

Original article

# Use of the stepwise progression return-to-play protocol following concussion among practicing athletic trainers

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## Abstract

**Purpose:** The purpose of this study was to determine whether practicing athletic trainers (ATs) were using the stepwise progression to make return-to-play (RTP) decisions after concussion and to determine what factors influenced their decision to use the stepwise progression.

**Methods:** A total of 166 ATs (response rate = 16.6%) completed a 21-item questionnaire that evaluated participant demographics, methods of concussion management, and RTP decision-making using the stepwise progression. Descriptive statistics and a logistic regression were completed to analyze data.

**Results:** Factors such as education level ( $p=0.05$ ) and number of concussions treated ( $p=0.05$ ) predicted use of the stepwise progression, whereas sex ( $p=0.17$ ), employment setting ( $p=0.17$ ), state law ( $p=0.86$ ), and years practicing ( $p=0.17$ ) did not predict whether ATs were following the stepwise progression.

**Conclusion:** The majority of the ATs from this study are employing the stepwise progression to safely return athletes to play after sustaining a concussion. This demonstrates that ATs are providing a standard of care for concussed athletes across various athletic training settings; however, having a graduate degree and treating more concussions per year are predictors of whether an AT follows all steps of the stepwise progression.

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**Keywords:** Athletic trainers; Concussion; Concussion management; Graduate degree; Return to play; Sports medicine; Stepwise progression

## 1. Introduction

The diagnosis and management of concussion injury has evolved within the sports medicine community over the past 2 decades.<sup>1</sup> Concussion injuries can present as a wide range of clinical situations with variable management resources (i.e., athletic trainer (AT) with specialist consultants and investigation tools) that influence the management of concussions.<sup>2</sup> Regardless of the circumstances, the return to play (RTP) decision after a concussion is ultimately one of the most difficult challenges facing sports medicine professionals.<sup>2</sup> Sports medicine professionals that take care of concussed athletes have the goal to return the athlete to play as soon as possible without putting the athlete at risk for further injury. RTP decisions must be comprehensive and include the nature of the injury and any previous history of concussion as well as physical and cognitive function.<sup>3</sup>

Concussion is a heterogeneous injury; however, it is important that a generalized systematic approach is put into action to manage each injury.<sup>4</sup> Regardless of level of participation, all athletes with a concussion should be managed using the same foundational RTP model.<sup>2</sup> Cognitive and physical rest are fundamental treatments of concussion until the athlete's symptoms have resolved.<sup>2,5</sup> Recently, some researchers have purported that cognitive and physical rest is an ineffective strategy in expediting the recovery process after concussion, but others maintain that there is merit in its use within concussion management.<sup>6</sup> Throughout most health care facilities this remains the current standard in concussion treatment and is widely practiced. After rest and absence of clinical signs and symptoms of concussion, a graded RTP rehabilitation program can be implemented under the direct supervision of a licensed medical professional. The graded RTP rehabilitation program is known as the stepwise progression in the athletic training community. The stepwise progression protocol is supported by published guidelines and consensus statements by the Concussion in Sport Group (CISG), American College of Sports

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Medicine (ACSM), American Medical Society for Sports Medicine (AMSSM), American Academy of Neurology (AAN), and National Athletic Trainers' Association (NATA), although there remains insubstantial evidence for its prescribed clinical use.<sup>7-11</sup> Current literature is lacking on the practices of using the stepwise progression in the clinical setting; however, the progression is well accepted and should occur before returning to sport.<sup>12</sup>

ATs are the primary health care professionals who are involved in the immediate recognition, diagnosis, and management of concussion injuries in the athletic population. In a survey of 907 National Collegiate Athletic Association (NCAA) member institutions, the AT was reported by 72.8% to be the primary individual who possessed RTP authority.<sup>13</sup> The current literature on RTP practices among ATs has investigated tools to diagnose and manage concussions; however, there is limited research investigating the use of the stepwise progression to make RTP decisions. Lynall et al.<sup>14</sup> reported that 90% ( $n=1053$ ) of practicing ATs are using published consensus statements and management guidelines to manage concussions. Similarly, results from a study done by Williams et al.<sup>15</sup> showed that high school ATs are practicing proper concussion management by utilizing objective tools for concussion assessment and that 70% of ATs are returning athletes to participation following established RTP protocols. At the collegiate level, 96.6% of the 327 responding NCAA Division I, II, and III universities stated that they had a concussion management protocol in place, involving RTP.<sup>16</sup> Likewise, in another collegiate study, 80.6% of participating ATs reported using a graded-exercise RTP protocol.<sup>17</sup> State laws, school district policies, and state athletic policy regarding concussions have been shown to restrict ATs from making the final RTP decision by following a stepwise RTP protocol.<sup>14,18</sup>

Despite increasing research and information on the pathophysiology of concussion and management approaches, the RTP decision is a controversial and difficult task for ATs. The literature is unclear and sometimes contradictory regarding specific management of concussion and RTP. The stepwise progression has been studied and supported by some researchers for its use in clinical practice to aid in recovery after a concussion. However, there have been other studies alleging that immediate cognitive and physical rest only hinder an athlete's recovery, finding that those who did not undergo rest recovered more quickly.<sup>6</sup> Ultimately, there is a lack of empirical research that has established evidence-based best practices; however, the stepwise progression is becoming the "gold standard" RTP protocol consistently across consensus statements. Therefore, the purpose of this study was to determine whether practicing ATs were using the stepwise progression to make RTP decisions after concussion and to determine what factors predicted their decision to use the stepwise progression. We hypothesized that the majority of ATs were using the stepwise progression to make RTP decisions after concussion and that the decision to use the stepwise progression would be predicted by work setting, state concussion legislation, and/or the concussion policy at their place of employment.

## 2. Materials and methods

### 2.1. Participants

One thousand NATA members were randomly selected and contacted through a free e-mail list-serve for NATA student members. Our sample size was not limited to ATs in any particular setting; rather all certified practicing ATs in all regions of the US were able to participate. The e-mail was distributed by the NATA office to registered NATA members.

### 2.2. Instrumentation

The survey instrument was a 21-item questionnaire that was developed using a literature review and an expert review. A panel of certified ATs and sport-related concussion researchers from 2 universities reviewed it for face and content validity. The questionnaire was pilot tested on 8 (5 males, 3 females) certified ATs employed in high school, clinic, and collegiate settings, resulting in a few modifications to survey questions. The survey evaluated methods of concussion management and RTP decision-making using the stepwise progression. The survey obtained demographic information from each participant pertaining to sex, employment setting, education level, state of practice, years of board certification, primary sport coverage, and number of concussions treated annually. The survey also contained questions relating to state concussion legislation, employment concussion policies, athletic conference and high school sport association policies, and legislation requiring use of the stepwise progression for RTP. Questions more specific to the stepwise progression assessed preferred concussion management tools, frequency of use of each step of the graduated stepwise progression protocol, the time period before progressing to the next step of the progression, and which health care provider is responsible for making the final RTP decision. More specific to concussion management tools, participants were also asked about their frequency of use of a variety of concussion management tools, including the stepwise progression, when making the RTP decision. Participants were also asked whether they believed that the stepwise progression was a valuable tool for ATs to use when making an RTP decision for concussed athletes.

### 2.3. Procedure

Approval for the study and use of human participants was permitted by the Michigan State University's Institutional Review Board. A cross-sectional survey was completed online through use of the NATA member e-mail list. Consent was implied when participants clicked on the link to the survey and agreed to participate in the study. The initial e-mail sent out from NATA contained an overview, an explanation for the study, and a hyperlink to the study. One month after the initial e-mail, a reminder was sent out by NATA. [Qualtrics.com](http://Qualtrics.com) was the host site for the survey, which took approximately 10–15 min to complete. All responses were returned to the website as anonymous data. Participants were allowed to withdraw at any time without penalty and were allowed to skip questions.

## 2.4. Data analysis

Responses from the web-based survey were downloaded from the website into a Microsoft Excel spreadsheet (Version 2010; Microsoft, Redmond, WA, USA) and later imported into IBM SPSS Version 22.0 (IBM, Armonk, NY, USA). Descriptive statistics were calculated for each response. In addition, logistic regressions were conducted to determine whether certain factors (i.e., sex, years of clinical experience, number of concussions treated in the past year, state legislation, education level, and employment setting) directly influenced the ATs' use of the stepwise progression to make RTP decisions for concussed athletes. Use of the stepwise progression was the dependent variable; it was determined when an AT self-reported that he or she had followed every consecutive step of the stepwise progression before returning an athlete to play. Each step of the stepwise progression was listed on the survey, and ATs had to indicate compliance at every consecutive step to be counted as using the stepwise progression. The significance level was set at  $p < 0.05$ .

## 3. Results

### 3.1. Demographic data

A total of 190 ATs responded to the e-mailed survey; however, only 166 responses (response rate = 16.6%) were included in the analysis because some surveys were overwhelmingly incomplete (males = 85 (51.2%), females = 76 (45.8%), unspecified = 5 (3.0%)). Not all 166 ATs responded to every question; therefore, data presented include valid percentages only from those ATs who did respond to each question. The most common education completion level of ATs was a master's degree ( $n = 113$ , 68.1%), followed by bachelor's degree ( $n = 45$ , 27.1%), doctorate ( $n = 7$ , 4.2%), and unspecified ( $n = 1$ , 0.6%) (Table 1). Over a third of the

Table 1  
Demographic composition of participants by sex, education, and employment ( $n = 166$ ).

Variable	Frequency	Percentage
<b>Sex</b>		
Male	85	51.2
Female	76	45.8
Unspecified	5	3.0
<b>Education</b>		
Bachelor's	45	27.1
Master's	113	68.1
Doctorate	7	4.2
Unspecified	1	0.6
<b>Employment</b>		
High school	68	41.0
Division I	27	16.3
Division II	7	4.2
Division III	18	10.8
High school/clinic	15	9.0
Clinic/hospital	10	6.0
Professional sports	4	2.4
Industrial	2	1.2
High school Division I	2	1.2
Other	13	7.9

Table 2  
Use of the stepwise progression.

Stepwise progression: Steps 1–6	Number of participants who utilize each step ( $n$ ) (%)
Asymptomatic at least 24 h	143/154 (92.9)
Light aerobic activity	147/154 (95.5)
Sport-specific drills and exercise	146/154 (94.8)
Noncontact training drills	144/154 (93.5)
Contact training drills/full practice	140/152 (92.1)
Game play	146/153 (95.4)

participants were actively employed in the high school setting ( $n = 68$ , 41.0%), followed by the Division I setting ( $n = 27$ , 16.3%), the Division III setting ( $n = 18$ , 10.8%), and the Division II setting ( $n = 7$ , 4.2%) (Table 1). ATs had an average of 11.7 years of clinical experience, ranging from 1–30 years. The average number of concussions treated by ATs in the past year was 12.8, ranging from 0 to 30. ATs employed in the high school setting reported assessing the most concussion injuries per year, ranging anywhere from 5 to 30 per year.

Of the participants surveyed, 85.5% ( $n = 142$ ) replied that their state had a law on concussion, 4.2% ( $n = 7$ ) stated that they did not have a state law in their respective state, and 10.3% ( $n = 17$ ) did not know whether their state had a concussion law. Findings indicated varied levels of high school and collegiate conference concussion policies, with 73.5% ( $n = 122$ ) of participants stating that they did have a policy, 16.3% ( $n = 27$ ) stating that they did not have a policy in place, and 9.6% ( $n = 16$ ) stating that they did not know whether a policy was in place. With respect to the presence of an employment concussion policy, 93.4% ( $n = 155$ ) stated that they did have an employment policy, 4.2% ( $n = 7$ ) stated that they did not have a policy in place in their work setting, and 0.6% ( $n = 1$ ) did not know whether they had an employment policy in place.

### 3.2. Stepwise progression and RTP

Results demonstrated that the majority of ATs (84%,  $n = 130/154$ ) are following all consecutive steps of the graduated stepwise progression (Table 2). ATs varied in time frame implementation of the stepwise progression, with 91.1% ( $n = 143/157$ ) stating that they waited 24 h after symptom resolution before initiating the stepwise progression or advancing to the next step in the progression and 8.9% ( $n = 14/157$ ) stating that they did not wait 24 h. Results from a logistic regression used to assess multiple demographics as predictors of the use of the stepwise progression for RTP after a concussion revealed significance for the demographic factors of level of education ( $p = 0.05$ ) and number of concussions treated in the past year ( $p = 0.05$ ). Sex did not predict use of the stepwise progression ( $p = 0.17$ ) (Table 3). Additionally, other factors such as employment setting ( $p = 0.17$ ) and years practicing as an AT ( $p = 0.17$ ) did not significantly predict whether ATs were following the stepwise progression. Moreover, the results from the logistic regression model investigating the direct predictors such as state legislation and employment concussion policies did not show any significance. Employment concussion policies

Table 3  
Factors that predict athletic trainers' use of the stepwise progression.

Predictors	Odds ratio	95% Confidence interval	<i>p</i>
Sex	1.019	0.992–1.045	0.17
Setting	0.908	0.791–1.042	0.17
Education level	0.344	0.119–0.991	0.05
Years of experience	1.024	0.990–1.060	0.17
Concussions treated	0.954	0.908–1.002	0.05
State law	0.872	0.182–4.178	0.86
High school or conference policy	2.345	0.833–6.599	0.11
Employment policy	0.970	0.832–1.131	0.67
Stepwise law	0.893	0.453–1.759	0.74

( $p=0.67$ ), high school or collegiate conference policies ( $p=0.11$ ), state concussion laws ( $p=0.86$ ), and state laws mandating the use of the stepwise progression ( $p=0.74$ ) did not significantly predict use of the stepwise progression.

The majority of participants (77.9%,  $n=120/154$ ) stated that the stepwise progression was always a valuable tool in making an RTP decision. In addition, 19.5% ( $n=30/154$ ) stated that it was a valuable tool most of the time, and 2.6% ( $n=4/154$ ) stated that it was sometimes or never a valuable tool to use when making an RTP decision. For choice of exertion exercise during the progression, 48% of participants preferred using the stationary bike, followed by 24% who preferred to have athletes do running outdoors and 12% who preferred using a treadmill. Results from this study demonstrate that ATs are the primary decision-makers when it comes to returning an athlete back to play. ATs are solely making the final RTP decision 29% of the time. It also appears that ATs are working with team physicians and primary care providers to make joint decisions 28% of the time, followed by the primary care physicians solely making the final RTP decision 22% of the time. Finally, neurologists and neuropsychologists are making RTP decisions less than 1% of the time.

#### 4. Discussion

Management of concussions has evolved over the years. In the early years of concussion management, grading of concussions was conducted on a 3-level scale with corresponding RTP timelines. This was superseded, however by the emergence of consensus statements, led most notably by the CISG. This group put forth new guidelines based on the world literature while also proposing an individualized approach to management of concussions. Alongside these consensus statements came the materialization of evidence-based guidelines offering similar standards of care.<sup>19</sup> The most current and widely recognized evidence- and consensus-based guidelines agree that a gradual stepwise progression in physical activity should be initiated before an athlete's return to sport.<sup>20</sup> As part of the stepwise progression, there is a 24 h wait rule in place recommending that an athlete be symptom free for 24 h before advancing in the steps of progression.<sup>10</sup> The findings of the current study suggest that the majority of ATs (84%) are using a stepwise progression when managing a concussed athlete and are waiting 24 h before

commencing the stepwise progression. This is consistent with previous researchers, who reported that the majority of ATs used published consensus statements and management guidelines for the treatment of concussions.<sup>14,17</sup> The 24 h period of physical and cognitive rest has been recently examined by researchers and found to be ineffective in reducing postconcussion recovery time.<sup>6</sup> Moreover, recommending strict rest for concussed adolescents has appeared to result in slower postconcussion symptom resolution.<sup>21</sup> More controlled trials are needed to better understand the implications of rest on concussion management. Moreover, a dose response to rest is lacking in concussion management literature; therefore, following the golden rule of waiting 24 h after an athlete is symptom free before incorporating the stepwise progression demonstrates that ATs are following consistent published recommendations.

Another reason that ATs follow the recommended stepwise progression may be increased education about concussion. Results from this study highlighted that level of education was a predictor of stepwise progression when returning an athlete to participation. ATs who are earning graduate degrees (either a master's or a doctorate degree) are more likely to implement a graduated stepwise progression process into their concussion management. This finding is particularly interesting because athletic training education is making a transition to the requirement for a master's degree. Although the majority of practicing ATs currently hold a master's degree,<sup>17</sup> the Commission on Accreditation of Athletic Training Education and NATA have mandated that all current undergraduate athletic training education programs transition to an entry-level requirement of a master's degree by 2022. Buckley and colleagues<sup>17</sup> reported that approximately 83% of practicing ATs at the Division II level and 87% at the Division III level presently hold a master's degree. With increased education comes more exposure to athletic training research, and 80% of ATs state that they learn about concussions from reading research articles. Moreover, 86% of ATs state that they have earned an average of 7 continuing education credits on concussion-related topics within the previous 3 years. A study conducted by Covassin and colleagues<sup>22</sup> also found that the NATA position statement was the most widely taught guideline by athletic training educators in the classroom, with 80% reporting this practice. In addition, 84% of participants reported that these guidelines were taught to students in the classroom as an effective management strategy in caring for concussed athletes. Thus, education and increased exposure to concussion management position statements as well as concussion research seem to be playing a role in whether ATs follow published concussion guidelines. This finding is particularly promising as athletic training education programs make the transition to the graduate level.

In addition to implemented degree changes, legislative processes have been put into practice in all 50 states and Washington, D.C., leading the way to standardizing the management of sport-related concussion in youth sport. Although these state concussion laws represent support for quality of care, the laws are difficult to enforce, and there are no outlined penalties for individuals or institutions that fail to comply.<sup>23</sup> The current study did not find that awareness of state concussion laws

significantly predicted the implementation of the stepwise progression. It is important to note that approximately 15% of the ATs in this sample either were unaware of the concussion legislation in their state of practice or stated that there was no concussion law in their state. This is concerning, because ATs are generally working in settings in which there is an inherent risk of a concussion injury. At the time this study was conducted, all 50 states had passed legislation; however, not all 50+ laws had gone into effect. Regardless, ATs must be aware of laws that address management of concussion, as well as any other health- or injury-related issues that may influence the process in which injuries are managed.

Results of the current study indicated that employment setting, years of experience as an AT, sex, concussion policies, and management plan did not predict utilization of the stepwise progression to make RTP decisions after concussion. National sports governing bodies, such as the NCAA and the National Federation of State High School Associations, have suggested and required institutions to develop and implement concussion policies. Thus, collegiate and high school athletic programs have developed concussion policies that ATs are required to follow. The presence of an institutional concussion management plan was reported by 92.7% of NCAA member institutions; however, it appears that physicians were more frequently making final RTP decisions at institutions with these concussion management policies.<sup>13</sup> Therefore, it may be that physicians who are ultimately responsible for making concussion management decisions and RTP plans may be more predictive of utilizing the stepwise progression. In regard to sex and employment setting, neither was predictive of utilization of the stepwise progression with concussed athletes. This is not necessarily a negative finding, because 84% of the total AT sample indicated that they followed all consecutive steps of the graduated stepwise progression. Thus, it does not appear to make a difference whether ATs are male or female, or what the employment setting is, because the majority of ATs follow the correct stepwise progression when working with concussed athletes.

The current study indicated that ATs who evaluate and manage only a few concussions annually may forget to follow the stepwise progression and may allow athletes to either skip steps or not wait until they are symptom free for 24 h before beginning the RTP progression. In breaking down our descriptive results, it did appear that males working in the collegiate setting who were treating only a few concussions annually were largely among the 15% of ATs not utilizing the graduated stepwise progression. Therefore, it is suggested that ATs who do not evaluate and manage a lot of concussions annually should stay current by attending continuing education seminars or workshops on concussion management.

Evaluating and managing sport-related concussion raises a variety of ethical and legal issues for ATs. Autonomy of practice should not supersede a concussion management model that involves a multifactorial approach. ATs in this study demonstrated that there is consistency in practice and that the majority of ATs are utilizing the stepwise progression to make RTP decisions; however, additional years of education to fulfill a graduate degree and increased exposure to concussion

injuries each year appear to predict increased usage of the stepwise progression. Although there is still no gold standard for concussion management, it appears that overall, ATs have followed recommended guidelines and implemented the graduated stepwise progression into their RTP process.

As with all studies, this study had a few limitations that must be mentioned. First, the survey information relied on participants to self-report. This questions the honest reporting of participants. Second, this study had a small sample size and needs to be replicated using a larger cohort. Finally, the majority of participants reported being employed in the high school setting (41%). According to the latest published NATA membership data, only 19.2% of NATA members are employed in the high school setting; 19% are employed in the collegiate setting, and 13% are employed in the clinic setting.<sup>24</sup> As a result, the study cannot be generalized to all athletic training settings.

## 5. Conclusion

The graduated stepwise progression has become the standard of care designed to prohibit symptomatic athletes from participating in any activity that may exacerbate symptoms. The stepwise progression protocol is supported by published guidelines and consensus statements by the CIGS, ACSM, AAN, and NATA. The current literature on RTP practices among ATs has investigated tools to diagnose and manage concussions; however, there is limited research investigating the use of the stepwise progression within the athletic training community to make RTP decisions. Although the stepwise RTP progression lacks empirical evidence, it has become the gold standard in returning a concussed athlete back to participation. This study found that ATs who evaluate and manage more concussed athletes annually and ATs with a higher education level more predictably use the stepwise RTP progression with concussed athletes. As the athletic training profession shifts to a graduate level degree, graduate AT students will gain more exposure to research and evidence-based practices that may contribute to concussion management decisions.

## Authors' contributions

JW carried out the study and was directly involved in conception of the study, participated in instrumentation design, coordinated data collection, completed data analysis, and drafted the manuscript; TC was involved in conception of the study, instrumentation design and drafting of the manuscript; ML assisted with preliminary data analysis and draft of the manuscript. All authors have read and approved of the final version of the manuscript, and all agree with the order of presentation of authors.

## Competing interests

The authors declare that they have no competing interests.

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