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Work-Related Illness and Injury Claims Among Nationally Certified Athletic Trainers Reported to Washington and California From 2001 to 2011

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Abstract

Background—Little is known about the work-related injury and illnesses experienced by certified athletic trainers (AT).

Methods—The incidence and characteristics of injury/illness claims filed in two workers' compensation systems were described from 2001 to 2011. Yearly populations at risk were

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ETHICS APPROVAL AND INFORMED CONSENT

All study procedures were approved by the Institutional Review Boards of Duke University, Washington State Department of Social and Health Services, and the California Health and Human Services Agency. Records were de-identified so informed consent was not required

DISCLOSURE (AUTHORS)

The authors report no conflicts of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

Steven Markowitz declares that he has no competing or conflicts of interest in the review and publication decision regarding this article.

DISCLAIMER

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention (CDC). Conclusions drawn from or recommendations based on the data provided by the Board of Certification, Inc. (BOC) are those of the author(s) based on analyses/evaluations of the author(s) and do not represent the views of the officers, staff or certificants of the BOC.

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estimated from National Athletic Trainers' Association membership statistics. Incidence rate ratios (IRR) were reported by job setting.

Results—Claims were predominantly for traumatic injuries and disorders (82.7%: 45.7% sprains/strains, 12.0% open wounds, 6.5% bruises) and at these body sites (back 17.2%, fingers 12.3%, and knee 9.6%) and over half were caused by body motion and overexertion (51.5%). Compared with school settings, clinic/hospital settings had modestly higher claim rates (IRR = 1.29, 95% CI: 1.06–1.52) while other settings (e.g., professional or youth sport, nursing home) had lower claim rates (IRR = 0.63, 95% CI: 0.44–0.70).

Conclusions—These first known estimates of work-related injuries/illnesses among a growing healthcare profession help identify occupational tasks and settings imposing injury risk for ATs.

Keywords

workers' compensation claims; injury; athletic trainer; reporting; musculoskeletal injury

INTRODUCTION

Workers within the healthcare sector such as nurses, emergency medical service workers, and physical therapists suffer from high rates of musculoskeletal injuries [Studnek et al., 2007; Pompeii et al., 2008; Darraugh et al., 2009; Gomaa et al., 2015], stress and fatigue [Revicki and Gershon, 1996; Boudreaux et al., 1997], and exposure to blood and body fluids [Dement et al., 2004; Chen and Jenkins, 2007; Haagsma et al., 2012]. Little is known regarding the work exposures and health outcomes among certified athletic trainers (AT) who provide for the health, wellbeing, treatment, and rehabilitation of patients in a variety of employment settings, including colleges and universities, secondary schools, professional athletic organizations, hospitals, medical and physical therapy clinics, and work-site health clinics. ATs are a specialized group of healthcare providers who perform similar clinical tasks as physical therapists and nurses and have similar physical exposures during emergency management and treatment as emergency medical technicians. Though overlap exists in some work tasks with these professions, no one job category encompasses the work exposures for ATs.

Athletic trainers earn a bachelor's or master's degree from one of 366 accredited programs in athletic training (as of 2008–2009 http://caate.net), which require appropriate coursework and supervised practical experience before taking a certification examination administered through the Board of Certification (BOC), Inc. Forty-nine of 50 U.S. states regulate the profession by means of licensure or registration. Though a bachelor's degree is the minimal degree requirement, many ATs have masters and doctorate degrees or dual certifications in another health related profession (e.g., physical therapy assistant, physical therapist, physician assistant, and emergency medical technician). Results of the 2003 Role Delineation Study for the athletic training profession conducted by the Board of Certification, Inc. indicated athletic trainers maintained additional credentials in other health care professions: 11.6% physical therapist, 5.2% emergency medical technician, 2.1% physician assistant or nurse practitioner, and 10.8% other [Board of Certification, 2004]. Traditionally, work settings for this profession have included post-secondary and secondary

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schools, and professional and amateur sports. However, the past 20 years have brought about a shift in the workforce; ATs can now be found in hospitals, medical and therapy clinics, fitness and sports centers, government and military training centers, and industry work-site clinics.

The Bureau of Labor Statistics estimated 25,400 ATs were employed in 13 different industries in 2014 [Bureau of Labor Statistics, 2016], a likely underestimate given that there are over 40,000 nationally certified athletic trainers [National Athletic Trainers' Association, 2014]. In 2014–2015, 3,039 newly certified ATs entered the job market, an increase of 581 compared to 2008–2009 [Board of Certification Inc., 2015]. From 2014 to 2024, a 21% increase in employment numbers is expected, representing a much faster than average growth compared to other occupations [Bureau of Labor Statistics, 2016]. Employment increases will be concentrated in school settings, youth leagues, and fitness and recreation sports centers [Bureau of Labor Statistics, 2016]. This variety of industries contributes to a unique combination of occupational exposures that are not captured by other professions in the healthcare sector. Many high schools and small colleges and universities contract out athletic health care and sport coverage to hospitals and medical and physical therapy clinics. For example, one clinic may employ several ATs to work in the clinic in addition to traveling out to the school locations to prepare athletes for and provide medical coverage for practices and games. As a result, ATs may be identified as working in medical setting rather than a school setting, yet their work tasks encompass those found in both settings.

The bulk of previous research on the occupational health of ATs has been limited to predictors of stress, burnout, and physical activity level [Campbell et al., 1985; Capel, 1990; Hendrix et al., 2000; Groth et al., 2008]. Studies have often been small-scale, cross sectional surveys limited to particular regions of the country, occupational settings (universities or high schools) or collegiate Divisions. Information regarding work-related injury and illness available through the Bureau of Labor Statistics uses sector-based approaches and relies on employer reporting of these events. As an occupation, ATs cross multiple National Occupational Research Agenda industry sectors including both the Healthcare & Social Assistance and the Services sectors and are not universally classified under one occupational code (e.g., athletic trainer code 299091) presenting a unique challenge for national statistics. Consequently, the Bureau of Labor Statistics estimates may not be representative of the injury experiences of the AT profession.

Two cross-sectional surveys of self-reported injury and musculoskeletal symptoms found common work-related injuries included overuse injuries (68%) and back (42%) and finger injuries (38%) in Taiwan [Ju et al., 2011], and in the US, a prevalence of work-related musculoskeletal symptoms of 50% or higher for the low back, neck and shoulder, and missed work due to low back symptoms of 20% [Hammerschmidt, 2008]. No research to date has examined injuries or illnesses reported to state-based or insurance-based workers compensation among this population. Given the forecasted growth of the athletic training profession, improving the understanding of work-related injuries and illnesses among athletic trainers will be important for maintaining a healthy occupational work force.

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The purpose of this study was to determine the incidence and describe the characteristics of work-related injuries and illnesses reported to two states' workers compensation programs over an 11-year period from 2001 to 2011 among a defined cohort of certified athletic trainers.

METHODS

Data Sources

We obtained and combined workers' compensation data from two different states' (California and Washington) workers' compensation programs that each collect and code elements from the first reports of injury/illness that are typical of workers' compensation data. The state sponsored Washington State Department of Labor and Industries provided workers' compensation claims data available from 1989 to 2011 that captures all injuries and illnesses reported to workers' compensation. In contrast, California is not a state sponsored program, but claims administrators (insurers, self-insured employers, and third party administrators) report claims information from work-related injuries and illnesses to the state workers' compensation division via standardized electronic reporting system. California's Workers' Compensation Information System (WCIS) is administered by Division of Workers' Compensation Statistical Unit and has been operational since 2000 [Dasinger et al., 2006]. Eight variables available for both states included: date of injury or illness, industry code (Standard Industrial Classification (SIC), North American Industry Classification System (NAICS), or insurance risk class or manual class code), occupation or job description, codes for the body part, nature, mechanism, and source of the injury or illness (Bureau of Labor Statistics Occupational Injury and Illness Classification System (OIICS) codes for Washington and internal California codes), and a text description of the event. The number of days of lost or restricted work time and medical costs were provided by Washington State only.

We used the Board of Certification (BOC), Inc. database of all current and past certified athletic trainers to identify the athletic trainers. All athletic trainers regardless of their certification status were eligible for linkage with workers' compensation claims.

Data Linkage

We extracted data from all three sources (BOC, Washington Labor & Industries, and California Division of Workers' Compensation) in July 2011 and again in March 2013. The BOC assigned each AT a unique identifier and provided a list of all ATs who were ever certified to both state agencies (n = 50,197 in 2011 and 56,374 in 2013) with four variables for linkage with workers compensation claims: first and last name, date of birth, gender, and the last four digits of the social security number. The state agencies used these four identifiers and previous algorithms used by the state agencies (e.g., a match on two of three variables: last four digits of social security number, name, date of birth) to match records in their files of compensation claims. State agencies then provided these claims to researchers for analyses stripped of all identifiers except the unique identifier assigned by the BOC. We then linked (i) the AT data file from the BOC containing the unique identifier and non-identifiable variables such as gender, birth month and year, certification month and year, and

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(ii) data files from state workers' compensation containing the unique identifier and the variables in workers' compensation data described above. Claims with impossible dates were excluded (e.g., injury date predates date of birth). Claims that occurred within the year of certification were included.

Claim Review Process

The claims provided by each state represent any claim ever filed by the individual on the BOC certification list, including claims from other employment outside athletic training and claims prior to certification. Therefore we reviewed each workers compensation claim to exclude claims from other employment and to also determine if the work tasks associated with the claim were under the domain of athletic training. Two certified ATs (KK and KR) independently reviewed each claim using the following two criteria: was the claim from an athletic training occupation, and was the claim event due to athletic training related tasks and/or activities. The two ATs met to discuss the claim coding and arrive at a consensus. When there was disagreement, a third certified AT (JH) made the final decision. We also excluded denied claims or claims that appeared to be duplicates. The percentage of agreement—or the percent of claims where both coders (KK and KR) agreed—were calculated after the initial independent review and again after the consensus review.

Job setting and occupation code—We used industry codes and occupation descriptions as well as information in the claim description fields to determine the job setting and occupation for each claimant; where an AT had more than one claim, we also used previous/subsequent claims. We coded claims where the occupation was clearly not an athletic training occupation (carpenter, wait staff, etc.) as "no." We coded one of 12 job settings (college/university, secondary school, clinic/hospital, health/fitness industry, professional sports/performing arts, industrial/corporate, military/government/law enforcement, sales/marketing, youth sports, other school setting, other setting, unknown or missing) and one of 15 occupations (AT, physical therapist, physical therapy assistant or aide, occupational therapist, physician assistant, emergency medical technician or paramedic, nurse, physician, orthopedic technician, teacher, coach, professor, AT student, other, unknown or missing) for each claim.

Claim resulted from an athletic training-related task or activity—We used information from the occupation and injury descriptions to determine if the task associated with the claim was typically performed by an athletic trainer (or a task that lies within the domains of athletic training) [Board of Certification, 2004]. Typical athletic training tasks would include injury evaluation and management, athletic event coverage, applying injury preventative measures such as taping and bracing, prevention and rehabilitation exercises, etc. Less typical tasks would include moving wheel chair bound patients and other tasks typically performed under an additional credential or certification (e.g., nurse, emergency medical technician) such as driving an ambulance, drawing blood, etc. Overuse, chronic, musculoskeletal conditions without clear injury mechanisms (e.g., "carpal tunnel") or non-specific injury mechanisms (e.g., "strained back lifting box") were included and coded according to the AT-occupation code. The work task and specific activity performed were further coded using a classification strategy developed by the lead author based on the Role

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Delineation Study conducted by the athletic trainer Board of Certification, Inc. [Board of Certification, 2004] and an occupational exposure assessment methodology used in other occupations (Posture, Activity, Tools, and Handling [Buchholz et al., 1996; Kucera et al., 2008]).

Work- Related Injury and Illness Definition

We classified each separate workers' compensation claim as an incident case according to the following criteria: (i) AT included in the Board of Certification list of certified athletic trainers; (ii) AT filed a non-rejected workers' compensation claim in either California or Washington for an injury or illness that occurred from 2001 to 2011; and (iii) claim occupation was "athletic trainer" or the claim described the activity associated with the injury or illness as one that is specific to athletic trainer work. Body part, nature (type), and mechanism of injury or illness were grouped using pre-defined categories based upon Occupational Injury and Illness Classification System (OIICS) version 1.01 codes [Bureau of Labor Statistics, 2007]. Medical only WA workers compensation claims from self-insured employers are not assigned OIICS codes, nor do self-insured employers provide medical cost data to the Department of Labor & Industries. California uses comparable codes for body part, nature (type), and cause developed by the Workers' Compensation Insurance Organization for the International Association of Industrial Accident Boards and Commissions [Workers' Compensation Insurance Organization, 2012]. It is a comprehensive list encompassing all numeric codes in use in any state. A crosswalk between these codes and OIICS codes was established by the lead author and used to code California claims.

Injury and illness claims reported to workers' compensation with wage replacement (which occurs following a three calendar day waiting period in Washington) or other disability benefits, or medical costs were analyzed. Severity analyses of claims with paid lost work days or medical costs were restricted to Washington because California does not require reporting of these details.

Data Analysis

We conducted descriptive analyses overall and stratified by state and year of the injury or illness, and included overall frequencies by demographic and employment characteristics including gender, age group, years since BOC certification, job setting, and occupation. Job settings were grouped as follows: school, clinic and hospital, or other. Workers' compensation claim characteristics were grouped and summarized by OIICS body part, nature (type), mechanism, and source of the claim (e.g., heat, sharp object) for both states and for Washington State—medical care and paid lost work days. Unadjusted rates, rate ratios and 95% confidence intervals of workers' compensation claims per 100 certified ATs were calculated overall and by year, state, gender, and job setting based on an assumed Poisson distribution of the event counts [Frome, 1983; Frome and Checkoway, 1985].

We did not have access to detailed work hours from employers, therefore the population at risk for calculating claim rates and rate ratios was estimated using yearly statistics on the number of certified ATs reported by the National Athletic Trainers' Association [National Athletic Trainers' Association, 2012]. The number of certified ATs who were NATA

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members (classified as “actively certified”) plus the non-NATA member certified ATs (not all certified ATs are members of the NATA) was summed for each year in Washington and California. These numbers represent the yearly number of certified ATs in each state only and do not represent those who are actively employed. To estimate the number of ATs stratified by gender and job setting in Washington and California, the national yearly stratum specific proportions were multiplied by the yearly totals from Washington and California. For example, in 2004 there were 53% males and 47% females nationally (total 24,899). There were 2,163 certified ATs in both states combined corresponding to 1,147 males (2,163 × 0.53) and 1,017 females (2,163 × 0.47).

All study procedures were approved by the Institutional Review Boards of Duke University, Washington State Department of Social and Health Services, and the California Health and Human Services Agency. Records were deidentified so informed consent was not required.

RESULTS

Data Linkage

Figure 1 describes the claim linkage, matching, review, and coding results for both states combined. A total of 1458 claims were linked to the BOC records (422 Washington claims from 1972 to 2011 and 1036 California claims from 2001 to 2012). After linkage, 570 claims were administratively excluded due to: low probability of a match (n = 196), the claimants’ occupation was clearly not athletic training (n = 131), and claim was outside the study period of 2001 through 2011 (n = 243) leaving 888 linked claims for detailed review.

Data Review and Coding

Initial independent review of claims by the two reviewers (KK and KR) indicated the highest agreement for job setting (83.0%) and lowest agreement for AT-related tasks (63.9%); after consensus discussions the percentage agreement between the two reviewers improved to over 90% for all variables. The third reviewer reviewed 37 claims where the first two reviewers did not reach consensus on AT occupation, job setting, or AT-related activity and assigned codes for the final analysis.

Of the 888 claims reviewed, we excluded 271 because they were not matches (n = 27), rejected (n = 14), duplicates (n = 58), not AT occupations (n = 139), or inadequate had missing or information to determine AT occupation (n = 33), leaving 617 claims (69.5%) that were associated with the athletic training occupation (Fig. 1).

Claimant Characteristics

The majority of the 617 claimants were female (57.1%), age 30–49 (63.1%), and had 10 or more years since certification (55.0%) (Table I). Schools (38.4%) and clinic and hospital (37.6%) were the most frequent work settings followed by other (16.2%) and unknown or missing settings (7.8%). Within the school settings, secondary school was more frequent than college or university (21.7% vs. 14.9%). Other settings included professional sports and performing arts, youth sports, nursing home, health and fitness industry, industrial/corporate, military/government/law enforcement, or sales/marketing [cell sizes for these groups were

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<15 so numbers are not reported]. Claimants' occupational group were most often described as a athletic trainer (38.4%) followed by 12 other occupations including physical therapist (16.2%), teacher, coach or professor (15.9%), physical therapy assistant or aide (7.8%), other health care provider (10.7% includes nurse, physician assistant, emergency medical technician/paramedic, Ortho tech, physician), or other occupation (8.7%).

Claim Characteristics

The most frequent body part affected included the upper extremity (25.8%) followed by the trunk (21.9%) and lower extremity (18.6%) (Table II). Back (17.2%), fingers (12.3%), and knee (9.6%) were the most frequent specific body sites affected. The nature of the claims were predominantly traumatic injuries and disorders (82.7%) which included injuries to muscles, tendons, ligaments, and joints (45.7%), open wounds (12.0%), bruises (6.5%), and injuries to bones, nerves, and spinal cord (4.4%). Accident type was most frequently caused by body motion (or reaction) and overexertion (51.5%) or contact with objects and equipment including other persons (24.0%). The source of the claim was most often persons, plants, animals, or minerals (38.4%) or tools, instruments, or equipment (19.0%).

Among accident types, for the 318 body motion and overexertion claims 40.3% were due to body motions (or reaction) of the injured worker themselves, 16.4% were overexertion from handling other persons (patients, athletes), and 9.8% were overexertion from handling athletic equipment (ice chests, coolers). For contact with objects and equipment including other persons claims (n = 148), 18.9% were contact with athletic equipment (balls, bats), 22.3% medical and surgical instruments (needles, scalpels), and 12.8% were contact with other persons (players, patients). Overall, a total of 49 claims (7.9%) were contact with medical instruments or blood and body fluids.

Athletic trainer (n = 237) versus other (n = 380) job titles—Claimants with "athletic trainer" job titles (as coded by the authors) were on average younger, with fewer years since certification, and in school settings compared with claimants with other job titles who were older, with more years since certification, and working in clinic/hospital settings (Table I). Body parts injured among "athletic trainer" job title claimants were more likely to be head (9.7% vs. 5.1%) or shoulder (8.4% vs. 4.0%) and less likely to be multiple body parts involved (5.9% vs. 10.8%) compared to other job title claimants. Accident types among "athletic trainer" job title claimants were more often body motion and overexertion injuries (57.4% vs. 49.5%) whereas other job title claimants reported more injuries due to harmful exposures and falls [small cell sizes; numbers not reported]. The source of injury or illness also differed by job title: "athletic trainer" claimants had more container and tools, instruments, and equipment-related events (22.8% vs. 16.7%) while "other" job title claimants had more structure and surface and vehicle-related events [small cell sizes; numbers not reported].

Claim Rates

From 2001 through 2011 the overall unadjusted average annual claim rate was 2.3 (95% CI: 2.1–2.4) per 100 athletic trainers, and by year ranged from a high of 3.4 per 100 in 2003 to a low of 1.4 per 100 in 2010 (Table III). Overall and by state the annual number of claims did

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not change substantially while the claim rate tended to decline over the 11-year period. The overall claim rate during this period was significantly higher in California compared to Washington (RR = 1.24, 95% CI: 1.01–1.52) (Table IV). Females experienced significantly higher claim rates compared with males (RR = 1.70, 95% CI: 1.44–2.01). Compared with school settings, clinic and hospital settings had a significantly higher reported claim rate (RR = 1.29, 95% CI: 1.06–1.52) while other practice settings (e.g., professional or youth sport, nursing home) had a significantly lower claim rate (RR = 0.63, 95% CI: 0.44–0.70).

Paid lost day and medical cost claims from Washington State—There were a total of just 10 paid lost day claims occurring during 2001–2011 for a corresponding paid lost day claim rate of 16.9 per 10,000 workers (95% CI: 6.4, 27.3) (10 paid lost day claims divided by 5924 ATs) over the 11 years. There were a total of 68 medical cost claims during 2001–2011 for a claim rate of 114.79 per 10,000 workers (95% CI: 87.5–142.1) over the 11 years.

Work Tasks and Activities Associated With the Claim

The majority of the 617 claims (77.6%) were associated with tasks under the domain of athletic training such as patient care and event coverage (Fig. 1). The remaining claims were not AT-related (5.8%, n = 36), were missing information (8.3%, n = 51), or tasks were unclear from the information provided (8.3%, n = 51). Claims were most frequently due to patient care-related tasks including rehabilitation, treatment, evaluation, and patient handling activities (Table V). The tasks and activities performed at the time of the claim differed by work setting. Claims due to patient care-related tasks were more frequent in clinic and hospital or other settings (39.1%) compared with school and athletic settings (11.8%). Claims due to event, set up and clean up tasks (e.g., preparation for event or game coverage, cleaning) were more frequent in school and athletic settings (26.3%) compared to clinic and hospital or other settings (8.1%).

DISCUSSION

Athletic trainers who filed 617 workers compensation claims in Washington and California during this 11-year period worked in a variety of employment settings and in over 13 occupations. The large majority of the claims were traumatic injuries and disorders—most often sprains and strains from body motion (or reaction) or overexertion; injuries to the back, fingers, and knees were most frequent. Higher reported claim rates were observed for California ATs compared with Washington ATs, females compared to males, and in clinic and hospital settings compared to school settings. Work tasks associated with the claim differed by employment setting, with patient care-related tasks more frequent in clinic and hospital or other settings compared with school and athletic settings; event and prep-related tasks were more frequent in school and athletic settings compared to clinic and hospital or other settings. These results are important for identifying modifiable risk factors for work-related injuries among a fast growing occupational group.

The Bureau of Labor Statistics reported 13 different industries employed athletic trainers in 2014 [Bureau of Labor Statistics, 2016]. We observed in this study about half the claimants worked in settings more traditional to athletic trainers such as schools and sports teams. The

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other half worked in other settings such as sports or physical therapy clinics, medical offices, and hospitals. Overall only 38.4% of all claims were identified by occupational title as athletic trainer in the claim dataset. The remaining claims were identified as other credentialed rehabilitative occupations, other health care-related occupations, teachers, and others. Collectively, these results indicate that the work and workers' compensation claims of athletic trainers span across several occupations, industries and settings. Future AT studies using workers' compensation claims will need to incorporate additional methods to identify these workers (e.g., text analysis).

Claims due to patient care-related tasks occurred in all settings, but were more frequent in the clinic and hospital settings—specifically patient handling activities. This finding is not surprising given nurses, emergency medical technicians, and physical therapists also report high rates of patient-handling injuries [Pompeii et al., 2008; Schoenfisch et al., 2013]. Among hospital workers, approximately one-third of musculoskeletal injuries reported to workers' compensation were due to patient handling activities [Pompeii et al., 2009]. Injury rates were highest for nurse's aides (8.8/100 workers) and emergency medical technicians (10.3/100 workers)—occupations associated with more frequent patient transfers. Physical therapists who transferred patients were at 2.6 times increased risk of low back musculoskeletal disorders compared to those who did not [Campo et al., 2008]. Education for athletic trainers should include training in safe patient handling with an emphasis on patient lifting devices and their use [Nelson et al., 2007a,b].

For ATs, the job setting and task provides an important avenue for exposure and risk assessment and potential intervention. For example, exertional musculoskeletal injuries during event set-up, coverage, and clean up tasks were more frequent in school and athletic settings where handling and moving coolers of ice and water are more common tasks. In high school settings an athletic trainer may be more likely to work alone and getting assistance with strenuous tasks is more challenging if available at all. Consequently, prevention measures for these events rely on the practice setting which drives the economics of hiring additional staff and the availability of assistance from additional staff to reduce an individual's exposures. Contact with objects, equipment or persons in the school and athletic settings were often sideline injuries due to being struck by a player or ball. This can be particularly challenging given the lack of space in some sports venues and the nature of the work where ATs assist both injured and non-injured athletes while games and practices are underway. Measures to protect against these events include recognition of this hazard and performing sideline evaluations well away from fields and courts of play whenever possible.

Motorized vehicle-related claims, though less frequent compared to other types of AT claims, have the potential to be more severe in terms of cost and days lost from work. Claims due to motorized vehicle crashes from traveling to and from work sites were reported in school and athletic and clinic and hospital settings. Athletic trainers travel with sports teams to away competitions. In addition, athletic trainers are increasingly found in outreach work arrangements where schools contract athletic training services from a hospital or clinic. These hospital/clinic employed ATs use their own motor vehicles to transport themselves and their medical equipment, ice, and water to the schools and athletic facilities where they provide medical coverage. Motorized vehicle crashes that occurred in school and

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athletic settings also included motorized carts. Athletic trainers use motorized carts to get to and from playing fields spread out over large campuses and for transporting equipment and injured athletes.

ATs everyday activities put them at risk of contact with blood and body fluids. Blood and body fluid exposure claims were also reported but were rare compared to other types of patient-related injuries. The majority of the blood and body fluid exposures reported during this 11 year period were due to sharp instruments such as scissors, scalpels, or needles. Less than 4% of blood and body fluid exposure claims appeared to be tasks typically performed under an additional health care credential such as drawing blood, catheterization, or assisting in surgery while the remaining 96% were associated with typical AT tasks (e.g., treating a cut, lancing a blister). A previous study conducted in the high school setting reported 12.9 exposures per 100 athletes involved potentially infectious body fluids for rate of 4.1 exposures per 100 athlete-contacts [Middlemas et al., 1997]. Given these exposures, continued and improved awareness measures to protect against blood and body fluid exposures are important for this profession. Consideration of technologies and techniques employed in other settings, such as sharps that retract into the devices, may be of benefit for athletic trainers (http://www.cdc.gov/niosh/stopsticks/safersharpsdevices.html).

Consistent with other published research studies of workers' compensation, females experienced higher claim rates than males in this study [Berecki-Gisolf et al., 2015; Lipscomb et al., 2015]. Whether this is reflective of differences in reporting behavior, health care seeking, or differences in risk is uncertain. Nationally females make up about half of the athletic trainer population. Clinic and hospital settings had a higher injury/illness claim rate which corresponds to a greater proportion of females working in these higher risk clinic and hospital settings.

Compared to other occupations, low reported claim rates were observed for ATs in this study for both states. Work-related injuries and musculoskeletal disorders often go unreported [Azaroff et al., 2002; Fan et al., 2006]. In the 2007 Behavioral Risk Factor Surveillance System Survey conducted in Washington and California, only 61% of those surveyed with work-related injuries filed for and/or received payment by workers' compensation for their work-related injury [Bonauto et al., 2010]. This suggests an undercount of up to 40% of work-related injuries in these two states. The culture of care providers encourages an "acceptable" level of personal risk, or personal sacrifice for the benefit of one's patients [Myers et al., 2012]. In a rehabilitation or sports medicine setting, reporting may be viewed as "weak" or embarrassing, or suggest incompetence in their field of training [Cromie et al., 2002]. Previous studies with physical therapists indicated that most preferred to self-treat or received treatment from a colleague (61%) for their work-related musculoskeletal disorders [Bork et al., 1996; Glover et al., 2005]. While some did report visiting a physician (13–39%) [Glover et al., 2005; Campo et al., 2008], few reported a workers' compensation claim (7%) [Cromie et al., 2000] or lost work time (3–7%) [Campo et al., 2008] for their injuries. Most reported working despite their injury and employed strategies to modify or decrease exposure that included adjusting table heights, getting help from coworkers, using another body part to perform manual therapy, changing their own or patient positions, use of other modalities, and discontinuation of treatment. Despite these strategies 17.7% of physical

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therapists reported changing their specialty area of practice and 3.2% left the profession altogether as a result of their musculoskeletal disorders [Cromie et al., 2000]. Among athletic trainers, burnout is associated with leaving the profession [Campbell et al., 1985; Capel, 1990] but the influence of physical demands on leaving the profession is not known and could contribute as well. Anecdotal evidence suggests the physical demands of the profession play a significant role in an AT's ability to remain in the profession.

It is unclear whether the higher injury rates observed for clinic and hospital settings in this study reflect higher risks or reporting differences. The culture in these settings may determine both an individual's ability and willingness to get assistance with work tasks and the ability to, and acceptability of, reporting and filing workers' compensation claims. There are many filters between the onset of a work-related injury and the reporting, medical care, and actual filing of a workers' compensation claim [Azaroff et al., 2002]. For athletic trainers in a high school setting where ATs are more likely to work alone, an injury may go unreported because there is no one to fill in for them. Rates of claims by work setting reflect the patient population (athlete or wheel-chair bound patient), work task (lifting a cooler of ice versus lifting a patient), and the frequency of these tasks or exposure in the employment setting. It may also be reflective of the resources the individual has available in that setting. For example, an AT working alone in high school setting versus an AT working in the professional sport setting with several AT staff to assist with heavy manual handling tasks.

LIMITATIONS

First, we did not know the individual's certification status at the time of the claim but we could determine if the claim occurred before or after the certification date. It is possible that some claims were from individuals who were no longer certified and had moved on to other professions. It is also possible that the linkage failed to include claims filed by an AT on the BOC list. Presence of these two situations would result in an over or under count of the claims.

Second, rates by state, gender, and setting utilized a population at risk (denominator) based on the certified population and not the actual "working" population. The 2003 BOC Role Delineation Study survey indicated that 8.5% of surveyed ATs were not currently practicing [Board of Certification, 2004]. As such our rates represent a conservative estimate because the denominator is overestimated.

Third, these rates are not comparable to Bureau of Labor Statistics estimates which are based on fulltime equivalents (FTE)—calculated as 2,000 hr per worker per year—and nonfatal days away from work. Bureau of Labor Statistics estimates likely represent only the specific "athletic trainer" job title and not the larger certified population. Using these criteria would have captured only 38.4% (237/617) of the claims in this study.

Fourth, the workers' compensation claims in this study came from two states with different workers' compensation systems and may not be generalizable nationally. Data were requested from four state workers' compensation systems; however, only Washington and California were willing and able to accommodate the request. Systems are in place for

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research collaborations in these two states. The differences between these two states also extend beyond their workers' compensation systems into the regulation of the athletic training profession. It is unknown whether the modest differences observed between the two states' claim rates in this study are due to the administrative, regulatory, and statutory differences between the two state workers compensation systems or whether it reflects an actual difference in injury or illness incidence. The latter is an important area of future research.

Last, 33 claims were excluded from analysis because information was missing or in not enough detail to determine if the claim was an athletic training occupation. A separate analysis that included those 33 claims did not result in substantive changes for the overall rates or RRs over the 11 year period.

STRENGTHS

First, this study represents 11 years of workers' compensation claims from two states individually linked to the national AT certification roster among an understudied and growing group of workers. Annual data by themselves have fairly small numerators and denominators, but combining 11 years of data allowed the calculation of more reliable rates and more detailed analyses. Nationally, California ATs comprise roughly 9% of all nationally certified ATs in 2009. Second, recognizing that athletic trainers are often dual certified and work in other industries and settings, we described workers' compensation claims filed by certified ATs in whatever setting or job title they worked in. Third, two certified ATs individually reviewed and coded the data and their agreement was high (averaged 85% for Washington and 73% for California), and disagreements were settled by a third certified AT. Fourth, ATs in Washington State must be licensed to legally work under the title "athletic trainer." California does not have any regulation of the athletic training profession; therefore, it is up to the employer to verify and require appropriate certification and training for individuals working under the "athletic trainer" title. If we had limited our analyses to these "athletic trainer" claims, we would have found only a small proportion of these claims. California Division of Workers' Compensation provided 1,724 claims where the occupation included the key word "trainer": out of 1,724 "trainer" claims filed in California, 116 were identified as athletic trainer claims (85 were certified by the BOC). The remaining 1608 claims were a variety of other occupations including professional/amateur athletes (10.6%), animal trainers (10.0%), and fitness trainers (10.2%). Using this methodology we would have captured 116 claims filed by athletic trainers as opposed to the 504 we found using our methodology.

CONCLUSION

Certified athletic trainers are an understudied group of workers that are largely invisible in existing national surveillance data and have a unique combination of work exposures. Previous studies among athletic trainers report high rates of burn-out but few studies have examined work-related injuries and illnesses. Given the many occupations and settings that athletic trainers work in, these findings suggest that prevention efforts need to begin pre-

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certification and comprehensively address the settings and jobs an AT might find themselves working in.

Like other healthcare professions, athletic trainers experience exertional injuries due to patient handling tasks and blood and body fluid exposures due to contact with sharp instruments or patients. As such, intervention strategies developed for other health care professions including minimal manual lift training [Nelson et al., 2007b] and appropriate sharps handling procedures and equipment [National Institute for Occupational Safety and Health, 2000] may be utilized to reduce these types of events among athletic trainers working in clinic and hospital settings. Future research and program development is recommended in order to translate these strategies for school and athletic settings where ATs are more often employed. The types of injury events unique to school and athletic settings, such as being unintentionally struck by athletic equipment or an athlete, motorized cart accidents, and exertional injuries due to handling heavy equipment including coolers of ice and water, further support the need for intervention strategies targeted to these settings. Efficient and cost effective strategies will be key given the limited resources for many of these settings.

Future studies need to characterize AT injury reporting practices and whether ATs employ prevention strategies to reduce their injury risk at work. To develop appropriate injury interventions, it is important to understand the organization of the work including the available resources. Characterizing the frequency of work exposures and hazardous conditions or situations and how they vary by work setting will enable the development of injury prevention strategies most likely to reduce the incidence and/or severity of the events. Finally, this study also demonstrates the need to improve occupational safety surveillance for these workers as they may not be identifiable through traditional methods that employ job titles. This is particularly important given the growth and expansion of athletic trainers in non-traditional employment settings and work arrangements.

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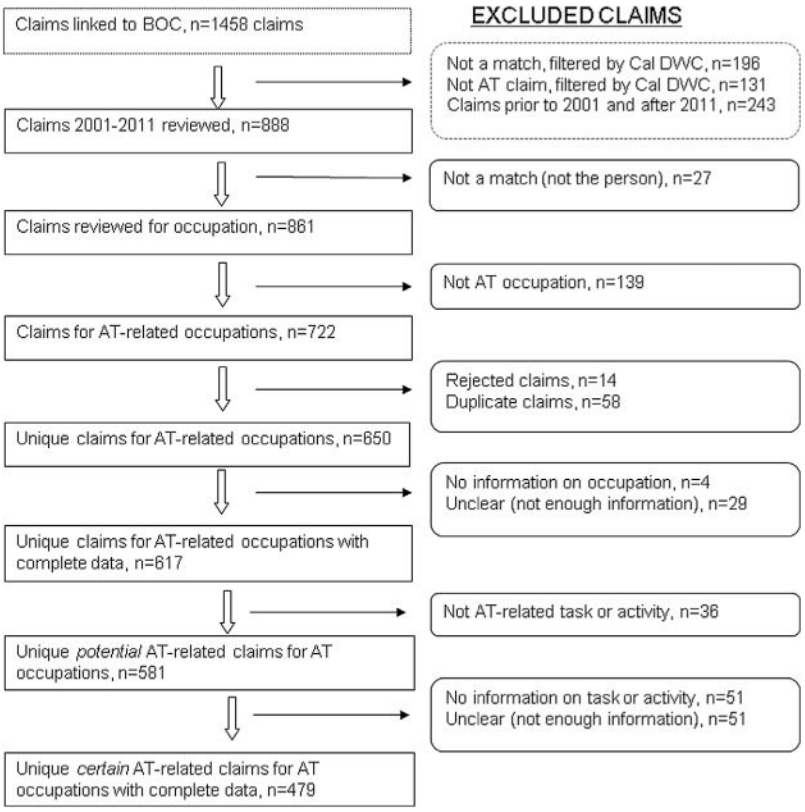

FIGURE 1.

Flow diagram for creating the analytical data set used, Linked Workers' Compensation Claims reported by ATs in Washington and California, 2001–2011. AT, athletic trainer; BOC, Board of Certification; Cal DWC, California Division of Workers' Compensation.

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TABLE I

Demographic and Occupational Characteristics of 617 Injured and ill Workers' Compensation Claimants by Athletic Training Job Title, Washington and California 2001–2011

	Job title					
	Athletic trainer [Number of claims (%)]		Other [Number of claims (%)]		Total [Number of claims (%)]	
Occupational group						
Athletic trainer	237	100.0	—	—	237	38.4
Physical therapist	—	—	100	26.3	100	16.2
Physical therapy assistant	—	—	48	12.6	48	7.8
Other medical professional *	—	—	71	18.7	71	11.5
Teacher, coach, professor	—	—	98	25.8	98	15.9
Other including ATstudent	—	—	54	14.2	54	8.8
Unknown or missing	—	—	9	2.3	9	1.5
Job setting category						
Schools	123	58.0	114	31.9	237	38.4
Clinic/hospital	53	25.0	179	50.1	232	37.6
Other	36	17.0	64	17.9	100	16.2
Unknown or missing	25		23	48		7.8
Injury/illness year						
2001–2004	93	39.2	151	39.7	244	39.6
2005–2008	92	38.8	125	32.9	217	35.2
2009–2011	52	21.9	104	27.4	156	25.3
Gender						
Female	130	54.9	222	58.4	352	57.1
Male	88	37.1	133	35.0	221	35.8
Unknown or missing	19	8.0	25	6.6	44	7.1
Age category						
<30	71	30.0	74	19.5	145	23.5
30–39	88	37.1	142	37.5	230	37.3
40–49	47	19.8	112	29.6	159	25.8
50+	31	13.1	51	13.4	82	13.3

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	Job title					
	Athletic trainer [Number of claims (%)]		Other [Number of claims (%)]		Total [Number of claims (%)]	
Unknown or missing	0	0.0	1	0.2	1	0.2
Years since certification						
0–4 years	66	27.8	75	19.7	141	22.9
5–9 years	59	24.9	78	20.5	137	22.2
10–19 years	63	26.6	152	40.0	215	34.9
20+ years	49	20.7	75	19.7	124	20.1
Total claims	237	100.0	380	100.0	617	100.0

* Other medical professional includes physician assistant, emergency medical technician/paramedic, nurse, physician, orthopaedic technician. Note: California Division of Workers' Compensation requires values for any cells with less than 15 cases to be collapsed into other categories or not reported.

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TABLE II

Characteristics of 617 Injury and Illness Claims Reported to Workers' Compensation, Washington and California 2001–2011

	Number of claims (%)	
Body part		
Head	42	6.8
Neck and throat	20	3.2
Trunk	135	21.9
Shoulder	35	5.7
Upper extremities	159	25.8
Lower extremities (includes hip)	115	18.6
Body systems	19	3.1
Multiple body parts	55	8.9
Self-insured * or unclassifiable	37	6.0
Nature of injury		
Traumatic injury and disorder	510	82.7
Systemic disease and disorder	44	7.1
Other (includes: other diseases, conditions, and disorders; infectious and parasitic disease; symptoms, signs, and ill-defined conditions)	32	5.2
Self-insured * or unclassifiable	31	5.0
Accident type		
Body motion (reaction) and exertion	318	51.5
Contact with objects and equipment including persons	148	24.0
Exposure to harmful substances or environments	44	7.1
Falls	38	6.2
Other (includes: other events or exposures; transportation accidents; assaults and violent acts)	28	4.5
Self-insured *	41	6.6
Source of injury		
Persons, plants, animals, and minerals	237	38.4
Tools, instruments, and equipment	117	19.0
Structures and surfaces	42	6.8
Containers	20	3.2
Vehicles	20	3.2
Other (includes: chemicals; furniture and fixtures; machinery; parts and materials; other sources)	49	8.0
Unclassifiable or not specified	104	16.9
Self-insured *	28	4.5
Total claims	617	100

* Self-insured claims from Washington State: only report claim details if claim results in paid lost work time.

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TABLE III

Unadjusted Yearly Incident Rates for 617 Work-Related Injury and Illness Claims Reported to Washington and California 2001–2011

	Washington				California				Total			
Year	Number of claims	Number of certified ATs*	Rate per 100 ATs	95% CI	Number of claims	Number of certified ATs*	Rate per 100 ATs	95% CI	Number of claims	Number of certified* ATs	Rate per 100 ATs	95% CI
2001	11	415	2.7	1.1–4.2	48	1,500	3.2	2.3–4.1	59	1,915	3.1	2.3–3.9
2002	15	458	3.3	1.6–4.9	42	1,678	2.5	1.7–3.3	57	2,136	2.7	2.0–3.4
2003	8	456	1.8	0.5–3.0	65	1,675	3.9	2.9–4.8	73	2,131	3.4	2.6–4.2
2004	8	480	1.7	0.5–2.8	47	1,683	2.8	2.0–3.6	55	2,163	2.5	1.9–3.2
2005	9	537	1.7	0.6–2.8	50	1,942	2.6	1.9–3.3	59	2,479	2.4	1.8–3.0
2006	10	525	1.9	0.7–3.1	44	1,899	2.3	1.6–3.0	54	2,424	2.2	1.6–2.8
2007	8	544	1.5	0.5–2.5	42	1,981	2.1	1.5–2.8	50	2,525	2.0	1.4–2.5
2008	13	582	2.2	1.0–3.4	41	2,131	1.9	1.3–2.5	54	2,713	2.0	1.5–2.5
2009	10	618	1.6	0.6–2.6	45	2,226	2.0	1.4–2.6	55	2,844	1.9	1.4–2.4
2010	8	644	1.2	0.4–2.1	32	2,268	1.4	0.9–1.9	40	2,912	1.4	0.9–1.8
2011	13	665	2.0	0.9–3.0	48	2,328	2.1	1.5–2.6	61	2,993	2.0	1.5–2.5
Total	113	5,924	1.9	1.6–2.3	504	21,311	2.4	2.2–2.6	617	27,235	2.3	2.1–2.4

*Number of certified ATs (rate denominators) in each state obtained from NATA membership statistics.

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TABLE IV

Unadjusted Incident Rates and Rate Ratios for 617 Work-Related Injury and Illness Claims Reported by ATs to Washington and California 2001–2011

	Number of claims	Number of AT-years[a]	Rate Per100 AT-years	95%CI	Rate ratio	95% CI
Overall	617	27,235	2.3	2.1–2.4	—	—
State						
Washington	113	5,924	1.9	1.6–2.3	1.00	—
California	504	21,311	2.4	2.2–2.6	1.24	1.01–1.52
Gender						
Male	221	14,077	1.6	1.4–1.8	1.00	—
Female	352	13,157	2.7	2.4–3.0	1.70	1.44–2.01
Unknown	44	—	—	—	—	—
Job setting						
School (college, university, or secondary school)	237	11,234	2.1	1.8–2.4	1.00	—
Clinic/hospital	232	8,527	2.7	2.4–3.1	1.29	1.06–1.52
Other[b]	100	7,471	1.3	1.1–1.6	0.63	0.44–0.70
Unknown or missing setting	48	—	—	—	—	—

[a]Denominators from NATA membership statistics; national proportions by strata (e.g., male/female) applied to yearly totals for both states combined to get the number of certified AT sin that strata for that year. Yearly totals then summed for each strata for the estimated number of AT-years.

[b]Otherjobsettingsincluded:Professionalsportsandperformingarts,Youthsport/rec,Health/fitnessclubs,industrial/occupational,military/government/lawenforcement, and other.

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TABLE V

Work Task and the Specific Activity Performed for 479 Athletic Training-Related Work-Related Injury and Illness Claims Reported to Washington and California, 2001–2011

	n (%)	
Work tasks		
Patient care (including evaluation, rehabilitation, and treatment)	165	34.5
Event-related (including pre-event, post-event, and event coverage)	64	13.4
Set-up and clean-up	34	7.1
Administrative and education	33	6.9
Strength, condition, and prevention	20	4.2
Traveling and other	60	12.5
Unknown or missing	103	21.5
Specific activity performed		
Patient rehabilitation (including: manual therapy; modalities, rehabilitation)	39	8.2
Patient care (including: emergency care; evaluation; first aid and wound care; taping, bracing, and wrapping)	79	16.5
Handling/moving patients	58	12.1
Handling/moving equipment	57	11.9
Administrative or idle	29	6.1
Teaching and demonstrating	29	6.1
Set-up, clean-up, tear-down or drive motorized carts or vehicles	30	6.3
Other	51	10.7
Unknown or missing	107	22.3
Total athletic training-related claims	479	100.0

California Division of Workers' Compensation requires values for any cells with less than15 cases to be collapsed into other categories or not reported (NR).