The Athletic Training Practice-Based Research Network: A National Model for Point-of-Care Sports Injury and Outcomes Documentation to Improve Athlete Health and Wellness

Full Paper

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Abstract

There is mounting evidence to suggest that sport-related injuries can negatively impact an individual's well-being and quality of life on a long-term basis. As a result, there has been increased interest in the medical community to gain a better understanding of effective treatment interventions to ensure optimal short- and long-term health. Despite the growing problem of sport-related injuries and the need to identify effective treatment interventions, there is surprisingly little data to describe the types of treatments provided for common sport-related injuries at the point-of-care and how those treatments can potentially impact short- and long-term patient outcomes. In this paper, we aim to (1) introduce the Athletic Training Practice-Based Research Network (AT-PBRN) as an infrastructure for collecting the requisite data to address current gaps in sports medicine literature, (2) summarize findings from the AT-PBRN, and (3) describe future directions of the AT-PBRN.

Keywords

Electronic medical record, patient outcomes, quality of life

Introduction: Sport Participation and Sport-Related Injuries

Sport participation is common in the U.S. For example, more than 7.8 million children and adolescents participate in interscholastic sports every year (National Federation of State High School Associations 2015). Despite significant benefits of sport participation related to the physical, mental, and social development of adolescent athletes (Lam et al. 2013; Washington et al. 2001), sport-related injuries such as sprains, strains, and concussions are a significant risk in this vulnerable population. It is estimated that 1.4 million injuries occur every year during interscholastic sport participation, with 57% and 43% occurring in competition and practices, respectively (Comstock et al. 2013). In addition to their high frequency of occurrences, sport-related injuries also place a significant financial burden on the U.S. healthcare system, with costs related to emergency department visits exceeding $1.7 billion annually (Comstock et al. 2013; Nalliah et al. 2014). Moreover, this is likely a severe underestimation of yearly medical costs due to sport-related injuries since it only accounts for services related to initial evaluation and acute management, and not subsequent office visits, surgical interventions, or rehabilitation services (Nalliah et al. 2014).

In addition to the short-term burden of sport-related injuries, there is a growing body of literature to suggest that common sport-related injuries can result in long-term consequences that can negatively impact the patient and, on a more global scale, the population. For example, both ankle (Horisberger et al. 2009; Valderrabano et al. 2006; Valderrabano et al. 2009) and knee (Lohmander et al. 2007; Lohmander et al. 2004; Oiestad et al. 2009) injuries have been linked to the subsequent development of osteoarthritis (OA), which often presents with persistent and chronic pain, long-term functional limitations, potential disabilities, and decreased quality of life (Lohmander et al. 2007; Osteoarthritis Action Alliance 2010; Osteoarthritis Action Alliance 2011). As the most common cause of disability in the U.S., OA is becoming a growing public health concern, costing the country $22.6 billion a year in medical costs (Osteoarthritis Action Alliance 2010; Osteoarthritis Action Alliance 2011). Compounding the global burden of OA is the rising number of early-onset OA cases in individuals between 25-50 years old (Osteoarthritis Action Alliance 2010; Osteoarthritis Action Alliance 2011). Often associated with sport-related injuries (e.g., anterior cruciate ligament injuries), early-onset OA is a growing concern in U.S. public health because these patients may require more treatment (eg, number of total knee replacements) and longer duration of treatment (e.g., 40 years vs. 20 years) as compared to typical OA patients, which will ultimately result in a higher burden on the country.

Due to the association of sport-related injuries and degenerative joint conditions as well as the negative, long-term impact of other sport-related injuries on the overall healthcare system (e.g., time and economic burden) and on the health-related quality of life (HRQOL) of the patient, there has been increased interest in the medical community to gain a better understanding of effective treatment interventions to ensure optimal short- and long-term health. However, despite the growing problem of sport-related injuries and the need to identify effective treatment interventions, there is surprisingly little data to describe the types of treatments provided for common sport-related injuries at the point-of-care and how those treatments impact short- and long-term patient outcomes. In this paper, we aim to (1) introduce the Athletic Training Practice-Based Research Network (AT-PBRN) as an infrastructure for collecting the requisite data to address current gaps in sports medicine literature, (2) summarize findings from the AT-PBRN, and (3) describe future directions of the AT-PBRN.

Sports Injury and Outcomes Documentation

The healthcare professional that is best positioned to offer an insight to the types of treatments provided for common sport-related injuries at the point-of-care is the athletic trainer. Athletic trainers are healthcare professionals who prevent, diagnosis, manage and treat injuries and illnesses arising from physical activities including sports (National Athletic Trainers' Association 2011). Athletic trainers are highly-educated physical medicine and rehabilitation specialists who are often the first medical professional to assess and treat a sport-related injury or illness including sprains, fractures, concussions, and life-threatening conditions such as exertional heat illness, spinal cord injury, and cardiac arrest. Under the direction of a physician, athletic trainers provide patient care in a variety of settings including high schools, colleges, military, and industrial facilities. Unlike most healthcare professionals, athletic trainers are readily and easily accessible to their patients. For example, athletic trainers are likely the only healthcare professional that provides care to a patient prior to (e.g., pre-participation examinations, injury prevention protocols, maintenance programs), at the moment of, and following an injury or illness. Furthermore, it is not uncommon for an athletic trainer to treat a patient on a daily basis from intake to discharge.

The unique aspects of athletic training clinical practice, such as accessibility to and frequency of treatments offered to the patient, place the athletic trainer in an ideal position to study the impact of common treatments for sport-related injuries on patient outcomes. However, there have been limited efforts to collect data arising from routine patient care provided by athletic trainers including common injuries diagnosed, types of treatments used to manage injuries, and the effectiveness of treatments in caring for patients. To date, efforts to characterize routine athletic training clinical practice have relied primarily on epidemiological (Darrow et al. 2009; Ingram et al. 2008; Rechel et al. 2008; Swenson et al. 2013a; Swenson et al. 2013b) and survey-based (Board of Certification 2010; Valovich McLeod et al. 2013) approaches. Although epidemiological studies provide important information about the types of injuries seen by athletic trainers, these investigations offer little insight to the types of treatments provided by the athletic trainer to treat the injuries. Surveys can help address these gaps by asking the athletic trainer what he/she is most likely to do in treating and managing specific injuries, but this approach depends on the respondent's memory and is likely limited by recall bias. In contrast to epidemiological and survey data, the collection of meaningful point-of-care data through sport injury and outcomes documentation can be used to provide a more comprehensive representation of the characteristics of athletic training clinical practice and, in turn, be used to understand and improve patient care (Lam et al. 2014; Valovich McLeod et al. 2012).

For example, the systematic collection and assessment of clinical outcomes can provide an understanding of the effectiveness (or ineffectiveness) of common treatment interventions (Jette and Haley 2005; Jette and Keysor 2002; Testa and Simonson 1996; Watts 1999). Clinical outcomes assessment is the study of the end of result of care and spans from the patient's initial entry into care and continues until the patient is discharged from care (Jette 1995; Jette and Haley 2005). Clinical outcomes of patient care are primarily categorized as outcomes that are meaningful and important to the *patient* (e.g., health-related quality of life and functional limitations such as inability to walk, run, jump, etc.), *clinician* (e.g., range of motion, swelling, laxity), and *administrator* (e.g., patient satisfaction) (Jette 1995; Kirkley and Griffin 2003). If clinical outcomes are consistently and systematically collected throughout the course of care and between patients, clinicians can evaluate these outcomes to gain a better understanding of their patient care performance, identify potential trends in their treatment approaches, and use this information to direct quality improvement efforts (Evans and Lam 2011; Jette and Haley 2005).

Much promise lays in clinical outcomes assessment efforts, particularly when outcomes are collected through multi-site collaborations (Evans and Lam 2011; Sauers et al. 2012). If these patient care data are collected as a collective and representative group, they can be aggregated together to offer more sophisticated analyses, boarder generalizations, and better guidance to quality improvement efforts (Evans and Lam 2011; Sauers et al. 2012). Although promising, this type of large-scale initiative to collect mass data at the point-of-care would require an extensive infrastructure to support the documentation of patient care and outcomes by athletic trainers. With the launch of the AT-PBRN in 2009 (Valovich McLeod et al. 2012), the requisite infrastructure was developed to facilitate data collection via patient care documentation and from a geographical diverse group of practicing athletic trainers.

Athletic Training Practice Based Research Network

The AT-PBRN is the first and only practice-based research network in athletic training that is recognized by the Agency for Healthcare Research and Quality. Practice-based research networks (PBRNs) are groups of clinicians and educators who work together to translate research findings into practice (Green et al. 2005). In order to be eligible for federal grant money, a PBRN must have an established infrastructure that includes the following basic elements: 1) At least 15 ambulatory practices and/or 15 clinicians devoted to the primary care of patients, 2) A statement of the PBRN's purpose and mission, including an ongoing commitment to research, 3) A director who is responsible for administrative financial, and planning functions, 4) A support staff of at least 1 person reporting to the director, 5) A mechanism such as a community advisory board to solicit advice and feedback from the communities of patients served by the PBRN clinicians, 6) An organizational structure independent of any single study, and 7) Communication processes such as regular newsletters, e-mails or listservs, conference calls, or face-to-face meetings (Green et al. 2005).

The overall aim of the AT-PBRN is to improve the quality of care and patient outcomes for patients under the care of athletic trainers. The AT-PBRN is headquartered out of A.T. Still University and administratively supervised by a group of faculty members from A.T. Still University. In addition to the administrative team, the AT-PBRN includes a group of scientists who are experts in different areas of sports medicine research (e.g., concussion, lower extremity, and upper extremity research) and an external advisory board consisting of physicians, athletic trainers, educators, and researchers. In addition to this core organizational structure, the AT-PBRN has established research partnerships with external institutions. Through these research partnerships, scientists and clinicians associated with the external institution contribute to the data collection of the AT-PBRN and, in turn, are provided with limited datasets on a regular basis from the AT-PBRN for scholarly use. Lastly, external researchers who are not under a formal partnership agreement with the AT-PBRN can individually submit a request to the administrative team to gain access to the desired data.

The foundation of the AT-PBRN exists in a web-based, patient-oriented electronic medical record (EMR) that is compliant with secure data acquisition, storage, and transmission standards set forth by the Health Information Portability and Accountability Act (Lam et al. 2015b; Valovich McLeod et al. 2012). Globally, this web-based system acts as the centerpiece of the AT-PBRN that links all members together. Currently, the AT-PBRN connects over 40 athletic trainers from across 13 states to provide the requisite infrastructure to engage in large-scale, multi-site clinical research. This type of an infrastructure accumulates clinical data at a rapid pace and from a nationally representative sample, making it an ideal model to establish evidence that is quickly and easily translated into routine patient care. For example, many of the AT-PBRN clinical practice sites are located in medically underserved communities in urban and rural areas, which have been traditionally underrepresented in sports medicine research.

The power of the EMR is that it allows the collection of patient data in real-time and at the point-of-care. To take full advantage of the system's web-based feature, athletic trainers are able to access the EMR on laptops, tablets, and smartphones, offering greater flexibility and mobility (e.g., allow clinicians to document their patient records in a variety of locations and at various times, allow their patients to complete PROMs in the athletic training clinic) and a secure way to enter and store patient information (i.e., all patient information is entered electronically and securely stored on redundant servers).

The EMR was designed to ensure that the collection of patient data does not require more time than what is commonly needed to complete appropriate healthcare documentation. Therefore, instead of burdening busy athletic trainers with separate data collection procedures for ongoing investigations, data collection occurs during the athletic trainer's routine patient documentation process. In short, the EMR is designed to enhance the documentation and clinical practice of athletic trainers, as well as to facilitate clinical research at the point-of-care. As a clinical tool, the EMR facilitates the thorough and complete documentation of patient records, including patient registration (e.g., sex, age, grade), injury demographic (e.g., sport, diagnosis), initial evaluation (e.g., mechanism of injury, clinical findings such as range of motion assessment and special test results, and patient goals), daily treatment (e.g., progress notes, exercise and treatment parameters), and discharge notes (e.g., clinical findings at discharge, progress related to patient goals) (Table 1). The EMR also includes ICD codes for injury diagnoses and American Medical Association Current Procedural Terminology (CPT®) codes for physical medicine and rehabilitation treatment codes.

System Component	**Example of Data Collected**
Patient Registration	Sex, age, race, grade
Daily Patient Encounter Tracking	Sign-in form
Injury Demographics	Sport, season, position, previous history of injury
Patient Evaluation	Diagnosis, injured body part, side, mechanism of injury
Daily Treatment, Progress, Discharge Notes	Interventions, rehabilitation protocols, date return-to-play
The International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10 CM) and Current Procedural Terminology (CPT) codes	Diagnosis, treatment codes for characterizing practice and calculating cost estimates
Single-Item Outcomes Instruments	Global Rating of Change; Satisfaction
Multi-Item Outcomes Instruments	Foot and Ankle Ability Measure, Pediatric Quality of Life Inventory

Injury Surveillance	Incidence, athlete-exposure, time loss/non time loss, sports participation

Table 1. Electronic Medical Record Documentation Features

A unique aspect of the EMR is the incorporation of patient-reported outcome measures, or self-report questionnaires used to capture the patient's perspective. Traditionally, patient care has emphasized the measurement and evaluation of changes at the *impairment* level (e.g., range of motion, strength) as indicators of treatment progression and success (Binkley 1999; Jette 1995; Suk et al. 2005). While these *clinician-rated outcomes* are meaningful and important to clinicians, they generally fail to capture changes that are meaningful and important to their patients (Jette 1995). As a result, clinician-rated outcomes may not be the best indicators for driving treatment decisions or providing patient-centered health care. In contrast, *patient-rated outcomes* are surveys or questionnaires completed by patients and target areas related to *function* (e.g., patient cannot run or cut) and *disability* (e.g., patient cannot play soccer), which are typically more meaningful and important to the patient and often best represent the way an injury, illness, or disease directly impacts a patient's daily life (Jette 1995; Kirkley and Griffin 2003). Thus, patient-rated outcome are more likely to effectively guide whole person, patient-centered care than clinician-rated outcomes (Jette 1995; Kirkley and Griffin 2003). Also, and more importantly, since patient-rated outcomes are completed by the patient and offer an insight into the patient's perspective related to his/her health care, they offer a way to formally incorporate the patient into all clinical decisions, enhancing whole person and patient-centered care (Jette 1995; Kirkley and Griffin 2003).

Within the EMR, patient-reported outcome measures are auto-generated for each patient based on the patient's age and the location of the injury and/or illness. The outcome measures are released every two weeks from intake to discharge to ensure that the patient's perspective is capture throughout the course of care, and reminders are sent to the patient and clinician to optimize completion rates. Once completed by the patient, patient-reported outcome measures are auto-scored by the EMR and recorded within the patient's medical record for the clinician to review and interpret. The auto-generation, -scoring, and -recording of the patient-reported outcome measures were designed to assist athletic trainers in capturing these important patient data. As the only athletic training EMR to offer built-in patient-reported outcome measures, the AT-PBRN EMR can facilitate whole person, patient-centered care and support investigations aiming to identify effective treatment interventions.

Sports Injury and Outcomes Documentation to Improve Athlete Health and Well Being

Since its launch, the EMR has demonstrated that patient care data can be reliably collected and that data can be aggregated across sites to begin answering questions that are clinically relevant to athletic training practice (Lam et al. 2016a; Lam et al. 2015a; Lam et al. 2016b; Lam et al. 2015b; Lam et al. 2014; Sauers et al. 2013; Snyder Valier et al. 2015; Valovich McLeod et al. 2012). To date, the AT-PBRN has generally focused on characterizing routine athletic training clinical practice. Practice characterization is a way to describe primary components of routine clinical practice (Downar et al. 2001). While practice characterization can encompass many variables and factors of routine patient care, previous investigations have generally classified practice characteristics into three major areas: patient, treatment, and value characteristics (Lam et al. 2015b; Valovich McLeod et al. 2012). Patient characteristics describe the primary demographics of the patient population, while treatment characteristics report on the method used by many health professionals to make improvements to a patient's condition. Lastly, value characteristics describe cost and quality of care provided by the clinician.

Through retrospective analyses of EMR data, the AT-PBRN has previously described primary practice characteristics of athletic training including patient (e.g., age, sex, sport, type of injury) (Lam et al. 2015b; Valovich McLeod et al. 2012) and treatment (e.g., type, duration and amount of treatment) (Lam et al. 2016a; Lam et al. 2015b; Valovich McLeod et al. 2012) characteristics of routine clinical practice. For example, based on 5,595 sport-related injuries recorded within the AT-PBRN, it was reported that most injuries in the ankle, head, and knee (Table 2). The most frequently reported service was athletic training evaluation/re-evaluation treatment, followed by hot/cold pack, therapeutic activities or exercise, strapping of lower extremity joints, and electrical stimulation (Table 3).

Body Part	Male	Female	Total
Ankle	571 (17.3)	518 (22.6)	1089 (19.5)
Back	137 (4.1)	104 (4.5)	241 (4.3)
Calf	116 (3.5)	129 (5.6)	245 (4.4)
Chest	43 (1.3)	9 (0.4)	52 (0.9)
Elbow	79 (2.4)	42 (1.8)	121 (2.2)
Finger	69 (2.1)	47 (2.0)	116 (2.1)
Foot	84 (2.5)	97 (4.2)	181 (3.2)
Forearm	37 (1.1)	13 (0.6)	50 (0.9)
General Medical	128 (3.9)	73 (3.2)	201 (3.6)
Hand	74 (2.2)	26 (1.1)	100 (1.8)
Head	568 (17.2)	338 (14.7)	906 (16.2)
Hip	122 (3.7)	90 (3.9)	212 (3.8)
Knee	469 (14.2)	360 (15.7)	829 (14.8)
Neck	78 (2.4)	19 (0.8)	97 (1.7)
Should	302 (9.1)	111 (4.8)	413 (7.4)
Thigh	217 (6.6)	193 (8.4)	410 (7.3)
Thumb	53 (1.6)	37 (1.6)	90 (1.6)
Toe	29 (0.9)	25 (1.1)	54 (1.0)
Trunk	29 (0.9)	11 (0.5)	40 (0.7)
Upper Arm	13 (0.4)	8 (0.3)	21 (0.4)
Wrist	84 (2.5)	43 (1.9)	127 (2.3)
Total	**3302 (100.0)**	**2293 (100.0)**	**5595 (100.0)**

Table 2. Injuries Documented within the AT-PBRN Grouped by Body Part and Sex [n, (%)].

In addition to patient and treatment characteristics, the AT-PBRN has begun to describe changes in patient-reported outcomes over time for a wide-range of injuries including ankle sprains (Lam et al. 2015a) and knee sprains (Lam et al. 2016b). For example, a recent study (Lam et al. 2015a) determined changes in self-report of function, as measured by the Foot and Ankle Ability Measure (FAAM), during the first two weeks after an ankle sprain injury. Thirty-nine patients (male=20, age=16.7±1.4 years, height=168.7±10.7 cm, mass=70.1±3.2 kg; female=19, age=16.5±2.3 years, height=143.3±23.4 cm, mass=67.5±3.0 kg) represented twelve different sports and were diagnosed with an ankle sprain injury by an athletic trainer within the AT-PBRN. Patients received usual care from an athletic trainer and completed the FAAM during treatment sessions at post-injury Time 1 [(T1); range=0-5 days post-injury] and Time 2 [(T2); range=10-15 days post-injury]. The FAAM is a patient-rated outcome measure consisting of two subscales: activities of daily living (FAAM-ADL; 21 items) and sport (FAAM-Sport; 8

Treatment or procedures	Male	Female	Total
Athletic trainer evaluation or re-evaluation	5756 (47.2)	3852 (44.2)	9608 (45.9)
Hot or Cold Packs	2530 (20.7)	1590 (18.2)	4120 (19.7)
Therapeutic activities or exercise	1730 (14.2)	1476 (16.9)	3206 (15.3)

Strapping - lower extremity	639 (5.2)	639 (7.3)	1278 (6.1)
Electrical stimulation	445 (3.6)	333 (3.8)	778 (3.7)
Manual therapy techniques or massage	320 (2.6)	426 (4.9)	746 (3.6)
Strapping - upper extremity	289 (2.4)	112 (1.3)	401 (1.9)
Whirlpool	182 (1.5)	136 (1.6)	318 (1.5)
Physical performance test or measurement	107 (0.9)	34 (0.4)	141 (0.7)
Ultrasound	79 (0.6)	39 (0.4)	118 (0.6)
Neuromuscular reeducation	42 (0.3)	40 (0.5)	82 (0.4)
Vasopneumatic Devices	32 (0.3)	21 (0.2)	53 (0.3)
Gait Training	20 (0.2)	16 (0.2)	36 (0.2)
Contrast Bath	11 (0.1)	3 (0.0)	14 (0.1)
Infrared	7 (0.1)	0 (0.0)	7 (0.0)
Aquatic Therapy	2 (0.0)	1 (0.0)	3 (0.0)
Iontophoresis	2 (0.)	0 (0.0)	2 (0.0)
Total	**12193 (100.0)**	**8718 (100.0)**	**20911 (100.0)**

Table 3. Treatments Documented within the AT-PBRN Grouped by Sex [n, (%)].

items). Subscale scores range 0-100, with higher scores indicating better function. Both subscales have established measurement properties including minimal important change (MIC) values (FAAM-ADL MIC=8 points; FAAM-Sport MIC=9 points). MIC values are important for patient care as changes in FAAM scores exceeding the MIC values would indicate that the patient experienced a meaningful change in status from the patient's point-of-view. Wilcoxon Signed-Rank tests were used to identify differences between T1 and T2. Significant differences were reported for both the FAAM-ADL (P<.001) and FAAM-Sport (P<.001) when comparing scores between T1 and T2. For FAAM-ADL, patients reported scores of 52.9±26.1 (range 6-100) and 88.8±13.4 (range=49-100) at T1 and T2, respectively. For FAAM-Sport, patients reported scores of 30.8±28.5 (range=0-100) and 68.0±28.1 (range=6-100) at T1 and T2, respectively. When comparing scores on an individual level, most patients reported score changes between T1 and T2 that exceeded the MCID value for the FAAM-ADL (89.7%, n=35) and FAAM-Sport (82.1%, n=37). However, few patients (FAAM-ADL: 25.6%, n=10; FAAM-Sport: 10.3%, n=4) reported a complete recovery of self-report of function (ie, a score of 100) at T2. Findings from this study suggest that patients who suffer an ankle sprain injury generally report significant and meaningful improvements in self-report of function during the first two weeks post-injury. However, most patients continued to experience deficits in self-report of general and sport function at two weeks post-injury. From a patient care perspective, clinicians should be aware of these deficits and ensure full recovery of self-report of function, even if the patient has returned to play during this time period. Furthermore, research efforts should aim to identify effective treatment strategies to address short- and long-term functional deficits in patients following ankle sprain injuries.

In a separate but similar study (Lam et al. 2016b), investigators determined changes in self-reported health status, as measured by the International Knee Documentation Committee Form (IKDC), during the first two weeks of treatment post sport-related knee injury. One hundred and two patients representing fourteen sports were diagnosed with a knee injury by an athletic trainer and grouped by injury severity based upon sport participation status at intake. At intake, 75 patients (male=56, female=19; age=19.4±8.2 years, height=173.5±11.2 cm, mass=75.7±15.4 kg) were restricted from participation and assigned to the severe knee injury (SKI) group, and 27 patients (male=11, female=16; age=19.9±8.2 years, height=169.5±13.9 cm, mass=75.0±19.7 kg) were cleared for participation and assigned to the mild knee injury (MKI) group. Patients received usual care from an athletic trainer and completed the IKDC during treatment sessions at Time 1 [(T1); range=0-7 days post-intake] and Time 2 [(T2); range=10-19 days post-intake]. The IKDC is a valid, reliable, and responsive (MIC=13 points) patient-reported outcome instrument that assesses impairments, function, and disability. The IKDC total score (TS-IKDC) ranges from 0-100, with higher scores indicating better health status. generalized estimating equation was used to evaluate interaction and main effects of injury severity and time, and Bonferroni-adjusted comparison evaluated pairwise differences. A significant interaction (P=0.001) was reported between injury severity and time, with the SKI group reporting greater improvement in TS-IKDC between T1 and T2 (14.1±12.8 points) than the MKI group (8.8±10.8 points). Significant improvements in TS-IKDC were reported for the SKI (P=0.001; T1: 43.6±19.1 [range 8-96], T2: 57.7±18.9 [range=18-100]) and MKI (P=0.001; T1: 61.1±15.3 [range 32-91] and 69.9±15.4 [range=39-98]) groups between T1 and T2. Individually, 54.7% (41/75) of the SKI group and 37.0% (10/27) of the MKI group exceeded the MIC value between T1 and T2. Findings from this study suggest that patients suffering knee injuries report statistically significant changes in health status during the first two weeks of treatment. Patients with SKI generally report greater improvements during this time than patients with MKI. However, based on the MIC, a relatively small percentage of patients experienced a perceived meaningful change in health status during this time period. Thus, future research should identify effective interventions that optimize patient outcomes on a short- and long-term basis following sport-related knee injuries.

Use of Data and Future Directions

Although practice characterization appears to be basic and self-evident, there is very little data describing these important components of patient care. An understanding of the patient, treatment, and value characteristics can have important implications for patient care as well as athletic training education, research and clinical practice. For example, identifying common injuries managed by athletic trainers can help direct educational and research efforts to ensure that athletic trainers receive focused knowledge in commonly injured body regions and utilize effective treatment interventions. Based on the clinical data from the AT-PBRN, it is clear that athletic trainers spend a great deal of time diagnosing, managing, and treating ankle sprains during routine patient care. Thus, educational, clinical, and research efforts should focus on optimizing patient outcomes following ankle injuries.

Although the promise of conducting practice-based research through the AT-PBRN is apparent, the vast majority of AT-PBRN studies so far have been retrospective in nature (i.e., characterizing routine AT practice via the analysis of medical records). Thus, the next logical step in the evolution of the AT-PBRN and practice-based research in athletic training is to conduct prospective investigations to determine the effectiveness of athletic training services on patient-reported outcomes following a sport-related injury. For example, there are currently on-going efforts within the AT-PBRN to determine the impact of commonly used interventions on patient outcomes following ankle sprains and the comparative effectiveness of common interventions in the treatment of common chronic conditions such as chronic ankle instability. These efforts were guided by the data collected within the EMR and aim to address apparent needs in routine athletic training clinical practice. Further, to our knowledge, these efforts are the first to use an EMR to collect clinical data in support of point-of-care investigations. Another area that the AT-PBRN can contribute to the current literature is injury prevention. The use of an EMR can facilitate the tracking of patients over time. Thus, the collection of baseline measures and tracking of patients over time may help identify potential risk factors for sport-related injuries and effective injury prevention programs. Ultimately, these types of efforts should help enhance clinical practice and improve patient care.

Summary

There is a current and pressing need to gain a better understanding of sport-related injuries including the identification of effective treatment approaches. To address this need, an extensive infrastructure is required so that point-of-care data can be collected consistently on a large scale. The AT-PBRN offers a way to support these initiatives. Since its launch, the AT-PBRN has demonstrated that patient care data, including patient-reported outcomes, can be reliably collected and that data can be aggregated across sites to begin answering questions that are clinically relevant to athletic training practice. Although the promise of conducting practice-based research through the AT-PBRN is apparent, the vast majority of AT-PBRN studies so far have been retrospective in nature (i.e., characterizing routine AT practice via the analysis of medical records). Thus, the next logical step in the evolution of the AT-PBRN and practice-based research in athletic training is to conduct a prospective study to determine the effectiveness of treatment and prevention approaches. Based on the clinical data from the AT-PBRN, studying the effectiveness of treatments for ankle sprains is a reasonable area to investigate.

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