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Current Concept Review

What to Cover When You're Covering: Preparing the Sideline Physician for the Season

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ABSTRACT

The evolving role of the sideline physician in sports medicine frequently involves comprehensive responsibilities beyond direct medical care. We outline important aspects of sideline preparedness and management, including the development and rehearsal of Emergency Action Plans (EAPs), initial approaches to assessing injured athletes, equipment removal strategies, and return-to-play decision-making processes. Epidemiological insights into sports injuries, particularly catastrophic events, underscore the importance of venue-specific planning within EAPs. We also provide guidance and recommendations for nuanced medical procedures such as IV fluid administration, anesthetic joint injections, and Toradol use, addressing current controversies and evidence-based recommendations. Medicolegal and ethical considerations emphasize the necessity of navigating legal statutes and maintaining patient confidentiality while adhering to ethical principles. Overall, this concept review underscores the multifaceted nature of the sideline physician's role, emphasizing evidence-based practice, transparent communication, and collaboration with stakeholders for optimal athlete care across all levels of play.

Key Concepts:

(1) Evolution of sideline physician role: the manuscript explores the expanded responsibilities of sideline physicians beyond direct medical care, encompassing aspects such as emergency action plan development and return-to-play decisions.
(2) Importance of emergency preparedness: emphasizes the crucial role of rehearsed emergency action plans in effectively managing on-field emergencies and optimizing patient outcomes.
(3) Nuanced medical procedures: discusses controversies and evidence-based recommendations surrounding procedures like IV fluid administration, anesthetic joint injections, and Toradol use.
(4) Medicolegal and ethical considerations: addresses the necessity for navigating legal statutes, maintaining patient confidentiality, and adhering to ethical principles in sports medicine practice.
(5) Collaborative care approach: underscores the significance of evidence-based practice, transparent communication, and collaboration with stakeholders for providing optimal athlete care across all levels of play.

Introduction

In parallel with the role of the sports medicine clinician, the role of the sideline or team physician has evolved to encompass greater scope over time. In addition to the responsibility of medical care of athletes at all levels, a team physician serves a major role in the organization and management of medical protocols for pre-, post-, and in-season athlete care. In a joint consensus statement from sports medicine professional societies, it is considered essential that the team physician be involved in all aspects of sideline and event preparedness, including emergency action plan (EAP) development and rehearsal [1]. The team physician, in collaboration with athletic trainers (ATs) and emergency medical providers, leads the assessment and management of game-day injuries, clearance for sports participation, and decision-making in return-to-play. Though emergencies are rare, preparedness is crucial to optimize patient outcomes. This review aims to summarize critical areas of

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knowledge for any sideline physician, including the essential components of an EAP, the initial approach to the downed athlete, evaluations of on-field emergencies, currently debated medical practices on the sideline, and the legal and ethical considerations involved in team coverage.

Epidemiology

Injury rates across all sports are higher in games than in practice; fortunately, when covering physicians and ATs are more likely to be on site. Head and neck injuries account for roughly 10% of sports injuries at both the high school and collegiate levels [2]. Though > 2,000 athletic-related spinal cord injuries occur in the United States annually, the majority do not have catastrophic consequences [2].

In the academic year 2021-2022, there were 65 sport-related catastrophic injuries reported in high school and collegiate athletics, according to the National Center for Catastrophic Sport Injury Research [3]. Over half of these injuries were from direct trauma, with 70% occurring during competition. Notably, exertional or medical events such as cardiac arrest were much more likely to occur during practice, conditioning, or scrimmage (over 65%) than in competition (28%). Exertional or medical catastrophic events were most likely to be cardiac (72%) or heat-related (12.5%). Catastrophic injuries most commonly occur in football, gymnastics, ice hockey, wrestling, and cheerleading [2].

Sideline preparedness

Emergency action plan

Perhaps the most crucial component of preseason preparation is the creation and rehearsal of an EAP [4]. The EAP should be available to all medical personnel and should be reviewed and rehearsed at least annually with the coaching staff, ATs, and all medical personnel. An interassociation consensus statement on collegiate athlete catastrophic injury prevention recommends that the following catastrophic events should have specific plans in place [4,5]:

- Head and neck injuries, including concussion and cervical spine injury
- Cardiac arrest/sudden cardiac death
- Heat illness/stroke
- Exertional rhabdomyolysis
- Exertional collapse
- Asthma
- Diabetic emergency
- Mental health emergency

The EAP may be a simple outline of processes during various medical emergencies, but should be venue-specific; for example, emergencies are managed differently in football, ice hockey, and gymnastics facilities. Essential components of an EAP include:

- Location and venue: that is, gymnasium, baseball field, football stadium, etc.
- Personnel assignments: who is responsible for emergency activation or calling 9-1-1, initiating CPR, accessing automated external defibrillator (AED) and other needed equipment, directing emergency medical services (EMS) to the scene, crowd control, etc.
- Identification of available equipment and supplies: AED, medical kit, Stop the Bleed kit, spine board, splints, oxygen, etc.
- Specific directions for EMS activation or 9-1-1 script:

  "*This is (Person calling), we have an emergency at (venue/surface), address is (XXX) and we require EMS.*" *Stay on the line, follow their instructions and be LAST to hang up.*

The EAP should be posted at a prominently visible location, such as by a telephone, in the dugout, by the AED, or at mid-court in the gym.

Medical time out

On game day, team physicians must be prepared for injury evaluation and return-to-play consideration for athletes before, during, and after competition. Prior to any game, sideline physicians should be active participants in the "medical time out," where all medical personnel are introduced and identified: ATs, team physicians, EMS personnel, and any game administrators or security personnel. During this meeting, all aspects of emergency response are reviewed, including the location of EMS, modes and access points for emergency transport, EAP hand signals, extraction/boarding procedures and supplies, and the location of AEDs.

At the completion of the season, team physicians should debrief to review injuries or illnesses that occurred throughout the season, provide feedback for modifications to the medical protocols and EAP, and discuss athletes who require ongoing care following the athletic season.

Initial approach to the downed athlete

The AT is often uniquely responsible for initiating emergency management as athletes' first point of medical contact. The AT will typically utilize hand signals discussed in the EAP to request additional assistance when warranted. EMS may assume responsibility for care depending on state regulations. We encourage meeting with EMS in the offseason to build relationships and practice clinical scenarios with the goal of streamlining care coordination and optimizing outcomes.

The primary assessment of the downed athlete is designed to evaluate for life-threatening concerns involving their airway, breathing, and circulation (ABC). However, given the time-sensitive nature of sudden cardiac arrest and time to compressions optimizing survival outcomes, the recommended order is C-A-B: initiate compressions first when warranted, then evaluate airway and breathing.

- Ensure the athlete is safe to approach
- Assess responsiveness by talking to the athlete
- In the absence of a response, ensure a member of the medical team calls 9-1-1 and obtains an AED per the EAP
- Start CPR compressions immediately, following American Heart Association guidelines

If there is concern for cervical spine involvement and spinal motion restriction is warranted, the provider first available, or as designated by the EAP, should personally stabilize the cervical spine or immediately assign this task to an assistant. Once stabilized, secondary assessments for peripheral sensation, distal pulses, or additional injuries are performed.

Equipment removal in sideline emergencies

A strategic approach to sideline equipment removal is essential for all athletic medical teams. Whether for spinal motion restriction or for delivery of Cardiopulmonary resuscitation (CPR), equipment that protects players during contact sports can hinder providers in an emergency.

Petschauer et al. studied cervical spine stability using healthy lacrosse players and found that helmet removal minimized cervical spine motion on spine boards when compared to helmeted conditions [6]. The log roll technique for helmet and pad removal has shown the greatest cervical instability when compared to full body levitation or upper torso tilt [6]. Cervical spine alignment is unacceptable with removal of the helmet alone—helmet removal should always be done concurrently with shoulder pad removal [7].

If emergent airway access is needed, Swartz et al. found that face-mask removal alone for airway access is associated with less cervical motion than complete helmet removal [8]. However, in ventilation simulations with ATs, Bowman et al. found that helmet removal was associated with a higher percentage of quality ventilations compared to helmeted simulations, though using a King LT airway did allow for quality ventilation in patients with helmets and chin straps [9]. Mihalik et al.'s study of ATs with simulated CPR demonstrated improved compression depth with equipment removal and demonstrated greater ventilation volumes and a greater percentage of adequate ventilation volumes by simply removing the chin strap [10].

Equipment removal decisions may depend on the number of trained personnel available, and all possible techniques should be rehearsed seasonally. In scenarios of acute athlete collapse, it may be best to practice early and complete equipment removal to ensure high-quality CPR while maximizing cervical stabilization.

Return-to-play decisions

Concussion and many musculoskeletal conditions have robust published frameworks for return-to-sport (RTS) [11–17]. In conditions warranting clearance evaluation that do not have well-described guidelines, it can be helpful to have a framework to reference to allow for more objective decision-making. This is especially useful for unprecedented or unexpected scenarios where shared and multidisciplinary clearance discussions are needed, or when deviation from an existing protocol is required.

Yung et al. describe key considerations during decision-making in RTS discussions [18]. They describe that "good decisions" and "good outcomes" are not mutually exclusive; the best decision using the available information may not result in the ideal outcome. Acknowledging each stakeholder's preference or bias can improve communication and allow the team to give appropriate weight to risk assessments [18]. There are a few RTS decision-making templates that clinicians can reference, including Clover and Wall's, Creighton et al.'s, and the Strategic Assessment of Risk and Risk Tolerance framework [19–21]. While the team physician should be responsible for the final medical RTS decisions, multidisciplinary discussions can mitigate barriers such as adherence to exercise modifications, rehabilitation access, and communication with athletes and coaches.

Mononucleosis

Infectious mononucleosis, caused by Epstein-Barr virus or Cytomegalovirus, demonstrates disproportionate incidence in adolescents and young adults, often affecting athletes in high school, college, and professional settings [22–25]. Hepatosplenomegaly is a well-documented sequela of mononucleosis and transiently increases the risk of splenic rupture. Though rare, this potentially fatal outcome with 9% mortality is the principal risk driver for removal from play during mononucleosis infection [22]. Monitoring splenomegaly, which may occur in half of patients, is unreliable without baseline measurements, which are not commonly obtained, and physical exams have been demonstrated to be unreliable [22–26]. It is, therefore, not recommended to use splenic ultrasound monitoring to guide RTS.

Given that splenic rupture occurs most commonly in the first 3 to 4 weeks of infection, the consideration to allow return for asymptomatic patients following this vulnerable period has been recommended [23,24,26,27]. Disclosing the nonzero risk for rupture up to 2 to 3 months after infection to the athlete is also recommended [22,24,27]. It may take this long for athletes to return to baseline performance levels, and this anticipatory guidance can be helpful for athletes, coaches, and ATs [24]. Previous guidelines, including the 2008 American Medical Society for Sports Medicine review, focused the RTS decision on clinical resolution of symptoms, refraining from high-intensity activity for the first 3 weeks of illness [20]. The updated 2023 guidelines recommend an RTS decision be made with patient-clinician collaboration that considers the athlete's clinical presentation, risk profile, degree of deconditioning, and unique demands of their sport [21].

Current debates in pregame procedures and treatments

Intravenous fluid use in athletes

In 2011, Fitzsimmons et al. published a study showing the use of pregame intravenous fluid (IVF) was widespread in the NFL (75% of teams reporting this practice) despite consistent recommendations against its use in published guidelines. These guidelines cite risks and mixed evidence regarding efficacy versus oral hydration [28–33]. IVF prior to competition are banned by the World Anti-Doping Association, due to potential ergogenic advantage, dilution of banned substances, and risks to athletes [29,30]. Notably, performance advantages have not been consistently demonstrated in studies comparing oral and IV hydration [32,34]. There is also unconvincing evidence for the superiority of Intravenous hydration for thermoregulation [32,35,36]. Oral hydration provides athletes with the benefits of decreased thirst sensation and perceived exertion when compared to IVF [32,36–38]. The NFL study demonstrated that most players received IVF to prevent dehydration and cramping despite limited evidence to suggest efficacy in this scenario [28,30,32].

Risks of IVF include injection site infection and thrombosis, electrolyte and acid-base derangements, cardiovascular congestion, and exacerbation of exercise-induced hyponatremia [29,31]. The NFL study found that 48% of athletes reported complications—these were most commonly superficial venous clots, air emboli, and pulmonary emboli [28]. This study also provides insight into the culture surrounding the judicious use of IVF; the most commonly cited primary reason for its use was player request, and 2 teams reported a concern for psychological dependence [28].

Published indications for IVF use in athletes include severe dehydration marked by an inability to tolerate or maintain oral hydration, altered mental status, circulatory support with small boluses for heat illness, hypovolemia with fluid management for perfusion maintenance, and intravenous medication administration [29,31,32]. Sodium monitoring is also essential if IVF is being used to rule out and monitor for hyponatremia [31,32].

Anesthetic joint injections in athletes

Local anesthetic joint injections to facilitate play have become commonplace in contact sports, including football, hockey, rugby, and soccer [39,40]. A 2016 NFL survey found that 100% of responding physicians utilize local anesthetic injections. The most common injection site reported in the NFL was the acromioclavicular joint (ACJ), representing 22% of injections. Compared to other joint injections, particularly weight-bearing joints, ACJ injections had fewer reported complications, higher patient satisfaction, and lower incidence of refractory pain. Complications of ACJ injections included distal clavicle osteolysis in 2 of 440 injections and 1 case of supraspinatus rupture [40].

Additionally, there is evidence to support greater utilization of ultrasound guidance for ACJ injections. A meta-analysis found an accuracy of 93.6% with ultrasound guidance compared to 68.2% with landmark guidance [41]. Wasserman et al. studied 30 patients receiving landmark-guided ACJ injections with contrast and found that only 43% of injections were intra-articular on postinjection radiographs [42]. Bisbinas et al.'s similar study of 60 patients found a 39.4% accuracy rate [43].

Currently published data on ACJ injections suggest relative safety, especially when compared to weight-bearing joint injections. Complications are reported, though rarely. The development of an injection registry and the use of ultrasound guidance can improve procedure efficacy and our understanding of complication rates.

Toradol use in athletes

The practice of pregame Toradol injections remains controversial. While adverse events related to Toradol use are rarely reported, cautious use has been recommended by the NFL Physicians Society Task Force and in neurosurgery literature [44–49]. NFL and National Collegiate Athletic Association (NCAA) studies with relatively small cohorts are underpowered to sufficiently rule out rare complications. Larger neurosurgical studies (1,000-5,000 patients) also note that larger studies are needed to definitively affirm Toradol safety [44–49].

Current guidelines recommend Toradol use with physician guidance and supervision—specifically to treat pain, rather than for pain prophylaxis—and to use the lowest effective dose for no more than 5 consecutive days given the risk of acute kidney injury [48,50]. Oral dosing is notably preferred over intramuscular administration, with studies showing oral administration has a more rapid onset of action and similar duration and pharmacokinetics curve when compared to intramuscular administration [46].

In studies comparing the use of Toradol from 2008 to 2016 in NCAA Division I and National Football League (NFL) athletes, reported use has decreased significantly since these recommendations were outlined in 2012 [49,51]. Ninety-three percent of responding NFL physicians reported pregame use of Toradol in 2008, which decreased to 48% in 2016. In NCAA Division I football team physicians, this practice decreased from 48% of team physicians reporting use in 2008 to 26% in 2016 [51]. Similarly to the discussion about IVFs, NFL physicians have reported concern about athletes' psychological dependence on pain prophylaxis or medication administered intramuscularly (a "needle placebo") [52].

Larger studies and more robust data collection around Toradol administration practices are needed to elucidate its safety and medical indications. Following recommendations for conservative use may reduce the risk of rare events and reduce dependency in healthy athletes.

Medicolegal considerations

The negligence standards for sports medicine are similar to the general practice of medicine, with tort law as it is applied to sports medicine practice remaining unchanged in recent decades despite the expanding work of teams and sports physicians [53]. While currently team physicians may not carry special legal duties, it is imperative for those practicing in sports medicine to recognize federal, state, and local legal regulations, as well as the guidelines of the specific school or organization they are working for.

The 3 tenants of malpractice or negligence remain similar for sports medicine and team physicians as for general practice [53]:

1. The physician had a duty of care from an established physician-patient relationship
2. The physician breached that duty of care
3. The physician's breach of duty caused actual harm or damage

While some established relationships may be clear, such as a designated team physician caring for an athlete in his or her clinic, other scenarios, such as volunteer coverage for youth sports, serving as a supervising provider for an AT, or limited involvement in mass preparticipation physicals may obfuscate this relationship. State statutes may even utilize compensation for care as a distinction for immunity in malpractice concerns [53]. Florida and Ohio, for example, have statutes providing immunity for volunteer team physicians at the youth, amateur, and school levels, elevating the burden from the standard of care to "willful or wanton misconduct." [53]. Georgia furthers that immunity includes preparticipation physical exams, provided the physician does not specifically fail to provide options for further care [53]. Similarly, professional team physicians may have protection from negligence claims under Workers' Compensation statutes unless "intent to harm" can be proven [54].

Preparticipation screening, particularly for underlying cardiac conditions, presents legal pitfalls both for clearance and disqualification. Paterick et al. note that while case law establishing the legal scope of the physician's role in preparticipation physicals is limited, strict adherence to established guidelines such as the American Heart Association's cardiac screening recommendations may best outline the standard of care [54]. It is recommended that any concern for underlying cardiac disease which may put the athlete at risk in sport should prompt removal of athlete clearance for training and competition, pending cardiology evaluation and completed workup [54].

Multiple lawsuits have also arisen from athletes claiming to have been restricted inappropriately. There is precedent at the high school and collegiate levels that schools are legally able to exclude athletes from participation because of confirmed cardiac disease, that students do not have a "compelling right to participate… without medical clearance," and that sports eligibility is "not an inalienable, libertarian right." [54]. While prior cases involved families willing to sign waivers or exculpatory agreements, such waivers may legally be unenforceable and not provide the expected immunity to the care team [54].

Team physicians that travel outside of their state of practice face another legal hurdle. While sports societies continue to advocate for national legislation in this area, it is important to know specific state and local statutes. Some states may waive some medical licensing requirements provided the physician is providing services specific to a team's athletes and staff. Further, team physicians must be cognizant of local laws regarding transporting, handling, and dispensing medications across state lines, especially controlled substances [53].

Ethical considerations

The team physician may face unique conflicts regarding the most basic tenet of the doctor-patient relationship: prioritizing the health of the patient above all other objectives. The desires of the team and even the athlete themselves may prioritize participation above safety and health.

Informed consent provides a primary example of the added difficulties in sports medicine as coaches, trainers, and other team personnel may have priorities or values that conflict with the athlete's health. Dunn et al. introduce a mid-season meniscus injury as a typical case of conflict: excision may allow a faster return to performance but may prioritize team and even athlete preferences above long-term medical consequences [55]. The team physician's concerns for medial sequelae such as post-traumatic osteoarthritis may create bias in consent discussions that conflict with the player's career priorities. While patient autonomy allows athletes to determine their own best interests, the team physician has an obligation to consider and discuss with the athlete external pressures that may influence these decisions [55].

Confidentiality is a similar area of conflict for the team physician. Physicians hired by the team, especially at the professional level, likely have an obligation to provide patient information to team officials [55]. As part of the employment record, the athlete's health information may not fall under the Health Insurance Portability and Accountability Act (HIPAA) [56]. Independent physicians managing professional athletes, however, have an obligation only to the athlete, and any requests for confidentiality would fall under HIPAA regulation. Team physicians at the collegiate level have guidance under the Federal Educational Rights and Privacy Act (FERPA), allowing student health clinic physicians to release health information to other school officials with an educational interest in the athlete without the athlete's consent [55]. This does not allow the sharing of this information with outside parties or media. However, collegiate team physicians who do not primarily practice in the student health clinic are governed by HIPAA rather than FERPA and must obtain permission from the athlete before sharing any health information with coaches or other team officials [55]. Regardless of the employment or policies involved, it is imperative that team physicians are

transparent with the athlete about any information being shared to maintain therapeutic alliance in the doctor-patient relationship.

Advertising team affiliation provides an opportunity for both marketing and ethical conflict. The American Academy of Orthopaedic Surgeons Committee on Ethics recommends against using team affiliation in any misleading way [57]. While paying for team physician rights is not recommended by most sports medicine societies, the paramount obligation is to ensure that patients are not misled that positions are earned by merit when, in fact, they are often based on the "highest bid." [55].

Summary

Serving as a team or sideline physician is a wonderful utilization of the expertise of any sports medicine physician, extending clinical practice, allowing community outreach, and creating a medical team for athletes at any level. Preparation to act as a sideline provider begins well before the season begins, with the creation and rehearsal of an EAP, coordination with local emergency medical personnel, and athlete record review to ensure that all athletes have been sufficiently evaluated for healthy participation. The EAP is an invaluable tool to improve preparing the medical team, including physicians, ATs, and EMS, to act swiftly to promote the best possible outcome. Preseason screening and return-to-play decisions should similarly be a team effort, with clearly defined roles and processes. Though standards of practice may be inadequately defined in the medical or legal literature, following available recommendations or consensus statements is most likely to ensure consistent decision-making and medicolegal protection. All team physicians, especially those who travel out of state with their teams, should be aware of local, state, and federal statutes regarding medical care and medication management. Controversies in clearance for participation, return-to-play decisions, and medical information communication can frequently arise at all levels of play. It is imperative for the team physician to be open with the athlete regarding his or her role with the team and to be transparent regarding information that is communicated to others.

Overall, it is important to understand and practice evidence-based and objective medicine, to communicate practices and plans transparently with patients and other medical providers, and to collaborate when possible with other stakeholders and medical providers. These emphases can help sports medicine physicians to maintain strong therapeutic alliances with patient-athletes and can support the physician's unique roles of leadership and responsibility for healthy athletes.

Additional links

- AMSSM National Fellow Online Lecture Series: The Role of the Team Physician
- AMSSM National Fellow Online Lecture Series: Sideline Emergencies
- JPOSNA®: The Bare Bones of Concussion: What the Sideline Orthopaedic Surgeon Needs to Know
- JPOSNA®: Adaptive Sport Participation in the Pediatric Population

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Author contributions

Michael A. Beasley: Conceptualization, Data curation, Methodology, Project administration, Resources, Writing – original draft, Writing – review & editing. **Alexandra Abbott:** Writing – original draft, Writing – review & editing. **James Mackie:** Writing – original draft, Writing – review & editing. **Joshua T. Goldman:** Conceptualization, Writing – original draft, Writing – review & editing.

Declarations of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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