Examining the Need for Specifying Educational Content for Cervical Spine Immobilization Skills in Athletic Training Education Programs

A THESIS

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by
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THESIS APPROVAL

Graduate Athletic Training Education

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INTRODUCTION

The concern of a potential cervical spinal injury is always in the back of the mind of an athletic trainer covering a sporting event. According to Vaccaro et al. 10% of all the cervical spine injuries in the United States occur in athletics.[1] The major life consequences these injuries can have on an athlete are the reason for concern. Proper management of the injured athlete is essential to reduce further injury. Protocols for the assessment and management of cervical spinal injuries can be helpful in crucial decision making, especially in sports involving protective equipment that may need to be removed in order to perform life-saving procedures or for proper immobilization.

Since there are various contact sports today, the need for an athletic trainer to cover those sports is great. The athletic trainer needs to be aware of all the protocols required, regardless of sport, to safely remove protective equipment if a cervical spine injury were to occur. According to studies looking at the National Collegiate Athletic Association (NCAA) Injury Surveillance System (ISS) done during 1988-1989 through 2003-2004, head and neck injuries are one of the most prevalent injuries in

football, men's lacrosse, and men's hockey. Dick et al. reported that, during fall games of football, 6.8% of all injuries that occur are to the head and are concussion related.[2] Dick et al. also reported in another study that, during games of men's lacrosse, 8.4% of all injuries that occur are to the head and are concussion related.[3] Ice hockey injuries were also examined. Agel et al. reported that, during games of men's hockey, 9.0% of all injuries that occur are to the head and are concussion related.[4] With these numbers, the question is, have athletic trainers been taught the protocols for all of the contact equipment sports?

Most studies today recommend leaving the helmet and shoulder pads on when cervical spine (CS) immobilizing, if no respiratory distress is present. [5-8] Football equipment has been well examined, but there are few protocols that describe when there is an emergency situation in which the equipment of hockey and men's lacrosse needs to be removed from the athlete. This creates a deficit in the acute care skills of athletic trainers.

This lack of knowledge and training for many athletic trainers indicates there is a need for these skills to be taught in athletic training education programs (ATEP). As of now, the athletic training competencies state that

athletic training students must be able to “establish and maintain an airway in a patient wearing shoulder pads, headgear, or other protective equipment and/or with a suspected spine injury.”[9] The problem is the competencies do not state which specific type of shoulder pads and headgear should be used, leaving the ATEP to choose which equipment they wish to utilize. If CS immobilization skills were taught for the three equipment intensive sports in their ATEP, then it can be assumed that athletic training students will then be prepared for emergency situations in these equipment intensive sports.

The goal this study is to determine if athletic training students are being taught football, ice hockey, and men’s lacrosse immobilization and equipment management techniques. By surveying athletic training education programs regarding which immobilization techniques are taught, a better understanding can be made if there is a need for specifying the educational content of acute care of injuries, as it relates to equipment removal for these sports, in the athletic training competencies.

METHODS

The purpose of this study is to examine the need for specifying the educational content that athletic training students are taught in acute care of injuries, pertaining to immobilizing cervical spine injured athletes wearing protective equipment, in the athletic training competencies. This section will include the following sections: Research Design, Subjects, Instruments, Procedure, and Data Analysis.

Research Design

A descriptive design was used for this study. The dependent variable is the athletic training education program’s teaching methods. The independent variable is the acute care protocols for cervical spine injured equipment wearing athletes that is required by the National Athletic Trainers’ Association (NATA) education council to be taught at the athletic training education programs.

Subjects

320 Athletic training education program directors (DI, DII, & DIII) were asked to volunteer in a survey for this study. The response rate was 40.3% (N = 129). Informed Consent was implied with completion and return of survey.

Instruments

An original survey was created. The ATEP Directors Survey (Appendix C3) was distributed to the athletic training education program directors through the web server program SurveyMonkey.com. The survey underwent expert review and piloting prior to distribution. The survey consisted of demographic questions regarding the programs, teaching methods for acute care and immobilization techniques for contact equipment athletes, and suggestions to specify competencies for acute care and CS immobilization proficiencies for contact equipment athletes. The data will automatically be calculated by Survey Monkey and placed into a spreadsheet format for the researcher to utilize in analysis. The survey consisted of 27 questions and required 10-15 minutes to complete. A cover letter explaining the study was also uploaded with the survey.

Procedure

The ATEP Director's Survey was examined by a panel of experts to determine the validity of the survey. The panel consisted of experts in field of context for the survey. Survey design and sport specifics were a part of their expertise. Once the panel approved the survey, the California University of Pennsylvania's Institutional Review Board for Protection of Human Subjects form (Appendix C4) was sent for approval before the study began. After approval, the survey was sent to 30 NATA district two programs as a pilot test to determine the reliability of the survey. The results proved reliable due to the analysis of the data. The survey was then sent to 320 program directors in athletic training education programs of Division I, II, and III via email. A cover letter (Appendix C2) was sent explaining the study to the ATEP directors. A link on the cover letter provided the program directors direct access to begin the survey. Email addresses were obtained through the Commission on Accreditation of Athletic Training Education (CAATE) website. The researcher determined and allowed three weeks for the program directors to complete the survey. Once every week, during the three weeks, a follow up email was sent to the ATEP

directors explaining the study and providing a link to the survey. This email reminded the program directors who had not yet taken the survey that is was still open. The email also stated that if the ATEP director had already taken the survey, then they do not need to take it again. Once the surveys were completed by the program directors, the answers were submitted back through SurveyMonkey.com. The web server program automatically organized, calculated, and placed all data in an excel spreadsheet for import to SPSS 16.0. Data analysis was then performed after the three week period for survey submission had passed.

Hypotheses

The following hypothesis is based on the review of literature.

H1: Athletic training students spend more hours in lecture for football cervical spine immobilization skills than for lacrosse and ice hockey cervical spine immobilization skills.

H2: Athletic training students spend more hours in lab for football cervical spine immobilization skills than for lacrosse and ice hockey cervical spine immobilization skills.

H3: Athletic training students spend more hours in clinical experience for football cervical spine immobilization skills than for lacrosse and ice hockey cervical spine immobilization skills.

Data Analysis

All data was analyzed by SPSS version 16.0 for windows at a level of significance at 0.05. The research hypotheses were analyzed using three, one-way analysis of variance to determine if athletic training students were spending more hours in lecture, lab, and clinical experience for football CS immobilization skills than for men’s lacrosse and hockey CS immobilization skills.

RESULTS

Purpose of Study

The goal this study is to determine if athletic training students are being taught various sport CS immobilization and equipment management techniques. By surveying ATEP directors on how their students are taught CS immobilization techniques, a better understanding can be made if there is a need for specifying the educational content of acute care of injuries in the athletic training competencies.

Demographic Information

320 Athletic training education program directors (DI, DII, & DIII) were asked to volunteer in an original survey for this study. Out of the 320 ATEP directors survey, 40.3 % (N = 129) responded to the survey. Table 1 represents the range of years that schools have been accredited by the overseeing accrediting body.

Table 1. Range of Years Accredited

Range of Years	Frequency	Percentage
1-5	36	27.9
6-10	50	38.7
11-15	9	6.9
16-20	4	3.1
21-25	11	8.5
>25	19	14.7

Table 2. represents the range number of students graduating from athletic training education programs in this study.

Table 2. Range Number of Students Graduating

Range of Students	Frequency	Percentage
1-5	36	27.9
6-10	51	39.5
11-15	25	19.3
16-20	6	4.6
21-25	7	5.4
>25	4	3.1

Table 3. represents the number of universities/colleges of each NATA district that participated in the study. Note that District 2 ATEP directors were used in the pilot study. The response rate was 53.3% (N = 16).

Table 3. NATA district

District	Percentage Overall Districts	Frequency	N = ATEP in District	Percentage in District
1	10.1	13	25	52
2	0*	0*	36	0*
3	11.6	15	51	29.4
4	24.1	31	80	38.7
5	15.5	20	54	37.1
6	6.9	9	25	36
7	6.9	9	14	64.3
8	8.5	11	18	61.1
9	13.9	18	45	40
10	2.3	3	8	37.5

*Were involved in pilot study and not used for experiment

Table 4. represents which contact sport each university/college does or does not have and which NCAA division they are associated with.

Table 4. Sport and NCAA division

Sport	Div.I	Div.II	Div.III	Club	None
Football	45	27	32	1	24
M. Lacrosse	3	1	10	21	94
Hockey	9	0	7	26	87

Hypothesis Testing

The level of significance used for testing the hypothesis was set at an alpha level of .05.

Hypothesis 1: Athletic training students will spend more hours in lecture for football CS immobilization skills then for lacrosse and ice hockey CS immobilization skills. A one-way ANOVA was performed comparing time spent in lecture for football CS immobilization skills to that of men's lacrosse and ice hockey CS immobilization skills.

Conclusion 1: A significant difference was found among time spent in lecture for the three contact sports ($F(2,384) = 136.98$, $P < .001$). Tukey's HSD was used to determine the differences between hours spent in lecture teaching CS immobilization skills for all three sports (Table 6). The analysis showed that athletic training students averaged more hours in lecture on football CS immobilization skills (2.68 ± 1.978) than men's lacrosse (0.32 ± .765) and ice hockey (0.38 ± .792) (Table 5).

Out of the 129 ATEP directors, 86 responded stating that CS immobilization skills for men's lacrosse were not taught in lecture. The remaining 43 respondents averaged 1.25 ± 1.06 hours in lecture. Out of the 129 ATEP directors, 84 responded that CS immobilization skills for

ice hockey were not taught in lecture. The remaining 45 respondents averaged 1.21 ± 0.74 hours in lecture.

Table 5. A One-Way ANOVA for Hours in Lecture on CS immobilization techniques.

HRLec	Sum of Squares	*df*	MS	F	P
Between Groups	468.159	2	234.080	136.980	.000
Within Groups	656.201	384	1.709		
Total	1124.360	386			

Table 6. Tukey's HSD for Comparing Time in Lecture (1 = Football, 2 = Men's Lacrosse, 3 = Ice Hockey)

	(I) Sport	(J) Sport	Mean Diff. (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
HRLec	1	2	2.364*	.163	.000	1.98	2.75
		3	2.302*	.163	.000	1.92	2.68
	2	1	-2.364*	.163	.000	-2.75	-1.98
		3	-.062	.163	.923	-.44	.32
	3	1	-2.302*	.163	.000	-2.68	-1.92
		2	.062	.163	.923	-.32	.44

*The mean difference is significant at the .05 level.

Hypothesis 2: Athletic training students will spend more hours in lab for football CS immobilization skills then for lacrosse and ice hockey CS immobilization skills. A one-way ANOVA was performed comparing time spent in lab for football CS immobilization skills to that of men's lacrosse and ice hockey CS immobilization skills.

Conclusion 2: A significant difference was found among time spent in lab for the three contact sports ($F(2,384) = 129.296$, $P < .001$). Tukey's HSD was used to determine the differences between hours spent in lab

teaching CS immobilization skills for all three sports (Table 8). The analysis showed that athletic training students averaged more hours in lab on football CS immobilization skills (3.88 ± 3.322) than men's lacrosse (0.29 ± 1.058) and ice hockey (0.30 ± .842) (Table 7).

Out of the 129 ATEP directors, 86 responded stating that CS immobilization skills for men's lacrosse were not taught in lab. The remaining 43 respondents averaged 1.72 ± 2.06 hours in lab. Out of the 129 ATEP directors, 84 responded that CS immobilization skills for ice hockey were not taught in lab. The remaining 45 respondents averaged 1.95 ± 1.21 hours in lab.

Table 7. A One-Way ANOVA for Hours in Lab on CS Immobilization Techniques

HRLab	**Sum of Squares**	***df***	**MS**	**F**	**P**
Between Groups	1109.056	2	554.582	129.296	.000
Within Groups	1646.903	384	4.289		
Total	2755.959	386			

Table 8. Tukey's HSD for Comparing Time in Lab (1=Football, 2=Men's Lacrosse, 3=Ice Hockey)

	(I) Sport	**(J) Sport**	**Mean Diff. (I-J)**	**Std. Error**	**Sig.**	**Lower Bound**	**Upper Bound**
HRLab	1	2	3.597*	.258	.000	2.99	4.20
		3	3.585*	.258	.000	2.98	4.19
	2	1	-3.597*	.258	.000	-4.20	-2.99
		3	-.012	.258	.999	-.62	.60
	3	1	-3.585*	.258	.000	-4.19	-2.98
		2	.012	.258	.999	-.60	.62

*The mean difference is significant at the .05 level.

Hypothesis 3: Athletic training students will spend more hours in clinical experience for football CS immobilization skills then for lacrosse and ice hockey CS immobilization skills. A one-way ANOVA was performed comparing time spent in lab for football CS immobilization skills to that of men's lacrosse and ice hockey CS immobilization skills.

Conclusion 3: A significant difference was found among time spent in clinical experience for the three contact sports ($F(2,384)= 75.824$, $P < .001$). Tukey's HSD was used to determine the differences between hours spent in clinical teaching CS immobilization skills for all three sports (Table 10). The analysis showed that athletic training students averaged more hours in clinical experience on football CS immobilization skills (3.62 ± 4.020) than men's lacrosse (0.32 ± 1.481) and ice hockey (0.25 ± .728) (Table 9).

Out of the 129 ATEP directors, 86 responded stating that CS immobilization skills for men's lacrosse were not taught in clinical experience. The remaining 43 respondents averaged 2.59 ± 3.52 hours in clinical experience. Out of the 129 ATEP directors, 84 responded that CS immobilization skills for ice hockey were not taught in clinical

experience. The remaining 45 respondents averaged 1.77 ± 1.06 hours in clinical experience.

Table 9. A One-Way ANOVA for Hours in Clinical Experience on CS Immobilization Techniques

HRClin	**Sum of Squares**	***df***	**MS**	**F**	**P**
Between Groups	954.795	2	477.397	75.824	.000
Within Groups	2417.717	384	6.296		
Total	3372.512	386			

Table 10. Tukey's HSD for Comparing Time in Clinical Experience(1=Football, 2=Men's Lacrosse, 3=Ice Hockey)

	(I) Sport	**(J) Sport**	**Mean Diff. (I-J)**	**Std. Error**	**Sig.**	**Lower Bound**	**Upper Bound**
HRClin	1	2	3.295*	.312	.000	2.56	4.03
		3	3.368*	.312	.000	2.63	4.10
	2	1	-3.295*	.312	.000	-4.03	-2.56
		3	.074	.312	.970	-.66	.81
	3	1	-3.368*	.312	.000	-4.10	-2.63
		2	.074	.312	.970	-.81	.66

*The mean difference is significant at the .05 level.

Additional Findings

Findings that were also noteworthy to the study were which semester athletic training students were being taught CS immobilization skills (Table 8). The 129 ATEP directors responded to which multiple semesters athletic training students were taught CS immobilization skills, which resulted in N = 334 responses.

Table 11. Semester AT Students Are Taught Cervical Spine Immobilization Skills

Semester	Frequency	Percentage
1st semester Freshman	27	8.1
2nd semester Freshman	43	12.8
1st semester Sophomore	77	23.1
2nd semester Sophomore	50	14.9
1st semester Junior	58	17.3
2nd semester Junior	23	6.8
1st semester Senior	36	10.7
2nd semester Senior	15	4.5
1st year entry master	3	.89
2nd year entry master	2	.59

Another important finding involved why the ATEP was unable to obtain the required equipment to teach CS immobilization skills for all three equipment intensive

sports. Out of the 129 ATEP directors, 80.6% (N = 104) answered that they do not have all the required equipment. The ATEP directors marked all answers that were reasons for not having the required equipment, resulting in N = 180 responses. Table 9 represents reasons why the ATEP were unable to obtain the equipment.

Table 12. Reasons for Inability to Obtain All Required Sports Equipment.

Reason	Frequency	Percentage
Budgetary Reasons	34	18.8
Inability to Obtain Equipment	25	13.8
Football not a high priority	0	0
Lacrosse not a high priority	46	25.5
Hockey not a high priority	42	23.3
Other*	33	18.3

* Comments can be seen in Appendix C5

The ATEP directors answered a series of Likert Scales pertaining to how they agreed or disagreed with the statements. The findings found for questions 19-21 (Appendix C3) were substantial for this study. The statements phrased how confident they were that the athletic training students attained CS immobilization skills for all three contact sports. Out of the 129 study participants, 99.2% (N = 128) completed the Likert Scales. Table 10 represents the program directors responses.

Table 13. Program Director's Opinion on How AT Students Are Prepared to Immobilize the Cervical Spine for all Three Equipment Intensive Sports

Sport	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
Football	4(3.1)	3(2.3)	47(36.4)	74(57.8)
M.Lacrosse	31(24.2)	56(43.7)	34(26.5)	7(5.4)
Hockey	32(25)	60(46.8)	28(21.8)	8(6.2)

The last considerable finding of the study involved the study participants answering a Likert Scale to whether or not they agreed with the phrase of educational competencies appropriately emphasize the need for athletic training students to have necessary skills to immobilize athletes in intensive equipment sports other than football. Out of the 129 study participants, 99.2% (N = 128) completed the Likert Scales. Table 11 represents the program directors responses.

Table 14. Program Director's Opinion on How Educational Competencies Emphasize Immobilization Skills on All Three Equipment Intensive Sports

Response	Frequency	Percentage
Strongly Disagree	9	7.1
Disagree	66	51.6
Agree	44	34.4
Strongly Agree	9	7.1

DISCUSSION

The following section will include 1) Discussion of Results, 2) Conclusion and 3) Recommendations.

Discussion of Results

The primary findings of this study were that athletic training students experienced more hours of lecture, lab, and clinical experience being taught CS immobilization skills for an athlete wearing football equipment, compared to that of an athlete wearing men's lacrosse and ice hockey equipment. The results showed that athletic training education programs were teaching 2-4 hours in lecture, lab, and clinical experience on football CS immobilization skills. Time that was devoted to CS immobilization skills that focused on men's lacrosse and ice hockey equipment was considerably less, ranging from 20-30 minutes in lecture, lab, and clinical experience respectively.

It should be known that out of the 129 program directors surveyed, 66.6% (N = 86) responded that they do not teach men's lacrosse CS immobilization protocols. These respondents did not answer questions to how many hours were spent in lecture, lab, and clinical experience and were

thus giving zeros for statistical analysis, which could explain the results of low average hours spent on men's lacrosse CS immobilization skills.

The remaining 33.4% (N = 43) of respondents were separately analyzed to find the mean hours spent in lecture, lab, and clinical experience. Athletic training education programs who did teach men's lacrosse CS immobilization skills averaged over an hour in lecture, two hours in lab, and three and half hours in clinical experience. These 43 respondents were also asked if they used men's lacrosse equipment in their clinic and formal instruction. The results showed that 23 of those programs did use the equipment, while the rest who do teach CS immobilization skills for men's lacrosse did not.

The same can also be said for why averaged hours spent on ice hockey CS immobilization skills were low. Out of the 129 program directors that responded, 65.1% (N = 84) reported that they do not teach ice hockey CS immobilization skills, thus given zeros during statistical analysis for mean hours spent in lecture, lab, and clinical experience.

The remaining 34.9% (N = 45) of program directors were separately analyzed to find the mean hours spent in lecture, lab, and clinical experience. Athletic training

education programs that did teach ice hockey CS immobilization skills averaged 45 minutes lecture, an hour and 10 minutes in lab, and an hour in clinical experience. These 45 respondents were also asked if they used ice hockey equipment in their clinic and formal instruction. The results showed that 21 of those programs did use the equipment, while the rest who do teach CS immobilization skills for ice hockey did not.

The findings support the hypotheses that athletic training students will spend more hours in lecture, lab, and clinical experience on football CS immobilization skills then for men’s lacrosse and hockey CS immobilization skills.

The 129 athletic training education programs were a collection of programs from all ten NATA districts, except district two. District two participants were involved in the pilot study. Pilot study results can be seen in Appendix C7. District four had the most participants, consisting of 24.1% (N = 31) of the total respondents. District ten consisted of 2.3% (N = 3) of the total respondents, but there are only eight ATEP in district 10. Most of the programs involved with the study were accredited or re-accredited within the past ten years. Programs that ranged from one to five years (27.9%) and six

to ten years (38.7%) had the highest number of respondents, while programs ranging from 11 years to 25 years (3.1%-8.5%) had the least number of respondents. The highest average number of graduates from ATEP's was six to ten students (39.5%), while the lowest average graduation rates was 25 students or more (3.1%).

The program directors also indicated which of the three equipment intensive sports their associated institutes had and the NCAA divisions they are in. What was found was that the majority of the programs had football (N = 45 in DI, N = 27 in DII, N = 38 in DIII, N = 1 Club, and 24 did not have football). Very few programs had DI men's lacrosse (N = 3) and hockey (N = 9) programs, with the majority of programs not having men's lacrosse (N = 94) and hockey (N = 87) programs. One consideration this study omitted was to survey institutes affiliated with the National Association of Intercollegiate Athletics (NAIA).

This study also investigated during which semester the athletic training students were being taught CS immobilization skills. The results showed that a majority of athletic training students obtained and learned CS immobilization skills during the first semester of their sophomore year. Programs were found to teach CS immobilization skills during multiple semesters in an

athletic training student's undergraduate career. Entry level master's programs were also teaching in multiple semesters. The findings demonstrate that athletic training students are well prepared early in their academic career to handle emergency situations involving acute head and neck injuries. Also, they are continually being re-educated on CS immobilization as they progress through the professional phase of the ATEP.

Even though athletic training students were taught CS immobilization skills early and often throughout their time in undergraduate and entry level master's program, the time was spent more on football CS immobilization skills than that for men's lacrosse and ice hockey. Assumptions can be made that more time was spent on football because programs have the sporting equipment associated with football. This study asked program directors what the reasons were if they did not have all the required equipment for all three equipment intensive sports. The highest percentage of responses was men's lacrosse CS immobilization skills (25.5%) and ice hockey CS immobilization skills (23.3%) were not as high of a priority to teach compared to that of football CS immobilization skills (0.0%). Budgetary reasons also had a high percentage (18.8%) of the responses for reasons not having all the required equipment.

Additional comments were allowed to be made by program directors to why they were unable to obtain all of the required equipment. The majority of programs directors commented that men's lacrosse and ice hockey were sports their students were not exposed to, because those sports are not at the college/university or surrounding clinical sites. This reason is not a valid one, just because ATEP's do not have these sports on their campus or surrounding areas does not mean a student that graduates from their program will not go on to work with men's lacrosse or ice hockey in the future. Program directors also stated that their programs utilize football equipment in formal and clinical instruction to explain the differences in men's lacrosse and ice hockey equipment. There are some that speculate that all helmets are generally the same and can utilize the same protocols. However, the helmet and shoulder pads for these three sports are so different in their design that different emergency protocols have to be made to accommodate them. Several program directors commented that the thought of teaching CS immobilization skills for different equipment intensive sports didn't occur to them, stating they have never seen rules that require all three to be taught. These program directors have it right; there are no rules, so the thoughts would

not occur to them. All the more reason for CS immobilization skills to be taught for equipment intensive sports other than football

The purpose of this study was to determine if there is a need to specify educational competencies of acute care of injury, pertaining to CS immobilization skills. Athletic training education program director's opinions can assist in that. The survey instrument devised a Likert Scale with three questions that stated how well prepared the students in director's ATEP are with immobilizing the head and neck of an athlete wearing football, men's lacrosse, and ice hockey equipment. Without much surprise, 57.8% of program directors strongly agreed and 36.4% agreed that the students in their programs were well prepared in football CS immobilization protocols.

Program directors also responded to how well the students were prepared in men's lacrosse CS immobilization protocols, 26.5% of ATEP directors agreed that the students in their program are well prepared in men's lacrosse CS immobilization protocols. However, 43.7% program directors disagreed and 24.2% strongly disagreed that the students in their program are well prepared in men's lacrosse CS immobilization skills.

The results also showed how program directors responded to how well their students were prepared in ice hockey CS immobilization protocols, 21.8% of ATEP directors agreed the students in their program are well prepared in ice hockey CS immobilization protocols. While 46.8% disagreed and 25% strongly disagreed that the students in their program are well prepared ice hockey CS immobilization skills.

Table 15. Program Director's Opinion on How AT Students Are Prepared to Immobilize the Cervical Spine for all Three Equipment Intensive Sports

Sport	**Strongly Disagree (%)**	**Disagree (%)**	**Agree (%)**	**Strongly Agree (%)**
Football	4(3.1)	3(2.3)	47(36.4)	74(57.8)
M.Lacrosse	31(24.2)	56(43.7)	34(26.5)	7(5.4)
Hockey	32(25)	60(46.8)	28(21.8)	8(6.2)

Program directors also expressed their disagreement that CS immobilization skills were being emphasized for all three equipment intensive sports by the educational competencies. Of program directors, 51.6% felt that the educational competencies do not fully specify protocols for CS immobilization skills for all three equipment intensive sports. With over fifty percent of the program directors in this study disagreeing that the educational competencies of acute care of injury are adequate, then this study suggests a just cause for changes to be made.

The data demonstrates the need for established protocols of CS immobilization for athletes wearing men's lacrosse and ice hockey equipment to be a mandatory competency. Athletic training education program directors are seeing first hand that athletic training students are not being fully educated on all the possible scenarios where a cervical spine injury can occur. It can be assumed that athletic training students, who graduate from a program where these skills are not being taught, will not be fully prepared to handle a situation where an athlete of men's lacrosse and/or ice hockey suffers a severe head and/or neck injury.

Conclusions

After reviewing the results of this study, it is concluded that athletic training students are spending significantly less time in lecture, lab, and clinical experience reviewing CS immobilization skills for athletes wearing men's lacrosse and ice hockey equipment compared to the time spent reviewing CS immobilization skills for football. Athletic training education program directors feel that educational competencies do not emphasize or specify CS immobilization skills for all three contact

equipment sports. Athletic training education programs should focus on increasing time spent on teaching their students CS immobilization skills for all equipment contact sports. Therefore, athletic training students will have more knowledge and ability to immobilize a head and neck for equipment intensive sports other than football.

Recommendations

Further research recommendations for this study involve indicating if there is a correlation between which equipment intensive sport each ATEP's college/university represents, to if the ATEP's have the associated sports equipment to teach CS immobilization skills. This would support that if the college or university has the sport, then the ATEP should have the required equipment to teach the corresponding CS immobilization skill.

Another possible area of research recommendation would be to indicate if there is a correlation between years an ATEP has been accredited and if the ATEP teaches CS immobilization skills for all equipment intensive sports. One might be able to differentiate that ATEP's with more years of accreditation will have more experience teaching,

thus branch out to teach CS immobilization skills for all contact equipment sports.

The greatest suggested recommendation, resulting from this study is for the athletic training competencies of acute care of injury to emphasize which types of contact sporting equipment to use. Athletic training students can then be proficient in performing CS immobilization for all contact equipment sports. This study's recommendation is that athletic training students be taught CS immobilization skills for the three equipment intensive sports at their ATEP, because in football, men's lacrosse, and ice hockey head injuries have one of the highest rates of occurrences per athlete-exposures. [2-4]

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APPENDICES

APPENDIX A

Review of Literature

REVIEW OF LITERATURE

Spinal injuries are a major concern in any sporting event due to major life consequences they can have on the athlete. According to studies looking at the NCAA Injury Surveillance System done during 1988-1989 through 2003-2004, head and neck injuries are one of the most prevalent injuries in football, men's lacrosse, and men's hockey. Dick et al. reported that, during fall games of football, 6.8% of all injuries that occur are to the head and our concussion related.[1] Dick et al. also reported in another study that, during games of men's lacrosse, 8.4% of all injuries that occur are to the head and our concussion related.[2] Hockey injuries were also looked at. Agel et al. reported that, during games of men's hockey, 9.0% of all injuries that occur are to the head and our concussion related.[3] The need for proper management is vital for the safety and well being of the injured athlete. The use of protocols in the assessment and management of spinal injuries can be helpful in decisive decision making, especially in sports involving protective equipment that might have to be removed.

Protocols have been well established and documented in the management and acute care of football athletes with

cervical spinal injuries, but not for other such sports as lacrosse and ice hockey. Protocols for injured lacrosse athletes, once developed need to be taught in the entry level setting, so future certified athletic trainers can provide the appropriate care for the injured athlete. The purpose of this literature review is to discuss the issues related to how immobilization skills are taught in ATEP. The sections that will be discussed include: (1) Spinal Injuries in Athletics, (2) Mechanisms of Injury, (3) Management of Spinal Injuries, and (4) Face Mask Removal.

Spinal Injuries in Athletics

Spinal injuries in collision sports can happen and it is the responsibility of the certified athletic trainer to be well prepared in cervical spine immobilization techniques to maximize the safety of the athlete. According to Vaccaro et al. only 10% of all the annual cervical spine injuries in the United States occur in athletics.[4] Although serious traumatic spine injuries are rare, all cervical spine injuries should be managed the same way, with the worst case scenario in mind. When a cervical spine injury occurs, the authors explain that symptoms that resolve quickly are typically found in less severe injuries like brachial plexus stretches or

“stingers”. Longer, more prolonged, symptoms are signs of something more serious and need to be examined immediately. Since there is no universally accepted return to play criteria, only a physician has final word on whether or not an athlete is ready for participation.[5]

Various spinal injuries can occur, and Walling[6] discusses goes over three different serious conditions that can be the result of sports-related injuries to the cervical spine. The three injuries are; (1) cervical cord neurapraxia, (2) spinal stenosis, and (3) “stingers”. Cervical cord neurapraxia and spinal stenosis is caused by hyperflexion or hyperextension of the neck and results in compression of the spinal cord. Once a football player has had one of these injuries, a second occurrence is 56% more likely to happen. A “stinger” is essentially an injury to the brachial plexus that causes paresthesia in the corresponding upper extremity, occurring as high as 65% of the time during a player’s career. Walling concludes by saying that since it is difficult to predict neurapraxia and the nature of the cervical spine injury, frequently the final decision on returning to play is made by the athlete.[7]

Langer, Fadale, and Palumbo[8] explain catastrophic neck injuries as a structural alteration of the cervical spine associated with damage to the spinal cord. Rare as this is,

this type of traumatic injury can lead to more severe neurologic conditions for a collision sport athlete, such as paralysis. During treatment, the helmet and shoulder pads worn by the athlete can cause a problem, but the authors explain how proper equipment protocols can avoid this. The authors conclude by saying that complete understanding of the anatomy, evaluation, and the protocols for on-site management is necessary for the best outcome.[9]

Related to the occurrence of spinal injuries, several articles performed multiple year studies in specific sports. Randall et al. review 16 years of NCAA injury surveillance data for men's football and identified potential areas of injury prevention weaknesses. Epidemiological data helps certified athletic trainers design injury prevention protocols and then test their effects.[10] The results of the data showed injury rates are always changing, so testing the effects of protective equipment need to be performed to determine their effectiveness. The data will also help designing new injury prevention techniques.

Diamond and Gale performed a study to examine lacrosse related injuries in the different genders and different ages. Data was assessed through the National Electronic Injury Surveillance System over a 10-year period. The

results showed that males accounted for 80.5% of the injuries that occurred, due to the nature of the sport. The head and face were more commonly injured, but were more prevalent among females. Women lacrosse players are at more of a risk to injury to the head and face than are men. It was the authors' recommendation that protective face gear be worn for women's lacrosse players.[11]

Tator, Carson, and Edmonds presented the ever growing increase of spinal injuries in hockey. In 1981, Canadian officials established the Committee on Prevention of Spinal Injuries in Hockey. Now called SportSmart, there job is to document the epidemiology of spinal injuries.[12] The first ever recorded spinal injury was 1966, and then from 1987 to 1991 there has been 182 cases reported. A total of 241 cases have been recorded from 1966-1993.[13] With this alarming rate of injuries, the authors believe there is need for more research to be done to relinquish these numbers.

Mechanisms of Injury

To better understand spinal injuries, the athletic trainer needs to better understand the mechanisms of injury. With that knowledge, the athletic trainer can help

decrease the risk of injury. Heck et al. presented guidelines to decrease the risk of cervical spine fractures and dislocations in football players. The authors explain how axial loading of the cervical spine is the primary cause in spinal injuries.[14] In football, tackling with the head up and with hitting with the shoulder or chest, the athlete decreases these chances. Their recommendations are to educate players, coaches, officials about how catastrophic these injuries can be when “spearing”. Also, advise coaches on correcting this behavior with their players.

Pre-participating physical examinations can help the athletic trainer discover if any of the athletes are more susceptible to cervical spine injuries. Decoster et al. designed a study to observe injury patterns between generalized joint hypermobility and nonhypermobile NCAA athletes. The researchers screened 310 athletes from 17 lacrosse teams for joint hypermobility before the season and recorded injury rates throughout the season. The injuries were then compared between hypermobile to nonhypermobile athletes. The results showed that twenty of the 147 men and 54 of 163 women were hypermobile. Throughout the season 100 athletes suffered 134 injuries.

However there were no significant differences in overall injury rate between the two mobility groups.[15]

Swartz, Floyd, and Cendoma's article provided knowledge about functional anatomy, kinematic response, and mechanisms involved in axial-compression cervical spine injuries, as they relate to sport injuries. The cervical vertebrae have 80-90 degrees of flexion, 70 degrees of extension, 20-45 degrees of lateral flexion, and 90 degrees of rotation on both sides. The first (C1) and second (C2) cervical vertebrae form to create the atlanto-axial joint. C1 is responsible for flexion and extension of the head, while C2 is responsible rotation of the head. The rest of the cervical column allows for flexion and extension, with limited lateral flexion. The most common mechanism of injury of the cervical spine is axial loading. Axial loading occurs when the head and neck is flexed to 30 degrees, like a head first tackle. When this happens the natural shock absorbing component disappears, potentially causing serious injury. The authors conclude that by understanding the mechanisms of cervical spine injuries, the likelihood of occurrence will reduce.[16]

Lacrosse helmets differ in design from football, but axial loading with lacrosse helmets can still cause significant damage to the spine. Caswell and Deivert

examined the effects of repetitive impact forces on lacrosse helmets and to increase awareness of helmet safety. Four helmets were studied, 2 traditional helmets and 2 contemporary helmets. The helmets were raised to 152 cm and released 10 times onto an anvil, padded with a small rubber modular elastomer programmer. A triaxial accelerometer was placed within a head form, inside the helmet to measure impact force. The results show that the repetitive drops increased results on the elastomer programmer, indicating a greater chance of cerebral injury. The researchers concluded that contemporary helmets faired better, but both helmets should be reconditioned or replaced every season.[17]

Management of Spinal Injuries

Management of spinal injuries is the most vital aspect when insuring safety for the injured athlete. The purpose of Banerjee et al. article is to describe the best way to manage an emergency catastrophic cervical injury in football and hockey athletes. The authors express the importance of pre-event planning and preparation. The importance of emergency responsiveness of cervical spine injuries is vital for on-field care and proper transport to

the emergency room.[18] They also review the protocols for the quick removal for protective gear. They concluded that the sports medical team should be highly qualified in all of these areas for proper care of the athlete.

The Inter-association Task Force for appropriate care of the spine developed guidelines for care. These guidelines were created for pre-hospital management of an athlete with a suspected spinal injury. They emphasize never moving an athlete with suspected with spinal injury and always be conscious of the athlete's ABC's, neurological status, and consciousness. The guidelines also recommend that the facemask should be removed prior to transportation, no matter what the current status is of the athlete's breathing. The guidelines conclude by saying that all skills should be all but second nature to the athletic trainer before they really needed in an emergency situation.

Bailes et al. point out that even though catastrophic spine injury in sport has been decreasing over the years, cervical spine injuries are still of high importance and requires constant attention by the athletic trainer. The magnitude of the injury is life altering and the importance of on-field management is vital. This article provides recommendations for management and treatment of this

injury. The authors conducted a literature review to find the most relevant sources between 1970 and 2005. By using MEDLINE and search terms such as ‘spinal cord injury’ and ‘cervical spine injury’, the authors found that there are a variety of injuries due to spinal trauma and the athletic trainer should be ready to follow the Inter-Association Task Force for the Appropriate Care of the Spine Injured Athlete.[19]

More pre-hospital guidelines were developed by Kleiner et al. The purpose of this text is to provide the certified athletic trainer with prehospital guidelines to manage a suspected spinal injury. The proper care of suspected spinal injuries can decrease the possibility of a secondary injury occurring. This text uses the Inter-Association Task Force for Appropriate Care of the Spine-Injured Athlete as their primary guidelines. Planning, practicing, and educating are what the authors conclude are the best ways to be prepared for treating a suspected head or spine injury.[20]

Waninger examined published articles on cervical management of a helmeted athlete with a suspected spinal injury. The author reviews on-field management with the emergency department. This author also exemplifies the importance of not removing the helmet or shoulder pads

unless absolutely necessary. Waninger points out that radiographs through the equipment may be inadequate and computed tomography and magnetic resonance imaging needs to be studied further.[21] The article concludes that planning ahead and being comfortable with the skills is important and should be practiced regularly.

Management begins on the field of the play. Tierney et al. had the objective to assess the effect of head position and football equipment on the cervical spine when an athlete is lying supine on a spine board. The design was set up with measuring occiput elevations at 0cm, 2cm, and 4cm with and without equipment. Depending on those elevations, sagittal space available for the cord, sagittal spinal-cord diameter, and cervical thoracic angle, were determined by MRI. Twelve men were used as subjects. The results showed that there was more sagittal space for the cord with 0cm of occiput elevation compared to 2cm and 4cm of elevation.[22] The equipment condition also showed similar results. The authors concluded that helmet and shoulder pads should be left on during spine-board immobilization of an injured football player. 0cm of occiput elevation should be maintained.

Segan et al. looked at why helmet removal in a spinal injury situation is potentially dangerous and the authors

give reasons for not removing a helmet. The authors tackle the myths of helmet immobilization such as how it interferes with immobilization, interfere with visual assessing, cause hyperflexion of the neck, and prevent proper airway management. The authors designed this article for EMT's, because they might confuse protocols for motorcycle helmet removal for football helmet removal. The authors explain facts for each myth and explain protocols for face mask removal when CPR is necessary. The authors recommend communication with local EMS so that the best care for the athlete is provided.[23]

Lacrosse equipment is much different than that of football. The helmets are not designed the same and the shoulder pads are not as thick. Studies have been done to examine how to manage lacrosse athletes with possible cervical spine injuries. Sherbondy, Hertel, and Sebastianelli's article determined that the lacrosse helmet and shoulder pads effect the alignment of the spine. The subjects for these trials were 16 uninjured male collegiate lacrosse players. Cervical spine angular alignment was evaluated by using computed tomography. The patients were immobilized in the supine position with the helmet and shoulder pads on, and with the helmet removed and shoulder pads on. The results showed that when the helmet and

shoulder pads were left on, there was an increase of cervical extension compared to no equipment. With just the helmet removed, there was an increase in cervical flexion compared to equipment in place. The authors concluded that the lacrosse helmet and shoulder pads should be left in place until they can be removed in a controlled fashion. [24] They also concluded that the effect the equipment has on the neck is different for lacrosse helmets then football or ice hockey helmets. Lacrosse helmets tend to have a curvature that extends the athletes neck. When comparing shoulder pads, lacrosse shoulder pads are thinner and less padded then football and hockey shoulder pads.

Ice hockey may be slightly less of a contact sport than football; however, hockey players can generate more force by building up speed on the ice. With that increase in force, it also creates an increase of potential catastrophic injuries, especially of the head and neck. The athletic trainer needs to be prepared for any such injury to occur. LaPrade et al. researched to determine if removing a hockey helmet causes any increase in lordosis of the cervical spine in ice hockey players. The trials consisted of radiographically assessing 10 male hockey players in three different scenarios. The subjects wore the helmet and shoulder pads, the shoulder pads and without the

helmet, and with no equipment at all. The results show that there is a significant increase in lordosis of the cervical spine with the helmet removed. The authors recommend that the hockey player's helmet should remain on and not be removed, except for rare exceptions.[25]

With lacrosse growing as a sport, more spinal injuries are occurring. With that in mind, some colleges with elite lacrosse programs have developed their own protocols for the acute care of a cervical spine injured lacrosse athlete. At the University of Maryland, the athletic trainers created guidelines and emergency action plans for lacrosse cervical spinal injuries. They also lay out specific lacrosse helmet removal techniques. They are very similar to that of a regular football helmet removal, but the lacrosse helmet has no cheek pads. They also recommend applying a cervical collar to keep the head from lying in extension. The guidelines did not mention shoulder pad removal. The authors recommend training every calendar year.[26]

Immobilization is the next task that needs to be second nature to an athletic trainer. The purpose of Wagninger et al's study was to compare the amount of cervical spine and head movement in football, lacrosse, and ice hockey helmets during immobilization procedures. The

subjects consisted of 12 ice hockey, 9 football, and 9 lacrosse NCAA DI athletes. The athletes were immobilized on backboards and three motion analysis cameras followed retroreflective markers placed on the helmets. The results showed football players having the least amount of motion, while lacrosse players had the most amount of motion, but the results were not significantly different. With this information the authors concluded that the same pre-hospital care that is done with football helmets can be done with the lacrosse and ice hockey helmets.[27]

Face Mask Removal

The US lacrosse association's sport science and safety division has published a set of protocols to help the certified athletic trainer in the process of removing the face mask. They also recommend that the helmet and shoulder pads should remain on to keep the cervical spine aligned. The positive aspect about this published work is that it goes over face mask removal protocols for all the different styles of helmets.[28]

As immobilization is accomplished, face mask removal should be done so the athletic trainer can assess the athlete thoroughly and provide CPR if necessary. Studies

examining the removal of the lacrosse facemask have not been performed. Swartz et al. investigated the affects of different football helmet designs on the performance of face-mask removal. The authors hypothesized that the cordless screw driver will perform with better efficiency than cutting tools. In this study, 19 certified athletic trainers were randomly assigned to two groups. One group was given a cordless screwdriver and a FM Extractor, while the other group was given a cordless screwdriver and a trainer's angel. They were asked to perform face-mask removals under six different conditions comprising of 3 different helmets, 3 types of face-masks, and 5 styles of loop straps. The results showed that the cordless screw driver was more efficient in creating less movement of the head, faster time to complete, and less difficulty in exertion. The conclusion is that for multiple helmet conditions, a cordless screwdriver is better for each situation.[29]

In an emergency situation, removing the face mask quickly is essential for delivering appropriate care for the athlete. Gale, Decoster, and Swartz investigated the effectiveness and speed of using combined tools to remove a face-mask during an emergency situation on the field throughout the course of the season. Eighty-four members of

a NCAA DII football team were used as subjects. Seventy-four were available for trials. A battery-operated screwdriver was used for face mask removal, along with other cutting tools if need be. The results showed that 98.6% of the trials were successful in face-mask removal and were completed in an average time of 40.09 seconds.[30] The authors also found that there was no difference in effectiveness or time throughout the season. They concluded that combining the cordless screwdriver with a cutting tool provides a fast and reliable way for face mask removal. They recommended that since one face-mask was failed to be removed, athletic trainers should be prepared for helmet removal.

When speed is a factor, head movement must be kept at a minimal. Swartz et al. evaluated the performance of different facemask removal tools during a football helmet face mask removal. Four different tools were used including: the anvil pruner, polyvinyl chloride pipe cutters, Face Mask Extractor, and Trainer’s Angle. Each tool was then used to retract a face mask. Eleven different athletic trainers were used as subjects. A 3-dimensional video was used to determine movement of the head while the tools were used to remove the face mask. The video was then analyzed for head movement and the time

it took for the face mask to be retracted. The results showed that the anvil pruner was quickest, while the Face Mask Extractor had the least amount of head movement. The authors concluded that the anvil pruner and the Face Mask Extractor had nearly identical scores.[31]

When time is an issue and rescue breathing only needs to be delivered, Richard et al. studied and compared 2 pocket-mask insertion techniques with a face-mask rotation technique to find which was the quickest to deliver rescue breathing with the least amount of cervical motion. Three airway techniques were tested: the chin-insertion technique (the pocket mask is inserted under the face mask onto the mouth and nose), eye-hole-insertion technique (the pocket mask is inserted through the eye hole onto the mouth and nose), and the screwdriver technique (which allows the valve to be placed through the facemask and attach to the mask). One athletic training team tested the techniques on 12 NCAA DIII football players. The results showed that both pocket-mask techniques allowed for quicker delivery of rescue breathing. The chin technique had greater displacement from the original spine placement than the eye-hole technique. The screw driver technique caused too much lateral spine translation. The authors concluded that

the eye-hole insertion was the better choice than the other two techniques.[32]

When the athlete has been received at the emergency department, there have been questions to whether or not imaging can be done with helmet still on. Veenema et al. tried to determine if the cervical spine can be visualized with the helmet and shoulder pads on while a lateral film is taken by an Emergency Department x-ray machine. One male subject was used and was fully immobilized under three different conditions: 1) no equipment, 2) football helmet and shoulder pads, and 3) hockey helmet and shoulder pads. A single lateral film was taken of the subject's cervical spine in all three scenarios. Results showed that the football helmet and shoulder pads could not be visually seen through. While the hockey helmet and shoulder pads could be visually seen through. The authors conclude that the hockey equipment can remain on, but the football equipment should be removed prior to imaging.[33] The authors admit that their primary limitation is a single subject that is uninjured.

Summary

Protocols have been well established and documented in the management and acute care of football athletes with cervical spinal injuries. Hockey also has protocols for injured athletes; maybe not as well know to every athletic trainer. However, very few protocols exist for men’s lacrosse. Teaching the protocols for cervical spine injured athletes in these three contact sports needs to be taught in the undergraduate setting, so the future certified athletic trainer can provide appropriate care. With a full understanding of spinal injuries, mechanisms of injury, and management of spinal injuries; the future certified athletic trainer should be able to care for the injured athletes in all contact sports.

APPENDIX B

The Problem

THE PROBLEM

Statement of the Problem

The athletic trainer in today's sporting world needs to be always aware and alert. An emergency situation where a equipment intensive sport athlete suffers a cervical spine injury requires the athletic trainer to act quickly and decisively, using everything that he or she has previously learned. The appropriate care in the field can have great impact on the injury outcome. Most athletic training education programs teach their students how to immobilize and remove a facemask by using football equipment. Few programs take the time to teach there students protocols for ice hockey and men's lacrosse.

The purpose of this study was to examine the need for specifying the educational content that athletic training students are taught acute care of injuries, pertaining to CS immobilization of athletes wearing protective equipment, in the athletic training competencies.

Definition of Terms

The following definitions of terms will be defined for this study:

1) Axial Load- a compressive force usually associated with the spinal column.
2) Athletic Training Competencies- a set of required teaching guidelines an ATEP has to follow.
3) Athletic Training Education Program (ATEP) - an education setting where students a taught the practice of athletic training.
4) Cervical Spine (CS) - seven vertebrae bones ranging from the base of the skull to the beginning of thoracic spine
5) Immobilization- technique used in stabilizing the head and neck of a person suspected of a spinal injury.
6) Commission on Accreditation of Athletic Athletic Training Education (CAATE) - Governing body that accredits athletic training programs at universities and colleges.
7) NATA Educational Council- Governing body that decides what content athletic training students are to be taught and tested.

Basic Assumptions

The following are basic assumptions the research will use in this study:

1) The subjects will answer honestly and to the best of their knowledge.
2) Subjects will not receive outside help any other individual or outside source on any question.
3) The sample is a representation of the population of CAATE program directors nationally.

Limitations of the Study

The following examples are possible limitations of the study:

1) The response rate of the survey could be low due to busy schedules of the program directors.
2) As with any anonymous survey, answers might not be answered honestly by the subjects.

Significance of the Study

Athletic trainers should possess all the available CS immobilization techniques when working with equipment intensive sports. Each sport has different equipment, which requires different methods of immobilization and face mask removal in order to provide the safest acute care for the

athlete. Athletic training education programs that teach only one method or use one style of equipment to teach their students are not providing their students with a full knowledge of CS immobilization skills.

This study examined how athletic training education programs teach their students how to immobilize an athlete wearing contact sport equipment. The survey asked athletic training education programs their teaching methods, sport specific immobilization techniques, and suggestions to specifying educational content in the athletic training competencies.

This study is important for athletic trainers and athletic training educators. An understanding of the different methods for CS immobilization for the various equipment intensive sports will make for a better athletic trainer. The athletic trainer educator, with a better understanding, will be able to teach the athletic training student to be more aware of the different and possible emergency situations they might find themselves in. This increase in awareness may help ensure the safety of an injured athlete.

APPENDIX C

Additional Methods

APPENDIX C1

Panel of Experts Letter

Hello,

My name is Eric Gelinas. I am a graduate student at California University of Pennsylvania conducting a survey for my thesis. My thesis chair is Dr. Linda Meyer and she suggested you to serve on my panel of experts and review my survey. Therefore, I am asking if you have the time and are willing to review my survey and give me critical feedback. My target audience is the CAATE program directors and I am researching how their faculty teaches their students the immobilization skills for cervical spine injured athletes wearing different types of sports equipment, specifically, football, ice hockey and/or men's lacrosse helmets and shoulder pads. I'm investigating to see if equipment other than football is being used when teaching cervical spine immobilization techniques. I am also investigating if the educational content found in the NATA competencies should be specified to include what type of equipment needs to be taught during c-spine immobilization skills.

I hypothesize that AT students spend more hours in lecture, lab, and clinical experience on football cervical spine immobilization skills. If that is the case, then students in the program are not being fully educated on all the contact sports that could potentially have an athlete suffer a cervical spine injury. I hope to change that.

Please let me know if you are NOT able to assist me with this survey. If you are able to assist, I kindly ask if you would please reply no later than Monday, November 17, 2008.
Either way, thank you for your time; I greatly appreciate it.

Sincerely,

Eric Gelinas

APPENDIX C2

Cover Letter

March 13, 2009

Dear Program Director,

My name is Eric Gelinas and I am a graduate student at California University of Pennsylvania. As part of my graduation requirement, I am to construct a thesis. Although it is a requirement, my committee chair Linda Meyer and I hope to add to the body of knowledge for the profession of athletic training. My CalU IRB approved thesis topic is “Examining the Need for Specifying Educational Content for Cervical Spine Immobilization Skills in Athletic Training Education Programs”.

I am writing to ask for your assistance to complete this survey. First, this is strictly voluntary and is not mandatory to complete. There is no risk involved in taking this survey. Second, this is strictly anonymous and all answers will be confidential and viewed by myself only. If you decide to complete and return the survey, then I will assume that it is an indication of consent to use the data.

If you are willing to take the survey please click on the link below:

http://www.surveymonkey.com/s.aspx?sm=t6hbCT5TUr7OVyxB_2fWa5_2fg_3d_3d

Please, if you could, respond back by April 3, 2009.

I deeply appreciate your time and assistance. If you have any questions or concerns, feel free to email me at gel2319@cup.edu or by phone 603-345-0719.

Sincerely,

Eric Gelinas, ATC
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APPENDIX C3

ATEP Directors Survey

ATEP Director Survey

1. Cumulatively, how many years has the ATEP at your institution been accredited by NATA, CAAHEP and/or CAATE?

   _____

2. On average, how many students graduate from your program annually?

   _____

3. In which NATA district is your college/university located?

   _____

4. What division do each of the university/college sport teams participate?

	Div I	Div II	Div III	Club	None
Football	☐	☐	☐	☐	☐
Men's Lacrosse	☐	☐	☐	☐	☐
Ice Hockey	☐	☐	☐	☐	☐

5. In what semesters are your AT students taught (theory and practice) cervical spine immobilization techniques? *(Mark all that apply)*

   ☐ 1st semester Freshmen
   ☐ 1st semester Sophomore
   ☐ 1st semester Junior
   ☐ 1st semester Senior
   ☐ 1st year entry master
   ☐ 2nd semester Freshmen
   ☐ 2nd semester Sophomore
   ☐ 2nd semester Junior
   ☐ 2nd semester Senior
   ☐ 2nd year entry master

6. In which of the following settings are the athletic training students taught how to immobilize a c-spine injured athlete wearing a **FOOTBALL HELMENT AND SHOULDER PADS**: *(Mark all that apply)*

   ☐ In a lecture setting
   ☐ In a lab setting
   ☐ Clinical experiences
   ☐ Not at all

If ATEP directors answer, *Not at all*, skip to question #10.

7. Do the AT students use football helmets and shoulder pads to practice with during the educational sessions?

   ☐ Yes ☐ No

8. Approximately how many total hours do the athletic training students spend on theory and hands on experience for immobilization skills for c-spine injured football players? *(Please Complete the Blanks)*

   ___hours in lecture
   ___hours in lab
   ___hours in clinical experience

9. When practicing the immobilization techniques, do the athletic training students practice on the actual playing surface or a similar playing surface for football?

   ☐ Yes ☐ No

10. In which of the following settings are the athletic training students taught how to immobilize a c-spine injured athlete wearing a **MEN'S LACROSSE HELMET AND SHOULDER PADS**: *(Mark all that apply)*

    ☐ In a lecture setting
    ☐ In a lab setting
    ☐ Clinical experiences
    ☐ Not at all

If ATEP directors answer, *Not at all*, skip to question #14.

11. Do the AT students use men's lacrosse helmets and shoulder pads to practice with during the education sessions?

    ☐ Yes ☐ No

12. Approximately, how many total hours do the athletic training students spend on theory and hands on experience for immobilization skills for c-spine injured men's lacrosse players? *(Please Complete the Blanks)*

    ___hours in lecture
    ___hours in lab
    ___hours in clinical experience

13. When practicing the immobilization techniques, do the athletic training students practice on the actual playing surface or a similar playing surface for lacrosse?

    □ Yes □ No

14. In which of the following settings are the athletic training students taught how to immobilize a c-spine injured athlete wearing an **ICE HOCKEY HELMET AND SHOULDER PADS**: *(Mark all that apply)*

    □ In a lecture setting
    □ In a lab setting
    □ Clinical experiences
    □ Not at all

If ATEP directors answer, *Not at all*, skip to question #19.

15. Do the AT students use ice hockey helmets and shoulder pads to practice during the educational sessions?

    □ Yes □ No

16. Approximately how many total hours do the athletic training students spend on theory and hands on experience for immobilization skills for c-spine injured ice hockey players? *(Please Complete the Blanks)*

    ___hours in lecture
    ___hours in lab
    ___hours in clinical experience

17. When practicing the immobilization techniques, do the athletic training students practice on the actual ICE playing surface or a similar playing surface for ice hockey?

    ☐ Yes ☐ No

18. Of the following, which of the learning styles are used to teach your athletic training students immobilization skills for c-spine injured athletes wearing contact equipment?

    ☐ Live presentation
    ☐ Video
    ☐ Handouts
    ☐ Other: *(Please Specify)* _____

19. Do you have the required specific sport equipment to teach c-spine immobilization skills for all three contact sports?

    ☐ Yes ☐ No

    If ATEP directors answer, *Yes,* skip to question # 21

20. If you don't have all the required equipment to teach c-spine immobilization skills for all three contact sports, why not? (Mark all that apply)

    ☐ Budgetary reasons
    ☐ Inability to obtain required equipment
    ☐ Hockey techniques are not as high priority
    ☐ Football techniques are not as high priority
    ☐ Lacrosse techniques are not as high priority
    ☐ Other: *(Please Specify)* _____

21. How are the athletic training students tested/evaluated on their immobilization skills?

    ☐ Written Exam
    ☐ Proficiency Exam
    ☐ Other: *(Please Specify)* _____

22. How are the athletic training students evaluated on their immobilization skills?

    ☐ Check off system with multiple criteria
    ☐ Letter grade system
    ☐ Point scale system
    ☐ Other: *(Please Specify)* _____

23. Are the athletic students who failed an immobilization exam allowed to retake it?

    ☐ Yes ☐ No

Please rate how you would answer the following statements by choosing one of the following

1. Strongly Disagree
2. Disagree
3. Agree
4. Strongly Agree

24. Our athletic training students are properly trained and prepared to immobilize FOOTBALL athletes wearing both a helmet and shoulder pads.

    ☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree

25. Our athletic training students are properly trained and prepared to immobilize MEN'S LACROSSE athletes wearing both a helmet and shoulder pads.

    ☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree

26. Our athletic training students are properly trained and prepared to immobilize ICE HOCKEY athletes wearing both a helmet and shoulder pads.

    ☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree

27. The educational competencies appropriately emphasizes the need for athletic training students to have the necessary skills to immobilize athletes in intensive equipment sports other than football.

    ☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree

APPENDIX C4

Institutional Review Board

California University of Pennsylvania

Proposal Number 08-029
Date Received 12-1-08

Exempt

PROTOCOL for Research Involving Human Subjects

Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects

(Reference IRB Policies and Procedures for clarification)

Project : **Examining Specific Educational Criteria in ATEP for C-spine Immobilization Techniques in Equipment Intensive Sports**

Researcher/Project Director: **Eric D. Gelinas**

Phone # **(603)-345-0719** ***E-mail Address*** **gel2319@cup.edu**

Faculty Sponsor (if required)

Department **Health Sciences and Sports Studies**

Project Dates: **January 2009** ***to*** **March 2009**

Sponsoring Agent (if applicable) _____

Project to be Conducted at: **California University of Pennsylvania**

Project Purpose: ☑ ***Thesis*** ☐ ***Research*** ☐ ***Class Project*** ☐ ***Other***

Keep a copy of this form for your records.

Required IRB Training

The training requirement can be satisfied by completing the online training session at http://cme.nci.nih.gov/ *. A copy of your certification of training must be attached to this IRB Protocol. If you have completed the training at an earlier date and have already provided documentation to the California University of Pennsylvania Grants Office, please provide the following:*

Previous Project Title _____

Date of Previous IRB Protocol _____

Please attach a typed, detailed summary of your project AND complete items 2 through 6.

1. *Provide an overview of your project-proposal describing what you plan to do and how you will go about doing it. Include any hypothesis(ses)or research questions that might be involved and explain how the information you gather will be analyzed. For a complete list of what should be included in your summary, please refer to Appendix B of the IRB Policies and Procedures Manual*

The purpose of this study is to examine specific educational criteria in athletic training educational programs for head/cervical spine immobilization techniques in equipment intensive sports. I have created an original survey that was sent to a panel of experts to test its content validity. With the panel's suggestions received and revisions made to the survey, the study will be sent to Cal U IRB for approval. While waiting for approval, I will obtain a mailing list of program directors from the National Athletic Trainers' Association (NATA). After IRB approval, I will send the survey via email to 30 Commission on Accreditation of Athletic Training Education (CAATE) athletic training education program directors in NATA district two as a pilot test. The pilot test will determine the survey's reliability. The study will then again be sent to IRB for approval if any additional changes are required. After IRB approval, I will send the survey via email to the 320 CAATE accredited athletic training education program directors in the 10 NATA districts via the NATA clearinghouse distribution list. The email will have a link to a cover letter and the survey instrument. The survey will be administered by using the internet based program "Survey Monkey". My study will attempt to answer the following question: 1) Do athletic training education programs (ATEP) teach cervical spine immobilization skills for football, ice hockey, and men's lacrosse? I hypothesize that a significant amount of athletic training education programs do not teach cervical spine immobilization skills for all three contact sports. A descriptive design will be used with this study. Descriptive data will be collected once the surveys are completed and returned. The data will be calculated and put into a windows excel program and ready for use by SPSS 16.0. The level of significance will be set at $\leq .05$ to test the stated hypothesis.

2. *Section 46.11 of the Federal Regulations state that research proposals involving human subjects must satisfy certain requirements before the IRB can grant approval. You should describe in detail how the following requirements will be satisfied. Be sure to address each area separately.*

   a. *How will you insure that any risks to subjects are minimized? If there are potential risks, describe what will be done to minimize these risks. If there are risks, describe why the risks to participants are reasonable in relation to the anticipated benefits.*

      1) There is minimal risk is this study. The survey is anonymous to all who are volunteering to complete the questionnaire.

   b. *How will you insure that the selection of subjects is equitable? Take into account your purpose(s). Be sure you address research problems involving vulnerable populations such as children, prisoners, pregnant women, mentally disabled persons, and economically or educationally disadvantaged persons. If this is an in-class project describe how you will minimize the possibility that students will feel coerced.*

      2) The selection of my subjects for the survey will be the 360 program directors of all the Commission on Accreditation of Athletic Training Education CAATE athletic training

education programs (ATEP). The subjects will not be judged on gender, race, or nationality.

c. *How will you obtain informed consent from each participant or the subject's legally authorized representative and ensure that all consent forms are appropriately documented? Be sure to attach a copy of your consent form to the project summary.*

3) The survey is strictly voluntary. All the subjects are not obliged to complete this survey. I will state in the cover letter that all who chose to respond and complete the survey, and then I will assume that is an indication of consent to use the data.

d. *Show that the research plan makes provisions to monitor the data collected to insure the safety of all subjects. This includes the privacy of subjects' responses and provisions for maintaining the security and confidentiality of the data.*

4) The data will be safely monitored through my personal account on 'Survey Monkey'. The data will be safely calculated and put into a windows excel program for my use with SPSS 16.0.

3. *Check the appropriate box(es) that describe the subjects you plan to use.*

☑ *Adult volunteers*	☐ *Mentally Disabled People*
☐ *CAL University Students*	☐ *Economically Disadvantaged People*
☐ *Other Students*	☐ *Educationally Disadvantaged People*
☐ *Prisoners*	☐ *Fetuses or fetal material*
☐ *Pregnant Women*	☐ *Children Under 18*
☐ *Physically Handicapped People*	☐ *Neonates*

4. *Is remuneration involved in your project?* ☐ *Yes or* ☑ *No. If yes, Explain here.*

5. *Is this project part of a grant?* ☐ *Yes or* ☑ *No If yes, provide the following information:*

Title of the Grant Proposal _____

Name of the Funding Agency _____

Dates of the Project Period _____

6. *Does your project involve the debriefing of those who participated?* ☐ *Yes or* ☑ *No*

If Yes, explain the debriefing process here.

If your project involves a questionnaire interview, ensure that it meets the requirements of Appendix __ in the Policies and Procedures Manual.

Dear Program Director,

My name is Eric Gelinas and I am a graduate student at California University of Pennsylvania. As part of my graduation requirement, I am to construct a thesis. Although it is a requirement, I hope to add to the body of knowledge for the profession of athletic training. My California University of Pennsylvania IRB approved thesis topic is "Examining Specific Educational Criteria in Athletic Training Educational Programs for Head/Cervical Spine Immobilizations Techniques in Equipment Intensive Sports". The survey will run from 3/17/2009 to 4/3/2009.

I am writing to ask for your assistance to complete this survey. First, this is strictly voluntary and is not mandatory to complete. There is no risk involved in taking this survey. Second, this is strictly anonymous and all answers will be confidential and viewed by myself only. If you decide to complete and return the survey, then I will assume that it is an indication of consent to use the data.

I deeply appreciate your time and assistance. If you have any questions or concerns, feel free to email me at gel2319@cup.edu or by phone 603-345-0719.

Sincerely,

Eric Gelinas

Project Director's Certification
Program Involving HUMAN SUBJECTS

The proposed investigation involves the use of human subjects and I am submitting the complete application form and project description to the Institutional Review Board for Research Involving Human Subjects.

I understand that Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects. If the Board grants approval of this application, I agree to:

1. Abide by any conditions or changes in the project required by the Board.
2. Report to the Board any change in the research plan that affects the method of using human subjects before such change is instituted.
3. Report to the Board any problems that arise in connection with the use of human subjects.
4. Seek advice of the Board whenever I believe such advice is necessary or would be helpful.
5. Secure the informed, written consent of all human subjects participating in the project.
6. Cooperate with the Board in its effort to provide a continuing review after investigations have been initiated.

I have reviewed the Federal and State regulations concerning the use of human subjects in research and training programs and the guidelines. I agree to abide by the regulations and guidelines aforementioned and will adhere to policies and procedures described in my application. I understand that changes to the research must be approved by the IRB before they are implemented.

Professional Research

Project Director's Signature

Department Chairperson's Signature

Student or Class Research

Student Researcher's Signature

Supervising Faculty Member's Signature if required

Department Chairperson's Signature

ACTION OF REVIEW BOARD (IRB use only)

The Institutional Review Board for Research Involving Human Subjects has reviewed this application to ascertain whether or not the proposed project:

1. provides adequate safeguards of the rights and welfare of human subjects involved in the investigations;
2. uses appropriate methods to obtain informed, written consent;
3. indicates that the potential benefits of the investigation substantially outweigh the risk involved.
4. provides adequate debriefing of human participants.
5. provides adequate follow-up services to participants who may have incurred physical, mental, or emotional harm.

☒ Approved ☐ Disapproved

Chairperson, Institutional Review Board

12-17-05
Date

Approved, September 12, 2005

APPENDIX C5

ATEP Directors Comments to Why They Are Unable to Obtain Required Equipment

ATEP Directors Responses to Why They are Unable to Obtain all the Required Equipment to Teach CI Immobilization Skills for all Equipment Contact Sports.

- Lacrosse and hockey are not conference sports.
- We teach the concepts and related them to the equipment we do practice on. We try to instill in our students that there is always more to learn and they need to learn "on the job" for each setting in which they are employed.
- Do not have these sports.
- We don't provide coverage for lacrosse and don't have ice hockey as a sport in our conference.
- We are in the process of ordering.
- Theory of helmet removal techniques are very similar, plus we do not have hockey or lacrosse at our institution.
- Haven't really thought about it much before.
- Do not have hockey.
- We don't have either sport in New Mexico!
- We do not have hockey or hockey in area.
- I have not seen a rule that all three sets of equipment are required by the NATA-EC.
- No hockey team and Lacrosse is not sanctioned-only a club.
- Have never even considered Lacrosse or Hockey when discussing c-spine injuries.
- Affiliated sites maintain hockey and football equipment.
- We don't work with hockey or lacrosse within our clinical settings.
- Don't have lacrosse or hockey.
- Time requirements and therefore priorities.
- We do not have any other contact sport except football.
- Can't justify purchasing if we don't have the sport.
- Not sure.
- Hockey and lacrosse are not clinical experiences for our students.
- Ice hockey and lacrosse are uncommon here.
- We don't have Lax or IH teams in this part of the country and just have not thought to include these sports in our practice sessions.

- Most institutions have football, while there are fewer that have lacrosse and hockey. So it is discussed and explained in lecture. We do not have the equipment since the school does not have the program. And, we have other purchases that need to be made before we by hockey and lacrosse equipment for our educational program.
- Not a part of our athletic programming.
- Didn't really consider it until now.
- School does not offer football or lacrosse.
- We do not have much hockey and Lacrosse in the south... football, however is a nation wide sport.
- Thought we needed only an equipment intensive sport.
- ATS are not clinically exposed to ice hockey/lacrosse experiences, however, taught in classroom setting.
- We do not have Lacrosse or Hockey in the area.
- Not sports our students see in our state.
- Sports are not that prevalent.

APPENDIX C6

ATEP Directors Comments about Study

ATEP Directors Comments about Study

- Great survey...I'm interested in reading the results (and very proud of you, by the way). Please stay in touch and keep me posted.

- Yes, please send me the results after you have them, Many thanks in advance

- I just wanted to send a quick note on your choice of topic. I get so many requests to fill things out, and I try to do them all. However, many of them are terrible. Bad topics of little importance and poor questions.

  You did a nice job with your questionnaire and have a very important topic. I know it opened my eyes a bit to the need to stress hockey and Lax stuff.

  Good luck with your study.

- I would like to see the results of the data you collect for your thesis.

  All the best

- Thanks for putting this survey together. This is something my colleagues and I have discussed quite a bit this year. We had actually been discussing designing a similar study to see exactly what programs were doing about cervical spine immobilization, spine boarding and facemask removal.

  I would be very interested in seeing your results when you are finished compiling them.

  As an additional line of questioning, it would be interesting to see how programs allow students to practice facemask removal (i.e.: what tools are available and how much practice time is allowed with the tools). Our program has gone to purchasing various tools (we have about 6-8 different facemask removal tools available and we allow the students plenty of time to practice with each during lab sessions). In fact, they practice so much, that we have had to replace two FM Extractor II's, one

"Trainer's Angel" and a number of anvil pruners in the last three years. Although it is tough on the budget, I am comfortable knowing they have put in the time to learn the proper techniques and also have determined which tool works best for them.

Our practice and teaching time is very high due to the inclusion of two EMT courses and a three-week focus on emergency care of the spine injured athlete in our spine evaluation and treatment course. It would be interesting to see exactly which courses are being used to teach this content and these psychomotor skills.

Also, we have begun devoting two hours during the junior year to spine boarding in the pool. I included this in our total lab hours of practice time (even though it did not involve the use of equipment). I would be curious to see if this is something that other programs are including as well.

Thanks again for gathering this information. I think it will prove to be incredibly valuable to educators and the profession of athletic training.

- I just completed your survey on c-spine immobilization and would be very interested in hearing the results of the surveys. Please pass along that information when it is available. Thanks and good luck with your thesis. I think you have a very intriguing project.

Appendix C7

Pilot Study Results

Pilot Study Results

Thirty NATA district two ATEP were asked to participate in the study and complete the ATEP Director's Survey. There was a response rate of 53.3% (N = 16). The results showed that ATEP's were averaging more hours in lecture for football CS immobilization skills (3.31 ± 2.52) than for men's lacrosse (0.96 ± 1.61) and ice hockey (0.72 ± 0.86).

The results showed ATEP's were averaging more hours in lab for football CS immobilization skills (4.12 ± 4.11) than for men's lacrosse (1.26 ± 2.4) and ice hockey (0.82 ± 1.75).

The results showed ATEP's were averaging more hours in clinical experience for CS immobilization skills (5.18 ± 6.07) than for men's lacrosse (0.94 ± 1.57) and ice hockey (0.72 ± 1.57).

Out of the 16 respondents, 31.2% (N = 5) stated that they do not teach men's lacrosse CS immobilization skills. The remaining 68.8% (N = 11) of the respondents were separately analyzed. The results showed ATEP's averaged 1.5 ± 1.05 hours in lecture, 1.84 ± 2.73 in lab, and 1.36 ± 1.74 in clinical experience.

Out of the 16 respondents, 37.5% (N = 6) stated that they do not teach ice hockey CS immobilization skills. The

remaining 62.5% (N = 10) of the respondents were separately analyzed. The results showed ATEP’s averaged 1.17 ± 0.78 hours in lecture, 1.68 ± 2.23 in lab, and 1.27 ± 1.95 in clinical experience.

ABSTRACT

Title: EXAMINING THE NEED FOR SPECIFYING EDUCATIONAL CONTENT FOR CERVICAL SPINE IMMOBILIZATION SKILLS IN ATHLETIC TRAINING EDUCATION PROGRAMS

Researcher: Eric D. Gelinas, ATC, PES

Adviser: Dr. Linda Meyer, Ed.D, ATC, PES

Date: May 2009

Research Type: Master’s Thesis

Context: Contact equipment intensive sports include more than just football. Today’s athletic trainer must be aware of the various emergency protocols incase a cervical spine injury occurs anyone of these sports.

Objective: Study to determine if athletic training students are being taught various contact sport immobilization and equipment management techniques.

Setting: An email was sent to the program directors with a link to the survey to be completed on an internet based program at the program directors own discretion.

Participants: 320 ATEP directors were asked to volunteer their time to participate in the survey. 129 ATEP directors responded to the survey.

Interventions: An original survey was created for this study. The survey was examined by a panel of experts to determine the validity of the survey. Then an IRB approved survey was sent to 30 program directors to test its reliability. The survey was created on the web server ‘Survey Monkey’ and sent via email to the program directors. A cover letter explaining the study was also uploaded with the survey.

Main Outcome Measures: The research hypotheses will be analyzed using a one-way analysis of variance at an alpha level of 0.05.

Results: The mean hours spent in lecture for Football CS immobilization was 2.68 ± 1.98, M. Lacrosse was .32 ± .76, and Hockey was .38 ± .79. The mean hours spent in lab for Football CS immobilization was 3.88 ± 3.22, M. Lacrosse was .29 ± 1.05, and Hockey .30 ± .84. The mean hours spent in clinical for Football CS immobilization was 3.62 ± 4.02, M. Lacrosse .32 ± 1.41, and Hockey .25 ± .72. A significant difference was found among time spent in lecture ($F(2,384) = 136.98$, $P < .001$), time spent in lab ($F(2,384) = 129.296$, $P < .001$), and time spent in clinical experience ($F(2,384)= 75.824$, $P < .001$) for the three contact equipment sports.

Conclusions: This study concluded that athletic training students are spending significantly less time in lecture, lab, and clinical experience reviewing CS immobilization skills for athletes wearing men’s lacrosse and hockey equipment compared to the time spent reviewing CS immobilization skills for football.

Word Count: 394

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