ORIGINAL RESEARCH

Health Supply Utilization at a Boy Scout Summer Camp: An Evaluation for Improvement and Preparedness

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Objective.—To describe the health conditions treated by a health services center at a Boy Scout summer camp and make recommendations for appropriate resources and supplies.

Methods.—We conducted a retrospective review of health center utilization at a Boy Scout camp in central Missouri during the summers of 2012 and 2013. Health logbook data were compiled and analyzed using descriptive and comparative statistics.

Results.—During the study period 19,771 camp participants made 1586 visits to the health care center. The overall incidence rate of health center visits was 6.20 visits per 1000 camp days. Two-thirds of visits were for illness and the remainder for injury. Over 90% of patients were returned to camp, 7.3% were transferred to another health facility, and 1.6% were advised to leave camp and return home. The most common treatments were rehydration (17.8 %) and administration of analgesics (13.4%) and topical creams (12.3%).

Conclusions.—Summer camps need to be prepared for a wide range of conditions and injuries in youth campers, leaders, and staff members. Over 90% of presenting complaints were managed on site, and the majority of conditions were easily treatable minor injuries and illnesses. We provide recommendations for appropriate medical supplies and suggest opportunities for improvement to aid health centers in planning and treatment.

Key words: camping, wounds and injuries/prevention and control, adolescent health services, quality improvement

Introduction

More than 11 million individuals attend one of the approximately 12,000 summer camps in the United States annually.¹ Campers are at potential risk for a wide spectrum of injuries and illnesses depending on the camp environment and scope of activities, nevertheless, information on the health care needs of camp participants is limited. The available literature on health issues in summer camps focuses on health risk factors, trends in healthcare center usage, and basic analyses of illness and

injuries reported by heterogeneous types of camps and outdoor experiences.^{1–11} These studies, and the guidelines published by the American Academy of Pediatrics,^{8,12} commonly exclude adults. Several studies have focused on specialized types of camps or populations of campers (such as persons with disabilities),^{13–15} limiting the generalizability of findings. The literature on wilderness travel is limited in applicability to summer camps, and recommendations are not generally evidence-based.^{6,16–18} This lack of information impedes appropriate planning for efficient treatment and prevention of health issues in participants in summer camps.

This study of youth and adults attending a Boy Scout camp aims to describe the health conditions of patients that presented to the health services center and to make recommendations about appropriate resources to meet those needs. The Boy Scouts of America has 2.3 million members aged 6–17 years, the majority of whom attend a summer camp at least once.¹⁹

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Methods

DESIGN AND POPULATION SOURCE

This study is a retrospective review of logbook data from the health center of a large Boy Scout camp in the central United States (H. Roe Bartle Scout Reservation, Osceola, MO, 2014). The 4200-acre camp resides in a hilly and densely wooded area in central Missouri. Data from the National Oceanic and Atmospheric Administration database shows a typical summer temperature range of 18.9°C to 43.3°C in the area with average daytime high temperatures of 27.4°C. Six camping sessions of 10 days each are conducted from June to August. Approximately 1600 participants attend each session, for an annual census of over 6600 scouts and 3000 leaders. Each session accommodates about 40 Boy Scout troops. Each Boy Scout troop has an average of 25 Boy Scouts and 5 adult leaders who attend camp. Over 400 camp staff members are present for all 6 sessions. Staff members consist of individuals, aged 16 years or older, who are involved with the Boy Scouts of America and wish to work at the camp and guide campers on merit badge courses, supervised activities, and other camping-related events. Leaders are individuals, over the age of 18 years, who come to camp with their troop and manage the troop campsites and their campers. Leaders are typically parents of campers in the troop or other adult volunteers in the troop. All camp participants, including adults, are required to complete a health history form, obtain a physical examination, and receive approval for participation in activities from his or her personal physician before attending camp. Camp participants are overwhelmingly male and come from a wide range of socioeconomic backgrounds in urban, suburban, and rural communities.

The health center provides health care 24 hours/day when the camp is in session. The center has 4 beds and is equipped with basic equipment including a defibrillator, blood pressure cuffs, glucometer, suture kits, bandages/wraps, and a small supply of prescription and non-prescription medications. No laboratory or radiological capabilities are available. As most medications and supplies are donated, availability is highly variable. Health care is provided by 1 or 2 volunteer physicians from a variety of specialties, including but not limited to orthopedic surgery, pediatrics, cardiology, internal medicine, otorhinolaryngology, emergency medicine, and family medicine. Three to 4 full-time volunteer health professionals assist in patient care administrative duties, including recordkeeping. Patients who require a higher level of evaluation or medical care are transported by private vehicle or ambulance to the nearest hospital, 48 km (30 miles) away.

DATA COLLECTION

During the study period all visits to the health center were documented manually in logbooks containing brief descriptions of the injuries or illnesses, examination findings, treatment provided, and disposition. Reasons for individual visits were categorized as illness, injury, prescription medication administration, or patient recheck. Follow-up visits for the same complaint were documented with a new study identification record and were marked as a “patient recheck” instead of an injury or illness. The definition of injury was adopted from that used in military studies as being a traumatic wound or other condition caused by an external force.²⁰ Prescription medication administration was defined as prescription medication brought by the patient from home, such as growth hormone injections or other medications that the health center administered. Any condition that did not meet criteria for injury, medication administration, or recheck was classified as an illness.

The study covered all logbook entries for camp residents and staff. Entries for visitors and those logbook entries that had missing or illegible data were excluded ($n = 27$).

CATEGORICAL MEASUREMENTS

Logbook data for 2 consecutive summer camp years (June–August 2012 and 2013) were retrieved by a medical student and entered into a computerized database. The data were categorized by patient age, chief complaint/findings, treatment provided, and disposition. Each patient was assigned a study identification number. No personal identifying information was recorded to ensure patient confidentiality. The University of Kansas Institutional Review Board approved these methods of collection and analysis.

STATISTICAL ANALYSIS

The incidence of reported events is described as rates per 1000 camper days, similar to other camp studies.^{1,7,18,20} The custom-built database used REDCap database software for secure storage of data. Continuous variables are described using mean and standard deviation, while categorical variables are described using frequency and percentage. The χ^2 test was used for comparisons between categorical variables. Logistic regression models were used to calculate odds ratios. Unless specifically stated for a correction, statistically significant differences and associations were identified by P values $< .05$. All statistical analysis were conducted using SAS v.9.4 (copyright 2002–2012 by SAS Institute Inc, Cary, NC).

Results

During the study period, the 19,771 camp participants made 1586 visits to the health care center. Twenty-seven health center cases were excluded due to missing information. The overall incidence rate of health center visits was 6.20 visits per 1000 camp days (Table 1). The incidence of visits for scouts (7.96) was significantly greater than that for staff (6.33) or leaders (2.83) ($P < .05$). The most frequent patients seen in the health center were the youngest scouts (median age, 13 years). Over 70% of visits were made by individuals younger than 18 years of age, but 144 (9.1%) visits involved patients over 50 years of age (Table 1).

Illness accounted for 67% of the total health care center visits, followed by injuries (18.2%), follow-up/recheck (13.6%), and prescription medication administration (1.2%) (Table 2). Dermatological conditions, including insect bites/stings were the leading single cause of visits (Table 3). Lacerations, abrasions, and orthopedic-musculoskeletal injuries accounted for the majority of injuries seen at the center (Table 4). No fatalities occurred during the study period.

Exploratory logistic regression analysis revealed that laceration was the only injury that had a significant difference in odds ratios between staff and campers and between leaders and campers (Table 5). Derma-

tologic, gastrointestinal, and respiratory illnesses had a significant difference in odds ratios between staff and campers and between leaders and campers. We found that in our sample, as age increased, the odds of experiencing a laceration; a closed-head injury; a head, ears, eyes, nose, and throat illness; or a gastrointestinal illness decreased (Table 6). The odds of presenting with an abrasion, dermatologic illness, musculoskeletal illness, or cardiovascular illness increased with age (Table 6).

Over 90% of patients (1444) were treated in the health center and returned to camp activities. Of the remaining 142 patients, 115 (81%) required transfer to another facility and 27 (19%) were sent home by privately owned vehicle. Illnesses were the most common reason for transfer (Table 7) in both campers and leaders and staff.

One hundred and fifteen patients were transferred to another facility predominantly because the health center lacked certain imaging or laboratory diagnostic equipment. The odds ratio of requiring a transfer was not statistically different when stratified by age or by camper, staff, and leader. Of the 115 transferred patients, 31 (27%) returned to camp, 21 (18%) did not return to camp because the outside care physician did not provide clearance, and 63 (55%)—or more than half of the total transferred patients—had no outcome recorded because

Table 1. Demographics of health center patients (2012 and 2013 camp years)

	<i>All camp participants</i>	<i>Boy Scouts</i>	<i>Staff</i>	<i>Leaders</i>
Total in camp	19,771	12,006	1166	6599
Total health center visits	1586 (8.0%)	956 (8.0%)	443 (38.0%)	187 (2.8%)
Visits per 1000 camper days	6.20	7.96	6.33	2.83
Age of health center visitors (years)				
Range	5–83	5–17	14–83	18–81
Mean (SD)	20.2 (14.6)	13.1 (1.9)	25.0 (16.4)	45.5 (14.6)
<9	7 (0.4%)	7	–	–
10–13	566 (35.7%)	566	–	–
14–17	572 (36.1%)	383	189	–
18–30	177 (11.2%)	–	146	31
31–50	120 (7.6%)	–	29	91
>50	144 (9.1%)	–	79	65
Number of patients requiring transfer				
Age <9 years	–	–	–	–
Age 5–13 years	28	28	–	–
Age 14–17 years	35	28	7	–
Age 18–30 years	12	–	5	7
Age 31–50 years	26	–	11	15
Age >50 years	14	–	4	10
Total	115	56	27	32

SD, standard deviation.

Table 2. Distribution of reasons for visit

<i>Reason for visit</i>	<i>No. of Visits</i>	<i>% of Subset Visits</i>	<i>% of Total Visits</i>
Illness			
<i>Boy Scouts</i>	620	58.3	39.1
<i>Staff</i>	302	28.4	19.0
<i>Adult leaders</i>	141	13.3	8.9
Subtotal	1063	100%	67.0%
Injury			
<i>Boy Scouts</i>	196	67.8	12.4
<i>Staff</i>	67	23.2	4.2
<i>Adult leaders</i>	26	9.0	1.6
Subtotal	289	100%	18.2%
Medicine administration	19	-	1.2
Follow-up	215	-	13.6
Total	1586	-	100%

of lack of follow-up communication with the transfer facility.

Oral rehydration was the most common treatment provided, followed by administration of ibuprofen/non-steroidal anti-inflammatory drugs, topical antibiotic ointment, and oral antibiotics. Cephalosporins, penicillin derivatives, and trimethoprim/sulfamethoxazole were the most common types of oral antibiotics provided. For injuries, the most common treatments utilized sutures, butterfly closures, splints, and crutches. The distribution of recommended supplies is based on the frequency of items used at the health center, grouped by what is required to treat up to 95% of the patient population (Table 8).

Discussion

The observed overall rate of 6.2 health center visits per 1000 camper days falls within the range of 1.15 to 10 per 1000 camper days reported for camps and wilderness activities.¹⁸ The wide range in the literature may be due to differences in study inclusion or exclusion criteria and type of camp activity. This study shows that Boy Scout camp health providers need to be prepared to treat adults, including staff, as well as adolescents and children. Most conditions seen and treated at the camp health center were minor in nature. Illness accounted for the majority of visits. Close living quarters and contact between individuals during activities could foster the spread of infections. The distribution of illnesses and injuries indicates that most patients require outpatient primary care.

Nearly all of the illnesses and injuries could be treated with a limited supply of medications and equipment.

Some transfers may have been prevented if radiograph capabilities were available at the health center; however, this is unlikely to be cost effective. The variability in the skill set of the treating physician could also influence the number of patients transferred. Due to communication limitations, we were unable to determine the outcome for more than half (54.8%) of transferred patients. This failure of information sharing was attributed to misperceptions regarding Health Insurance Portability and Accountability Act regulations or a lack of established protocols for transfers of information to referring providers.

QUALITY IMPROVEMENT

The leading illnesses resulting in transfer were for cardiovascular; head, ears, eyes, nose, and throat; and neurological complaints for leaders and staff, compared with head, ears, eyes, nose, and throat; gastrointestinal; and dermatologic conditions in campers (Table 7).

A few simple strategies could improve communication regarding transferred patients. We recommend that all transfer patients carry a records release form, requesting the treating facility to fax patient outcome results back to the camp health center. This protocol would be more effective if established with surrounding hospitals before the camping season. In the health center, complete and legible records are important to monitor services and support quality improvement initiatives. Logbooks should have the same required fields for each patient, recording the chief complaint, findings, treatment, disposition, and follow-up. Electronic logbooks may successfully minimize the legibility errors and facilitate chart reviews and audits while increasing the accuracy, consistency, and ease of data input.²¹ Staff training could also improve consistency and completeness of the database.

SUPPLY UTILIZATION

A 1997 study⁶ provided evidence-based recommendations for medical supplies for wilderness travel. Although this is useful for first aid kits, residential camps have different medical needs.

Table 8 provides a recommended supply list for camp health centers to provide quick and efficient care for a camp population. The supplies needed to treat up to 75%, 85%, and 95% of the health center population are shown based on our data for treatment supply utilization (Table 8). To treat a larger proportion of patients, a health center should consider having radiograph and basic laboratory facilities on site; unfortunately, such services are unlikely to be cost effective. Camps must also plan for low-frequency, high-consequence emergency events in which timely intervention is critical.

Table 3. Distribution of illnesses

<i>Illness category</i>	<i>Mean age (SD)</i>	<i>No. of visits</i>	<i>% of total visits</i>	<i>Rate per 1000 camper days Age 5–13*</i>	<i>Rate per 1000 camper days Age 14–17*</i>	<i>Rate per 1000 camper days Age 18–30*</i>	<i>Rate per 1000 camper days Age 31–50*</i>	<i>Rate per 1000 camper days Age > 50*</i>
Dermatologic								
<i>Insect bite/sting</i>	13.7 (15.7)	89	25.1	9.8 (6.8, 12.9)	8.8 (5.7, 11.8)	9.5 (3.9, 15.1)	16.2 (6.6, 25.8)	12.8 (5.2, 20.3)
<i>Rash</i>	12.2 (14.5)	56	15.8	4.8 (2.6, 7)	4.9 (2.7, 7.2)	6.0 (1.6, 10.5)	5.9 (0.1, 11.7)	5.8 (0.7, 10.9)
<i>Cellulitis</i>	17.2 (20.4)	49	13.8	1.8 (0.5, 3.1)	2.5 (0.9, 4.1)	1.7 (−0.7, 4.1)	4.4 (−0.6, 9.4)	8.1 (2.1, 14.2)
<i>Blisters</i>	13.4 (19.7)	42	11.9	3.0 (1.3, 4.7)	2.7 (1, 4.4)	4.3 (0.5, 8.1)	5.9 (0.1, 11.7)	11.6 (4.4, 18.8)
<i>Tick removal</i>	10.9 (18.3)	40	11.2	4.8 (2.6, 7)	2.7 (1, 4.4)	0.9 (−0.8, 2.5)	2.9 (−1.1, 7)	3.5 (−0.5, 7.4)
<i>Swelling/Erythema</i>	13.1 (15.2)	32	9.1	3.3 (1.5, 5.1)	5.2 (2.9, 7.6)	2.6 (−0.3, 5.5)	16.2 (6.6, 25.8)	8.1 (2.1, 14.2)
<i>Sunburn</i>	11.3 (9.6)	22	6.3	2.3 (0.8, 3.8)	0.5 (−0.2, 1.3)	1.7 (−0.7, 4.1)	1.5 (−1.4, 4.4)	0 (0, 0)
<i>Abscess</i>	14.2 (19.2)	16	4.5	0.3 (−0.2, 0.7)	0 (0, 0)	0 (0, 0)	0 (0, 0)	1.2 (−1.1, 3.4)
<i>Ingrown toenail</i>	12.6 (5.9)	8	2.3	0.8 (−0.1, 1.6)	3.6 (1.6, 5.5)	2.6 (−0.3, 5.5)	1.5 (−1.4, 4.4)	0 (0, 0)
Subtotal	13.2 (16.7)	354	33.3%	30.8 (25.3, 36.3)	31 (25.3, 36.7)	29.3 (19.4, 39.1)	54.5 (36.9, 72.1)	51.1 (36, 66.2)
HEENT								
<i>Ear infection</i>	13.4 (6.2)	71	25.8	1.5 (0.3, 2.7)	6 (3.5, 8.6)	6 (1.6, 10.5)	1.5 (−1.4, 4.4)	0 (0, 0)
<i>Sore throat</i>	10.6 (12.3)	54	19.6	3.3 (1.5, 5.1)	5.5 (3.1, 7.9)	12 (5.7, 18.4)	2.9 (−1.1, 7)	1.2 (−1.1, 3.4)
<i>Headache</i>	10.1 (10.7)	51	18.5	3.3 (1.5, 5.1)	6.3 (3.7, 8.9)	8.6 (3.3, 13.9)	2.9 (−1.1, 7)	1.2 (−1.1, 3.4)
<i>Fever</i>	10.5 (14.5)	48	17.5	4.5 (2.4, 6.6)	3.6 (1.6, 5.5)	3.4 (0.1, 6.8)	2.9 (−1.1, 7)	0 (0, 0)
<i>Viral syndrome</i>	11.8 (3.7)	39	14.2	1.5 (0.3, 2.7)	2.7 (1, 4.4)	5.2 (1, 9.3)	1.5 (−1.4, 4.4)	0 (0, 0)
<i>Bloody nose</i>	12.9 (1.8)	12	4.4	3.8 (1.9, 5.7)	1.6 (0.3, 3)	0 (0, 0)	0 (0, 0)	0 (0, 0)
Subtotal	11.5 (12.1)	275	25.8%	17.9 (13.8, 22.1)	25.8 (20.6, 31)	35.3 (24.5, 46.1)	11.8 (3.6, 19.9)	2.3 (−0.9, 5.5)
GI								
<i>Abdominal pain</i>	14.2 (10.3)	52	32.5	7.3 (4.7, 10)	6 (3.5, 8.6)	2.6 (−0.3, 5.5)	2.9 (−1.1, 7)	7 (1.4, 12.5)
<i>Nausea</i>	11.3 (6.2)	46	28.8	5.3 (3, 7.6)	6.3 (3.7, 8.9)	2.6 (−0.3, 5.5)	0 (0, 0)	1.2 (−1.1, 3.4)
<i>Vomiting</i>	11.8 (7.0)	31	19.4	4.5 (2.4, 6.6)	4.4 (2.2, 6.5)	2.6 (−0.3, 5.5)	0 (0, 0)	3.5 (−0.5, 7.4)
<i>Diarrhea</i>	12.9 (11.5)	14	8.8	0.3 (−0.2, 0.7)	1.6 (0.3, 3)	0.9 (−0.8, 2.5)	1.5 (−1.4, 4.4)	5.8 (0.7, 10.9)
<i>Constipation</i>	17.2 (1.9)	11	6.8	1.5 (0.3, 2.7)	0.5 (−0.2, 1.3)	0 (0, 0)	0 (0, 0)	1.2 (−1.1, 3.4)
<i>Gastritis</i>	18 (2.6)	6	3.7	0.3 (−0.2, 0.7)	0.3 (−0.3, 0.8)	0.9 (−0.8, 2.5)	1.5 (−1.4, 4.4)	0 (0, 0)
Subtotal	14.2 (9.3)	160	15.1%	19.2 (14.9, 23.5)	19.2 (14.7, 23.7)	9.5 (3.9, 15.1)	5.9 (0.1, 11.7)	18.6 (9.5, 27.7)
General								
<i>Dehydration</i>	15.2 (13.6)	54	60.7	9.6 (6.5, 12.6)	7.4 (4.6, 10.2)	5.2 (1, 9.3)	4.4 (−0.6, 9.4)	3.5 (−0.5, 7.4)
<i>Heat exhaustion</i>	17.6 (11.0)	19	21.3	2.3 (0.8, 3.8)	1.6 (0.3, 3)	1.7 (−0.7, 4.1)	2.9 (−1.1, 7)	1.2 (−1.1, 3.4)
<i>Malaise</i>	14.4 (23.6)	9	10.1	0.3 (−0.2, 0.7)	0.8 (−0.1, 1.8)	1.7 (−0.7, 4.1)	1.5 (−1.4, 4.4)	2.3 (−0.9, 5.5)
<i>Homesick</i>	11.2 (4.2)	7	7.9	1 (0, 2)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
Subtotal	14.6 (13.0)	89	8.4%	13.1 (9.6, 16.7)	9.9 (6.6, 13.1)	8.6 (3.3, 13.9)	8.8 (1.8, 15.9)	7 (1.4, 12.5)
Respiratory								
<i>Cough</i>	14.3 (13.2)	32	40.5	1.3 (0.2, 2.4)	2.2 (0.7, 3.7)	11.2 (5.1, 17.3)	2.9 (−1.1, 7)	1.2 (−1.1, 3.4)

<i>Upper respiratory infection</i>	16.6 (11.9)	25	31.6	1.3 (0.2, 2.4)	1.9 (0.5, 3.3)	8.6 (3.3, 13.9)	2.9 (−1.1, 7)	1.2 (−1.1, 3.4)
<i>Shortness of breath</i>	15.4 (15.6)	22	27.8	0.8 (−0.1, 1.6)	0.5 (−0.2, 1.3)	0 (0, 0)	4.4 (−0.6, 9.4)	0 (0, 0)
Subtotal	15.4 (12.9)	79	7.4%	3.3 (1.5, 5.1)	4.7 (2.4, 6.9)	19.8 (11.7, 27.9)	10.3 (2.7, 17.9)	2.3 (−0.9, 5.5)
Musculoskeletal								
<i>Joint pain (no trauma)</i>	14.6 (16.1)	36	60.0	1.8 (0.5, 3.1)	1.6 (0.3, 3)	0 (0, 0)	1.5 (−1.4, 4.4)	3.5 (−0.5, 7.4)
<i>Back pain</i>	36.4 (18.9)	9	15.0	0.5 (−0.2, 1.2)	0.3 (−0.3, 0.8)	3.4 (0.1, 6.8)	4.4 (−0.6, 9.4)	2.3 (−0.9, 5.5)
<i>Neck pain</i>	34.1 (13.5)	9	15.0	0.3 (−0.2, 0.7)	1.1 (0, 2.2)	0.9 (−0.8, 2.5)	0 (0, 0)	2.3 (−0.9, 5.5)
<i>Muscle pain</i>	19.4 (20.0)	6	10	0.3 (−0.2, 0.7)	0.5 (−0.2, 1.3)	0.9 (−0.8, 2.5)	0 (0, 0)	1.2 (−1.1, 3.4)
Subtotal	26.1 (18.7)	60	5.6%	2.8 (1.1, 4.4)	3.6 (1.6, 5.5)	5.2 (1, 9.3)	5.9 (0.1, 11.7)	9.3 (2.9, 15.7)
Neurologic								
<i>Syncope</i>	29.4 (17.3)	9	30.0	0.3 (−0.2, 0.7)	0.8 (−0.1, 1.8)	0.9 (−0.8, 2.5)	1.5 (−1.4, 4.4)	1.2 (−1.1, 3.4)
<i>Anxiety</i>	18.6 (1.5)	6	20.0	1.3 (0.2, 2.4)	1.4 (0.2, 2.6)	0 (0, 0)	0 (0, 0)	1.2 (−1.1, 3.4)
<i>Dizziness</i>	32.4 (14.9)	6	20.0	0.5 (−0.2, 1.2)	0.5 (−0.2, 1.3)	0 (0, 0)	0 (0, 0)	2.3 (−0.9, 5.5)
<i>Numbness</i>	46.2 (6.1)	5	16.7	0 (0, 0)	0 (0, 0)	0 (0, 0)	1.5 (−1.4, 4.4)	1.2 (−1.1, 3.4)
<i>Seizure</i>	18.4 (4.1)	4	13.3	0.3 (−0.2, 0.7)	0 (0, 0)	1.7 (−0.7, 4.1)	0 (0, 0)	0 (0, 0)
Subtotal	29.0 (17.2)	30	2.8%	2.3 (0.8, 3.8)	2.7 (1, 4.4)	2.6 (−0.3, 5.5)	2.9 (−1.1, 7)	5.8 (0.7, 10.9)
Cardiovascular								
<i>Chest pain</i>	47.4 (1.9)	6	37.5	0.3 (−0.2, 0.7)	0.5 (−0.2, 1.3)	0.9 (−0.8, 2.5)	1.5 (−1.4, 4.4)	2.3 (−0.9, 5.5)
<i>Hypertension</i>	43.2 (16.7)	4	25.0	0 (0, 0)	0.3 (−0.3, 0.8)	0 (0, 0)	0 (0, 0)	1.2 (−1.1, 3.4)
<i>Hyperglycemia</i>	39.4 (24.8)	3	18.8	0.5 (−0.2, 1.2)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
<i>Hypoglycemia</i>	18.4 (1.4)	2	12.5	0.5 (−0.2, 1.2)	0 (0, 0)	0 (0, 0)	0 (0, 0)	2.3 (−0.9, 5.5)
<i>Orthostasis</i>	56 (0)	1	6.3	0 (0, 0)	0.5 (−0.2, 1.3)	0 (0, 0)	2.9 (−1.1, 7)	1.2 (−1.1, 3.4)
Subtotal	40.9 (21.4)	16	1.5%	1.3 (0.2, 2.4)	1.4 (0.2, 2.6)	0.9 (−0.8, 2.5)	4.4 (−0.6, 9.4)	7.0 (1.4, 12.5)
Total		1063	100%	91.1 (81.7, 100.5)	100.4 (90.1, 110.6)	111 (91.9, 130.2)	104.6 (80.2, 128.9)	103.4 (81.9, 124.8)

SD, standard deviation; HEENT, head, ears, eyes, nose and throat; GI, gastrointestinal.

* 95% confidence interval.

Table 4. Distribution of injuries

<i>Injury type</i>	<i>No. of injuries</i>	<i>% all injuries</i>	<i>Rate per 1000 camper days Age 5–13 (*)</i>	<i>Rate per 1000 camper days Age 14–17(*)</i>	<i>Rate per 1000 camper days Age 18–30 (*)</i>	<i>Rate per 1000 camper days Age 31–50 (*)</i>	<i>Rate per 1000 camper days Age >50 (*)</i>
Laceration	108	37.3	15.4 (11.5, 19.3)	8.2 (5.3, 11.2)	1.7 (-0.7, 4.1)	5.9 (0.1, 11.7)	7 (1.4, 12.5)
Abrasion	81	28.0	5.8 (3.4, 8.2)	6.9 (4.2, 9.5)	4.3 (0.5, 8.1)	7.4 (0.9, 13.8)	5.8 (0.7, 10.9)
Orthopedic-	40	13.8	3 (1.3, 4.7)	3.3 (1.4, 5.2)	4.3 (0.5, 8.1)	5.9 (0.1, 11.7)	1.2 (-1.1, 3.4)
Musculoskeletal							
Closed head injury	13	4.5	2 (0.6, 3.4)	1.4 (0.2, 2.6)	0 (0, 0)	0 (0, 0)	2.3 (-0.9, 5.5)
Contusion	12	4.2	1 (0, 2)	1.1 (0, 2.2)	0 (0, 0)	1.5 (-1.4, 4.4)	0 (0, 0)
Strain	9	3.1	1.3 (0.2, 2.4)	3.6 (1.6, 5.5)	5.2 (1, 9.3)	1.5 (-1.4, 4.4)	2.3 (-0.9, 5.5)
Splinter	9	3.1	1.3 (0.2, 2.4)	0.5 (-0.2, 1.3)	0.9 (-0.8, 2.5)	0 (0, 0)	1.2 (-1.1, 3.4)
Puncture wound	7	2.4	0.5 (-0.2, 1.2)	0.8 (-0.1, 1.8)	1.7 (-0.7, 4.1)	0 (0, 0)	1.2 (-1.1, 3.4)
Corneal abrasion	5	1.7	0.5 (-0.2, 1.2)	0.3 (-0.3, 0.8)	0 (0, 0)	0 (0, 0)	0 (0, 0)
Skin tear	4	1.4	2 (0.6, 3.4)	0.8 (-0.1, 1.8)	0.9 (-0.8, 2.5)	0 (0, 0)	0 (0, 0)
Chemical burn	1	0.4	0 (0, 0)	0.3 (-0.3, 0.8)	0 (0, 0)	0 (0, 0)	0 (0, 0)
Total	289	100%	30.8 (25.3, 36.3)	26.3 (21.1, 31.6)	18.1 (10.3, 25.8)	22.1 (10.9, 33.3)	20.9 (11.2, 30.6)

* 95% confidence interval

Although not needed during our study period, camps should consider having access to automated external defibrillators, epinephrine auto injectors, and other rarely used but potentially life-saving supplies.

Limitations

The study limitations include its restriction to 1 camp during 2 consecutive summer sessions, which limits generalizability of our findings. The study also covers only those treated by the health center. Health conditions in campers may have been undercounted; because Boy Scout training emphasizes first aid and self-sufficiency, a significant amount of minor injuries and illnesses could have been self-treated. In addition, camp-related injury or illness may not be apparent until after the camp session ended. Data collection was limited by the logbook format. Information was recorded at the discretion of the individual responsible for center records each day, and multiple providers resulted in inconsistent recordkeeping that may have contributed to errors regarding disposition or follow-up. Some entries (1.7%) were illegible. Entries on transfer to other facilities did not always specify transport type or differentiate the need for transfer, in particular for those patients requiring further diagnostic imaging or laboratory evaluation versus those requiring a higher level of care.

Conclusions

In our retrospective study of health center utilization at a Boy Scout summer camp, illnesses were far more common than injuries, and the majority of conditions were treatable with a limited list of supplies. We provide evidence-based recommendations for appropriate supplies and suggest opportunities for improvement, including supply preparedness, improved emergency medical services relationships, and communications with hospitals regarding transfers. For camps with limited funds, these data-driven recommendations are essential for appropriate planning and efficient treatment.

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Table 5. Odds ratios and 95% confidence intervals for injury and illness

Variable	Staff compared with campers	Leaders compared with campers	P value
	Unadjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	
Injury*	0.88 (0.696–1.119)	0.59 (0.408–0.845)	.02
Laceration [†]	0.58 (0.357–0.930)	0.31 (0.123–0.769)	.01
Abrasion	1.08 (0.630–1.856)	1.44 (0.726–2.866)	.58
Orthopedic–Musculoskeletal	1.61 (0.594–0.4587)	1.15 (0.245–5.345)	.64
Closed head injury	0.17 (0.022–1.305)	0.01 (0.001–999.9)	.23
Contusion	0.77 (0.203–2.909)	0.64 (0.080–5.160)	.87
Strain	0.59 (0.121–2.825)	0.01 (0.001–999.9)	.80
Splinter	0.29 (0.036–2.377)	0.01 (0.001–999.9)	.51
Puncture wound	0.41 (0.048–3.512)	0.01 (0.001–999.9)	.72
Illness*	1.13 (0.894–1.436)	1.703 (1.183–2.452)	.02
Dermatologic [†]	0.84 (0.643–1.099)	2.05 (1.475–2.861)	<.01
HEENT	1.24 (0.949–1.615)	0.79 (0.521–1.202)	.10
GI [†]	0.88 (0.604–1.283)	0.24 (0.096–0.596)	.01
General	0.65 (0.428–0.997)	0.58 (0.302–1.100)	.06
Respiratory [†]	2.01 (1.231–3.275)	1.50 (0.728–3.082)	.02
Musculoskeletal	1.49 (0.829–2.669)	2.29 (1.143–4.593)	.06
Neurologic	0.57 (0.209–1.532)	2.04 (0.840–4.961)	.09
Cardiovascular	2.42 (0.807–7.230)	2.60 (0.644–10.492)	.22

CI, confidence intervals; HEENT, head, ears, eyes, nose, and throat; GI, gastrointestinal.

* Indicates a Bonferroni correction adjustment requiring $P < .0125$ for significance.

[†] Indicates a significant value, $P < .05$ for exploratory analyses.

Table 6. Odds ratio of injury and illness with age as a continuous variable

Variable	Unadjusted OR (95% CI)	P value
Injury*	0.99 (0.985–1.000)	.060
Laceration [†]	0.98 (0.958–0.996)	.016
Abrasion [†]	1.01 (1.000–1.029)	.046
Orthopedic–Musculoskeletal	0.99 (0.973–1.021)	.791
Closed head injury [†]	0.82 (0.672–0.999)	.049
Contusion	1.02 (0.995–1.053)	.110
Strain	0.93 (0.798–1.085)	.359
Splinter	0.83 (0.636–1.083)	.170
Puncture wound	0.90 (0.703–1.155)	.410
Illness*	1.01 (1.000–1.015)	.060
Dermatologic [†]	1.02 (1.008–1.023)	<.0001
HEENT [†]	0.99 (0.981–0.999)	.037
GI [†]	0.97 (0.949–0.987)	.001
General	0.99 (0.972–1.001)	.077
Respiratory	1.01 (0.990–1.019)	.555
Musculoskeletal [†]	1.02 (1.005–1.034)	.009
Neurologic	1.01 (0.986–1.032)	.442
Cardiovascular [†]	1.03 (1.003–1.054)	.026

OR, odds ratio; CI, confidence intervals; HEENT, head, ears, eyes, nose, and throat; GI, gastrointestinal.

* Indicates a Bonferroni correction adjustment requiring $P < .0125$ for significance.

[†] Indicates a significant value, $P < .05$ for exploratory analyses.

Table 7. Distribution of reasons for transfer to another facility

<i>Reason for transfer</i>	<i>No. of patients</i>	<i>% of patients</i>	<i>Reason for transfer</i>	<i>No. of patients</i>	<i>% of patients</i>
Camper			Leaders and Staff		
Illness	32	57.1	Illness	37	62.7
HEENT	10	31.3	Cardiovascular	10	27.0
GI	9	28.1	HEENT	8	21.6
Dermatologic	4	12.5	Neurological	7	18.9
Respiratory	3	9.4	Musculoskeletal (nontrauma)	4	10.8
Musculoskeletal (nontrauma)	3	9.4	General	3	8.1
General	2	6.3	Respiratory	3	8.1
Cardiovascular	1	3.1	GI	2	5.4
Injury	24	42.9	Injury	22	37.3
Orthopedic-Musculoskeletal	15	62.5	Orthopedic-Musculoskeletal	16	72.7
Closed head	9	37.5	Closed head	6	27.3
Subtotal	56	48.7	Subtotal	59	51.3

HEENT, head, ears, eyes, nose, and throat; GI, gastrointestinal.

Table 8. Distribution of recommended supplies

<i>Supplies needed to treat 75% of the patients that presented to the health center (%[*])</i>		<i>Additional supplies needed to treat 85% of patients that presented to the health center (%[*])</i>		<i>Additional supplies needed to treat 95% of patients that presented to the health center (%[*])</i>	
Oral rehydration fluids	17.8	Cortisporin otic solution	16.8	Antidiarrhea	6.4
Ibuprofen/NSAID	13.4	Aluminum acetate soak	14.2	Moleskin	6.3
Antibacterial cream	12.3	Nonsedating antihistamine	13.3	Pramoxine topical	6.3
Antibiotics	10.7	Oral steroids	13.2	Saline irrigation solution	5.6
Antiemetic	10.5	Butterfly bandages	12.5	Stool softeners	5.6
Normal bandages	8.1	Elastic/Compression bandages	12.2	Emollients topical	5.2
Acetaminophen	7.2	Albuterol	9.7	Antifungal cream	5.2
Antihistamine	6.8	Splints	9.4	Silver sulfadiazine	4.8
Cough/Cold	5.5			Menthol/Zinc oxide	4.6
Sutures	4.7			Barrier cream	4.6
Topical steroids	3.7			Iodoform gauze	4.4
				Betadine	4.1
				Rubbing alcohol	4.1
				Ocular antihistamine	4.1
				Calamine lotion	3.7
				Crutches	3.7
				Antacid	3.4
				Lidocaine gel	3.3
				Ocular anesthetics	3.3
				Nasal spray	3.1
				Aloe vera	3.0
				Benzocaine topical	2.9
				Compression stockings	2.4
				Ocular antibiotics	1.2
Total 100		Total	100	Total	100

NSAID, nonsteroidal anti-inflammatory drugs.

% represents the frequency of items used.

Important items that are rarely needed: automated external defibrillator, oxygen, epinephrine auto-injectors.

* Percent needed from this column.

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