Summer Camp Health Initiative pilot study: An overview of injury and illness in two Canadian summer camps

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Preamble

The authors are four current medical students and long-time camp staff. We have had many years of experience in and around the camp health centres and developed a keen interest for camp health. This study is part of a larger health program called the ‘Summer Camp Health Initiative’, which is aimed at further developing camp health provision and promotion through research and programming.

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Abstract

Summer camp is an important aspect in the lives of millions of youth around the world. Data regarding illnesses and injuries in healthy, all-purpose residential camps are sparse, and data on Canadian residential camps are even sparser. This pilot study examined the incidence of new-onset illnesses and injuries and circumstances surrounding their occurrence at two general-activity Canadian residential camps. Modified Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) forms were used for data collection, and were completed by infirmary staff. There were 898 total infirmary presentations, resulting in a frequency of 52.7 presentations per 1000 camp days (CD). Illness rate was 32.2 and injury rate was 20.5 per 1000 CD. Most common symptoms included sore throat (13.4/1000 CD), headache (9.8/1000 CD), cough (7.0/1000 CD), runny nose (6.7/1000 CD) and nausea and vomiting (5.0/1000 CD). Cuts, abrasions, lacerations were the most common injury at 5.7/1000 CD, followed by sprain/strain, bruises, bug bites and splinter/sliver to the extremities. This study confirmed the utility of our methodology and highlighted areas of improvement for subsequent research. It also demonstrated a similarity between Canadian and American residential camps in terms of infirmary presentations and common injuries and illnesses. The study is intended to serve as a baseline for future research on injury and illness prevention and management in a camp environment.

Introduction

Summer camp is an important aspect in the lives and development of millions of youth around the world. According to the 2015 American Camp Association annual report, over five million youth attend summer camps annually at over 2400 camps in the United States. In Ontario alone, there are over 600 summer camps associated with the Ontario Camps Association, the provincial regulatory body for camps. Many of these camps are residential and consist of intimate, rural environments that provide campers and staff with cohabitation and routines that are vastly different from their usual urban lifestyle. These living conditions, together with a drastic shift in the type of supervision, terrain, and activities, result in a different health experience for the attendees compared to their home environments. For instance, children are responsible for seeking out medical assistance and reporting their symptoms primarily on their own volition (Trachtman et al. 1994). Despite the unique setting, there are limited standards and policies guiding the implementation of health practice at camps. With so many people attending camps, and the impact of injuries and illnesses on social and emotional well-being, proper healthcare practice and health promotion is vital to ensure an optimal camp experience (Garst et al., 2013).

Literature regarding injury and illness prevention in general-activity residential camps has not yet been conducted with a Canadian population. Within the existing American camping literature, there is considerable variability in the ways in which events are reported (e.g., retrospective treatment logs, phone/internet reporting, weekly reports), definitions of injury, and limited levels of on-site monitoring of data collection practices. Additionally, not all studies implemented or documented oversight of each camp's quality and quantity of data collection and

reports. Prior research has indicated rates of injuries and illnesses using the "per 1000 camp days (CD)" metric (Appendix I). The findings of these studies range from 0.93-1.38 illnesses per 1000 CD and 0.47-0.5 injuries per 1000 CD (Yard et al., 2009; Garst et al., 2013).

With respect to injuries, human factors have been shown to play a larger role than the physical environment (Meyer et al., 1963). Garst et al. (2013) demonstrated that major risks for illness and injury were associated with supervision, use of protective equipment, tripping/falling, arriving at camp ill, and the spread of communicable illness. Injury associations have widely varied between studies: Goldlust et al. (2009) found no association between "significant injury" (at least 24 hours of restriction from camp activities) and age, sex, time of day, level of supervision, location, or camper-to-staff ratio, while the studies by Trachtman et al. (1994) and Rauckhorst and Aroian (1998) have shown trends and associations between injuries and one or more of gender, age, or time of day. Specifically, a higher proportion of females and younger campers presented with injuries, and most injuries presented earlier in the day. Sprains, cuts, abrasions, splinters, bruises and fractures were among the most common injuries, and campers were more prone to injury than staff (Trachtman et al., 1994). Lastly, lower extremities were injured more often, and the most common injury mechanisms included falling and tripping (Papageorgiou et al., 2008).

With regards to illnesses, the most frequent reasons for visits to the infirmary are communicable diseases, discomfort-related problems, and allergies, with upper respiratory complaints being the most common symptom at these visits (Trachtman et al., 1994). Allergies and mononucleosis were the main causes of evacuation to off-site care in one study (Elliott et al., 2003).

The large volume of campers attending residential camps, combined with the limited body of research and health-care promotion/prevention strategies suggest that there is a need for further research in this area. The primary purpose of the present study was to examine the incidence of illnesses and injuries that present to camp health centres amongst individuals attending residential summer camp. The secondary purpose was to understand the underlying factors involved in their illnesses/injuries (cause, timing, gender, supervision, age, duration, etc.). This is a pilot study and is intended to serve as a baseline for future studies in camps regarding targeted illness/injury prevention and management, efficient healthcare policy and protocol, and ensuring proper data collection and methodology. Findings from this project may be useful in drawing conclusions influencing health policy decisions for camps across Canada.

Methods

Participants

The sample consisted of all registered campers and employed staff at both participating summer camps. There were a total of 470 participants, which included 224 females (47.7%) and 246 males (52.3%), and 329 campers and 141 staff (see Table 1 for baseline camp demographics). A convenience sample of summer camps was used, and camp cohorts consisted of mainly Jewish Caucasian individuals. Exclusion criteria consisted of the following: presentations that were highly specific as to potentially identify the presenting individual, as determined by the physician and infirmary staff; presentations regarding mental health; presentations to the infirmary for regular daily medications; and campers returning to the infirmary for daily medication for an acute illness (e.g., a seven day course of antibiotics

prescribed at camp). Both camps are residential camps lasting six and eight weeks long, with a portion of campers that stay for just the first ten days or three weeks. Altogether, this constitutes 17052 “camp days” (CD), a measure that incorporates both population size and time spent at camp by each individual and specifically reflects the sum of the daily population of campers/staff at each camp, on each day of the week throughout the camp session (Goldlust et al., 2009; Garst et al., 2013; see Appendix I). Campers and staff participate in a wide range of activities at these camps, including swimming, paddling, water-skiing, arts and crafts, dancing, sports, camping, and more.

Design

This is a multi-site quantitative descriptive study involving two residential camp cohorts. Both camp directors expressed written informed consent to grant data collection on camp grounds. Data on injuries, illnesses, their causes, and management was collected over the course of the entire camp summer session. A combination of pre-existing camp protocols on health and data collection methods based off of previous literature was used and is detailed in the *Measures* section below. Ethics approval was obtained from the Queen’s University Health Sciences Research Ethics Board.

Measures

A modified version of the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) form (Appendix II) was used for collection of illness and injury presentations. All forms were completed by the camp infirmary staff and volunteers. CHIRPP forms are well-

studied forms with high reliability and validity, which were created by Pickett et al. (2000). They are short questionnaires that collect data on demographics (e.g., sex, age) and the nature and location of injuries experienced by individuals upon arrival to emergency rooms in 11 pediatric hospitals and six general hospitals in Canada (Public Health Agency of Canada, 2016). We modified the forms to include information relevant to camp settings, such as specific locations and activities at camp (dining hall, sports, dancing, etc.), common camp illnesses based on Garst et al. (2013), safety equipment used, and management. All collection forms did not contain any identifying information. Data on injury and illness was admissible for collection if it met either of the following two requirements: (1) camper/staff seeks or is brought to the infirmary for medical attention, or (2) any emergency outside of the infirmary requiring attention from the infirmary staff. Training was provided during the pre-camp session to all infirmary staff involved in data collection and uploading in order to maximize inter-observer reliability. As well, the principal investigators provided regular oversight and feedback sessions to ensure that questions that arose were answered.

Data Collection

All data were collected between June 20, 2015 and August 20, 2015. Camp infirmary staff collected the information during regular infirmary hours after breakfast and dinner. Infirmary staff consisted of any of the following individuals: a camp physician, camp nurses, and general camp staff appointed to work in the infirmary. Any additional presentations during off-hours were collected by infirmary nurses. Strategies recommended by Doraiswamy (1999) for maximizing compliance with reporting and completion of forms were incorporated, such as

education on the CHIRPP form for infirmary staff, staff encouragement, and signing off the collector's name on the form. Forms were kept in the camp infirmary in a secure cabinet and collected at the end of the camp sessions for uploading into a password-protected and encrypted electronic offline database. Primary investigators provided on-site monitoring throughout the summer to ensure appropriate data collection and storage. Principal investigators received the completed database at the end of the summer session.

Data Analysis

The primary outcome was the incidence of injury and illness that presented to camp health centres at residential summer camps. The secondary outcomes were the circumstances associated with the illnesses/injuries (cause, timing, age, duration, management, etc.). Descriptive statistics were used to identify the characteristics of the sample, such as age and sex. The study variables and illness/injury incidence frequencies were calculated by determining the number of cases per camp days. Ages were categorized into "junior campers", "senior campers", and "staff", as outlined in Table 1.

Results

The current study identified rates of illness and injury presentations at two general-activity residential camps, as well as circumstances surrounding their presentations. There were a total of 898 infirmary presentations, resulting in a frequency of 52.7 presentations per 1000 camp days (CD). The illness rate was 32.2 per 1000 CD and the injury rate was 20.5 per 1000 CD. The most common category of illness was communicable/infectious disease (50% at 15.4/1000 CD;

see Figure 1) with the most common symptoms including sore throat (13.4/1000 CD), headache (9.8/1000 CD), cough (7.0/1000 CD), runny nose (6.7/1000 CD) and nausea and vomiting (5.0/1000 CD; see Figure 2). The five most common injuries were cuts/abrasions/lacerations followed by sprain/strain, bruises, bug bites, and splinter/sliver (Figure 3).

Males presented to the infirmary more frequently than females (54.2% for males vs. 45.8% for females). The highest frequencies of injury/illness presentations occurred in the senior camper population (42.5% or 23.0/1000 CD) compared to the junior campers (36.5% or 18.1/1000 CD) and staff (11.5% or 7/1000 CD). The highest frequency of presentations occurred in week two of camp (26.5%; see Figure 4), followed by week three (19.3%) and then week one (18.5%). Similar numbers of presentations occurred in the morning (23.4/1000 CD) and evening/night (20.6/1000 CD). Refer to Table 2 for a summary of the above results.

Half (50.0%) of presentations had a prior visit to the infirmary in the past seven days for reasons such as a different presentation, to accompany someone to the infirmary, or to receive daily medications. The location of injury in camp varied between age groups, with the most frequent occurrences at sports courts and the waterfront, as displayed in Figure 5. The lower limb was the most common body region involved in injuries (Figure 6). The incidence of different causes of injury is reported in Figure 7. The activity at time of injury varied among the different age groups: the majority of injuries were from horseplay and swim in junior campers, from sports in senior campers, and from swim in staff (Figure 8). Lastly, of the 228 injury presentations that included documentation regarding staff supervision, 69% of injuries occurred in the presence of staff, while 31% of injuries were not supervised, as displayed in Figure 9.

Discussion

The current study examined the incidence of injuries and illnesses and associated circumstances at residential summer camps, with the goal of identifying areas that could benefit from future development of health promotion and injury/illness prevention strategies. The following patterns emerged: (1) more illnesses than injuries were recorded throughout the summer; (2) the most common illnesses reported were those related to communicable disease; (3) the most common injuries were specific to the age of the population but included sprains/strains and cuts/bruises to extremities; (4) age played a role in the frequency of and reason for infirmary visits throughout the summer; (5) a higher number of presentations occurred in week two than any other week; (6) half of presentations had a prior visit to the infirmary in the past seven days.

Frequency of Illness and Injury

A higher number of illness than injury presentations were observed, and the number of injury/illness presentations were higher than observed in previous studies. While this may be a result of more frequent data collection monitoring, our study documented presentation frequency rather than presentations that were considered injuries/illnesses only if they resulted in removal from normal camp routine (Garst et al., 2013). Similar presentation frequencies as our study were demonstrated in a study by Asnes (1974), one of the earliest studies documenting presentation to camp infirmaries, which had 1412 presentations in 675 camp attendees over a one month session. This results in a rate of approximately 67.5 presentations per 1000 CD, similar to our results. Additional research on injury and illness at camps has indicated rates of injuries and

illnesses ranging from 0.93-1.38 illnesses per 1000 CD and 0.47-0.5 injuries per 1000 CD (Yard et al., 2009; American Camping Association, 2011; Garst et al., 2013). However, these studies had different criteria as to what was considered an illness or injury, such as resulting in the disruption of normal camp routine for four or more hours, and did not account simply for presentations to infirmaries. A possible limiting factor to our illness and injury findings may be a result of injury severity. Illness presentations were more likely to range from mild to severe, as medications are only allowed to be kept in the infirmary, whereas injury presentations were more likely to be either moderate or severe, as mild injuries are often easily treatable by general staff using basic first aid and do not warrant a presentation to the infirmary. These injuries were not reported and may have led to sampling error. Furthermore, not everyone at camp is at the same risk level for certain injuries. Certain individuals may choose to not participate in high-risk activities, or opt for more safety precautions. On the contrary, campers and staff were often exposed to communicable illness to a similar degree (Figure 10). While it is easier to alter risk level for injuries, it is much harder to alter risk level for illness at camp. While proper hygiene and prevention methods could be used to alter risk level, in reality these practices are hard to achieve in the camp setting due to crowded living environments and a lack of proper protocols for containing and preventing communicable disease. Based on these observations, we believe we could better control the spread of communicable disease at camp with more protocols in place. This would include implementing quarantine cabins, better hand hygiene, and effective hand-washing programs for all ages at camp. As well, better supervision for cabin cleaning can help promote adequate and hygienic living conditions. Awareness campaigns and educating campers and staff about communicable disease may also help to prevent spread of disease.

Common Illnesses

The most frequent symptoms that presented to the infirmary included sore throat, cough, headache and runny nose (Figure 2). These are all symptoms associated with communicable disease and are signs of infectious symptoms. These results were similar to American studies on the topic, which showed high incidence of communicable and infectious disease such as upper respiratory tract infections (Garst et al., 2013; Yard et al., 2006; Rauckhorst & Aroian, 1998). Our subsequent research will incorporate cluster symptoms in order to better evaluate frequently presenting symptoms at camp. Explanations for infectious symptoms have previously been discussed, but may be related to poor hygiene, close person-to-person contact, inadequate sleep, and crowded living conditions. We pose the following question: can proper patient/camper education on presentation protocol to the infirmary reduce the number of presentations? Based on our observations, many campers and staff would not present to a primary care physician with their symptoms if they were outside of the camp environment; the ease of access allows them to present with any minor complaint. We propose that reassurance is a major component and a primary reason for presentation of minor symptoms, especially in the junior camper population. As well, we believe that if campers were comfortable being reassured by their counselors in the same manner as they would be with camp nurses or physicians, a decrease in the number of people presenting to the infirmary with minor, non-acute symptoms might be observed. Increasing infirmary screening measures and establishing more restrictive protocols at camp may also reduce the volume of this specific population.

Common Injuries

We observed that most injuries occurred to the lower limb (Figure 6). This is similar to other studies, which have also identified the lower limb as a common area for injury (Papageorgiou et al., 2008). Two common injuries that were reported in association with the lower limb were bug/tick bites and splinters, which was also demonstrated in Trachtman et al. (1994). Often, the lower limb has more area exposed and is closer to the ground where bug/tick bites and splinters are more likely to occur via walking through long grass or on wooden docks. In order to better prevent these risks, camps should consider maintaining grass and docks (i.e. shorter grass length and sanding docks) as well as potentially instituting a footwear policy in areas where splinters are of concern and a long pants policy in areas where bug and/or tick bites are of concern. Indeed, as Lyme disease becomes more prevalent in Eastern North America and awareness continues to increase in the general public (Ogden et al., 2009), camps will likely experience pressure to demonstrate the measures they are taking to address this issue.

Age

Senior campers had the highest absolute number of presentations at 23.0 per 1000 CD, compared to 18.1 per 1000 CD for junior camp, and 21.8 per 1000 CD for staff. (Note: these numbers reflect the overall burden of each age group on camp healthcare, not the relative incidence). Possible explanations include that there were higher numbers of senior campers (38.5%) than junior campers (31.5%) and staff (30.0%) and thus a higher likelihood of presentation. Senior campers are also more independent and therefore able to present on their own to the infirmary instead of waiting for a staff to accompany them. Furthermore, they tend to

participate in more intimate activities such as hugging and close contact as well as higher risk sporting activities and more vigorous horseplay with less frequent supervision.

However, when frequencies were calculated according to *age-group specific camp days*, junior camp had the highest rate of presentations at 72.5/1000 CD, compared to 52.5 for senior camp and 34.4 for staff (see Figure 11). In other words, a physician at camp could expect to see senior campers more frequently during the summer, but relative to the time each age-group spent at camp and the number of campers in each section, junior campers were much more frequent presenters. Many studies have indicated that campers have increased injury frequency than staff, such as Trachtman et al. (1994) and Rauckhorst & Aroian (1998), who suggest that difficulty adjusting to camp may contribute, along with heightened somatic awareness. Moreover, we speculate that poor hygiene may be a contributor, as younger campers may be less independent and less thorough at cleaning their hands and body. As well, younger children may be more susceptible to certain illnesses such as viruses, and may be more likely to present to the infirmary with relatively benign complaints. Further studies could better analyze the infirmary usage patterns of junior campers. Counselors are at high risk of illness due to a higher likelihood of insufficient sleep, high stress (Edwards et al., 2013), and living in a cohabitated environment with their campers in sometimes unhygienic conditions. Despite these risk factors, staff presented with the lowest frequency of presentation at 21.8/1000 CD. We believe that these risk factors combined with the lower frequencies of presentation suggest that staff may either have insufficient time to report to the infirmary during open hours, or they self-medicate more often, which campers are not permitted to do. Additionally, they may be better educated in appropriate hand hygiene. This finding is in line with Garst et al. (2013) and Goldlust et al. (2009) who

demonstrated higher rates of illness and injury respectively among campers compared to staff, and Elliott et al. (2003), which found significantly higher incidents among campers than staff. Meyer et al. (1963), however, found lower accident and disability rates among campers compared to staff, which they attributed to the high demands that come with being a staff and needing to keep up with younger, "more energetic" campers; however, this data is from over 50 years ago and the camp health system and general daily routines have likely undergone many changes since this time.

Week of Camp

The highest number of presentations occurred in the second week of the camp session. We believe this is likely accounted for by the drastic change in lifestyle habits, specifically sleep and hygiene patterns, at camp compared to those at home. The first week of camp often involves shortened sleep periods and increased physical activity relative to the campers' and staff regular patterns. By the second week, campers and staff have had over seven days of exposure to dirty and crowded living conditions. The increase in number of presentations during the second week is also in accordance with the length of typical viral incubation periods of 2-6 days for common pediatric viruses such as Rhinovirus, Enterovirus, Adenovirus, Parainfluenza and Influenza (Lessler et al., 2009). There was a rapid decline in presentations during the second half of the camp session (see Figure 4 and Table 2). This is most likely due to a large portion of campers leaving camp midway through the summer. Other possibilities for this decline may be related to better adjustment to life at camp as by this time campers and staff likely have better adjusted to sleep cycles, living conditions, and the daily camp routine. Additionally, a higher staff-to-camper

ratio following the departure of a portion of the campers midway through the summer would increase supervision and thereby possibly reduce the likelihood of illness and injury in a junior camp population.

Time of Day

The time of presentation varies according to camp routine and infirmary protocol. Generally, the infirmary is open in the morning following breakfast and in the evening following dinner; urgent situations may present throughout the day. There is no general sick call in the afternoon, likely accounting for the lower number of afternoon presentations, and staff are instructed to bring campers to the infirmary during off-hours only in urgent situations, which cannot wait until the next sick call (see Figure 12). Future research should investigate afternoon or off-hour presentations to determine the type of presentations and their level of urgency at these times, in order to better identify causes and to expedite their management. The number of presentations was similar between the mornings and evenings as these were the designated open infirmary times.

Recent Exposure to the Infirmary

Half (50.0%) of people who presented to the infirmary had previously been there in the past seven days. This demonstrates the possibility of campers being exposed to other illnesses when either at the infirmary or while waiting in line. It is also possible that infirmary presentation does not cause additional illness, rather a higher likelihood of return. This may be due to lack of knowledge on the illness itself and the need for reassurance, or in fewer cases, the

increased return rate with the same presentation may be a result of improper treatment. Future years of this study have been amended to incorporate randomized identification numbers to analyze frequent infirmary users. Additionally, some camp attendees likely presented due to increased comfort with the camp health care system. By being present in or around the infirmary, they may become more comfortable with the system. Further investigation could look to demonstrate any association between patients in the infirmary and future presentation. Further studies in this area would be needed to better assess return presentations to the infirmary and their causes.

Staff Supervision

The majority of the time, staff were present at the time of injury. This suggests that either there is adequate supervision but a lack of proper attention, or that campers' injuries are not dependent on supervision. "Staff supervision" entailed that a staff was present, though not necessarily actively watching the campers, which may partly explain the high frequency of injuries caused by horseplay (3.7/1000 CD). While the nature of these incidents are not known, increased awareness and supervision may be helpful in decreasing this frequency. As staff were often present at the time of injury, further camp-specific first aid training could better prepare staff for first aid in the field. Camps should consider reminding their staff to be attentive while supervising campers' activities.

Limitations

Statistical Analysis

One major limitation of our study was our inability to perform statistical testing to compare groups within our study. We were unable to do so as privacy clearance to record identifiers of each interaction with healthcare had not been granted. This precluded the study's ability to control for repeated measures of a single individual within groups that would heavily skew the comparisons. This limitation will be addressed in future studies, as the use of randomized identification numbers has been approved by the Research Ethics Board.

Camp Cohort

This study involved a convenience sample of two Jewish Canadian camps, and thus may not be an accurate representation of average Canadians attending summer camps. Although data regarding household income were not collected, campers and staff at these camps may have been, on average, of higher socioeconomic status compared to the average Canadian camper.

Inter-Observer Variability.

As with any study that involves multi-observer data collection, there is a risk of inter-observer variability. In order to maximize consistency in data collection, all staff responsible for entering data participated in interactive pre-camp training as well as weekly debriefing meetings. These meetings gave data collectors the opportunity to ask questions about complex or ambiguous cases in a positive, supportive setting.

Difference in Injury/Illness Definition

Differing definitions for illness and injury from other studies limited the ability to adequately compare rates between studies. Some of the discussion points mentioned above have involved comparisons in data from the present study to the aforementioned American studies (e.g., Garst et al., 2013), which rely on the assumption that our study followed similar

methodology. Our study accepted any presentation that either presented to the infirmary or required medical attention elsewhere; we did not include any restrictions on the severity of presentation because one of our primary objectives was to capture the overall caseload of the infirmary and to obtain a baseline of the number and type of infirmary presentations. In contrast, Garst et al. (2013) restricted the definition of an illness/injury as an incident that causes a camper or staff member to miss at least four hours of usual camp activity. This narrowed definition likely limited the number of cases ultimately reported, and should therefore be considered carefully when making comparisons.

Variability of Camp Setting

As with other research in this field, the present study is limited by the inherent variability of the summer camp setting. Some factors could not be controlled and/or accounted for, such as campers leaving midway through the summer and unreported healthcare utilization during out of camp trips and excursions.

Future Directions

This project is a pilot study intended to be continued for the next two years. Feedback from structured meetings with camp physicians, nurses, camp staff, and principal investigators has resulted in minor amendments to the CHIRPP forms for subsequent years. Specifically, the investigators had regular phone conferences to discuss changes for the following iteration of the study: broad categorization of specific data points (date, time, body part, diagnosis), addition of management and investigations for each presentation, randomized identification numbers to permit significance analysis, and additional camp recruitment. A data collection sheet with

proposed amendments can be found in Appendix III. Future studies are intended to direct camp research towards subsets of prominent injuries and illnesses, identify areas in need of better camper and staff education, training, or awareness, and provide recommendations to mitigate injuries and illnesses in residential summer camps.

Conclusion

While camp is a safe and secure environment for children, injuries and illnesses remain a common occurrence. This pilot study demonstrated that the healthcare centres are highly utilized at residential camps. There are many presentations to these centres, more often as a result of illness, rather than injury. Junior campers are the highest frequency users, and campers overall present more often than staff. Importantly, the study has confirmed use of our methodology and we will continue forward with similar methods, amending only minor issues on the CHIRPP form that led to inefficiencies such as: categorization of time, age, and day, broader diagnostic categories, and incorporation of any investigations and management plans on the forms. Identification numbers should be included in order to better analyze presentations and assess for significance between age groups. These changes, along with the recruitment of additional camps, will allow for improved data quality and greater capacity for statistical comparison. Our results are similar to American studies (both old and new) in terms of types of presentations, illness, injuries, and injury causation. Camp attendees appear to have similar presentation data across North America, and further studies should focus on implementing interventions in order to reduce the number of illnesses and injuries occurring at camps.

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Tables

Table 1. Camp Characteristics

	Frequency	%
Gender		
F	224	47.7
M	246	52.3
Total	470	100
Age group		
Jr. Camper (6-11)	148	31.5
Sr. Camper (12-16)	181	38.5
Staff (17+)	141	30
Total	470	100

Table 2. Frequency and Incidence for Injuries and Illnesses

	Frequency	Per 1000 Camp Days	%	Per Day
Total Presentation	898	52.7	-	21.4
Reason For Presentation				
Illness	549	32.2	61.1	13.1
Injury	349	20.5	38.9	8.3
Time At Presentation				
Morning	405	23.8	45.1	9.6
Afternoon	142	8.3	15.8	3.4
Evening/night	351	20.6	39.1	8.4
Week of presentation				
1	166	9.7	18.5	23.7
2	238	14.0	26.5	34
3	173	10.2	19.3	24.7
4	110	6.5	12.2	15.7
5	105	6.2	11.7	15
6	95	5.6	10.6	13.6
Not specified	11	0.7	1.2	1.6
Gender				
F	411	24.1	45.8	9.8
M	487	28.6	54.2	11.6
Age group				
Jr. Camper	309	18.1	34.4	7.4
Sr. Camper	393	23.1	43.8	9.4
Counselor	196	11.5	21.8	4.7
Total	898	52.7	100	21.4

Note: The time ranges for morning, afternoon and evening/night are 6 am -12 pm, 12:01pm - 6 pm, and 6:01pm - 5:59 am respectively

* The age ranges for Jr., Sr., and Counselors are 6-11, 12-16 and 17+ respectively

Figures

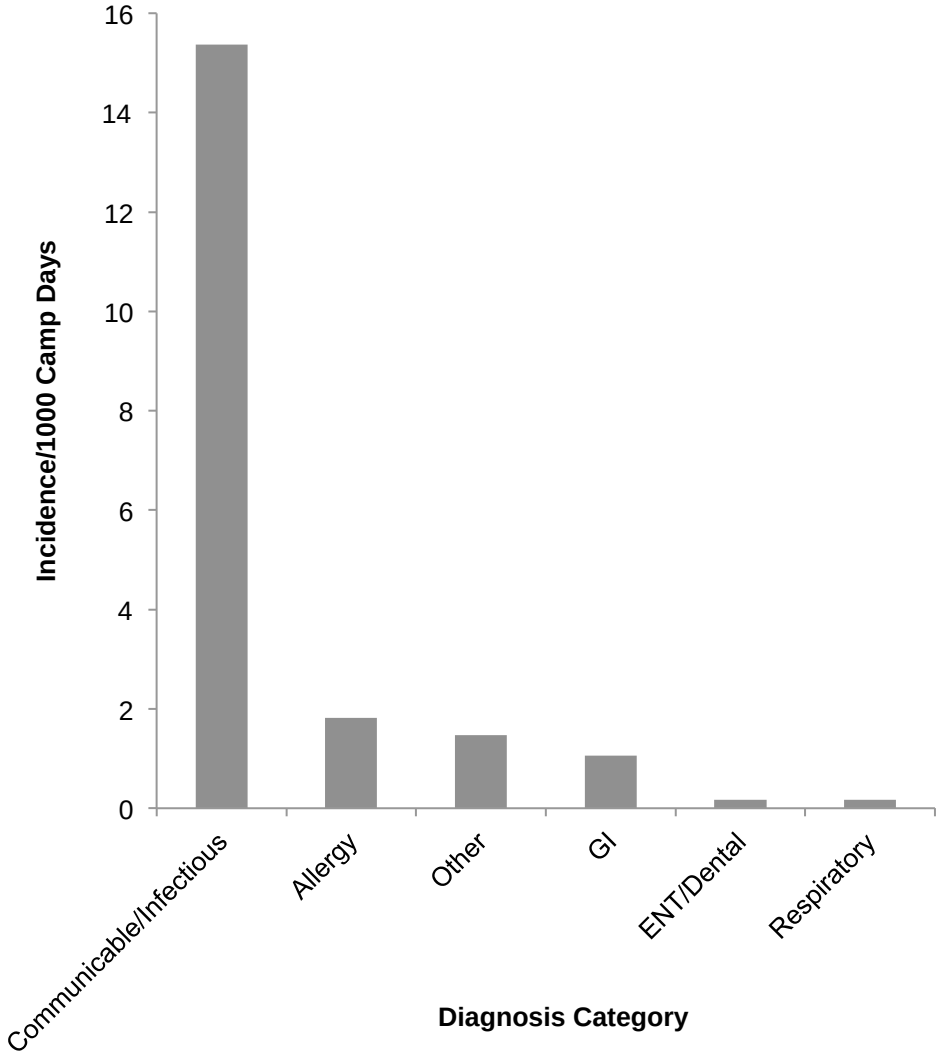

Figure 1: Diagnosis categories of reported injuries per 1000 camp days. ENT: ear, nose, & throat diagnoses (otolaryngology).

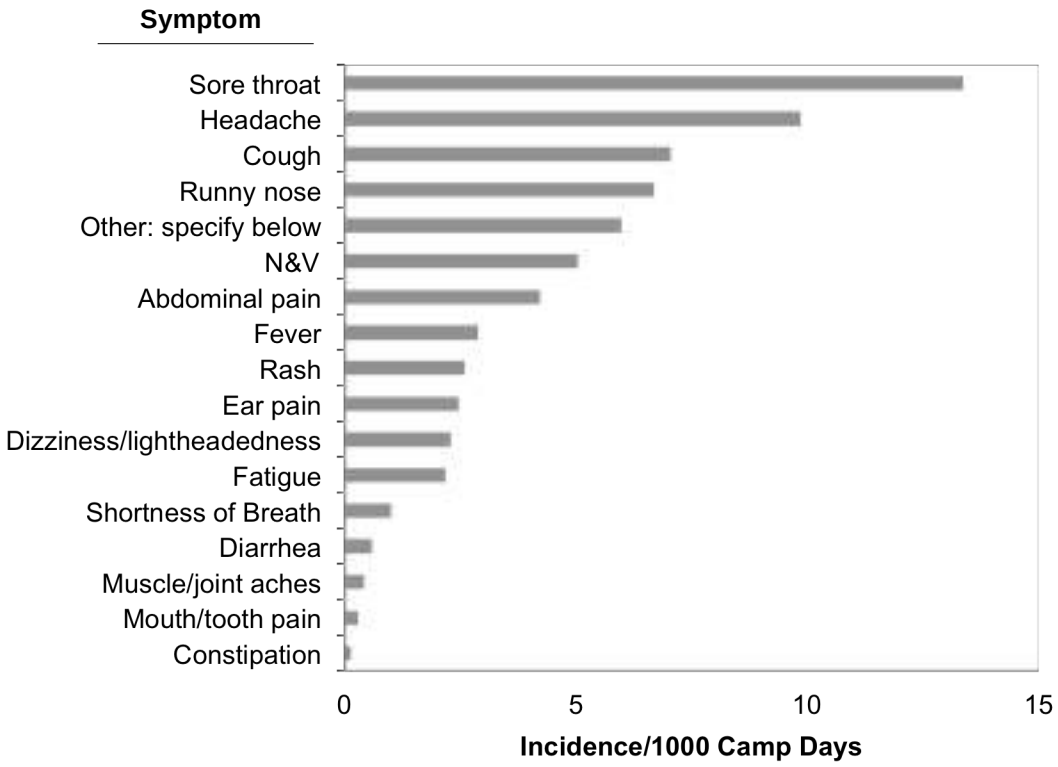

Figure 2: Incidence of symptoms upon illness presentation per 1000 camp days

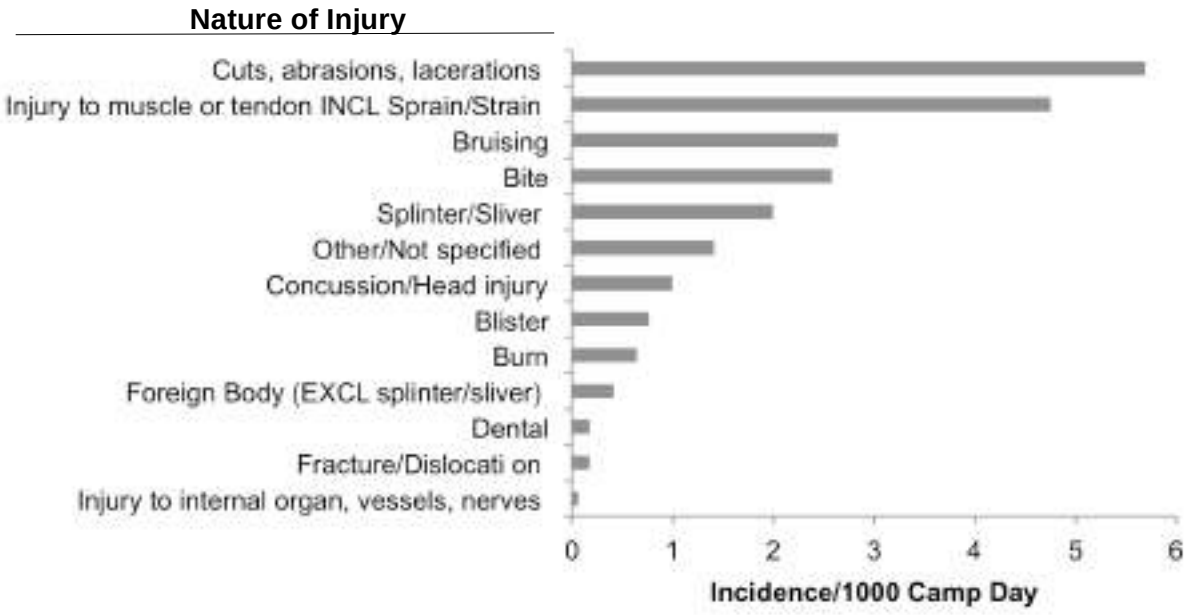

Figure 3: Nature of injuries per 1000 camp days. INCL, including; EXCL, excluding.

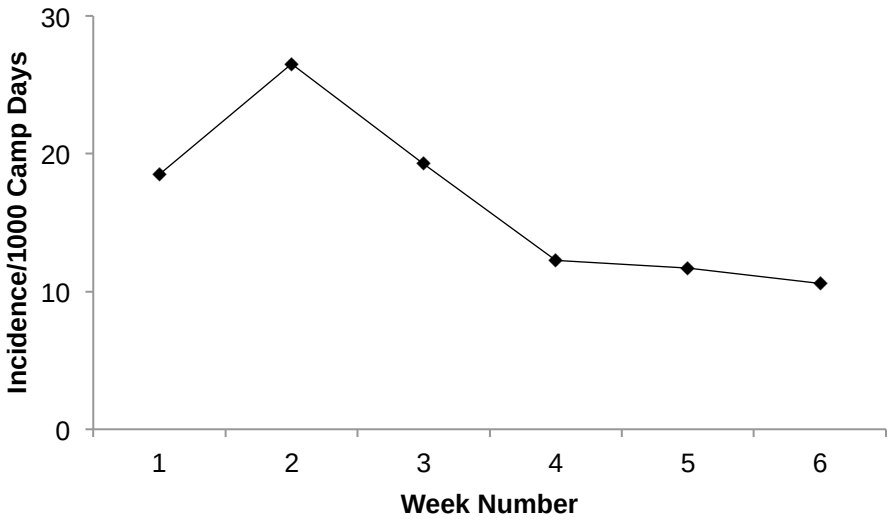

Figure 4. Incidence of all-category presentations (includes illness & injury) by week number. All values are per 1000 camp days.

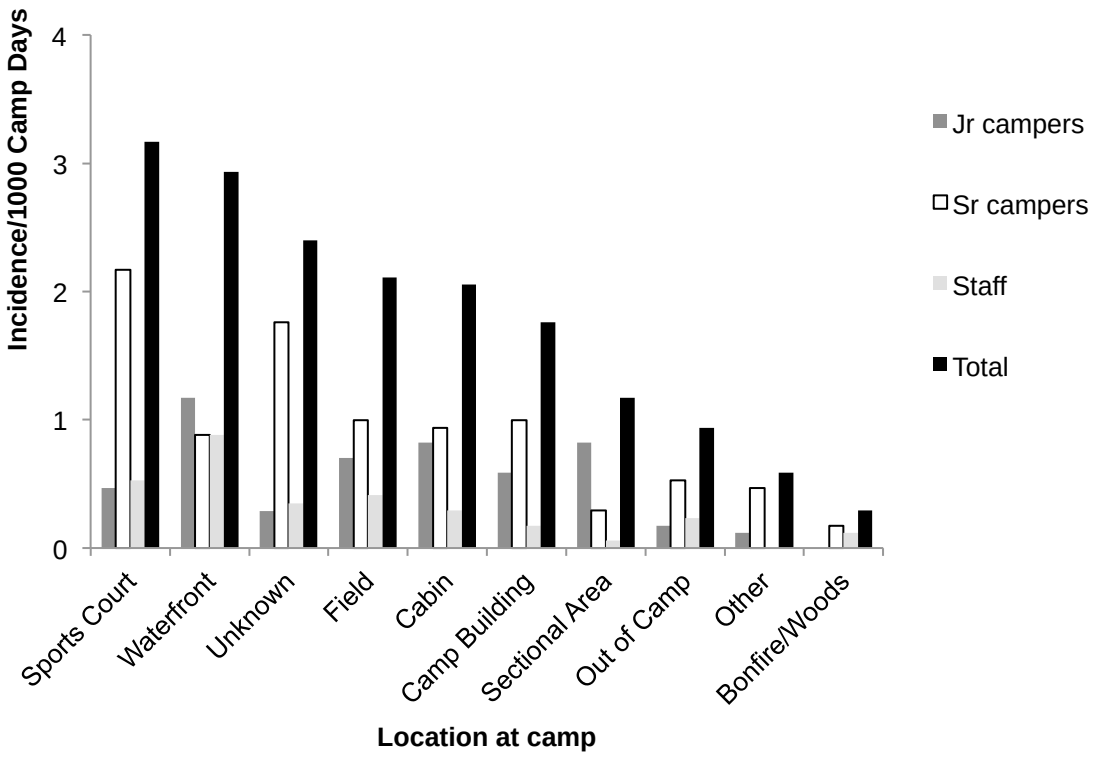

Figure 5: Location of injury in camp per 1000 camp days according to age group

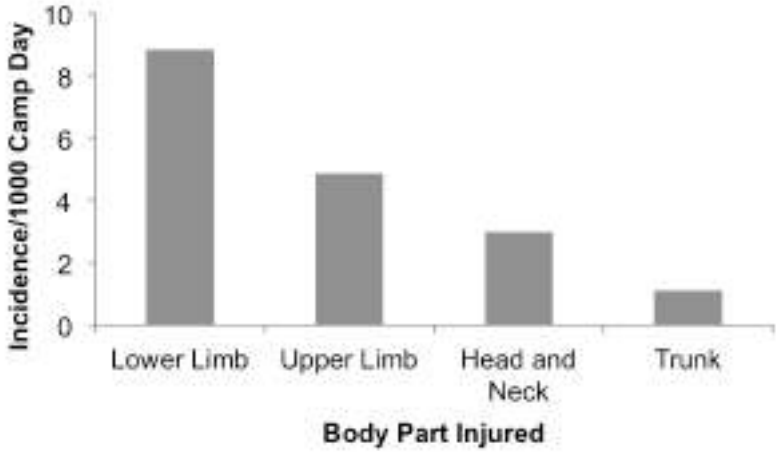

Figure 6: Most commonly injured body part per 1000 camp days

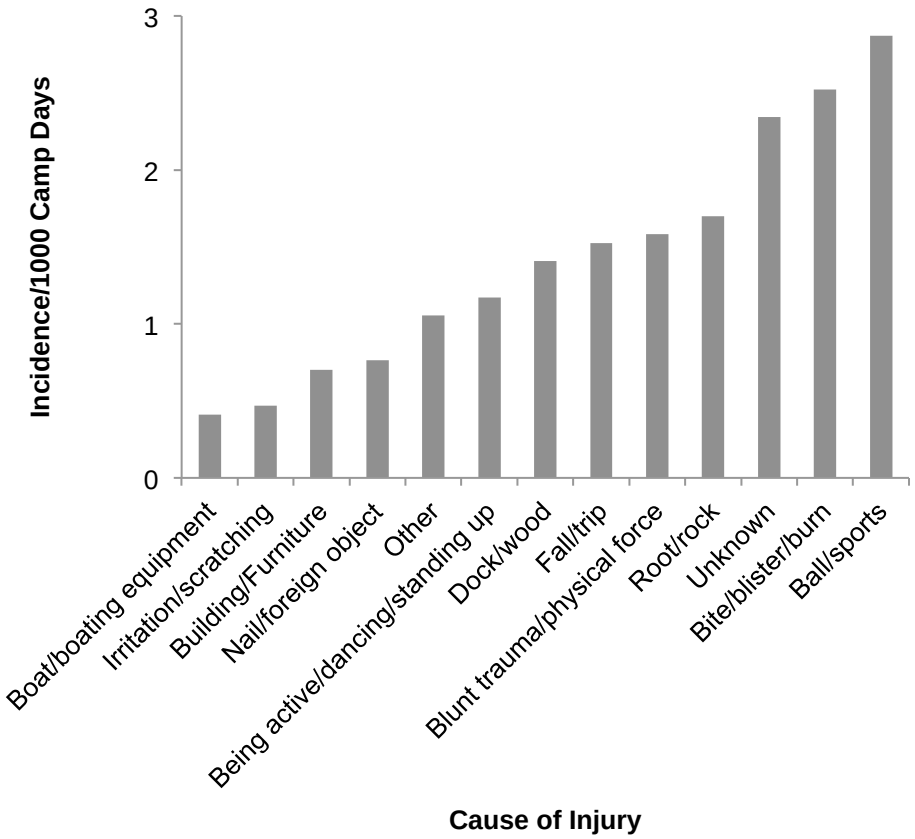

Figure 7: Cause of injury per 1000 camp days. The 'unknown' category includes all injuries that were designated to have undetermined or unknown causes; whereas 'other' includes known causes that are not included in any other category.

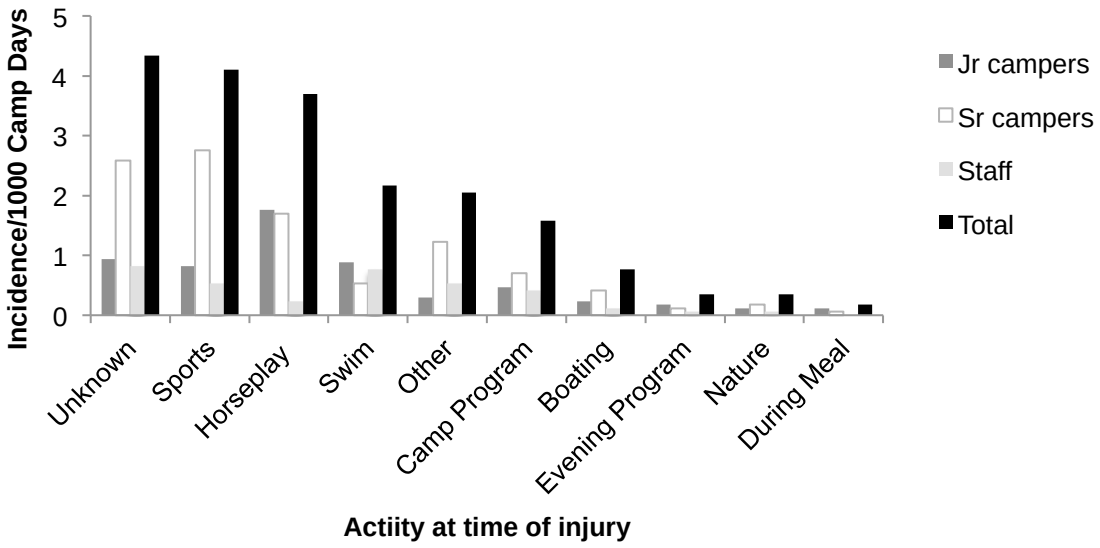

Figure 8: Activity at time of injury per 1000 camp days according to age group

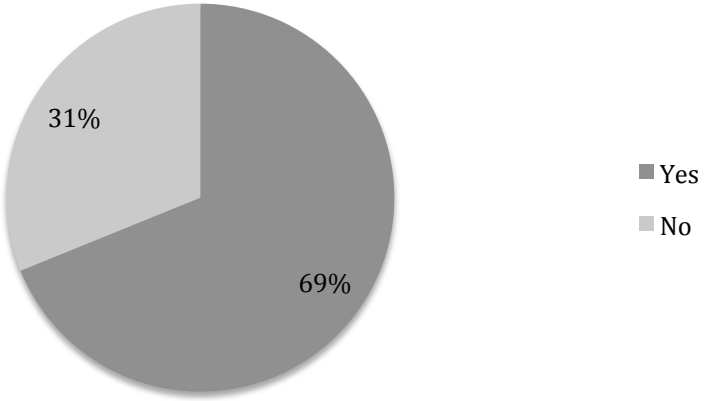

Figure 9: Staff supervision at time of injury.

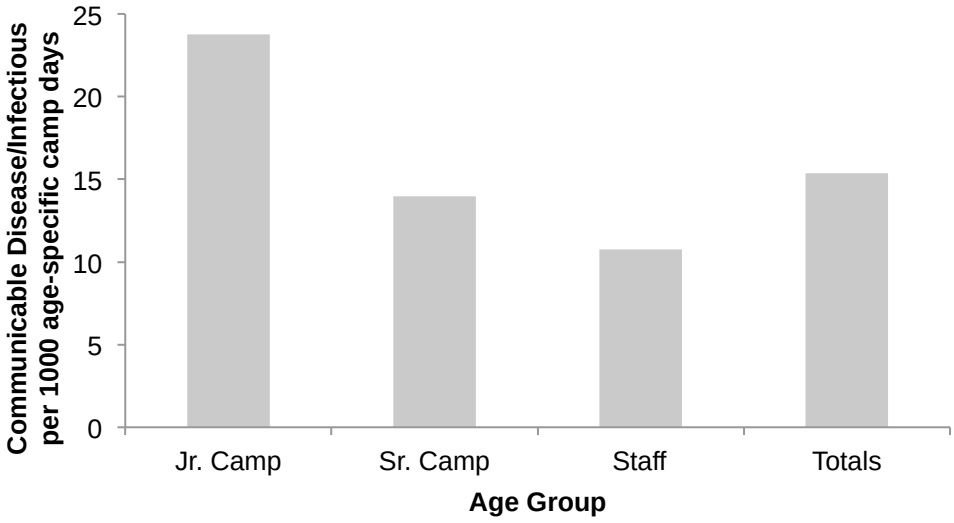

Figure 10. Communicable disease/infectious illness rates per 1000 age-specific camp days by age group

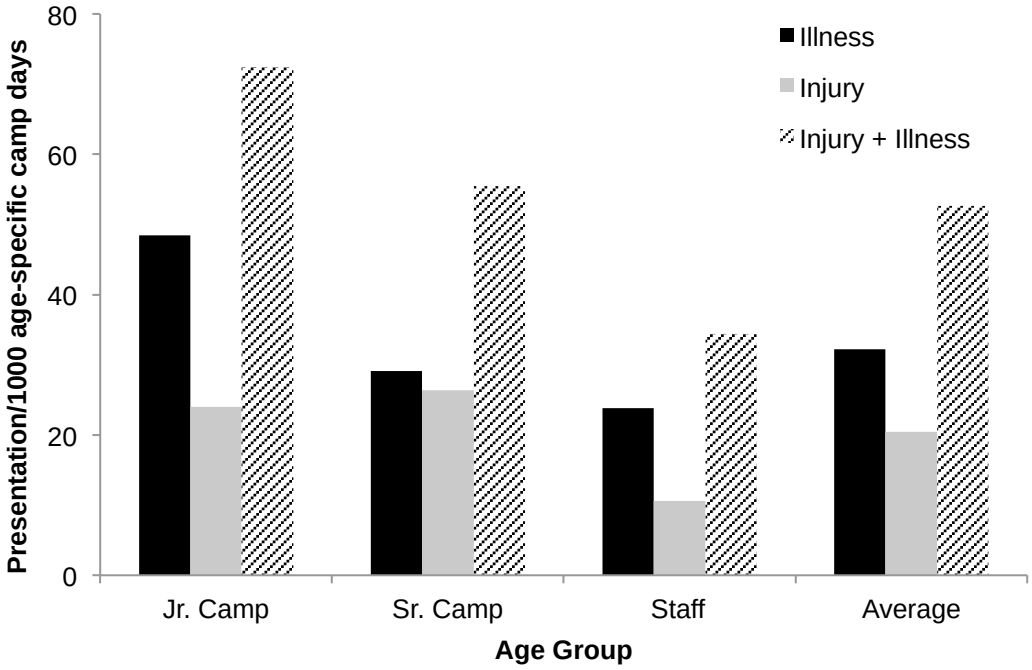

Figure 11. Presentations to the infirmary per 1000 age group specific camp days. Injury, illness and total presentation rates compared to age group. Age specific camp days are proportional to the size of the age-group and their average length of stay at camp. Junior and senior (camp sections) are denoted by Jr. and Sr., respectively.

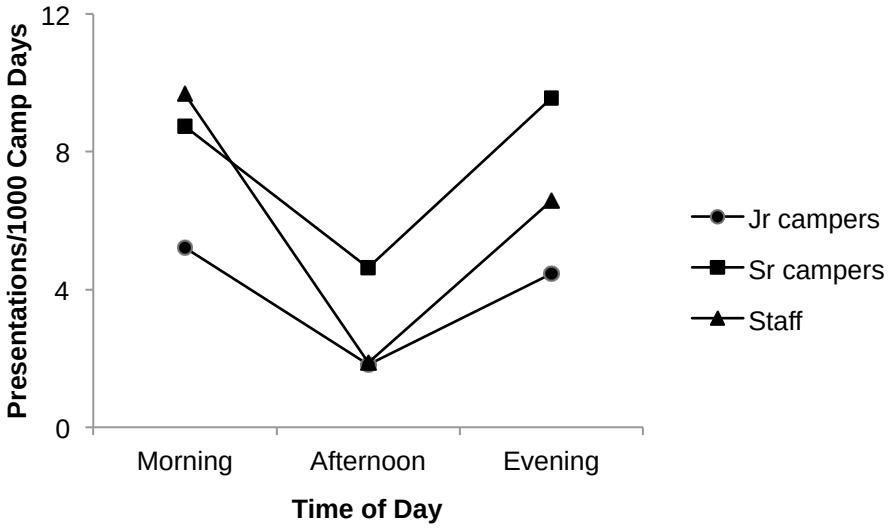

Figure 12. Presentations (including both injury and illness) per 1000 camp days at different times by age group

Appendices

Appendix I: Sample Camp Day Calculations

Sample Camp Day Calculation

Incidence of Illness = (number of illness presentations)*1000 / (number of campers * average number of days campers stayed at camp)

For example: If a camp had 500 campers over the summer, who stayed an average of 20.3 days, and 45 cases of sore throat (ST) were reported over the summer:

Incidence of ST = 45 cases of ST *1000 / (500 campers * 20.3 days/camper)

= 4.43 / 1000 camp days

Sample Age-Specific Camp Day Calculation

Age Specific Incidence of Illness = (number of illness presentations)*1000 / (number of campers * average number of days campers within 1 age group stayed at camp)

For example: A camp had 500 campers, and had 50 staff, 150 senior campers and 300 junior campers over the summer. The junior campers stayed at camp on average for 20 days and the senior campers and staff stayed on average for 30 days. There were 45 cases of sore throat (ST) were reported over the summer (Jr - 15, Sr - 20, Staff - 10):

Age Specific Incidence of ST

Jr campers = 15 cases of ST *1000 / (300 campers * 20 days/camper) = 4.43 / 1000 camp days	*Sr campers* = 20 cases of ST *1000 / (150 campers * 40 days/camper) = 4.43 / 1000 camp days	*Staff* = 10 cases of ST *1000 / (50 campers * 40 days/camper) = 4.43 / 1000 camp days

Appendix II: Modified CHIRPP Form (Summer 2015)

Note: continued on the following page

Modified CHIRPP Injury/Illness Data Collection Form: Filled out by:_____

1. Gender: ☐ Male ☐ Female ☐ Unspecified Age: _____	2. Have they been to infirmary for *any* other reason in the last **7 days**: ☐ Yes ☐ No i.e. meds
3. Infirmary visit #: Please x the number following each visit for the same presentation in an individual Day: 1 2 3 4 5 6 7 8 9 10 11 12 13 14	
4.A. When did the injury/illness occur? Please circle: Su M Tu W Th F Sa ☐☐ ☐☐ ☐☐☐☐ _____ D D M M Y Y Y Y	4.B. Time of day at presentation: am/pm H H M M please circle Time at onset of injury/illness: _____
5. Reason for presentation: ☐ Injury (proceed to 6) ☐ Illness (proceed to Section 2.1)	6. For any injury: A. Where in camp did the injury occur? _____ B. Cause of Injury: _____ C. Safety equipment in use at time of injury? □ Yes (Check all that apply) □ No □ Helmet □ Sports Padding □ Life Jacket □ Other _____ D. Staff Supervision at time of injury? □ Yes □ No

7. Activity at time of injury/illness. (What were they doing when they got injured/ill?)
Please fill out all the apply

A. Activity

☐ Sports →
- ☐ Hockey ☐ Basketball
- ☐ Volleyball ☐ Baseball/Softball
- ☐ Soccer ☐ Tetherball
- ☐ Gaga ☐ Ultimate Frisbee
- ☐ Football ☐ Other: _____

☐ Boating →
- ☐ Waterski/Wakeboard/Kneeboard
- ☐ Tubing ☐ Canoe/ Kayak/ Paddleboat
- ☐ Sailboat ☐ Buddyboard/Windsurfing
- ☐ Other: _____

☐ Arts/Drama →
- ☐ Dance ☐ Arts & Crafts
- ☐ Music ☐ Drama

☐ Nature: Please specify: _____

☐ Swim

B. ☐ Camp Program →
- ☐ Evening Program ☐ Day Program
- Please specify: _____

C. ☐ Horseplay or Incidental
Please specify: _____
_____

D. ☐ Out of camp →
- ☐ Tripping
- ☐ Other: _____

E. ☐ During Meal ☐ After Curfew ☐ Rest Period
Please specify: _____

F. ☐ Other: Please specify: _____
_____

Appendix II: Modified CHIRPP Form (Summer 2015) (continued)

Section 2.

1.1 Nature of Injury

- O Bite (bug/animal)
- O Burn
- O Blister
- O Concussion/Head injury
- O Dental
- O Foreign Body (EXCL splinter/sliver)
- O Splinter/Sliver
- O Fracture/Dislocation
- O Injury to internal organ, vessels, nerves
- O Cuts, abrasions, lacerations
- O Bruising
- O Injury to muscle or tendon INCL Sprain/Strain
- O Other/Not specified

O **More than 1 nature of injury (check all that apply)**

1.2 BODY PARTS

Head and Neck
- O Face
- O Eyes
- O Ears
- O Nose
- O Mouth/Jaw
- O Scalp/Skull
- O Neck
- O Other Head Injury

Trunk
- O Abdomen INCL all abdominal organs
- O Lower back/Spine
- O Groin/Pelvis, INCL pelvis contents, bladder, buttocks, rectum, genitalia, perineum, scrotum
- O Thorax INCL ribs, heart, lungs, arm pits, lower esophagus, lower trachea
- O Upper back/spine EXCL scapula

Upper Limb
- O Shoulder INCL scapula
- O Arm/Forearm
- O Wrist
- O Hand INCL metacarpal, fingers, thumb

Lower Limb
- O Hip
- O Leg INCL femur, tibia, fibula, knee
- O Ankle
- O Foot/Toes

Other
- O Unspecified body part

O **More than 1 body part (check all that apply)**

2. Other Clinical Presentations (Illness)

2.1 Symptoms
- O Dizziness/lightheadedness
- O Fatigue
- O N&V
- O Fever – cause undetermined
- O Muscle/joint aches
- O Shortness of Breath
- O Cough
- O Runny nose
- O Sore throat
- O Rash
- O Diarrhea
- O Constipation
- O Abdominal pain
- O Headache
- O Ear pain
- O Mouth/tooth pain
- O Other: _____

2.2 Diagnosis: (if possible)

Allergic Reaction
- O Allergic skin reaction (e.g. contact dermatitis, drug reactions, plants…)
- O Anaphylaxis
- O Environmental (pollen, hay fever)
- O Food allergy

Communicable Disease/Infectious
- O Conjunctivitis/Eye infections
- O Head lice
- O Ear Infection/Effusion
- O Skin infections (cellulitis, impetigo, fungal,)
- O Urinary tract infection
- O Upper Respiratory Tract Infection (INCL laryngitis, Strep Throat, common cold)

Respiratory
- O Asthma exacerbation

GI
- O Gastroenteritis/Diarrhea

ENT/Dental
- O Orthodontic Problem
- O Epistaxis

Other
- O Heat exhaustion/hyperthermia/Dehydration
- O Other: _____

3. Sent to Hospital? ☐ Yes ☐ No

Comments:

Appendix III: Modified CHIRPP form version 2 (Proposed for 2016)

Note: continued on the following page

Filled out by: _____

Modified CHIRPP Injury/Illness Data Collection Form: **ID Reference #**:_____

Section 1. DEMOGRAPHICS	
1.1 Gender: ☐ Male ☐ Female Age: _____	1.2 Have they been to infirmary for *any* other reason in the last **7 days**: ☐ Yes ☐ No i.e. meds
1.3 Infirmary visit #: Is this a return visit for the same reason for presentation? ☐ Yes ☐ No	
1.4 Reason for presentation: ☐ Injury ☐ Illness	**1.5 Timing: (please circle)** Day of presentation: Su M Tu W Th F Sa Week #: 1 2 3 4 5 6 Time at presentation: Morning Afternoon Evening/Night

Section 2. ILLNESS (for injury see section 3.)

2.1 Symptoms: (✓all that apply)

- O Dizziness/lightheadedness
- O Fatigue
- O N&V
- O Fever – cause undetermined
- O Muscle/joint aches
- O Shortness of Breath
- O Cough
- O Runny nose
- O Sore throat
- O Rash
- O Diarrhea
- O Constipation
- O Abdominal pain
- O Headache
- O Ear pain
- O Mouth/tooth pain
- O Other: _____

Investigations:

Management:

Sent to Hospital? ☐ Yes ☐ No

2.2 Diagnosis: (if possible)

- O Allergic Reaction
  E.g. Allergic skin reaction, Anaphylaxis, Environmental (pollen, hay fever), Food allergy
- O Communicable Disease/Infectious (*specify if possible*)
  - O Conjunctivitis/Eye infections
  - O Head lice
  - O Ear Infection/Effusion
  - O Gastroenteritis
  - O Skin infections (cellulitis, impetigo, fungal,)
  - O Urinary tract infection
  - O Upper Respiratory Tract Infection (INCL laryngitis, Strep Throat, common cold)
- O Respiratory
  E.g. Asthma exacerbation
- O ENT/Dental
  E.g. Orthodontic Problem, Epistaxis
- O Other
  E.g. Hyperthermia/Dehydration

_____

Appendix III Modified CHIRPP form version 2 (Proposed for 2016) (continued)

Section 3. INJURY

3.1 Nature of Injury (✓all that apply)

- O Bite
- O Burn/Blister
- O Concussion/Head injury (SEE BELOW SECTION **3.A**)
- O Foreign Body (EXCL splinter/sliver)
- O Splinter/Sliver
- O Fracture/Dislocation
- O Injury to internal organ, vessels, nerves
- O Cuts, lacerations, bruises
- O Injury to muscle or tendon INCL Sprain/Strain
- O Other/Not specified

3.2 Body Parts (✓all that apply)

- O Head and Neck
- O Trunk
- O Upper Limb
- O Lower Limb
- O Other

3.3 Activity at time of injury

□ Sports

□ Boating

□ Arts/Drama

□ Nature

□ Swim

□ During Meal

□ After Curfew

□ Rest Period

□ Other: Please specify:

_____

3.4 Where in camp did the injury occur?

□ Bonfire Site/Woods
□ Field
□ In/Around Cabin
□ Out of camp
□ Sectional Area
□ Sport Court
□ Waterfront
□ Other: _____
□ Unknown (e.g. bug bite)

3.5 Supervision:

Staff Supervision at time of injury?
□ Yes □ No

Injury due to Horseplay?
□ Yes □ No
Please specify:

_____

Sent to Hospital? □ Yes □ No

Additional Comments:

Diagnosis: _____

Investigations:

Management/Follow up:

3.A. For Any Head Injury:

Mechanism of Injury: _____
Presence of:

- O Decreased level of consciousness (e.g. loss of, failure to obey commands, eyes closed, confused, or abnormal speech)
- O Vomiting ≥ 2 episodes
- O Amnesia (includes blackout)
- O Worsening headache (severity is greater than at time of injury)
- O Scalp injury
- O Signs of basal skull fracture (Battle's Sign, Raccoon Eyes, hemotympanum, CSF otorrhea, or CSF rhinorrhea)
- O History of prior concussion
- O ≥4hours of absence from camp activity

Neurologic Exam: □ Normal □ Abnormal
CT Head performed at hospital? □ Yes (result:_____) □ No