal regulation of camps, but these efforts did not progress out of congressional committee.[33] Individual federal agencies such as the Centers for Disease Control and Prevention have addressed specific camp health issues as needed, such as the novel H1N1 influenza.[34] Health experts from within the camp community have occasionally provided guidance to legislators.

Not all states require that camps be licensed, and inspection and oversight widely varies.[32,30] As a result, camps are primarily self-regulated. Several groups have created recommendations for best practices including the American Academy of Pediatrics[14] and the Association of Camp Nurses.[35,36] As noted, the most comprehensive assessment of

camp health and wellness standards is the American Camp Association's Accreditation Program, which collates best practices from multiple content experts.[15] These recommendations, however, lack the support of generalizable data addressing the risk of injuries and illnesses at camp.

Theoretical Framework for Camp Healthcare

Anderson and McFarlane's Community-as-Partner Model[37] provided a framework for engaging the camp community to gather information about the community and its health and wellness needs. This systems model appeared well-suited for the study of camp healthcare. In contrast to medical models, which are generally disease-oriented, illness and organ-focused approaches, systems models provide a more holistic, socio-cultural approach,[38] which supported a view of camp as a community. Thus, the Community-as-Partner model allowed for an examination of not only the causes of injury and illness in camps but also an understanding of the specific practices undertaken by the camp community to improve community health and wellness.

Purpose of Study

The purposes of this study were threefold: to benchmark illness and injury rates among campers and staff at US summer camps; to understand risk factors associated with such adverse events; and to identify intervention strategies to reduce the incidence of camp injuries and illnesses.

Methods

Collaboration

This study was conducted by the American Camp Association from 2006 through 2010 in cooperation with an advisory committee of camp healthcare professionals and through collaboration with faculty from The Research Institute at Nationwide Children's Hospital at The Ohio State University.

Sample

All US summer camps were eligible to participate in the study. A convenience sample of day and resident camps was collected each year of the study. These camps offered a wide variety of activities, which could include arts and crafts, aquatics, environmental education, adventure/challenge, paddling, sports/recreation, and other such programs. Some participating camps were ACA-Accredited and others were not. Because the exact number of US camps is unknown, a representative rather than a random sample of US camps was targeted.

The sample size ranged from 186 (low) to 295 (high) participating camps in any given year of the study. Camps could participate in as many years of the study as desired.

Session length for camps participating in this study was defined as short-term (less than 14 days) and long-term (15 or more days). Using these definitions, 50% of camps self-identified as short-term, 46% as long-term, and 4% did not respond. Data regarding a camp's geographic region were collected: 25% of participating camps were in the Mid-Atlantic Region, 24% were in the Mid-America Region, 17% were in the Southern Region, 16% were in the Northeast Region, and 15% were in the Western Region.

Data Collection

CampRIO™ (Reporting Information Online): The first two study goals were addressed through the collection of data utilizing a Web-based program called CampRIO™ (Reporting Information Online) for surveillance of illness and injuries sustained by day and residential campers and staff. During the summer's 10-week data collection period, healthcare staff from participating camps logged into CampRIO™ weekly to enter information about the injured or ill individual, the injury or illness event, and the context for the injury or illness (Table 1).

Table 1. Data Collected from Participating Camps

Person data	-Age and sex -Role at camp -Pre-existing chronic health condition -Length of time at camp (this season)
Incident data	-Where the incident happened (included out-of-camp option) -Name of the activity in which the person was engaged when incident occurred -Time of day the incident occurred and during what week of camp -Mechanism(s) or object(s) influencing the incident, especially use/non-use of protective equipment -How long it took before the person returned to their camp routine -Relationship of the incident to an existing chronic health condition
Injury/illness and context data	-Diagnosis -Part(s) of body involved -Description of primary symptoms experienced -Presence of secondary injuries or illnesses as a result of this incident -Communicability assessment (for illness) -Credential of professional who treated the injury/illness -Experience of the data reporter (Had this person been trained to report data?) -Weather influences (e.g., rain, high humidity, extreme temperatures, altitude) -Participation in formal safety training preceding incident

For campers, the case definition for a *reportable illness or injury* was defined as an event that occurred during a camper's participation in the camp program, whether at camp or during an off-site camp activity, resulting in the removal and/or restriction of the camper from their normal camp routine. For staff, a *reportable illness or injury* was defined as an event that occurred during a staff member's contracted dates, resulting in the removal and/or restriction of the staff member from his/her usual and routine camp responsibilities. In addition, the illness or injury had to restrict the resident camper or staff member from camp activities for more than or equal to four hours and in day camps the illness or injury had to restrict the camper or staff member from camp activities for more than or equal to one hour.

These time-sensitive thresholds were utilized for a specific reason. Camp health centers care for many sub-clinical client needs like itchy mosquito bites – things that have minimal impact on the camper and/or staff experience. The study design did not want results diluted by these minimal-impact events. By eliminating less impactful injuries and illnesses and focusing on the more impactful events, the data set included events that made a difference to an individual's camp experience, something that influences valued management concerns like camper return rates and insurance loss ratios.

Concepts embedded in the study methodology included *impact*, *exposure*, and *rate*. For resident camps, "impact" was defined as an injury or illness that took a camper or staff member away from the camp experience for at least four hours. For the day camp community, injuries and illnesses had to remove a person from their usual camp experience for at least one hour. "Exposure" referred to the length of time a person was at camp (ie, how long they were at risk for injury or illness). Campers or staff spending one week at camp had less exposure than those spending four or more weeks.

Exposure data for each injury or illness were based on the concept of a "camp day," defined as one camper or staff member at camp for one day. Exposure data were reported using "per 1,000 camp days." This study identified changes as rates rather than percent change. "Rate" referred to the number of impacts that occurred during a specific time. Using rates instead of percentages is common in epidemiological studies such as this one because rates take exposure data into consideration. To better understand the use of rates, first imagine 1,000 campers and staff standing in front of you, and then imagine that your camp injury-illness rate per 1,000 camp days was 1.5. This means that out of the 1,000

campers and staff, 1.5 of them would get so injured or ill on this day that it pulled them from their camp routine, thus meeting the definition for inclusion in this study.

The reliability and validity of the CampRIO™ methodology were important considerations. *Reliability* (or precision) refers to the repeatability of a measurement.[10] This study represented the largest known data set of its kind collected to date, including data representing hundreds of camps and 7,490,133 camp-days (Table 1). Large samples such as the one used in this study increase the reliability of the data.[39] This study also used a data entry system (CampRIO™), which was based on an established methodology[40] and a piloted survey instrument.[25] In addition, inter-observer variation was minimized by providing pre-camp training to the health center staff who collected and inputted data, as well as by providing them with a contact phone number to use should questions arise.

Validity (or accuracy) refers to whether the concepts being studied are actually being measured.[10] Validity was maximized in this study through the use accepted definitions of *injury* and *exposure*, by involving a large number of camps from across the United States, and by using an automated communication system that informed participating camps when information was entered into the CampRIO™ system incorrectly.

Camp Director Survey

A post-study camp director survey addressed the third study goal. The survey, which was distributed to the entire sample of participating day and resident camps through SurveyMonkey, measured directors' perceptions of the effectiveness of online modules for injury and illness prevention in camps, and well as changes in healthcare practices associated with information learned through the online modules. The survey questions included: "Which of the following practices describe something you learned through participation in the [study]?" and "Describe changes in practice (programming, policy, operations) your camp made to reduce injuries or illnesses among campers and staff as a result of your involvement in the [study]."

Data Analysis

Illness and injury rates were calculated for each camp using commercially available statistical software, with summary statistics presented here. For categorical variables, differences were analyzed using relative risks with 95% confidence intervals and tests based on a simple random sample ($P<.05$ was considered significant.) The institutional review board at The

Research Institute at Nationwide Children's Hospital at The Ohio State University approved this study.

Results

This five-year illness and injury surveillance study sought to benchmark illness and injury incidence rates for campers and staff, identify risk factors for camp-related injury and illness, and identify intervention strategies to reduce the incidence of camper and staff illness and injury.

Response Rates

The CampRIO response rate (ie, the number of camps that entered data into CampRIO for each applicable camp session) ranged from 140 camps (low) to 180 camps (high) across each of the five years of the study (Table 2), which was considered robust compared with the 100 representative sites common in national injury surveillance studies.[41] A total of 134 camp directors completed the Camp Director Survey through SurveyMonkey, representing a 30% response rate.

Table 2. Number of Camps Submitting Data and Number of Camp-Days for Each Year of the Study (Years 1-5)

Study Year	# of Camps Enrolled (Day and Resident Camps Combined)	Response Rate (Day and Resident Camps Combined)	Camper and Staff Camp-Days* (Total Day and Resident Camp Participant Days)
Year 1	186	140	1,058,758 overall
Year 2	295	160	1,490,812 overall
Year 3	236	179	1,618,055 overall
Year 4	228	180	1,812,540 overall
Year 5	200	163	1,509,968 overall

* Total number of camp-days= 7,490,133

Benchmarking Rates of Camper and Staff Illness and Injuries

Camper and Staff Illness. The first goal of this study was to benchmark illness and injury incidence rates for campers and staff. Overall and across all day and resident camps, *day* campers become ill at a rate of 0.85 per 1,000 camp days and staff became ill at a rate of 0.71 per 1,000 camp

days; and *resident* campers became ill at rate of 1.38 per 1,000 camp days and staff became ill at a rate of 0.93 per 1,000 camp days. Thus, campers and staff involved in day camps tended to have lower rates of illness than campers and staff involved in resident camps (Tables 3 and 4).

Table 3. Illness/Injury and Camper/Staff Rates per 1000 Camp Days for Day Camp*

	Injury Rate	Illness Rate	Camper Illness	Staff Illness	Camper Injury	Staff Injury
Year 1	-	-	-	-	-	-
Year 2	0.31	0.45	0.41	0.60	0.3	0.33
Year 3	0.39	0.62	0.6	0.58	0.42	0.21
Year 4	0.58	1.13	1.22	0.75	0.61	0.40
Year 5	0.40	1.19	1.25	0.92	0.44	0.24
Overall	0.42	0.83	0.85	0.71	0.44	0.30

* After 2006 data was collected, the definition of an "adverse event" for day camps was changed from an injury or illness that takes a camper or staff member out of the camp experience for "4 hours or more" to "1 hour or more" for Years 2-5. Thus, the Year 1 data for day camps is not available for comparison with subsequent years.

Table 4. Illness/Injury and Camper/Staff Rates per 1000 Camp Days for Resident Camp

	Injury Rate	Illness Rate	Camper Illness	Staff Illness	Camper Injury	Staff Injury
Year 1	0.50	0.98	1.00	0.93	0.54	0.40
Year 2	0.46	1.00	1.06	0.83	0.48	0.41
Year 3	0.40	1.10	1.18	0.86	0.41	0.34
Year 4	0.46	1.57	2.02	0.91	0.53	0.34
Year 5	0.54	1.34	1.45	1.12	0.57	0.49
Overall	0.47	1.23	1.38	0.93	0.50	0.39

Camper and Staff Injuries

Both day and resident camps reported very low rates of camper and staff injuries. Tables 3 and 4 provide the overall rates of injuries for campers and staff at day and resident camps. The aggregate injury rates for the five study years were .47 injuries per 1,000 camp-days for resident camps and .42 injuries per 1,000 camp-days for day camps. In other words, there was less than one injury in every 1,000 days a camper or staff member spent at camp. These rates did not vary significantly across the study period.

The most common body areas injured involved the lower extremities (campers- 39%; staff- 44%), followed by the upper extremities (campers- 31%; staff 27%) and the head/face/neck (campers- 24%; staff 19%). Most injuries to campers and staff occurred during planned camp

activities such as playing a sport/game (campers- 21%; staff- 17%) and were classified as musculoskeletal injuries (Table 5).

Sprains and strains (28.9%) topped the list of diagnoses most likely to take campers and staff away from camp for four or more hours, followed by wounds (15.4%), bruises/contusions (15.0%) and fractures (15.0%). In resident camps, injuries were most likely to occur during a structured camp activity (campers 52%; staff 36%), during free time (campers 60%; staff 21%), or during evening programs (campers 11%; staff 1%). In day camps, injuries were most likely to occur during structured camp activity (campers 68%; staff 65%) or during free time (campers 28%; staff 15%).

Table 5. Activities Associated with Injury in Day and Resident Camps (Years 1-5)

Campers		Staff	
Playing a sport/game	21%	Playing a sport/game	17%
Sleeping/sitting	14%	Walking	12%
Walking	10%	Sleeping/sitting	11%
Routine action	10%	Routine action	11%
Water-related (non-swimming)	9%	Horse-related	7%
Running/jogging	8%	Water-related (non-swimming)	6%
Horse-related	4%	Instructing/supervising	5%
Biking	4%	Chore/task	5%
Prohibited activity/horseplay	4%	Using knife (food prep, arts/crafts)	3%

Risk Factors Associated with Camper and Staff Illness and Injuries

The second goal of this study was to identify risk factors associated with camper and staff illness and injury. These factors represented the most common contributors to camper and staff injury or illness.

Risk Factor #1: Spread of communicable illness in camp

The potential for transmission of communicable illness from person to person was a major risk factor. In some study years illnesses associated with the respiratory tract were most prevalent and in other study years illnesses associated with the gastro-intestinal tract were most prevalent (Table 6).

Table 6. Most Common Camper and Staff Illness Diagnosis* by Year (Years 1-5)

Year 1	Year 2	Year 3	Year 4	Year 5
Stomach flu /virus/ache (19.0%)	Stomach flu/ virus/ache (19.1%)	Gastroenteritis (21.4%)	Infectious upper respiratory (23.3%)	Gastroenteritis (14.1%)
Sore/strep throat (11.9%)	Allergies/head cold/sinus infection (13.0%)	Virus (8.4%)	Gastroenteritis (10.8%)	Stomach flu/ virus/ache (10.5%)
Unclassified virus (12.3%)	Unclassified virus/f ever (10.3%)	Strep throat/ pharyngitis (6.7%)	Influenza strain unknown (9.3%)	Upper respiratory Infection (9.5%)
Fever (7.7%)	Sore/strep throat (9.8%)	Upper respiratory infection (4.6%)	Strep throat/ pharyngitis (4.8%)	Sore/strep Throat (8.6%)
Allergies/head cold/sinus infection (5.0%)		Eye infection/ pink eye (3.4%)	Headache (4.3%)	

*Illness diagnosis was an open ended question. In order to best categorize as many illness diagnoses as possible, categories may have changed slightly from year-to-year.

These findings, which indicated that illnesses such as the common cold and flu were among the most frequently reported, raised questions about communicability. Based on reported data, there was a roughly 50/50 split between illnesses that were communicable, as opposed to those that were not (Table 7). Interestingly, data showed that communicable disease existed at camps but the amount of communicability – passing an illness from person to person – was low. This low rate of communicability suggested that protective behaviors were sometimes present, which indicated that communicable disease was a risk factor of the camp experience.

Table 7. Illness Communicability among Campers and Staff in Day and Resident Camps (Years 1-5)

Communicability of Illness	Year 1	Year 2	Year 3	Year 4	Year 5
Non-communicable illness	57.3%	58.2%	48.3%	41.0%	50.8%
Communicable illness- Not seen in others	17.9%	19.0%	16.2%	13.5%	16.0%
Communicable illness- Seen in others	24.8%	22.7%	35.5%	45.6%	33.2%

Risk Factor #2: Arriving at camp with an illness

The study also asked about onset of illness. In both day and resident camps, the symptoms of most illness (over 50% in each year of the data set) started when the camper or staff member was at camp. However, at least 3%—and one year as high as 20% (day camps, 2006)—of illness started before the camper or staff member came to camp. Based on these data, directors can generally expect that 5% to 7% of the illness that occurs in camp will have started before the camper or staff member arrives. These findings have important implications for communicability. When campers arrive ill, the illness often initially reflects seemingly benign symptoms like a sore throat or upset stomach. These benign presentations can be prodromal phases of more impactful illnesses, and this kind of exposure can introduce an illness to the camp population. For example, the "common cold" turns into chicken pox, the sore throat becomes strep, and an upset stomach introduces Norwalk virus.

Risk Factor #3: Injuries associated with slips, trips, and falls

Data indicated that lower extremity injuries were the most common and slips, trips, or falls was the most common mechanism of injury. Data about the context of slip/trip/fall injuries most often included active programs like playing a game or sport or water-related programs such as swimming. These findings raised questions about the footwear that was being worn during injury events. The survey instrument was modified in the middle of the five-year study to better understand footwear that was being worn during slips, trips, and falls. Data collected on footwear worn by campers and staff during slips, trips, and falls indicated that resident campers were wearing open heel or open toe shoes or were not wearing shoes in 20.4% of all slip, trip, and fall events. Resident camp staff were wearing open heel or open toe shoes or were not wearing shoes in 28.9% of all slip, trip, and fall events. These results indicated how improper footwear may contribute to the risks associated with slips, trips, and falls.

Risk Factor #4: Injuries associated with the failure to use proper protective equipment

The fact that lower extremity musculoskeletal injuries accounted for the majority of injuries, and that these occurred during camp activities raised questions regarding the use of protective equipment. In about 40% of all injuries protective equipment was a required component of a camp activity but not used in about 15% of these cases. In these instances, either no

protective equipment was being worn or the protective equipment was ill-fitting or worn to the point of being ineffective. Examples include failure to wear appropriate footwear for horseback riding, failure to use appropriately sized hot pad protection in the kitchen, and using a lifejacket with one or more missing straps.

Risk Factor #5: Injuries associated with youth supervision

Sixty percent of resident camper injuries and almost 30% of day camper injuries occurred during free time, a time when campers are not required to be at any one place. This break in the day also means that staff supervision changes; generally fewer staff are on duty and their supervision focus is to oversee campers in their vicinity. Given the data, a tension exists between the freedom of unplanned time and the potential for increased injury.

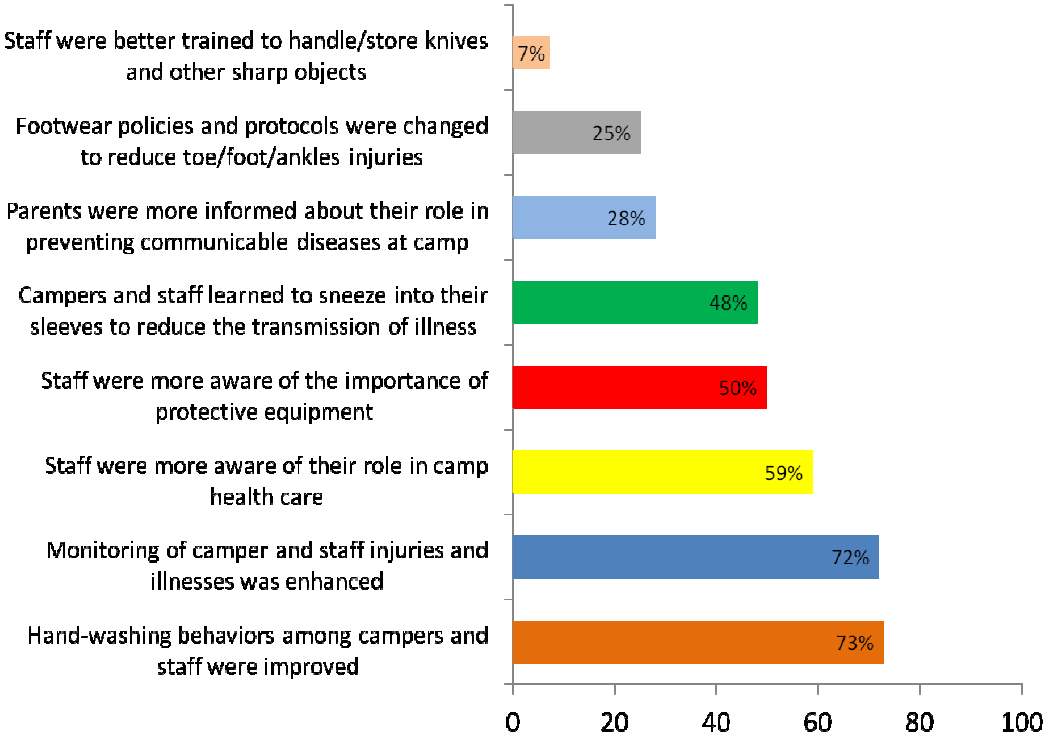
Intervention Strategies for Reducing the Incidence of Camper and Staff Illnesses and Injuries

The third goal of this study was to identify intervention strategies to reduce the incidence of camper and staff illness and injury. Online modules were created and delivered to participating camps and a measure of the interventions' influence was achieved via a self-report camp director survey distributed to camp directors at the end of the study. These online modules included: (1) communicable disease prevention, (2) minimizing trips and falls, (3) knife and sharp object safety, and (4) using protective equipment. Approximately 11,300 directors, staff, and volunteers from participating camps accessed the courses. The goal of the online course intervention was to encourage campers and staff to practice risk reduction behaviors.

As previously discussed, the rates of adverse events remained relatively constant across the five years of the study, and the online modules did not appear to reduce the rates of injuries and illness in the areas applicable to the interventions. However, responses to the post-study camp director survey provided another measure of the impact of the online modules. As indicated by Figure 1, a number of promising healthcare practices were learned through participation in the study, which also included completion of the online modules. The most common responses included: (1) learning the importance of washing hands to control communicable disease (73.4%), (2) learning how to monitor injury/illness experience to recognize and respond to camper and staff health needs (71.8%), (3) learning how to teach staff about their role in

camp healthcare (58.9%), and (4) learning to remind staff of the importance of protective equipment (50.0%).

Figure 1. Changes in Practice Identified by Camps Directors (n=134)



Discussion

Considering Rates of Illness and Injuries in Camps

This descriptive study demonstrated that ongoing surveillance of injuries and illnesses is not only feasible in day and resident camps, but also fruitful. The study provided national data which allowed the camp community to benchmark actual rates of camper and staff injuries and illnesses as a comparison for camp-specific adverse events. As previously noted, healthy camp environments are based on intentionally monitoring the injuries and illnesses of campers and staff,[42] and these monitoring activities—which involved data collection, analysis and interpretation—support *The Scope and Standards of Camp Nursing Practice*.[36]

The study results highlighted three important facts about camp-related injuries and illnesses: (1) the likelihood of campers or staff getting ill or injured is fairly low; (2) campers and staff tend to get ill more often than injured in both day and resident camps, and (3) campers and staff

experience injuries and illnesses differently in that, on average, campers sustained five adverse events for every four staff adverse events.

The aggregate injury rates for the five study years were .47 injuries per 1,000 camp-days for resident camps and .42 injuries per 1,000 camp-days for day camps, which provide compelling evidence for the safety of camp experiences. Comparing injury rates at camp with injury rates in other common youth activities is informative, as youth are exposed to lower rates of injury during camp experiences compared to injury rates in high school sports (Table 8). Because the camp injury rates included both middle and high-school-aged youth, this comparison is imperfect. Still, the low rates of injury during day and resident camp experiences are remarkable considering that "exposure" to camp is so much greater than "exposure" during high school sports, particularly during resident camp settings in which campers are at camp twenty-four hours a day.

This study provides compelling evidence about the relative safety of the camp experience, as evidenced by the very low rates of camper and staff injuries in both day and resident camps. This is an important marketing message for camps to use to attract parents concerned about the safety of youth settings, and the risks associated with sending one's child away from home for one or more weeks to attend camp. But it's also a compelling reason to look more closely for the protective factors associated with a camp experience. Why are camp injury-illness rates lower than those reported by other youth settings?

Table 8. Injury Rates* for Youth Participating in Day and Resident Camps Compared with Injury Rates for Youth Participating Anything else that you might want to add in High School Sports (Years 1-5)

Youth Activity	Injury Rates**
Resident Camp	*0.50*
Day Camp	*0.44*
Boys' Football	4.36
Boys' Wrestling	2.50
Boys' Soccer	2.43
Girls' Soccer	2.36
Girls' Basketball	2.01
Boys' Basketball	1.89
Girls' Volleyball	1.64
Boys' Baseball	1.19
Girls' Softball	1.13

* Rate for camps = chance of 1 child in 1,000 becoming injured during one 24-hour period at camp; Rate for sports= chance of 1 child in 1,000 becoming injured during a practice or competition.
** Centers for Disease Control and Prevention[43]

Although camp experiences present a lower risk than many other youth activities, there are several opportunities for preventing camp injuries and camp program providers need to be vigilant in their risk reduction efforts. Injuries are different from illnesses in that campers and staff differ in their intellectual and motor skills, their understanding of risk, and the activities in which they may be participating. It is for these reasons that injuries in campers and staff must be evaluated separately. Interventions which might be appropriate for campers might not be appropriate for staff; the converse is also true.

Addressing Risk Factors for Camper and Staff Illness and Injury

Reducing the Spread of Communicable Illness. The finding that campers and staff were more likely to become ill at camp rather than injured indicates that there is an opportunity to be proactive toward illness prevention in a similar manner that many camp providers currently focus on injury reduction. Reducing the spread of communicable disease appears to be the best place to start, since evidence of communicability (i.e., one person's illness was seen in others) was seen in about 50% of all instances of camper and staff illness.

Camps must become partners with parents. Through parental screening of their own child's health before the camper arrives on-site, many communicable illnesses can be prevented from entering the camp community. Additional risk reducing strategies include opening day screening processes and protective health behaviors like effective hand washing, appropriately covering coughs and sneezes, and staying well rested. Increasing the social distance between people and quarantine protocols for those who are ill reduce the risk even further. This study highlights the importance of controlling the spread of germs in camps, which has been noted in the literature.[11] Staff play a crucial role in modeling appropriate coughing/sneezing techniques, such as coughing/sneezing into an arm or sleeve instead of one's hands. Other strategies for camp administrators to consider include improving hand-washing education, procedures, and monitoring, and providing hand sanitizer as an option when soap and water are unavailable. The key for camp administrators is intentional planning, implementation, and monitoring of strategies to reduce the spread of communicable illnesses in camps.

Increasing Use of Protective Equipment

The finding that protective equipment was not being used in about half of applicable camper and staff injury events is alarming, and presents

another point for administrative intervention. Providing sports equipment and other protective gear that is appropriate for participants' ages and development levels is a must, but so is monitoring how consistently staff are using protective equipment. When staff fail to use warranted protective equipment, they not only place themselves at increased risk of injury, but they also provide a poor example to campers who may be involved in or witness such unprotected activity.

Protective equipment is particularly important in light of the fact that 24% of camper injuries and 19% of staff injuries involved the head, face, or neck. Head and neck wounds and blows to the head can cause severe injury or long-term impairment. Given that younger campers, such as the participants of many day camps, have larger heads in proportion to their bodies and underdeveloped motor skills, administrative action to ensure that well-fitting protective gear is both readily available and being used is imperative.

Increasing Use of Appropriate Footwear

The results regarding slips, trips and falls suggest that more attention needs to be given to footwear worn during (and when traveling to and from) camp activities. With national trends indicating that youth are spending less time outdoors,[44] many youth are simply unaccustomed to walking in nature—on surfaces that might be uneven or covered with soil, gravel, roots, or other natural elements.

Although closed-toed shoes are generally perceived to be safer than open-toed shoes,[45,46] and are in fact required during activities such as horseback riding according to recognized camp standards,[15] there is great variety in camps' footwear policies and how those policies are monitored and enforced. Evidence suggests that directors who make footwear policy changes often report significant reductions in foot and ankle injuries.[47]

Improving Youth Supervision

Opportunities exist to improve supervision in camps during both structured activities and free time. Fifty-two percent of resident camper injuries and 68% of day camper injuries occurred during structured activities. Furthermore, 60% of resident camper injuries and almost 30% of day camper injuries occurred during free time. These findings suggest that camp administrators need to provide program staff with a description of the specific behaviors associated with proper supervision. Clearly articulating to program staff what appropriate supervision looks like and how a youth supervision plan is to be implemented is critical. An effective

model that can inform how supervision could be better articulated to camp staff can be found in lifeguarding protocols.[48] These protocols, which describe in detail how aquatic staff are expected to perform their duties, address specific dimensions of performance including: appropriate attire, equipment staff should carry, spaces staff should monitor, where staff should be looking, behaviors that indicate a swimmer in trouble, incident response behaviors, and so on.

Camp directors and program staff need to note what campers are doing and quickly assess risk potential of that behavior. The finding that resident campers sustained three-quarters of their injuries during their first week at camp suggests that unfamiliarity with the camp environment may lead to an increased risk of injuries, so staff must have increased vigilance when new campers arrive. Providing consistent, appropriate supervision during the first week of camp may be one way that camp staff can reduce first-week injuries.

Designing Effective Interventions for Illness and Injury Reduction in Camps

This study provided an opportunity to design and implement specific online modules as interventions for participating camps, and to use the surveillance methodology to test those interventions. Although use of the online modules as an intervention beginning in year three of the study did not result in obvious changes in rates of injury and illness during years four and five, directors associated the online modules with positive changes in their camp's safety mindedness and health practices. So, although the results do not indicate, for example, a decrease in the overall rates of slips, trips, and falls because of the footwear-related online course intervention, which taught staff about proper footwear choices, camp directors implemented more stringent footwear policies and practices and experienced positive outcomes as a result. Footwear data collected in response to foot/toe/ankle injuries also indicated that more campers and staff were wearing appropriate footwear as the study progressed.

As noted earlier, health interventions are more successful when community members are involved.[37] From a camp perspective, program staff buy-in for any healthcare intervention is of primary importance. Staff must understand their role in camp healthcare, they must be trained properly, and they must be prepared to model appropriate health behaviors. Most of all, staff must internalize the information and put it into practice.[49] Strategies such as staff skill verification checklists and other observation-based measures, techniques used to confirm staff skills associated with specialized activities in camp, might also be appropriate

for verifying that staff understand and can model appropriate healthcare behaviors.

Policy Implications for Improving Camp Healthcare Practices

As previously noted, there is wide variability in the oversight of summer camps by state and federal authorities. As a result, camps must by necessity self-regulate and self-assess. The results of this study provide guidance to healthcare providers at individual camps as to the areas and activities which might be of greatest risk at their camp, and as a corollary, the areas where interventions could have the greatest effect. Additionally, the results support the conclusion that camp is as safe as, or safer than, many activities parents choose for their children, particularly community based sports. This finding should re-assure parents and regulators that camp is an appropriately safe activity and that the camp industry is willing and capable of tracking, reporting and influencing its own illness and injury profile.

The results of this study guided the creation of professional development opportunities for camp professionals through the American Camp Association, and shaped camp nursing practices through the Association of Camp Nurses. Several groups have created recommendations for best practices including the American Academy of Pediatrics.[14]

Collecting Health Information in Camps

This study raised an interest in continued surveillance of camp injury-illness data for both individual camps as well as a national aggregate. Camp professionals saw how attention to injury-illness events could be used for program improvements; camp healthcare providers noted increased awareness for injury prevention. Interestingly, most camps already have their data captured in their health record system; extracting that information in a meaningful and easy way is the challenge.

With that in mind and given the results of this study, any individual camp professional could, using the questions provided in Table 1 and the definitions of adverse events provided for campers and staff, monitor injury or illness rates in his/her camp. Using a spreadsheet to capture needed information as cases present in the camp health center is one such method. Other approaches are likely viable, including some of the electronic health record systems currently available for camps.[50] Any camp professional that collects camp-specific data on camper and staff illnesses and injuries can use their data to identify “hot spots” and, consequently, develop interventions that improve health and safety.

Interventions appropriate for one camp may be different from those needed at another camp.

As with any surveillance system, the first step for monitoring injuries and illnesses in youth settings is tracking the information. A systematic investigation of healthcare logs—which many camps already use as a part of camp healthcare documentation—can be an important step in the annual evaluation process. The simple act of tracking injury and illness patterns will likely draw attention to trends that might not have been noticed before. . Program providers are better able to implement prevention strategies when they have closely monitored these trends and then applied the knowledge gained to specific changes in practices such as increased staff training, modified healthcare staffing patterns, and so on.

Understanding where and when preventable incidents may occur allows for focus during training. Knowing the conditions that are most likely to yield illness makes it more likely the appropriate number and type of staff are available or on call. This is how a youth program provider can translate his/her own site-level monitoring efforts to improve changes in practice.. Knowledge and action make the difference. Systematic examination of the data from children and staff in youth development settings such as camps provides a unique lens into the relative safety of these settings and opportunities for program improvements.

As we look to the future of injury and illness monitoring in camps, a desired outcome of this study would be to increase a camp's capacity for injury and illness surveillance. Camps need the capability to access software or web-based tools for more effective and efficient electronic tracking of camper and staff adverse events. Furthermore, camps need to be able to run camp-specific reports throughout the year for more effective and responsive risk management and healthcare planning.

Study Limitations

A few study limitations are recognized. The camps that participated in this study may not be entirely representative of average day and resident camps. Although data regarding whether or not a camp was ACA-accredited was not analyzed for this study, it seems probable that many participating camps were ACA-accredited given the recruiting methods used. Because of familiarity with camp standards, ACA-Accredited camps might be more aware of health, safety, and risk management procedures, and may not be representative of the larger population of camps that may not have the same level of familiarity with camp standards.

The degree to which camp healthcare providers were familiar with the weekly reporting tool and the overall process of injury/illness monitoring may have influenced the accuracy of the reported rates of injuries and illnesses over the five years of the study. . As reporters became more aware of injuries and illnesses and more comfortable using CampRIO™, reporters may have entered greater numbers of adverse events than they did in previous years of the study.

A different approach could have been used to examine the effectiveness of the injury and illness interventions. For example, offering half of the participating camps the interventions and half not may have identified other variables that contributed to injury and illness rates and explained the lack of change in injury and illness rates over time. This provides another opportunity for future research.

Finally, this study focused on illness and injury events that met the definition of *adverse event* (ie, took the person away from their regular camp activity for one [day camps] or four [resident camps] hours]. Those illness or injury complaints that did not meet the study criteria—things like minor sore throat, slight headache, or mild sprain—may have been indicative of other illness or injury data points that were overlooked by the study methodology. If these minor complaints have been included and addressed, then it's possible that the rates of more impactful illnesses and injuries might have decreased over time.

Conclusions

Healthy communities and quality program providers alike rely on a strong evidence base for decision-making and planning. Camps now have an evidence base in the form of the national benchmarks provided by this study, which serve as a foundation for what is actually happening in day and resident camps when it comes to the injury and illness experiences of youth and staff. Furthermore, methodologies like the one explored in this study add to the tools available to camp program providers for illness and injury surveillance.

Prevention is the goal, and this study highlighted opportunities for prevention by identifying risk factors that camp program providers—in coordination with parents and camp healthcare staff—can address before, during, and after the camp experienceThis study highlights the need for the implementation and maintenance of a multiyear surveillance system to monitor camper and staff adverse events and support the development and implementation of risk-reducing strategies. Once camps address adverse events that are largely preventable, they can devote more resources to incidents that are more difficult to control.

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