Implementation Science: Lessons Learned From Evaluating Practice Recommendations for the Care of Patients With Spine Injuries

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Health care providers are encouraged to provide care according to practice recommendations because these suggestions should improve patient care and promote optimal patient outcomes. The goals of these practice recommendations are to improve patient care and promote optimal patient outcomes. However, without integration into clinical practice, the value of practice recommendations in supporting patient care is lost. Unfortunately, little is known about the success of integrating practice recommendations into clinical practice, and targeted efforts to promote integration are likely needed. Implementation research is a broad area of study that focuses on how guidelines, programs, or interventions are put into practice and delivered. The Translating Research Into Injury Prevention Practice (TRIPP) framework consists of 6 stages that support implementation science, and the framework has been used to assist in integrating injury-prevention programs into patient care. The structure of the TRIPP framework makes it applicable to other programs that would benefit from implementation science, including practice recommendations.

Stages 5 and 6 of the TRIPP framework emphasize the need to explore the implementation context and factors related to uptake of a program by end users. This commentary highlights our efforts to use methods for implementation research to evaluate stage 5 of the TRIPP framework as it relates to acute care for patients with suspected spine injuries and provides 6 lessons learned that may assist in future efforts to better implement practice recommendations in patient care. Targeted efforts to assist clinicians in implementing practice recommendations may promote their use and ultimately enhance the care provided for patients with a variety of health conditions. An essential component of any implementation effort is understanding end users via stages 5 and 6 of the TRIPP framework, and this understanding may maximize knowledge translation and encourage practice change and advancement.

Key Words: research translation, dissemination and implementation, clinical practice guidelines

Key Points

- Practice recommendations are created to improve patient care and promote positive outcomes; however, availability
 of these recommendations alone does not ensure their implementation in clinical practice.
- Implementation research studies how guidelines, such as practice recommendations, are put into real-world practice and explores factors that promote or impede their uptake by end users.
- Understanding end-user behavior and the factors that facilitate or impede the implementation of practice recommendations is essential to creating successful implementation efforts.
- Targeted efforts to assist clinicians in implementing practice recommendations at the time of release may promote their use and enhance the care related to a variety of important athletic health care topics.

thetic trainers (ATs) and other health care providers are encouraged to deliver care that follows practice recommendations. Practice recommendations typically consist of a series of statements that are developed through rigorous literature reviews and syntheses with the intent of producing comprehensive, evidence-based recommendations for clinical practice. Often, professional organizations create practice recommendations, such as position and consensus statements, on topics related to the health and safety of patients. A primary aim of practice recommendations is to promote optimal patient outcomes by delivering care that aligns with best practices. Simple availability of practice recommendations is unlikely to drive practice change because they must be translated into practice if they are to benefit patients. Essentially, the value of practice recommendations in supporting patient care is lost if they are not used in practice. Unfortunately, little is known about the success of integrating practice recommendations into clinical practice, and targeted efforts to promote their integration are needed.

Implementation research is a broad area of study that focuses on how guidelines, programs, or interventions are

put into practice and delivered, as opposed to whether or not they work in theory.¹ Implementation research also emphasizes the development of population-targeted programs, design of program delivery methods, and program evaluations to determine the effectiveness of strategies in terms of uptake, adoption, and sustainability.^{2–4} A detailed understanding of the real-world environment and context where the practice recommendations will be implemented is essential for successful uptake, adoption, and sustainability.^{3,5–7} Without this knowledge, lack of end-user "buy in" and ultimately use may result.^{3,5–7} Efforts to better understand the implementation context of ATs in various practice settings are needed to support integration of the best available evidence into practice.

Factors that facilitate or create barriers to implementation of practice recommendations have been highlighted in several models. These include the Translating Research into Injury Prevention Practice (TRIPP) framework^{2,4}; Research, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework^{3–6}; Intervention Mapping protocols^{3,5,8}; and implementation drivers.^{3,8} Understanding factors from the perspectives of the end users, with relevance to their everyday clinical contexts, is essential for creating effective implementation strategies.^{1–3,5,6,9,10} Unfortunately, few researchers in athletic health care have focused on the implementation context for the majority of practice recommendations, with most studies related to injury prevention^{11,12} and concussion.¹³

Recently, the TRIPP framework has been used for studies on injury-prevention implementation. However, the structure of the framework makes it applicable to other programs that would benefit from implementation science, including practice recommendations. The TRIPP framework consists of 6 stages that span injury surveillance to identifying the scope of a problem to factors related to the implementation context,² and it is an extension of a 4-stage model introduced by van Mechelen et al.¹⁴ Collectively, stages 1 through 4 of the TRIPP framework focus on gauging the size of the problem (eg, obtaining injury-surveillance data), understanding the cause of injuries or diseases (eg, etiology), and identifying strategies and their efficacy, which are all areas that the research community tends to explore and support.² Through stages 5 and 6 of the TRIPP framework, the need for studies that explore the implementation context and factors related to uptake of a program, such as practice recommendations, by the end user is emphasized.² In stage 5, the purpose is to determine how the practice recommendation can be translated into the intended, real-world setting.² Stage 5 requires the exploration of why programs are or are not implemented and considers the factors that support or hinder uptake. Factors related to the context, resources, and attitudes of stakeholders and end users may also be investigated in stage 5. A better understanding of the factors that promote uptake and success of implementation is helpful in understanding what works and sharing those achievements with others. However, it is equally informative to evaluate the reasons for a lack of adoption and to consider perceived barriers so that strategies to promote implementation can be developed. During stage 6, actual implementation occurs, and program effectiveness is evaluated.² Stages 5 and 6 are essential for the implementation of a practice recommendation to understand the end user and to support uptake

Table. Recommendations for Patients With Possible Spinal Injuries

Recommendations

- 1. Develop EAP in conjunction with local emergency medical services.
- 2. Conduct a timeout before athletic events to ensure the EAP is reviewed.
- 3. Activate the EAP in accordance with the level or severity of the injury.
- 4. Apply a rigid cervical stabilization device to a patient with a spine injury before transport.
- 5. Develop a transportation plan before the start of any athletic practice or competition.

Abbreviation: EAP, emergency action plan.

efforts; the athletic training community would benefit from studies to evaluate these important phases of the TRIPP framework.

This commentary highlights our efforts to use methods of implementation research to evaluate stage 5 (ie, understanding the local context to strategize implementation efforts) of the TRIPP framework in relation to an athletic health care topic. Over the years, the acute care of patients with suspected spine injuries has been a focus of athletic health care and has gained considerable attention from the athletic training community, given the significant role that ATs play in the emergency management of patients with these serious injuries.^{15–17} Although guidelines for the acute management of patients with spine injuries have been available for years, limited information is available regarding how well these practice recommendations have been implemented in clinical practice. Further, as research evidence about the care of these patients expands, updates to spine care practice recommendations are expected. Future updates to practice recommendations would benefit from our greater understanding of current clinical practices as well as influential factors for and barriers to implementation. A better understanding of the factors related to enduser behaviors, such as the decision to implement a recommendation or not, are needed to assist with the ultimate uptake of any practice recommendations² and may make the difference between a successful and a failed implementation strategy. This commentary is intended to outline the lessons we learned from our efforts to understand end-user behavior related to the treatment of athletes with a suspected spine injury and is not intended to be a detailed research report.

Stage 5 of the TRIPP Framework: Lessons Learned

Our approach was designed to better understand the comfort, ease of implementation, success, influential factors, and barriers of ATs who did or did not implement practice recommendations for athletes with suspected acute spine injuries. To do so, we invited practicing ATs from across the country to complete a comprehensive survey about practice recommendations for the acute care of patients with suspected spine injuries^{18–20} that were based on long-standing and emerging practices^{15–17} (Table). Responses from 2304 ATs were analyzed for the entire survey, and of those, a total of 1755 (76.2%) ATs responded to the portion of the survey that related directly to the implementation of practice recommendations. The lessons learned that we discuss in this commentary are

based on data from ATs who completed the section of the survey dealing with the implementation of practice recommendations.

Lesson Learned #1: Implementation Behaviors. Using survey methods to assess clinicians' current implementation practices provides a snapshot of what is occurring in clinical practice. A small percentage (20.2%, n = 354/1755) of ATs who completed the survey implemented all 5 of the practice recommendations studied, with only a small percentage (2.3%, n = 41/1755) indicating that they did not implement any of the recommendations. The majority of ATs (70.1%, n = 1231/1755) stated that they implemented 3 or more of the practice recommendations studied. Of all the practice recommendations, the one most frequently indicated as not implemented (57.5%) was to conduct a timeout before the start of athletic events to ensure emergency action plans (EAPs) were reviewed. Medical timeouts are encouraged before all athletic events, whether practice or competition, to ensure that those onsite have reviewed the EAP and are prepared in the case of an emergent situation such as an acute spine injury.^{21,22} Simple strategies to support the medical timeout, such as a checklist to review before athletic events, have been created and disseminated within the profession.^{21,22} Although our data do not provide us with insight as to why medical timeouts were not often performed, simply knowing that the current data suggest a low level of implementation of this practice recommendation is helpful. First, knowledge of a low level of implementation can initiate the development of targeted strategies to support implementation, such as educational efforts to ensure awareness of the practice recommendation or a specific rollout of a medical timeout tool kit that highlights the available checklist. Additionally, knowledge of a low level of implementation can be used to inform future practice recommendations. Efforts aimed at better understanding the reasons for lack of implementation of the medical timeout and the subsequent development of targeted, real-world strategies to promote uptake are needed to increase the use of this practice recommendation.

Lesson Learned #2: Motivations for Implementation. We are better informed about what motivates ATs to provide care according to practice recommendations from our survey of ATs and their implementation of spine injury practice recommendations. Athletic trainers who implemented the practice recommendations frequently indicated that they did so because "it is a priority" and "perceived professional responsibility and/or best practice." Over 60% of respondents identified these 2 factors as influential across all 5 practice recommendations studied. "It is a priority" was an influential factor for over 70% of respondents when considering practice recommendations related to developing an EAP in conjunction with emergency medical services (EMS), conducting a timeout to review the EAP before athletic events, and activating the EAP in accordance with the level or severity of injury. Similarly, more than 70% of respondents identified "perceived professional responsibility and/or best practice" as an influential factor for creating an EAP in conjunction with EMS and conducting a timeout to review the EAP before athletic events. No other influential factors, except having an "established relationship with EMS when developing an EAP," received 50% endorsement by those who imple-

mented the practice recommendation studied, demonstrating the high value that ATs place on motivators such as prioritization, professional responsibility, and best evidence to drive care. These findings suggest that ATs wish to implement practice recommendations into their patient care because to do so is their professional duty. Strong professional responsibility, or role commitment, has long been a hallmark of athletic training practice and has been studied to a limited degree. Athletic trainers in the secondary school²³ and collegiate²⁴ settings identified strong professional responsibility as part of their roles. Further, a significant factor in their commitment was their dedication to their patients,^{23,24} which aligns with the responses from our survey in which best practices influenced the decision to implement a recommendation. Implementation strategies that capitalize on and promote professional responsibility as a reason for following practice recommendations may encourage uptake and should be considered in future implementation efforts.

Lesson Learned #3: Stakeholder Relationships. The value of relationships with relevant stakeholders to the success of practice recommendation implementation was another lesson learned through our study. The relationship that ATs have with EMS is an important influential factor when considering the care of athletes with spine injuries, with nearly 30% of those who implemented any of the 5 practice recommendations studied endorsing this relationship. However, ATs who did not create an EAP in conjunction with EMS identified (1) lack of an established relationship with EMS and (2) lack of support from EMS as barriers. Fostering an established relationship with EMS and creating a shared vision for emergency procedures can make care more efficient and support positive patient outcomes. Accordingly, clinical practice guidelines^{25–29} on the emergency care of school-aged children and athletes advised that EAPs be developed in conjunction with EMS. Further, the National Association of State EMS Officials recommended that ATs and local EMS regularly practice the EAP together in drills to strengthen, plan execution of, and ease transition of care during an actual emergency,³⁰ a position that has been supported by others.^{26,27,31,32} Frequent practice not only builds a relationship with EMS but also makes execution of the EAP more efficient and provides opportunities to identify concerns or problems with the plan that can be improved for better delivery in future emergencies. Targeted strategies that provide practical examples and real-world tips to ATs on how to build strong relationships between EMS personnel and ATs should be developed to support the implementation of practice recommendations because the lack of such a relationship may hamper uptake.

Lesson Learned #4: Resources for Implementation. Another lesson learned from our work to better understand the factors related to use of the spine practice recommendations was the value of resources in end-user uptake. The availability of resources was helpful for successful implementation and the lack of resources was a barrier to implementation. A limited number of personnel, not enough trained staff, and a lack of applicability to the current practice setting were barriers noted by at least 20% of survey respondents. Because staffing requirements were identified as an influential factor in and a barrier to the implementation of several practice recommendations, further exploration of this topic is warranted. In traditional models of athletic training, especially in the high school setting, having an adequate number of trained personnel may be a concern.

In 2010, Wham et al³³ studied factors related to providing appropriate medical care in South Carolina secondary schools and reported that the majority of schools surveyed indicated having a single AT. Pryor et al³⁴ also looked at athletic training services in the secondary school and reported that about 70% had access to athletic training services, yet only one-third of those positions were full time. In the collegiate setting, although staffs were larger than in secondary schools, only one-third of National Collegiate Athletic Association Football Bowl Division schools met the "Appropriate Medical Coverage for Intercollegiate Athletics" guidelines put forth by the National Athletic Trainers' Association³⁵ to ensure proper health care coverage for athletes.³⁶ Most Bowl Division schools were short 1 to 3 full-time equivalents of ATs.³⁶ Given that most high schools employ only 1 AT and upperdivision colleges fall short of personnel recommendations, coupled with the reality that some emergency techniques are better performed with more people,³⁷ the availability of trained staff to carry out acute spine care practice recommendations warrants attention. Short handedness in terms of trained personnel may not be easy to overcome, and strategies to support implementation, given the reality of limited staff, should be explored in future implementation research. Additionally, the reality of understaffing and resource limitations, which are often challenging, should be considered in the development of future practice recommendations.

Lesson Learned #5: Comfort and Ease of Implementation. As part of our work, we also sought to learn about the comfort and ease ATs felt in regard to implementing spine injury practice recommendations because evaluating the attitudes of end users is an important component of stage 5 of the TRIPP model.² Athletic trainers who indicated that they implemented a recommendation most often reported being moderately or extremely comfortable with doing so. Thus, comfort with a recommendation may be an important factor when considering implementation of practice recommendations and should be a component of implementation strategies. Additionally, at least 75% of ATs who commented that they implemented a specific practice recommendation reported it to be moderately or extremely easy to implement and were moderately or extremely successful in its implementation. These findings suggest that ATs who are implementing practice recommendations are doing so with ease and success. Identifying factors that make implementation easy and successful would help inform larger efforts aimed at increasing the use of practice recommendations.

Lesson Learned #6: Feasibility of Implementation. Finally, because it is likely that spine injury practice recommendations will be updated in the future, we also wanted to investigate ATs' perceived feasibility regarding the implementation of such recommendations in the future. Of those ATs who did not currently implement a recommendation, the majority (more than 50%) indicated it would be moderately or extremely feasible to implement these practice recommendations in the future. Thus, feasibility did not seem to be a hindrance to implementing spine injury practice recommendations because most ATs found them achievable. Further, the process for developing future practice recommendations may benefit from our learning that ATs found the recommendations feasible, and a targeted implementation strategy that accompanies the release of new recommendations may encourage greater uptake. A better understanding of the factors and barriers perceived as influential in implementation by those who do and those who do not implement recommendations will assist us in planning strategies to promote the successful adoption of these critical recommendations now and in the future.

Conclusions

Through our work to explore stage 5 of the TRIPP framework related to spine care, we learned that most ATs implemented 3 of 5 practice recommendations, and they often did so because of professional responsibility and the desire to use best practices. Further, relationships with and support from EMS influenced the decision to implement practice recommendations in acute spine care and could impose barriers if absent. These findings are the foundation for targeted implementation research aimed at more widespread use of these important practice recommendations and the subsequent evaluation of specific strategies to promote their use (ie, TRIPP framework stage 6).

Practice recommendations, including position and consensus statements, are important to study from an implementation standpoint for several reasons. First, ATs are encouraged to deliver care in an evidence-based manner, using the most up-to-date clinical practices. Following established practice recommendations is an important step in ensuring that high-quality care is delivered to every patient with an injury or health condition. However, one of the challenges with any type of practice recommendation is that often these practices are not implemented.³ Practice recommendations that are not widely implemented are not effective in improving the health of populations.^{1,2} Designing implementation strategies geared at the needs of end users is important to encourage their use, with reports of 2 to 3 times greater influence with carefully implemented programs than without.⁹ Unfortunately, simple dissemination of resources and information does not lead to successful implementation outcomes.8,10 When encouraging the implementation of practice recommendations to a broad group of people with the purpose of large-scale uptake, understanding the implementation context,^{2,4,38} as well as engaging the end users early in the planning and designing of implementation strategies is essential.^{5,39,40} Through our study, we learned that a better understanding of the influential factors in and barriers to the implementation of any practice recommendations should produce a knowledge base for targeted efforts aimed at increasing the rate of adoption or uptake.

Future Directions

As dissemination and implementation research becomes more prevalent in the broader health care community, implementation studies that focus on stages 5 and 6 of the TRIPP framework are needed in athletic health care. We must ensure that ATs are effectively translating new knowledge gained from the dissemination of position statements, consensus statements, and practice recommendations to enhance their clinical practice. From a public health perspective, the severity of the health outcome should drive public health priorities and actions,⁴¹ which includes studying and evaluating the implementation of important practice recommendations.

A necessary area of study is the implementation of the numerous position statements that the National Athletic Trainers' Association produces to promote athletic health care. Although these statements provide guidance in the delivery of care according to best practices, they are often disseminated without a targeted implementation strategy. Athletic trainers are left to figure out how to apply the recommendations to practice on their own. Targeted efforts to assist clinicians in implementing guidelines at the time of the statement's release may promote their use and ultimately enhance the care provided for patients with a variety of health care conditions. Understanding end users via stages 5 and 6 of the Tripp framework is essential to maximizing knowledge translation and encouraging practice change and advancement.

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