Evidence-Based Practice for the Athletic Training Profession

Cailee Elizabeth Welch
Old Dominion University

Follow this and additional works at: https://digitalcommons.odu.edu/hms_etds

Part of the Health and Physical Education Commons, and the Kinesiology Commons

Recommended Citation
Welch, Cailee E.. "Evidence-Based Practice for the Athletic Training Profession" (2012). Doctor of Philosophy (PhD), Dissertation, Human Movement Sciences, Old Dominion University, DOI: 10.25777/6z6k-ra17
https://digitalcommons.odu.edu/hms_etds/29

This Dissertation is brought to you for free and open access by the Human Movement Sciences at ODU Digital Commons. It has been accepted for inclusion in Human Movement Sciences Theses & Dissertations by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.
EVIDENCE-BASED PRACTICE FOR THE ATHLETIC TRAINING PROFESSION

By

Cailee Elizabeth Welch, MSEd, ATC
Bachelor of Science, Athletic Training, 2007, Boston University
Master of Science in Education, Athletic Training, 2009, Old Dominion University

A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirement for the Degree of

DOCTOR OF PHILOSOPHY

HUMAN MOVEMENT SCIENCES

OLD DOMINION UNIVERSITY

May 2012

Approved by:

Bonnie L. Van Lunen (Director)

Danica G. Hays (Member)

William A. Pitney (Member)
ABSTRACT

EVIDENCE-BASED PRACTICE FOR THE ATHLETIC TRAINING PROFESSION

Cailee Elizabeth Welch
Old Dominion University, 2012
Director: Dr. Bonnie Van Lunen

As evidence-based practice (EBP) becomes a necessity in athletic training, it is essential to recognize current barriers and modes of accessibility to information for enhancement of clinical decision-making. Furthermore, the effectiveness of educational interventions (EI) to enhance knowledge of EBP concepts must be investigated. The aim of Project I was to assess attitudes and beliefs, perceived barriers, and accessibility to resources of EBP among athletic trainers (AT). Project II was designed to investigate the effect of an EI on enhancing AT’s knowledge of EBP concepts. Project III explored ATs’ experiences of the EI and whether it elicited changes within their educational or clinical practices.

The Evidence-Based Concepts Assessment (EBCA) was utilized in Project I to survey 1,209 athletic training educators, clinicians, and post-professional students. Overall, participants “agree” (3.27) EBP has various benefits to clinical practice and “disagree” (2.23) that there are negative perceptions associated with EBP. Clinical prediction rules (22.1%) and Cochrane databases (22.8%) were the two resources with the least direct access. Time (76.6%) and availability of EBP mentors (69.6%) were the two most prevalent barriers towards implementation of EBP.

Project II consisted of the development of 10 online modules focusing on various EBP concepts; these online modules were assessed through a randomized controlled trial design among 164 athletic training educators, clinicians, and students. Composite scores
on the Evidence-Based Practice Knowledge Assessment prior to implementation phase
did not differ between the control and experimental group ($M_{C,pre}=30.12±5.73,$
$M_{E,pre}=30.65±5.93$); however, the experimental group ($M_{E,pos}=36.35±8.58$) obtained
significantly higher scores ($P=0.013$) on the post-assessment compared to the control
group ($M_{C,pos}=30.99±6.33$). No differences were identified between time instances within
the control group ($P=0.080$); however the experimental group obtained significantly
higher scores on the post-assessment than the pre-assessment ($P<0.001$).

The 25 ATs (12 educators, 13 clinicians) interviewed six months following the
implementation of the online modules identified knowledge gain and enhanced
importance of EBP as beneficial outcomes of the modules. Educators described a positive
impact on teaching as well as the ability to instill value and practice of EBP among
students. Clinicians reported an enhanced ability to implement EBP following the
modules, but that the EI did not directly impact behavioral changes within daily clinical
practice. Strategies to incorporate EBP throughout the athletic training profession were
also identified.
ACKNOWLEDGEMENTS

When I started this journey a few years ago, I thought I had a pretty good idea of what to expect. Looking back at everything that has happened throughout this process, I’ve realized the experience was more than anything I could have ever imagined, and I am so grateful I was given the opportunity to experience every single minute of it!

There are so many people who have made this journey possible over the past several years. First and foremost, I would like to thank my dissertation committee. Your advice and guidance throughout this process has been invaluable and I truly respect everything that you do. I am sincerely grateful for your assistance in helping me complete this dissertation. Bonnie – I’m not sure words will do my appreciation any justice. Saying that you have been my dissertation committee chair, program director, mentor, and role model just doesn’t seem to describe the amount of gratitude I have for all that you have done for me. You have afforded me with so many invaluable opportunities over the past several years that have allowed me to grow both professionally and personally. I admire your faith, passion, commitment, and your astonishing ability to so gracefully balance an incredible career and such a loving family. I will forever be thankful for all that you have done, and I look forward to what lies in store for us in the future.

To my friends – near, far, old, and new – I want to thank you for your encouragement and compassion throughout this process. Many of you have stood by my side from the start, and helped me through all the highs and lows of this experience. Lauren – thank you for keeping it real, and for always telling me exactly like it is. You have been there for me through thick and thin, and I will always be thankful. Dorice – Your help with the projects involved in this dissertation have made it the finished product
that it is today. I know our working relationship will surely take us on many adventures, but it has been our enduring friendship that I will always cherish. Thank you to my colleagues and peers for always keeping me on my toes, and for always being there to listen. I wish I could say something about all the incredible people in my life, but just know that each and every one of you has truly left a footprint on my heart.

To my family – Mom, Dad, Michael, and Melissa your support throughout this process has been monumental. Thank you from the very bottom of my heart for believing in me every step of the way. I wouldn’t be where I am today without your unconditional love and constant encouragement. I am so lucky to have such an unbelievable family! I also want to thank my extended family for being so motivating. Your phone calls and visits were my lifeline to keep my going. And lastly, to my new family – the McCarty’s, Moran’s, Carr’s, and Schaffer’s – I am so grateful to have such a wonderful group of people in my life. Thank you for all your love and support and for understanding that my laptop would be with me during every family visit!!

Finally, to Kyle – Thank you for being my everything! You entered my life three weeks after I started this journey, and we are ending this adventure together as husband and wife! Thank you for taking care of every other aspect of our lives during this process and for always understanding when I had to cancel our plans to meet my never-ending deadlines!! You are such an unbelievably caring and selfless person, and you always know the right thing to say to keep me motivated (and sane)! I can only hope to support you as much as you have supported me. I am so blessed and honored to be your wife!

So many people have played such a significant role in allowing me to the best I can be.

Thank you – with all my heart.
TABLE OF CONTENTS

| LIST OF TABLES | xiii |
| LIST OF FIGURES | xiv |
| LIST OF PUBLICATIONS | xv |

CHAPTER

I. INTRODUCTION

Project I

| Statement of the Problem | 3 |
| Experimental Hypotheses | 3 |
| Independent Variables | 5 |
| Dependent Variables | 5 |
| Assumptions | 5 |
| Limitations | 6 |
| Delimitations | 7 |

Project II

<p>| Statement of the Problem | 7 |
| Experimental Hypotheses | 7 |
| Independent Variables | 8 |
| Dependent Variables | 9 |
| Assumptions | 9 |
| Limitations | 10 |
| Delimitations | 11 |</p>
<table>
<thead>
<tr>
<th>Project IIIA</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement of the Problem</td>
<td>11</td>
</tr>
<tr>
<td>Aims of Research</td>
<td>11</td>
</tr>
<tr>
<td>Limitations</td>
<td>12</td>
</tr>
<tr>
<td>Delimitations</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project IIIB</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement of the Problem</td>
<td>13</td>
</tr>
<tr>
<td>Aims of Research</td>
<td>13</td>
</tr>
<tr>
<td>Limitations</td>
<td>13</td>
</tr>
<tr>
<td>Delimitations</td>
<td>14</td>
</tr>
</tbody>
</table>

| Operational Definitions | 15 |

<table>
<thead>
<tr>
<th>II. REVIEW OF THE LITERATURE</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evolution of Athletic Training</td>
<td>18</td>
</tr>
<tr>
<td>History of Athletic Training</td>
<td>18</td>
</tr>
<tr>
<td>Program Directorship</td>
<td>22</td>
</tr>
<tr>
<td>Clinical and Educational Instructors</td>
<td>24</td>
</tr>
<tr>
<td>Terminal Degrees</td>
<td>30</td>
</tr>
<tr>
<td>Athletic Training Clinicians</td>
<td>31</td>
</tr>
<tr>
<td>Evidence-Based Practice</td>
<td>35</td>
</tr>
<tr>
<td>History of Evidence-Based Practice</td>
<td>35</td>
</tr>
<tr>
<td>Steps of Evidence-Based Practice</td>
<td>38</td>
</tr>
</tbody>
</table>
1. Defining a Clinical Question ......................................................... 39
2. Conducting a Literature Search ..................................................... 43
3. Critically Appraising the Literature ................................................. 51
4. Applying the Evidence .................................................................. 53
5. Evaluating the Outcomes ................................................................. 53

Clinician Barriers Towards Evidence-Based Practice ...................... 54

Incorporation of Evidence-Based Practice ........................................ 54
Evidence-Based Practice in Other Healthcare Professions ............... 55
Evidence-Based Practice in Athletic Training .................................. 57
Knowledge ...................................................................................... 59
Implications for Implementation ....................................................... 61
Challenges for Implementation ......................................................... 63

Evidence-Based Practice Educational Interventions ....................... 64
Teaching Evidence-Based Practice .................................................... 64
Evidence-Based Practice Workshops and Courses ......................... 67
Online Tutorials ............................................................................... 69
Advantages and Caveats .................................................................. 69
Preliminary Strategies for Design ...................................................... 71
Tutorial Development Process ......................................................... 73
Tutorial Dissemination ..................................................................... 74
Tutorials Among Other Professions ................................................ 76

Questionnaires ............................................................................... 77
III. PROJECT I – ATTITUDES, BELIEFS, BARRIERS, AND ACCESSIBILITY TO EVIDENCE-BASED PRACTICE RESOURCES AMONG ATHLETIC TRAINING EDUCATORS, CLINICIANS, AND STUDENTS

Introduction

Methodology

Results

Discussion

Conclusions and Implications

References

IV. PROJECT II – EFFECTIVENESS OF AN EVIDENCE-BASED PRACTICE EDUCATIONAL INTERVENTION FOR ATHLETIC TRAINERS: A RANDOMIZED CONTROLLED TRIAL

Introduction

Methods

Results

Discussion

Conclusions and Implications

References
V. PROJECT IIIA - PERCEIVED OUTCOMES OF ONLINE MODULES DESIGNED TO ENHANCE ATHLETIC TRAINERS’ KNOWLEDGE OF EVIDENCE-BASED PRACTICE

Introduction ................................................................. 176
Methods ................................................................. 178
Results ................................................................. 185
Discussion ............................................................... 191
Conclusions and Implications .............................................. 202
References ...................................................................... 204

VI. PROJECT IIIB - FUTURE DIRECTIONS OF EVIDENCE-BASED PRACTICE IN ATHLETIC TRAINING: PERCEIVED STRATEGIES TO ENHANCE THE UTILIZATION OF EBP

Introduction ................................................................. 216
Methods ................................................................. 219
Results ................................................................. 226
Discussion ............................................................... 231
Conclusions and Implications .............................................. 242
References ...................................................................... 243

VII. CONCLUSIONS ................................................................ 251
APPENDICES .................................................................................................................... 253

I. The Evidence-Based Concepts Assessment ............................................................... 253

II. The Evidence-Based Practice Knowledge Assessment .............................................. 268

III. Post-Module Qualitative Interview Protocol .......................................................... 292

VITA .................................................................................................................................. 295
## LIST OF TABLES

<table>
<thead>
<tr>
<th>III.1</th>
<th>Participant Demographics (n=1,209)</th>
<th>135</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.2</td>
<td>Negative Perceptions Among Five Athletic Training Groups</td>
<td>137</td>
</tr>
<tr>
<td>III.3</td>
<td>Benefits to Practice Among Five Athletic Training Groups</td>
<td>138</td>
</tr>
<tr>
<td>III.4</td>
<td>Personal Skill and Attribute Barriers Among Five Athletic Training Groups</td>
<td>139</td>
</tr>
<tr>
<td>III.5</td>
<td>Support and Accessibility of Resources Barriers Among Five Athletic Training Groups</td>
<td>140</td>
</tr>
<tr>
<td>IV.1</td>
<td>Primary Athletic Training Role Definitions</td>
<td>170</td>
</tr>
<tr>
<td>IV.2</td>
<td>Final Module Breakdown By Evidence-Based Practice Step</td>
<td>171</td>
</tr>
<tr>
<td>IV.3</td>
<td>Group Means By Primary Athletic Training Role</td>
<td>172</td>
</tr>
<tr>
<td>IV.4</td>
<td>Experimental Group Perceptions of the EBP Online Learning Modules (%)</td>
<td>173</td>
</tr>
<tr>
<td>V.1</td>
<td>Roles and Experiences of the Research Team</td>
<td>211</td>
</tr>
<tr>
<td>V.2</td>
<td>Participant Demographics</td>
<td>212</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.1</td>
<td>Direct Access to Resources Among Five Athletic Training Groups</td>
<td>141</td>
</tr>
<tr>
<td>III.2</td>
<td>Resource Utilization Among All Participants (n = 1,209)</td>
<td>142</td>
</tr>
<tr>
<td>IV.1</td>
<td>Investigation Mortality and Response Rates</td>
<td>174</td>
</tr>
<tr>
<td>V.1</td>
<td>Research Team Involvement During CQR Data Analysis</td>
<td>213</td>
</tr>
<tr>
<td>V.2</td>
<td>Conceptual Framework of Themes and Categories</td>
<td>214</td>
</tr>
<tr>
<td>VI.1</td>
<td>Conceptual Framework of Themes and Categories</td>
<td>250</td>
</tr>
</tbody>
</table>
LIST OF PUBLICATIONS

The following manuscripts support compilation of this dissertation:


CHAPTER I
INTRODUCTION

Over the past decade, evidence-based practice (EBP) has become more commonly recognized amongst the athletic training profession. The integration of the best available research evidence, patient values, and clinician expertise used for making clinical decisions most accurately describes the term evidence-based practice (Forrest & Miller, 2002; Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996; Steves & Hootman, 2004). EBP is conducted in a five step process: defining a clinical question, conducting a search of the most current literature, critically appraising the literature, relating the research back to the initial clinical question, and finally evaluating the effectiveness of the outcomes (Sackett et al., 1996). It is important to note that although the EBP process involves utilizing available evidence to make an informed decision, it does not ignore the importance of a clinician’s individual knowledge and clinical experience or each individual patient’s goals and values (Shlonsky, 2004).

As evidence-based practice becomes more popular throughout health care, it is important for all health care professionals to accept and implement this fundamental idea into clinical practice and education as a vehicle for improving patient care. Medicine, dental medicine and nursing have become the pioneering professions to adopt and utilize evidence-based practice into everyday health care. Over the past decade, accrediting bodies, governing agencies and health care payers have emphasized the push towards EBP (DePalma, 2007; Fineoutoverholt, Melnyk, Schultz, 2005; Zinberg, 1997). Not only becoming increasingly prevalent in clinical practice, evidence-based practice has flourished in nursing education as well as professional publications. Several journals have
been created over the past several years solely focusing on evidence-based nursing practice. Other healthcare professions, such as physical therapy, occupational therapy and athletic training have gradually begun to adopt and incorporate evidence-based practice into daily practices and education (Kronenfeld et al., 2007).

Creating a culture of evidence-based practice must start with education. For EBP to become a standard within clinical practice, athletic trainers must be well versed in its fundamentals. Compared to other allied health professions, athletic training as a whole is lacking in publications identifying outcomes research to support its clinical practices (Steves & Hootman, 2004). Having scientific evidence will not only support the effectiveness of athletic training clinical methods, but may also provide reasoning for the acquisition of third-party financial reimbursement (Hertel, 2005). From an academic standpoint, it is important for educators in athletic training programs to prepare students with the proper skills to enhance clinical decision-making (Romanello & Martin, 2006; Welch et al., 2011a).

With the inclusion of an evidence-based practice content area in the 2011 release of the 5th Edition Athletic Training Education Competencies, it is critical for strategies and resources to be developed to educate athletic training students, educators, and clinicians alike. While recent studies have aimed to identify baseline knowledge levels (Hankemeier et al., Accepted-b; Manspeaker, Van Lunen, Turocy, Pribesh, Hankemeier, 2011b; Welch et al., 2011a), perceptions (Hankemeier & Van Lunen, 2011; Manspeaker & Van Lunen, 2010), and barriers to implementation (Hankemeier & Van Lunen, Accepted-a; Manspeaker & Van Lunen, 2011c; Welch McCarty, Hankemeier, Walter, Newton, Van Lunen, Accepted), very few studies (Manspeaker et al., 2011b; Welch et
Have examined the effectiveness of educational strategies to incorporate evidence-based practice into athletic training clinical practices. Thus, while it is important to have a solid understanding of athletic trainers' perceptions of evidence-based practice and their perceived barriers towards EBP implementation, the profession has reached a critical time where developing EBP education strategies and identifying effective dissemination modes is crucial.

Project I

Statement of the Problem

The purpose of this study was to assess the attitudes and beliefs and perceived barriers of evidence-based practice among athletic training educators, clinicians, and students. Additionally, we sought to determine participants' accessibility to resources relating to evidence-based practice.

Experimental Hypotheses

Null Hypothesis I

There will be no statistically significant differences in attitudes and beliefs composite scores between athletic trainers, regardless of athletic training group, on the Evidence-Based Concepts Assessment.

Research Hypothesis I

a. Individuals affiliated with athletic training education programs (i.e., educators, approved clinical instructors, students) will achieve significantly higher composite scores on the benefits to practice items, indicating they agree that evidence-based practice provides various benefits to practice.
b. Clinicians will achieve significantly lower negative perception composite scores regarding the implementation of EBP than all other athletic training groups.

Null Hypothesis II

There will be no statistically significant differences in accessibility composite scores between athletic trainers, regardless of athletic training group, on the Evidence-Based Concepts Assessment.

Research Hypothesis II

a. Professional educators, post-professional educators, and post-professional students will utilize resources relating to evidence-based practice more frequently than approved clinical instructors and clinicians not affiliated with education programs.

b. Professional educators, post-professional educators, and post-professional students will report higher rates of direct access to resources than approved clinical instructors and clinicians not affiliated with education programs.

Null Hypothesis III

There will be no statistically significant differences in barriers composite scores between athletic trainers, regardless of athletic training group, on the Evidence-Based Concepts Assessment.

Research Hypothesis III

a. Clinicians will achieve significantly higher composite scores regarding perceived barriers relating to personal skills and attributes than all other athletic training groups.

b. Clinicians will achieve significantly higher composite scores regarding perceived barriers relating to support and accessibility to resources than all other athletic training groups.
Independent Variables

The independent variables of this study were:

1. Athletic Training Group (5)
   a. Professional athletic training education program directors
   b. Approved clinical instructors (ACI)
   c. Clinicians
   d. Post-professional athletic training education program directors
   e. Post-professional athletic training students

Dependent Variables

The dependent variables of this study were the scores achieved by the responses of the participants on the Evidence-Based Concepts Assessment.

Assumptions

The following is a list of assumptions that can be associated with this study:

1. The instrumentation used in the study was determined to be valid by a panel of subject matter experts.
2. The instrumentation used in the study was determined to be reliable via a test-retest assessment of a pilot sample (n=32).
3. The participants answered the survey honestly and to the best of their ability.
4. The participants in the clinician group truly had no affiliation with an athletic training education program.
5. The professional athletic training program directors disseminated all appropriate information relating to the survey to the athletic training faculty and approved clinical instructors affiliated with the institution.
6. The post-professional athletic training program directors disseminated all appropriate information relating to the survey to the athletic training faculty and post-professional students affiliated with the institution.

7. The participants' responses were strictly due to their own knowledge and experience and not external sources.

8. The participants' attitudes and/or other influences did not manipulate their responses on the assessment.

**Limitations**

There were several limitations to this study:

1. The participants of this study were from a sample of convenience.

2. The survey and all information relating to the study could not be directly sent to the post-professional student group. All information was required to be passed along via the post-professional program director at each institution.

3. The survey and all information relating to the study could not be directly sent to the approved clinical instructors affiliated with a professional athletic training education program. All information was transmitted via the athletic training education program director at each institution.

4. Clinicians not affiliated with athletic training education programs who practice in a college/university or secondary school setting were excluded from this study to prevent potential cross-over of the approved clinical instructors solicited with different sampling procedures.

5. Different sampling methods were utilized to target each sample of athletic trainers.
**Delimitations**

This study was delimited to the following sample groups:

1. Program directors of CAATE-accredited professional athletic training education programs as listed on the CAATE website (www.caate.net) during January 2010.
3. Programs directors of NATA-accredited post-professional athletic training education programs as listed on the NATA website (www.nata.org) during January 2010.
4. Post-professional athletic training students enrolled in a post-professional athletic training education program during January 2010.
5. Clinicians not affiliated with athletic training education programs, excluding clinicians practicing in the college/university or secondary school setting. A list of clinicians’ names and email addresses were obtained from the National Office for the NATA via the *NATA Survey List Request Form*.

**Project II**

**Statement of the Problem**

The purpose of this study was to assess the effect of an evidence-based practice educational intervention (i.e., 10 online learning modules) on enhancing athletic trainers’ knowledge of EBP concepts.

**Experimental Hypotheses**

*Null Hypothesis 1*
There will be no statistically significant difference between pre-module scores or post-module scores achieved by participants in the experimental group and participants in the control group on the *Evidence-Based Practice Knowledge Assessment*.

*Research Hypothesis 1*

a. There will be no differences in pre-module scores achieved by participants in the experimental group and participants in the control group on the *Evidence-Based Practice Knowledge Assessment*.

b. Participants in the experimental group will achieve higher post-module scores on the *Evidence-Based Practice Knowledge Assessment* than participants in the control group.

*Null Hypothesis 2*

There will be no statistically significant difference between pre-module knowledge and post-module knowledge for all participants on the *Evidence-Based Practice Knowledge Assessment*.

*Research Hypothesis 2*

a. Participants in the experimental group will achieve higher post-module scores than their pre-module scores on the *Evidence-Based Practice Knowledge Assessment*.

b. There will be no differences in pre-module scores and post-module scores achieved by participants in the control group on the *Evidence-Based Practice Knowledge Assessment*.

*Independent Variables*

The independent variables of this study were:

1. Group (2)
   
   a. Control
   
   b. Experimental
2. Time (2)
   a. Pre-Intervention
   b. Post-Intervention

**Dependent Variables**

The dependent variables of this study were the scores achieved by the responses of the participants on the *Evidence-Based Practice Knowledge Assessment*.

**Assumptions**

The following is a list of assumptions that can be associated with this study:

1. The instrumentation used in the study was determined to be valid by a panel of subject matter experts.

2. The instrumentation used in the study was determined to be reliable via a test-retest assessment of a pilot sample (n=82).

3. Each online module clearly and thoroughly covered the intended evidence-based practice concepts.

4. The questions on the knowledge assessment were an accurate representation of the information emphasized within the online modules.

5. The participants’ responses on the knowledge assessment were strictly due to their own knowledge and not external sources.

6. The participants answered the knowledge assessments honestly.

7. The participants in the experimental group did not share their personal module access code with participants in the control group or other individuals not associated with the study.
Limitations

There were several limitations to this study:

1. Technological errors may have prevented NATA members from receiving the initial email requesting voluntary participation in this study therefore limiting individuals from having the opportunity to participate.

2. NATA members have the opportunity to refuse emails sent from the NATA office; therefore, some members who would be interested in participating in the study were not aware of the opportunity to provide consent.

3. Due to technological difficulties, participants may not have been able to access the initial participation survey webpage, therefore preventing them from providing their consent.

4. Due to technological difficulties, participants may not have been able to access the knowledge assessment survey webpage, therefore preventing them from completing the pre-module or post-module assessment.

5. The type of environment in which the participant took each knowledge assessment was not controlled.

6. The ability of the participants to understand the directions and questions was not controlled.

7. The amount of time participants in the experimental group spent on each module could not be controlled.

8. The ability for participants in the experimental group to share their access code to the modules with other individuals could not be controlled.
9. The ability to prevent participants in the control group from looking up evidence-based practice related information during the intervention phase could not be controlled.

10. The ability to prevent participants from utilizing external resources while completing the knowledge assessment could not be controlled.

**Delimitations**

This study was originally delimited to all athletic trainers and athletic training students who were identified as current members of National Athletic Trainers’ Association members in April 2011. Following initial correspondence, the remainder of the research investigation was delimited to the 473 NATA members who provided their voluntary consent to participate in the study.

**Project IIIA**

**Statement of the Problem**

The purpose of this study was to explore the experiences and theories athletic trainers have toward an evidence-based practice educational intervention and its effectiveness on behavioral changes as it relates to athletic training education and clinical practice.

**Aims of Research**

The main research questions that structured this study were:

1. How do athletic trainers perceive the evidence-based practice online learning modules?
2. Did the evidence-based practice online learning modules influence clinical practice or didactic education behavioral changes among athletic trainers?
3. What strategies do athletic trainers believe will be beneficial to educate the athletic training profession on the concepts involved in the evidence-based practice process?

**Limitations**

Some limitations may exist for this study:

1. **Time** – The interviews, transcription, data analysis and management along with setting up research team meetings will place a large demand on the primary researcher. Time constraints may affect the research team as it may become difficult to schedule frequent meetings during the data analysis process in which all team members can be present. Therefore research team members should be made aware of this study’s anticipated time commitments prior to agreeing to become a part of the research team.

2. **Disregard of researcher bias** – Reflexive journals may not be utilized by the researcher and research team, which could therefore affect the procedural rigor of the study.

3. **Inaccurate description of the data** – The CQR tradition relies heavily on participant involvement throughout the research process. If participants are not provided the opportunity to member-check transcriptions, core ideas, categories, or the end product, or if participants fail to respond to member-checking opportunities, the data may be described incorrectly which could severely affect the transferability and confirmability of the results.

4. **Restriction of various data methods** – Only individual phone interviews will be conducted during this study. A lack of various data methods within a research study
may cause the research team to miss important themes or concepts, therefore decreasing the true representativeness of the overall study.

**Delimitations**

This study was initially delimited to the 166 individuals who accessed the evidence-based practice online learning modules during the experimental phase of the study entitled, “An Assessment of the Effectiveness of Evidence-Based Practice Online Learning Modules: A Randomized Controlled Trial.” To be a participant in this investigation, individuals in the experimental group had to (1) be certified by the Board of Certification (BOC) and (2) access 100% of the online learning modules as determined by the online module usage data sheet.

**Project IIIB**

**Statement of the Problem**

The purpose of this study was to explore the experiences and theories athletic trainers have toward identifying strategies and techniques to aid athletic training educators and clinicians in successfully implementing evidence-based practice within athletic training education and clinical practice.

**Aims of Research**

The main research question that structured this study was:

What strategies do athletic trainers believe will be beneficial to educate the athletic training profession on the concepts involved in the evidence-based practice process?

**Limitations**

Some limitations may exist for this study:
1. Time – The interviews, transcription, data analysis and management along with setting up research team meetings will place a large demand on the primary researcher. Time constraints may affect the research team as it may become difficult to schedule frequent meetings during the data analysis process in which all team members can be present. Therefore research team members should be made aware of this study’s anticipated time commitments prior to agreeing to become a part of the research team.

2. Disregard of researcher bias – Reflexive journals may not be utilized by the researcher and research team, which could therefore affect the procedural rigor of the study.

3. Inaccurate description of the data – The CQR tradition relies heavily on participant involvement throughout the research process. If participants are not provided the opportunity to member-check transcriptions, core ideas, categories, or the end product, or if participants fail to respond to member-checking opportunities, the data may be described incorrectly which could severely affect the transferability and confirmability of the results.

4. Restriction of various data methods – Only individual phone interviews will be conducted during this study. A lack of various data methods within a research study may cause the research team to miss important themes or concepts, therefore decreasing the true representativeness of the overall study.

**Delimitations**

This study was initially delimited to the 166 individuals who accessed the evidence-based practice online learning modules during the experimental phase of the
study entitled, "An Assessment of the Effectiveness of Evidence-Based Practice Online Learning Modules: A Randomized Controlled Trial." To be a participant in this investigation, individuals in the experimental group had to (1) be certified by the Board of Certification (BOC) and (2) access 100% of the online learning modules as determined by the online module usage data sheet.

**Operational Definitions**

1. **Evidence-Based Practice** is the integration of the best available research evidence, patient values, and clinician expertise to make clinical decisions (Forrest & Miller, 2002; Sackett, et al., 1996; Steves & Hootman, 2004).

2. **National Athletic Trainers' Association (NATA)** is a national, professional, membership organization consisting of certified athletic trainers and athletic training students, with the main focus to enhance the quality of healthcare by certified athletic trainers and to advance the athletic training profession (About The NATA, 2012).

3. **The Commission on Accreditation of Athletic Training Education (CAATE)** is the governing board responsible for developing, maintaining and promoting the minimum standards of quality for athletic training education programs. An institution must adhere to these standards in order to be recognized as a CAATE accredited athletic training education program. Furthermore, via comprehensive and annual review processes, CAATE is responsible for the evaluation of a program’s compliance with the standards (CAATE, 2008).

4. **Board of Certification (BOC)** is a body that sets the standards for practice in athletic training. It is a program that provides certification for entry-level athletic trainers and recertification for certified athletic trainers (Board of Certification, 2011).
5. **Athletic Training Education Program Director** is the person recognized by the department of the institution possessing the responsibility for the accountability of the day-to-day operation, coordination, supervision, and evaluation of all aspects of the athletic training education program (CAATE, 2008).

6. **Athletic Training Student (ATS)** is an individual enrolled in a CAATE-accredited professional undergraduate or entry-level masters education program. This individual is not certified via the Board of Certification (BOC).

7. **Approved Clinical Instructor (ACI)** is an appropriately credentialed professional identified and trained by the CAATE-accredited athletic training education program Clinical Instructor Education (CIE) to provide instruction and evaluation of the Athletic Training Educational Competencies and/or Clinical Proficiencies. (CAATE Clinical Education Terminology, 2012).

8. **Athletic Training Educator** is any qualified person listed by a CAATE-accredited professional athletic training education program or NATA-post-professional athletic training education program as the instructor of record for athletic training didactic curriculum courses.

9. **Graduate Student** is an individual has successfully graduated from a CAATE-accredited professional athletic training education program, is certified via the BOC, and is currently enrolled in a graduate program to receive a masters or doctoral degree.

12. **Graduate Clinical Preceptor** is an individual working at clinical sites identified to supervise, consult, and provide knowledge and skills that will strengthen the graduate students’ current foundation. Preceptors provide a safe environment where students can practice these skills and provide feedback to improve on these skills. Clinical preceptors
serve in post-professional programs accredited by the NATA (NATA Education Council, 2002).

13. **Athletic Training Clinician** is any certified athletic trainer (AT) who is currently practicing in as a health care setting and does not have any education instruction or clinical education supervision responsibilities for an athletic training education program.

14. **Evidence-Based Concepts Assessment (EBCA)** is a survey instrument with six Likert scale importance items, 15 Likert scale attitudes and beliefs items, six multiple-choice knowledge questions with associated confidence level Likert scale items, 16 Likert scale barrier items, and a section assessing the accessibility of resources for the participant.

15. **Evidence-Based Practice Online Learning Modules** are a series of ten online modules developed by the Evidence-Based Education for Athletic Training Research Team. These modules were created for dissemination to all members of the NATA and development was funded via a grant from the NATA Board of Directors. Each module was specifically developed to cover pertinent information relative to the evidence-based practice content area within the 5th edition of the Athletic Training Education Competencies.

16. **Evidence-Based Practice Knowledge Assessment** is an instrument consisting of 60 multiple-choice questions regarding knowledge pertaining to evidence-based concepts discussed in the evidence-based practice online learning modules.

17. **Consensual Qualitative Research (CQR)** is a method of qualitative research that examines the significance behind individual experiences through the use of interviews. CQR focuses on the collaboration between multiple researchers to reach an agreement on the interpretation of the data (Hill, Knox, Thompson, Nutt-Williams, Hess, & Ladany, 2005).
CHAPTER II
REVIEW OF LITERATURE

The following is a detailed review of literature concerning evidence-based practice (EBP) and its relationship to athletic training education and clinical practice. While several publications have both defined evidence-based practice and proposed its importance for adoption into the athletic training profession, there is a need for research to examine the perceptions athletic trainers have toward evidence-based practice as well as the development and effectiveness of educational methods for implementation and dissemination into athletic training clinical practice. As the athletic training profession as a whole gradually begins to adopt evidence-based practice, it is important that educators and clinicians possess the knowledge and abilities to utilize evidence-based concepts within the athletic training curricula and clinical practice. This chapter serves to identify the evolution of athletic training, the history and process of evidence-based practice, the role of evidence-based practice in other health professions, and lastly to review different teaching strategies incorporating evidence-based practice into the athletic training profession.

Evolution of Athletic Training Education

History of Athletic Training

The athletic training profession is still considered relatively young and new when compared to similar health professions such as physical and occupational therapies. According to O’Shea, the National Athletic Trainers’ Association (NATA), founded in 1950, developed a purpose statement to “build and strengthen the profession of athletic training through the exchange of ideas, knowledge, and methods of athletic training” (as
cited in Delforge & Behnke, 1999, p. 53). Shortly after the launch of the NATA, the Committee on Gaining Recognition was developed to focus on athletic training education and enhancement of the profession (Delforge & Behnke, 1999). By 1959, the committee received approval from the NATA board of directors for an athletic training educational program. Curricula for this program entailed instruction in biology, anatomy, human and exercise physiology, physics, psychology, nutrition, basic and advanced techniques of athletic training, first aid and safety, laboratory practices, as well as other courses.

Although the athletic training education program was a new area of interest in the late 1950's and early 1960's, the curriculum was comprised of course work that most often already existed in physical education and health departments of four-year colleges and universities (Delforge & Behnke, 1999).

The newly approved curriculum in 1959 had two major foci that would enhance an athletic trainer's marketability. The first emphasis was for athletic trainers to acquire a secondary-level teaching credential, due to the large demand of employed athletic trainers at the high school level. The secondary-level focus was primarily in health or physical education and the athletic training curriculum included prerequisites on top of the athletic training courses to attain such a credential. The second emphasis of this educational program was to include prerequisite courses for physical therapy. The purpose of the inclusion of these classes was to again increase professional development and marketability (Delforge & Behnke, 1999).

In 1969, after a 10 year gap from the approval of the first athletic training education program, the Committee on Gaining Recognition (by then known as the Professional Advancement Committee) had divided into two sections: the Subcommittee
of Professional Education and the Subcommittee on Certification (Delforge & Behnke, 1999; Grace, 1999). During this time, the Professional Education Committee recommended that the NATA recognize four universities across the country (Mankato State University, Indiana State University, Lamar University, and the University of New Mexico) as providing the first undergraduate athletic training education programs. This recognition thus initiated the NATA athletic training education program evaluation and approval process (Delforge & Behnke, 1999).

By the end of the 1960's, the importance of a prepared athletic trainer was recognized by the American Medical Association (AMA) (Newell, 1984). Only one year after the first four undergraduate athletic training education programs were recognized by the NATA, the NATA Certification Committee, formerly known as the Subcommittee on Certification, administered the first certification examination (Delforge & Behnke, 1999; Grace, 1999). However, during this time the certification examination was only one of four ways in which an individual could become a certified athletic trainer. Graduation from a school of physical therapy, completion of an internship program, or a special consideration route which involved at least five years as an actively participating athletic trainer were also established ways to attain certification. Also in the early 1970’s, the first graduate athletic training education programs emerged at the University of Arizona and Indiana State University (Delforge & Behnke, 1999; Grace, 1999).

The 12 years following the recognition of the first undergraduate athletic training education program and the commencement of the certification examination, an abundant number of ATEPs emerged (Delforge & Behnke, 1999). By 1982, 58 new athletic training education programs were developed making a total of 62 programs. Likewise,
nine graduate athletic training education programs were formed during this time. As a result, athletic training as a profession began to assume its own identity and the need for prerequisites for physical therapy programs began to fade. By the mid 1970’s a revised curriculum was established including courses more applicable to athletic training. This new curriculum included more coursework in areas such as applied anatomy and kinesiology as well as competency skill checklists to guide an athletic training student’s clinical development. A requirement of a minimum of 600 clinical hours under direct supervision of a NATA-certified athletic trainer also became mandatory (Delforge & Behnke, 1999).

The early 1980’s initiated the proposal of an athletic training major and by 1986 only those education programs that met the credentials would obtain NATA approval (Delforge & Behnke, 1999). To continue professional growth and recognition as an individualized major, in 1988 the NATA Board of Directors sought accreditation of entry-level athletic training education programs by the AMA Committee of Allied Health Education and Accreditation (CAHEA). First however, the AMA had to recognize athletic training as an allied health profession, which was not successfully accomplished until 1990.

By the end of 1990, the Joint Review Committee on Educational Programs in Athletic Training (JRC-AT) was assembled and included representatives from the Academy of Family Physicians, the American Academy of Pediatrics, AMA, NATA, and in 1995 the American Orthopaedic Society for Sports Medicine (Delforge & Behnke, 1999). One of the initial tasks of the JRC-AT was to develop standards and guidelines for CAHEA accreditation. In 1994, Barry University and High Point University became the
first two entry-level ATEPs accredited by CAHEA. Accreditation via CAHEA was short-lived however, and within a few years the Commission on Accreditation of Allied Health Education Programs (CAAHEP) became the governing accreditation board for entry-level athletic training education programs (Delforge & Behnke, 1999).

As time progressed, the various approaches to seek certification began to diminish. As recommended by the NATA Education Task Force, by 2004 the only way to become eligible for the BOC examination was for the candidate to successfully complete a CAAHEP-accredited athletic training education program (Perrin, 2007). Currently, athletic training students are required to complete a minimum of two years of clinical education at various settings such as colleges/universities, secondary schools, hospitals, industrial settings and sports medicine clinics under the direct supervision of an Approved Clinical Instructor. As of 2006, the Commission on Accreditation of Athletic Training Education (CAATE) replaced CAAHEP and now governs over 360 ATEPs (CAATE, 2012).

The future of athletic training education programs already holds promising changes. The NATA Educational Degree Task Force made recommendations that were then mandated by the NATA that no later than the 2014-2015 academic year, individuals entering the profession must have a degree specifically in athletic training. Such a degree is essential for the recognition of athletic trainers’ education. Throughout much debate to parallel athletic training with other health care professions, the task force also recommended that at this time, the minimum entry level into this profession should remain at the baccalaureate level (Albohm, 2011).

Program Directorship
As athletic training education programs progressed throughout the end of the twentieth century and into the twenty-first century, the need for a leadership position became apparent. Prior to the 1970's, all responsibility for athletic training education was left to the head athletic trainer and team physician (Leard, Booth, & Johnson, 1991). Thus, an athletic training education program director position (ATEPD) was created. Currently, the Commission on Accreditation of Athletic Training Education standards requires the ATEPD assignment to have a full-time faculty position with all rights, responsibilities and privileges as defined by the institution. They must also have programmatic and administrative responsibility as well as the appropriate release workload that is necessary to complete such administrative tasks of the assignment (Sexton, 2008).

The main responsibilities of this position, which originally was still held by the head athletic trainer, were the administration of the education program in addition to the administration of health care to the athletes (Sciera, 1981). However, as the position of the ATEPD became more defined, responsibilities began to transform. Currently, there has become a trend that most colleges and universities are hiring individuals for the ATEPD with both athletic training certification and a terminal degree. Therefore, program directors are taking on more tenure-track appointments then previous years (Perkins & Judd, 2001). Thus, it is important for ATEPD's to fully understand the tenure and promotion process involving individual fulfillment of teaching, research and service.

Regardless of whether a program director holds a tenure appointment, the ATEPD position has numerous duties. Presently, a program director must be able to balance the tasks of student recruitment and retention, advising, clinical education, and accreditation
on top of their scholarly activity and committee work. Concurrently, a program director is also responsible for the day-to-day coordination, operation, supervision, and evaluation of both the academic and clinical education components of the athletic training education program (Sexton, 2008). More specifically, alongside budgetary and fiscal management, the ATEPD has the duty of curricular planning and development as well as organization and administration of all aspects of the educational program (Sexton, 2008). The program director therefore makes all final decisions on any aspect of program delivery within the educational program. Thus, in regards to evidence-based practice, it is imperative for the ATEPD to fully comprehend the EBP process before it can be properly implemented and executed throughout both the didactic and clinical education components of the program.

The multiple demands and complexity of the position have significantly changed the ATEPD role to a point that it has become difficult to find the time to maintain both the quality of clinical practice as an athletic trainer as well as any requirements necessary for tenure and/or promotion (Judd & Perkins, 2004). Only 42% of program directors are clinically active on top of their other responsibilities (Perkins & Judd, 2001). Currently, ATEPDs not only have significantly less interaction time with patients, but also have less control of the day-to-day procedures and functions of the athletic training facility. However, athletic training program directors are not alone. Program directors of other professions such as laboratory sciences have expressed concerns about the increasing weight of responsibilities (Judd & Perkins, 2004). Thus, program directors must be multifaceted with skills as leaders, health professionals, researchers, and educators (Bordage, Foley, & Goldyn, 2000).

Clinical and Educational Instructors
Clinical and educational instructors also play an important role in professional athletic training education programs. Educational instructors are often hired by the academic department and focus on classroom learning while clinical instructors are employed by the athletic department and are primarily found in the athletic training facility or clinical setting (Carr & Drummond, 2002). Thus, both instructors play a role in the education of the athletic training student (ATS). In some colleges and universities however, a certified athletic trainer can hold a dual appointment, acting as both an educational and clinical instructor. According to the National Commission on Allied Health Education, the primary role of an health education program is to provide education to its students in both a didactic and clinical manner (Carr & Drummond, 2002). It is necessary therefore, for classroom and clinical instructors to collaborate and create a balance between education and practice that can be emphasized to the ATS.

Clinical education permits students to approach “hands-on” learning during real life situations involving actual patients as well as communication with other health professionals that make up the sports medicine team. Such situations allow students to apply theories learned in the classroom while encouraging critical thinking, problem solving and decision-making (Lauber, Toth, Leary, Martin, & Killian, 2003). The quality of clinical instruction an ATS receives is determined by the attributes of the clinical instructor. Although it contributes to a majority of their daily responsibilities (Foster & Leslie, 1992), clinical instructors serve to supervise as well as teach and evaluate necessary psychomotor skills to athletic training students during their clinical experiences (Lauber et al., 2003). A benefit to clinical instruction throughout athletic training programs is the generally small ratio between students and clinical instructors. According
to the CAATE standards and guidelines (2008), there should not be more than eight students per one clinical instructor in a given semester. This allows for more personal and individualized instructional opportunities for the athletic training student (Laurent & Weidner, 2001).

In the 2001 revised standards and guidelines, CAAHEP officially adopted the Approved Clinical Instructor (ACI) (Weidner & Henning, 2004). Currently, CAATE standards and guidelines (2008) identify an ACI as any health care professional as defined by the American Medical Association and the American Osteopathic Association who has been properly credentialed for a minimum of one year, and is formally trained with the skills to effectively teach and evaluate athletic training students’ clinical proficiencies. However, ACIs typically tend to be certified athletic trainers who have held BOC certification for a minimum of one year (Sexton, 2008). To remain an approved clinical instructor, the ACI must complete formal retraining at least once every three years. Formal retraining reviews the several standards, in conjunction with CAATE accreditation guidelines, that an ACI must maintain including legal and ethical behavior, communication skills, interpersonal relationships, instructional skills, supervisory and administrative skills, evaluation of performance as well as clinical skills and knowledge. Approved clinical instructors should display clinical aptitude by making sound clinical decisions as well as maintaining a systematic approach to critical thinking and problem solving (Weidner & Henning, 2004). Concurrently, the ACI should always be prepared to explain their actions and clinical decisions to an athletic training student as well as exemplify the proper role of an athletic trainer as a part of the health care team.
If a certified athletic trainer has not received formal training to become an ACI, but is interested in mentoring and supervising athletic training students throughout their clinical education experiences, they may opt to become a clinical instructor (CI). Again, according to the CAATE standards and guidelines (2008), a CI is identified as an American Medical Association and American Osteopathic Association declared health care professional that has been credentialed for a minimum of one year. Unlike ACIs that must maintain the responsibility of supervision, mentorship, instruction, and most importantly evaluation of the athletic training student’s clinical proficiencies however, the clinical instructor’s responsibility to the ATS is solely to supervise, mentor and instruct the student during their clinical experience. Health care professionals that have not been credentialed for at least one year may still be clinical instructors, however a plan for the CI to be supervised by a properly credentialed approved clinical instructor and/or clinical instructor must be formulated to guarantee the quality of teaching and supervision provided to the athletic training student (Sexton, 2008).

The role and influence of the approved clinical instructor and/or clinical instructor can have a tremendous effect on a student’s clinical experience. It has been estimated that athletic training students perceive 53% of athletic training professional development comes from clinical experience (Weidner & Henning, 2005). Additionally, Laurent and Weidner (2001) examined the perceptions of helpful clinical instructor characteristics by both the clinical instructor an athletic training student. Several teaching tips for clinical instructors were thus identified. These tips include clinical instructor confidence, respect for the students, effective communication with the student as to what is expected of them,
remaining accessible, willingness to admit when information is not known, and listening attentively to both students and athletes (Laurent & Weidner, 2001).

As with any teachable situation, an effective instructor must be able to describe a concept in multiple ways to account for the various learning styles of the students at hand. Particularly within athletic training clinical education, an approved clinical instructor and/or clinical instructor must be aware of the athletic training student’s educational competency level, learning style and willingness to perform athletic training skills at all times (Meyer, 2002). Each ATS may approach a clinical situation differently, and as their emotional maturity, motivation, cognitive readiness to perform a specific task, and clinical experience level acclimates, ACIs and CIs must be confident in their own leadership skills and teaching abilities so that they may be ready to adapt to any type of clinical conflict or situation (Meyer, 2002). Thus, when approved clinical instructors as well as CIs display both leadership expertise and effective teaching strategies, they positively enhance not only the students’ learning experiences, but also their own clinical growth (Merideth, 2007).

Similar to the role of clinical instructors, athletic training didactic instructors influence the professional development of athletic training students within the classroom. Qualifications of the athletic training educational faculty include teaching eligibility though professional preparation as well as experience in their respected fields as distinguished by the educational institution (Sexton, 2008). Educational instructors must also be recognized as a faculty member and/or instructional staff of the institution and most importantly be familiar with the Athletic Training Educational Competencies that are relevant to the courses they will be instructing. Instructors teaching within an athletic
training education program may be other healthcare professionals other than BOC certified athletic trainers, however since the 1997 NATA Board of Director’s decision to execute a single BOC certification route, hiring ATCs as the full time athletic training educational faculty has become prominent (Starkey & Ingersoll, 2001). This faculty may be preferred in some ATEPs as they can most accurately educate and mentor students in the athletic training educational competencies that will be transferred into practices during their clinical experiences.

On a daily basis, athletic training educators focus their teachings on information and skills that are necessary for athletic training students to learn and master. Educators are constantly interacting both with students and colleagues for suggestions and constructive feedback in regards to suitable ways to instruct learners in ways that enhance their educational wellbeing (Peer & Rakich, 2000). One of the greatest accomplishments of an effective educator is to be able to grab the attention of the students and encourage them to make a commitment to learning and to strive for success (Cornesky, 1992). Particularly within athletic training, it is the didactic instructor’s goal to portray athletic training skills and competencies to the ATS in such a manner that allows them to confidently and effortlessly apply their classroom knowledge to real life situations during their clinical experience.

For several years there has been a gap between what is taught in the classroom and what is practiced in the athletic training room. Although athletic training education programs have grown stronger in their didactic and clinical unity, unfortunately this gap may still exist today. In a majority of the athletic training programs, the didactic instructors are hired by the ATEP, while clinical instructors are hired by the athletic
department (Carr & Drummond, 2002). Therefore, both departments share the responsibilities of educating the athletic training students. Commonly, classroom instructors juggle other program responsibilities such as advising students, administrative tasks on top of their individual research endeavors and service pursuits. These factors typically make up the majority of the instructor’s workload, leaving very little to no reassignment time designated for clinical education (Hertel, West, Buckley, & Denegar, 2001). Therefore, because of their lack of presence in the clinical setting, didactic instructors often lack credibility when it comes to clinical practice (MacCormick, 1995).

A successful working relationship between academicians and clinicians must be maintained throughout an athletic training education program (Carr & Drummond, 2002). Athletic training clinicians should become involved in the didactic portion of the student’s education, just as an athletic training academic instructor should remain as clinically active as possible (Weidner & Henning, 2002). Finally, in addition to maintaining a balance between the classroom and clinical setting, both didactic and clinical instructors must communicate and develop strategies in which both sides of the program can model to students the distinct ways in which classroom knowledge can be integrated into clinical practice. More specifically, academicians and clinicians should demonstrate how research evidence can be utilized in both the classroom and the clinical site (Weidner & Henning, 2002).

Terminal Degrees

As athletic training education continues to evolve to become more widely recognized as an evidence-based healthcare profession, its educational faculty have begun to progress as well and the need for more doctoral-educated athletic trainers has
become indispensable (Hertel et al., 2001). In 1997, along with the transformation to a sole certification route, the National Athletic Trainers' Association Educational Task Force initiated an Educational Council that, along with several other duties, would be a resource for the creation and implementation of athletic training doctoral programs (NATA Task Force, 1997). Currently, athletic training educators in ATEPs hold varying types of degrees, academic rank, and percentages of their assignment dedicated to academics (Starkey & Ingersoll, 2001).

A terminal degree has been recommended to individuals wishing to pursue a program director assignment within athletic training (Leard et al., 1991). However, many new terminally degreed athletic trainers struggle with the immediate demands and challenges of simultaneously balancing teaching, research and service responsibilities (Starkey & Ingersoll, 2001), let alone any type of additional administrative and operational components of both the academic and clinical education programs an ATEP program director would juggle (Peer & Rakich, 2000). Thus, with the push for evidence-based practice among healthcare professions, a terminal degree should be more widely emphasized to all athletic trainers, not just those seeking a program directorship. To do so however, athletic training doctoral programs need to be developed and accredited. The implementation of doctoral programs in athletic training will not only produce more terminally degreed athletic trainers that will help spread the knowledge base within athletic training, but it will also address the growing concern about the lack of clinical practice research in the athletic training profession (Hertel et al., 2001).

*Athletic Training Clinicians*
As an athletic training student approaches the completion of his or her athletic
training degree and successfully passes the board of certification exam to become a
certified athletic trainer, there are several professional avenues he or she may choose to
take. Several newly certified athletic trainers opt to further their education and continue
on to post-professional athletic training education programs (PPATEP). The aim of
PPATEPs is to expand the depth of the applied, and experimental knowledge and skills of
novice certified athletic trainers (NATA Education Council, 2002). Additionally, these
programs focus to strengthen the student’s critical thinking and appraisal skills, as well as
their ability to attain leadership roles in clinical, teaching, research, or administrative
settings (Henry, Van Lunen, Udermann, Onate, 2009; Knight, 2002; Seegmiller, 2006).
As of March 2009, approximately 70% of certified athletic trainers have a master’s
degree or higher terminal degree (Facts About Athletic Trainers, 2009).

While there are several job opportunities in academics for athletic trainers, an
athletic trainer may choose to focus their time practicing clinically. In the athletic clinical
setting, athletic trainers often hold a pivotal role within the sports medicine team
(Delwiche & Hall, 2007). Athletic trainers most frequently collaborate with sports
medicine physicians, physical therapists, and various other health care professionals;
however, due to job responsibilities of traveling with sports teams, and following injuries
from acute care all the way through to return-to-play status, athletic trainers are generally
the most intimately involved sports medicine team member in regard to the participant’s
daily activities (Delwiche, 2007). Furthermore, the athletic trainer is typically the first to
respond and provide immediate care to injured individuals (Prentice, 2005).
There are numerous clinical settings in which certified athletic trainers can be employed. The most commonly perceived setting where an athletic trainer can be found is among collegiate or secondary school athletics. Working under licensed physicians and in cooperation with nurses, athletic directors, school administrators, and coaches, certified athletic trainers practicing in the collegiate or secondary school settings have numerous clinical opportunities (Ayres, 2009). Prospective job responsibilities may include preparing athletes for practice and competition, injury evaluation, developing injury prevention and conditioning programs, providing immediate care to acute or catastrophic injuries, and implementing treatment and rehabilitation programs for injured participants (Ayres, 2009). Along with the daily responsibilities of clinical care for multiple sports teams as well as individual participants, athletic trainers employed in the collegiate and secondary school settings may also have additional obligations to teaching and administrative tasks (Brumels & Beach, 2008).

Although the collegiate and secondary settings are the most commonly thought of positions for certified athletic trainers, more than 50% of the 30,000 represented members of the National Athletic Trainers’ Association are employed in clinical settings outside of school athletics (Facts About Athletic Trainers, 2009). Non-traditional athletic training settings include professional sports, performing arts, industrial and occupational positions, military/law enforcement, and hospitals and clinics. Approximately 800 certified athletic trainers work among professional sports, including the National Basketball Association, National Football Association, Major League Baseball, Auto Racing, and Rodeo, among various other sports (Ayres, 2009). Certified athletic trainers have also been employed in the performing arts (i.e., Radio City Music Hall Rockettes,
Cirque Du Soleil, and Blue Man group) where they perform specialized injury prevention and rehabilitation to dancers, vocalists, and musicians (Ayres, 2009). Similarly, athletic trainers provide care to “industrial athletes” in various occupational settings such as Coca-Cola, General Motors, and FedEx (Ayres, 2009). In more recent years, athletic training involvement in the military and law enforcement has emerged to include employment positions with the Navy SEALS, Marines, United States Coast Guard, United States Army, and the Federal Law Enforcement Training Center (Ayres, 2009).

Approximately 23% of NATA members work in some type of clinic setting, making hospitals, clinics, and physician’s offices the most common employment setting among athletic trainers (Ayres, 2009; Delwiche & Hall, 2007). Clinic employment positions may include working under physicians in the orthopedic, family, pediatric, psychiatric, and sports medicine settings (Ayres, 2009). Furthermore, an average day for athletic trainers working in this setting may involve practicing in the clinic in the morning and then working at a contracted high school or college in the afternoon (Delwiche & Hall, 2007).

As athletic training continues to emerge, professional recognition is essential. A current issue within the profession is achieving state regulation and licensure. To ensure their role as qualified health professionals, it is imperative for athletic trainers to attain some form of state directive. By pursuing licensure among all states, athletic trainers will protect the profession from allowing unqualified individuals to practice and provide care, as well as call themselves athletic trainers (Kronenfeld et al., 2007). As of 2011, 47 states have solidified regulation/licensure for athletic training with action taking place to secure regulation for the remaining four states (About the NATA, 2012).
Evidence-Based Practice

History of Evidence-Based Practice

Evidence-based practice (EBP) is a phenomenon that has become increasingly popular in health and medicine over the past several decades. In the twenty-first century clinicians in various health professions are beginning to make the shift from traditional medicine, experience, and intuition, to a more judicious, conscientious, and patient-centered approach to health care (Fisher & Wood, 2007; Sackett, Rosenberg, Gray, Haynes, Richardson, 1996; Steves & Hootman, 2004). Major professional organizations and federal agencies have shifted their focus to emphasize the importance of evidence-based practice as a means to improve health care (Fineoutoverholt, Melnyk, Schultz, 2005). Currently, the Joint Commission on Accreditation of Healthcare Organizations administratively requires evidence-based policies and procedures (DePalma, 2007), and it will not be long before other adjustments to shift towards an evidence-based practice paradigm will be made.

Evidence-based practice can be most accurately defined as the integration of the best available research evidence, patient values, and clinician expertise used to make clinical decisions (Sackett et al., 1996). This research evidence focuses on day-to-day patient-centered outcomes that will be most applicable to the individual needs of a patient (Steves & Hootman, 2004). It has been estimated that patient outcomes are improved by at least 28% when the clinical decisions are based from research evidence rather than traditional methods of treatment (Fineoutoverholt et al., 2005). However, it is important to note that although EBP suggests that the traditional approach to medicine, that so many clinicians are familiar with, may no longer be entirely the best approach to health
care, it does not ignore a clinician’s knowledge or experience in clinical practice (Fisher & Wood, 2007). Therefore, evidence-based practice should be utilized as a tool to assist healthcare professionals in making appropriate clinical judgments that are based on patient-outcomes.

One of the greatest misconceptions of EBP is that it is a blueprint on how to practice within healthcare professions (Steves & Hootman, 2004). Some healthcare providers believe that EBP creates a “cookbook” approach to clinical practice (Shlonsky, 2004), and will therefore produce cookbook clinicians. What these individuals fail to comprehend, however, is that evidence-based practice is not a set of robotic guidelines for clinicians to follow, but instead an integration of three fundamental elements. Any clinician who feels that they must restrict their clinical behavior and practices to only what the evidence concludes has missed the concept of EBP (Steves & Hootman, 2004). As previously mentioned, evidence-based practice involves not only the best current research evidence, but also incorporates the clinician’s individual expertise and most importantly the patient’s own personal values and goals. None of these three essential rudiments can stand alone in the EBP process; all three must be successfully blended together to truly define what evidence-based practice really is (Shlonsky, 2004).

Unfortunately, evidence-based practice has also become a catchphrase for anything within clinical practice that can somehow be linked to an experimental study, regardless of the evidence quality depicted in the study, as well as consideration of the patient’s values and needs (Shlonsky, 2004). However, what many novice EBP healthcare professionals fall short to recognize is that not only does evidence-based practice take into account the best available research to support answers for everyday
clinical questions, but it also encourages clinicians to search for the disconfirming evidence (Shlonsky, 2004). By identifying and weighing both sides of the literature, practitioners can therefore make stronger clinical decisions as well as be able to more accurately discuss the benefits and caveats of such choices with their patients.

A clinical decision based on the best available research is a concept that has been found in writings dating back to the mid-nineteenth century (Steves & Hootman, 2004). More recently, the notion of evidence-based practice has been coined as the hallmark of excellence throughout clinical practice (Fisher & Wood, 2007). Starting in 1972, a British epidemiologist, Dr. Archie Cochrane, began the evidence-based practice movement by criticizing the health care profession for not providing the public with access to systemic reviews of evidence. By publishing a systematic review proving that corticosteroid therapy reduced the chances of premature infant death from 50% to 30%, Dr. Cochrane established the importance of current research and providing the evidence in reviews that can be used to guide clinicians in clinical practice interventions (Fineoutoverholt et al., 2005). Due to Dr. Cochrane’s influence, the Cochrane Collaboration was established in 1993, which can be utilized to assist health care providers during the clinical decision making process. It also serves to develop systematic reviews of current research and make these analyses available to the public (Fineoutoverholt et al., 2005). The Cochrane Collaboration contains over 190,000 randomized controlled trials and is proclaimed the best and most thorough source to obtain evidence for clinical practice treatments (Bigby, 1998).

Since the commencement of the Cochrane Collaboration in 1993, several other databases, textbooks, and peer-reviewed journals have been developed to encourage
healthcare providers to transform their clinical practices to include evidence-based practice. Internet tutorials have even been created to provide clinicians with short mini-courses on how to properly conduct an EBP search. For example, The Centre For Evidence-Based Medicine website (Oxford, England) contains useful tools for learning evidence-based practice as well as schedules of courses on how to utilize and teach EBP (Bigby, 1998). This website can be visited at http://cebm.net/. Other useful resources include *Evidence-Based Medicine: How to Practice and Teach EBM* (Sackett et al., 1996) and *A Basic Science for Clinical Medicine* also written by (Sackett et al., 1991). *A Basic Science for Clinical Medicine* provides a complete delineation of the origins and principles of evidence-based medicine (Bigby, 1998).

**Steps of Evidence-Based Practice**

One of the difficulties about adopting the evidence-based practice concept into health care professions is the lack of knowledge and awareness about how it should be appropriately conducted. Novice clinicians often lack the necessary skills and become frustrated when they are asked to implement evidence-based practice into their daily practices (Killeen & Barnfather, 2005). Because the Internet allows patients to effortlessly access health care and medical information, it is critical for health care professionals to remain up-to-date with the most scientific research (Forrest & Miller, 2002). The demand for clinicians to be conscious of the most efficient way to access this research is becoming a necessity. Therefore, understanding the evidence-based practice procedure is an essential step for creating the potential for the greatest patient outcomes possible (Forrest & Miller, 2002). This process requires the clinician to proceed through four fundamental steps. First, a sound clinical question must be developed which will
guide the clinician in the research progression. Once this question is developed, a search for the most current literature is conducted using various search engines and databases. Next, the research is appraised for its accuracy, and finally the applicability of the evidence is determined as it relates back to the clinical question (Bigby, 1998; Craig, Irwig, & Stockler, 2001; Fisher & Wood, 2007). Current literature also suggests a fifth step to the evidence-based practice process: evaluating the clinical outcomes after evidence implementation (Fineoutoverholt et al., 2005; Forrest & Miller, 2002; Steves & Hootman, 2004).

*Step One – Defining a Clinical Question*

To grasp a better understanding of how to properly conduct each step of the EBP process, the following case example will be utilized: A 23-year old female recreational rower enters the athletic training room complaining of low back pain. She states that her back has been bothering her for three weeks and has noticed an increased severity of pain within the last few days. She is concerned that her pain is going to get so severe that it will ultimately inhibit her rowing and asks what you, the certified athletic trainer, can do to help alleviate her pain. After a complete evaluation of the patient you determine she has mechanical low back dysfunction and would like to research which intervention strategies can help this patient.

Developing a sound clinical question is the most important yet most difficult part of conducting evidence-based research (Bigby, 1998; Sackett, et al., 1996). A well-built question should direct an answer that is focused on patient-centered outcomes and will not only improve the quality of care, but will also increase patient satisfaction (Forrest & Miller, 2002). Conversely, a poorly written question can result in one of two situations;
the clinical question is not clear enough which produces irrelevant literature, or the question is so broad that the resultant is an excessive amount of information obtained from the literature search that may be unmanageable in a given period of time (Steves & Hootman, 2004). Typically a well-constructed clinical question identifies four main components. These elements are often referred to as PICO, which identifies the population or patient problem [P], intervention or area of interest [I], comparison intervention or group [C], and lastly the outcomes [O] (Fineoutoverholt et al., 2005; Forrest & Miller, 2002). The PICO format allows the clinician to develop a well-written question that is both specific and direct, and will allow them to easily proceed to the next step of the evidence-based practice process. Clinical questions may also be grouped into several categories such as diagnosis, therapy, prognosis, harm, and prevention, which therefore allow the clinician to further individualize their search (Bigby, 1998). These categories help guide the clinician as to which type of clinical study will constitute the best evidence available for that particular clinical question (Bigby, 1998). Developing a strong clinical question therefore allows the clinician to focus on the patient and carefully choose the best intervention for that particular individual (Bigby, 1998). The clinical question is the driving factor to a smooth evidence-based practice search. Thus, to avoid complications and a faulty start, it is crucial for the clinician to formulate a well-built, searchable and answerable question (Fineoutoverholt et al., 2005).

One of the largest obstacles novice EBP clinicians experience while developing a PICO question is the ability to provide an adequate amount of information in each category without becoming too detailed (Forrest & Miller, 2002). To avoid such a challenge, the clinician should provide a succinct phrase for each of the four categories. It
may also be useful for the clinician to form an individualized systematic approach to formulating PICO questions so that eventually developing clinical questions will become routine and second nature.

Identification of the population or patient problem \( P \) is the initial step in developing a well-constructed clinical question using the PICO process. Addressing the patient’s chief complaint as well as pointing out the most important characteristics such as gender, age, race and previous conditions will sum up the information needed for this clinical question component (Sackett et al., 1996). Referring back to the case example, the patient is identified as a 23-year old female who participates in rowing. Including this patient information may produce too specific of a search however, resulting in few research studies that can be related to the specific individual at hand. Therefore, the \( P \) portion of this clinical question can be broadened to include ‘young adult athletic females’.

The second phase of the PICO process is to distinguish the intervention \( I \). This step can incorporate the clinician’s expertise as it allows them to identify what they plan to do for the patient whether it be a diagnostic test, type of medication or treatment, recommendation of the use of a particular procedure or adjunctive therapy (Forrest & Miller, 2002). In the case example, the athletic trainer would like to research which intervention techniques will be most suitable to relieve pain for this particular patient. Therefore, a specific treatment method has not been identified and the clinical question will include a broader search for all intervention techniques to alleviate low back pain.

The comparison \( C \) element incorporates the clinician’s consideration of another option to the type of intervention identified in the second step. This alternative can
include any type of substitution, such as a similar diagnostic test or a treatment technique read about in a peer-reviewed journal, or can denote a lack of any intervention method at all. Often, there is no other alternative to the intervention method and therefore the comparison component is considered to be an optional section of the PICO process (Forrest & Miller, 2002). The female rower in the example has not been receiving any type of treatment for her low back pain prior to seeing the athletic trainer; the comparison to the intervention techniques in question would be no treatment at all. Thus, instead of stating this null method in the clinical question, the comparison component can be eliminated for the question formulation.

The final portion of building a solid clinical question using the PICO format is the outcome [O]. This aspect should specify the intended result(s) of what the clinician hopes to accomplish or change as well as be measurable. Variables such as improving or maintaining a condition, and alleviating or eliminating symptoms can be included in the outcomes section (Forrest & Miller, 2002). For the female rower, the short-term outcome is to alleviate her pain while the long-term goal would be to further focus on completely eliminating her low back pain.

It has been suggested that a fifth component of the PICO formula can help to further narrow down the amount of information that may be produced from a literature search. This component focuses on the time period as it relates to the population and outcome of interest (Johnston & Fineout-Overholt, 2005). However, in some circumstances, time is not a factor of the clinical question and therefore this fifth component is often discarded in the PICO process. Returning to the case example once again, the athletic trainer would like to know both immediate and long term intervention
strategies to help the patient. Therefore, a search for both short term and long term interventions can be conducted, or the time component can be disregarded from the clinical question so that the literature search will produce results of varying treatment durations.

Once a brief phrase has been developed for each of the four components within the PICO process, the individual elements can be pieced together to construct the finalized clinical question. To conduct a literature search for the female rower in the case example, a possible clinical question could be assembled as follows: “What are possible intervention strategies for reducing the severity of pain in young adult athletic women with mechanical low back dysfunction?” This clinical inquiry clearly identifies the population, intervention, and outcome in question and is specific but simultaneously broad enough to hopefully produce a manageable amount of research evidence.

*Step Two – Conducting a Literature Search*

Once a clinical question has been clearly defined, the clinician may proceed to the next step of the EBP process: Searching for the best evidence. Several years ago, the process of searching for research evidence was rather daunting. However, since the mid-1990’s, rapid technological advancements have allowed easy access to electronic formats and bibliographic databases via the Internet (Bidwell, 2004; Steves & Hootman, 2004). Therefore, retrieving information no longer requires a clinician to spend hours turning pages through old medical journals in the library (Steves & Hootman, 2004). There are several places in which information can be obtained, however the ideal research exploration should include high quality data that are relevant, comprehensive and user-friendly (Craig et al., 2001). By utilizing the clinical question, the clinician will be able to
determine which databases are most suitable to search, which study designs will be most appropriate, as well as which specific keywords will be most influential in obtaining accurate and useful information (Fineoutoverholt et al., 2005).

Although developing the clinical question may be the most crucial of the five steps to evidence-based practice, searching for accurate literature and narrowing it down to a manageable amount of information is by far the most time-intensive (Steves & Hootman, 2004). The concept of evidence-based practice would be void if research literature did not exist or was unavailable. Therefore, knowing how to search through numerous resources and minimize information to answer a clinical question is crucial for healthcare professionals to comprehend. Simultaneously, it is also important for the clinician to be able to appraise whether the literature found gives high quality evidence; a skill that will be described in step three of the evidence-based practice process.

Not too long ago, exploring for answers to the numerous questions clinicians came across daily was a daunting process. Searching for research often involved long hours in the library looking through medical journals, textbooks, or even the microfiche (Steves & Hootman, 2004). Today, however, quality evidence can be found almost anywhere thanks to the modern technological advances of the Internet and communication. Potential sources not only include the typical textbooks, published journals, and systematic reviews that are primarily thought of when searching for evidence, but also colleagues, experts, or even individual personal experience (Bigby, 1998). With the vast amount of available current resources, clinicians should now be able to access any type of information whenever they may need it.
While delving into the abundant amount of current literature available, it is important to remember that the ideal research evidence should not only be valid and relevant to the clinical question, but should also be user-friendly (Craig et al., 2001). One of the benefits of a well-defined clinical question is that it makes the hunt for quality evidence more straightforward. The PICO formulated question allows the clinician to combine appropriate words and phrases, which will suit the specific query language of many on-line searching services (Bigby, 1998). However, before the necessary search terms are identified, the next obstacle of step two is determining which type of study will provide the most appropriate research evidence.

For the majority of health care providers planning to implement EBP into their clinical practice, it is not imperative to know finite details about the numerous types of study designs. However, it is important to have a general understanding of the different types of studies so that the research evidence may be properly comprehended. Several types of study designs analyze primary data and are retrospective in nature; the condition, intervention or outcome has already occurred in the past (Johnson, 2001). These study designs are described as non-experimental research and include case reports, case series and case-control. A case report is a collection of data on a single patient whereas a case series is a collection of information gathered on a particular course of treatment or intervention of individual patients (Fisher & Wood, 2007; Forrest & Miller, 2003). A case report is advantageous in that it allows a clinician to report a rare or unique clinical event whereas case series provide documentation on situations in which a new or complex intervention is used (Fisher & Wood, 2007). Generally, both case reports and case series involve a selection bias because the researcher more often than not has a
direct relationship with the subject. Subjective assessment is also the most common form of analysis in these studies and therefore result in very few conclusions (Fisher & Wood, 2007). Finally, because there is no control group in either of these study designs, the reported results hold no statistical validity (Forrest & Miller, 2003). Case-control studies involve analyzing a patient with a particular condition to similar individuals that do not have the condition. This type of study design allows for a small subject sample size, generally occurs over a short duration, and is typically used when the prognostic factors to a certain condition are being questioned (Fisher & Wood, 2007). It is important to note that this type of study is generally found to be less reliable than others because identification of a statistical difference between groups does not necessarily indicate that one condition caused another (Forrest & Miller, 2003).

Two other study designs, cohorts and randomized controlled trials, also involve primary data, however are classified as prospective studies. These studies look more at the effect of an intervention versus the initial cause. Both study designs utilize control groups, which is a major advantage to the validity of the conclusive evidence (Fisher & Wood, 2007). A cohort study is used to follow a group of subjects with a particular condition compared to another group who are not affected by the same condition over time (Forrest & Miller, 2003). Although this type of design is ideal for examining the natural course of a disease, determining risk factors of a particular condition and clarifying the outcome of a type of intervention (Fisher & Dvorak, 2005), there are several disadvantages. Cohort studies can be expensive, time-consuming, require strict inclusion and exclusion criteria and often must include subjects that agree to standardized follow-up appointments on a regular time basis (Fisher & Wood, 2007).
A randomized controlled trial (RCT) is an experimental research design that collects data from subjects using various experimental measures. It is the most well recognized study design and is considered to be the gold standard of experimental research (Fisher & Wood, 2007). A RCT involves two groups, often named the experimental group and the control group, in which subjects are typically randomly assigned. The experimental group receives the intervention in question while the control group receives an alternative treatment, placebo, or no treatment at all. Both groups are evaluated to see if any differences exist (Forrest & Miller, 2003). Although randomization eliminates selection bias, a RCT can be extremely difficult to properly execute. Disadvantages of a randomized controlled trial include subject recruitment difficulties, high costs, limited ability to generalize the results to a larger population, and are often time-consuming (Fisher & Wood, 2007). Research equipment is most often used in an RCT, which further depletes financial resources. Also, because subjects are randomly assigned to the different groups, it is difficult to ensure a demographic balance between groups (Fisher & Wood, 2007). Patient compliance and mortality rates are also problematic factors to a RCT (Fisher & Wood, 2007).

Other study designs a clinician should be familiar with are systematic reviews and meta-analyses. Generally, these types of studies focus on a larger picture than the previously mentioned study designs as they serve as compilations of primary data from various research studies conducted that revolve around a similar condition or intervention of interest. More specifically, these studies synthesize a large pool of data in attempt to answer a clinical question that may not be answerable with a single research study (Fisher & Dvorak, 2005). The main criterion for merging studies into one analysis is that their
combination makes practical sense and provides results that therefore can be interpreted 
(Green & Britten, 1998). A systematic review has explicit criteria for the retrieval and 
analysis of evidence collected in individual research studies (Forrest & Miller, 2003). 
They provide an unbiased synthesis of evidence and ensure that all research data 
pertaining to the subject, including everything from case reports to randomized controlled 
trials, is evaluated for its quality and relevance in clinical application (Petrie, 2006). 
Whereas randomized controlled trials are considered the gold standard for research data, 
systematic reviews are considered the gold standard for research evidence because they 
provide a method for handling large quantities of research information (Forrest & Miller, 
2003). Thus, the unbiased nature of systematic reviews gives the clinician the opportunity 
to determine for themselves the validity of conclusions presented (Fisher & Wood, 2007).

Meta-analyses provide a synthesis of quantitative data, most often from 
ranged controlled trials. Although this study design is very similar to a systematic 
review in regards to its formation and analysis, a meta-analysis is more of a statistical 
process that combines and synthesizes the statistical analyses of independent studies into 
a single, larger analysis (Forrest & Miller, 2003). Generally, a meta-analysis becomes 
useful when the statistical results of an independent study are inconclusive due to low 
power (Fisher & Wood, 2007). Thus, when a meta-analysis is formulated, the sample size 
and power of the results usually increase (Forrest & Miller, 2003).

A basic understanding of the different types of studies will aid a clinician in 
determining which study design will provide the most appropriate results to answer his or 
er her clinical question. However, the next obstacle of a successful literature search is to 
figure out where the exploration should begin. Several databases are available via the
Internet complete with an abundant amount of full-text peer-reviewed journal articles. Often, Bradford’s Law of Scattering (Delwiche & Hall, 2007) helps to identify “zone 1” journals, that is, the journals that contain the most relevant research for a distinct profession. In 2007, Delwiche & Hall performed Bradford’s Law of Scattering, which revealed six journals most prevalent for athletic training. These journals, in descending order for the number of citations, included the *American Journal of Sports Medicine*, *The Journal of Athletic Training*, *Journal of Orthopaedic & Sports Physician Therapy*, *Medicine & Science in Sports & Exercise*, *Physical Therapy*, and the *Journal of Sport Rehabilitation* (Delwiche & Hall, 2007). Other journals relevant to the athletic training profession include the *Athletic Training Education Journal*, *Athletic Training and Sport Health Care*, and *International Journal of Athletic Training and Therapy*. Along with going to a journal’s direct webpage to search for literature, numerous search engines provide viable options for retrieving pertinent information. Generally, particular search engines are more appropriate depending on the field. Although there are several databases utilized, some of the more popular search engines include MEDLINE, PubMed (the public access version of MEDLINE), SPORTDiscus, and the most well known database for high quality sources, the Cochrane Database of Systematic Reviews (CDSR; Bidwell, 2004).

The majority of search engines available have different methods for retrieving literature. Therefore, because searching skills will improve over time (Bigby, 1998), it is best to become familiar with a select few of the most pertinent databases relevant to the healthcare field. For the purposes of this literature review, MEDLINE will be the selected search engine for discussion, since it includes a good range of journals related to medical
research (Delwiche & Hall, 2007). More specifically, MEDLINE is the National Library
of Medicine's bibliographical database and covers numerous health fields including
medicine, dentistry, nursing, and various other preclinical science fields (Bigby, 1998).

Regardless of the database used, the objective of literature searching is to locate
applicable articles and eliminate irrelevant articles (Bigby, 1998). Conveniently,
techniques such as text word searching, MeSH word searching, exploding, and truncation
can help to expedite the process. To begin, text word searches allow the individual to
search the MEDLINE database for particular words in a title or abstract that relate to the
author's intent within the article (Bigby, 1998). However, there are some flaws to this
approach. If the author happens to misspell a word, the article may not appear within the
search results. Furthermore, if a word is omitted from the abstract or title, the article will
also not be presented in the final results (Bigby, 1998).

Medical Subject Headings, more commonly referred to as MeSH headings, are a
collaboration of controlled medical vocabulary terms indexed within the MEDLINE
database (Bigby, 1998). As each citation is catalogued into the MEDLINE library, it is
given a specific MeSH heading(s), which will therefore continuously include the article
when that particular term is being investigated (Bigby, 1998). MeSH headings also tend
to have subheadings, which further delineate a particular article or group of related
articles (Bigby, 1998). However, a major fault to the MeSH heading cataloging system is
that the term assigned to an article may not coincide with the author's original intent of
the publication (Bigby, 1998). Therefore, pertinent articles may be overlooked when a
MeSH word search is being conducted.
To further increase the sensitivity of a literature search, exploding and truncating MeSH heading terms can be used (Bigby, 1998). By exploding a MeSH heading, the individual searching for articles has chosen to include all logical subheadings associated with that particular MeSH term (Bigby, 1998). Truncation on the other hand, allows the individual to search for terms by utilizing the root of the word. For example, if an individual was interested in retrieving articles about tendinopathies, they may choose to enter the search term ‘tend$’. The $ symbol in this entry acts as a wildcard, and will therefore produce results for all articles that contain the root ‘tend’ (e.g., tendon, tendinopathy, tendinitis, tendinosis, etc.).

Along with utilizing the techniques to narrow down articles retrieved within a literature search, most databases include features that aid in limiting the number of citations collected. Specifically with MEDLINE, an individual may choose to limit a search by distinguishing the language presented, publication type, type of subjects, and year of publication (Bigby, 1998). Including or excluding such criteria will help to further refine what may already become a time-intensive searching process.

**Step Three – Critically Appraising the Research Literature**

The third step of evidence-based practice involves critically appraising the evidence. Unfortunately, publication does not necessarily ensure the quality of a study. In fact, poor-quality studies tend to overestimate the actual benefits gained from intervention results by an estimated 30% (Moher et al., 1998). Similarly, results gained from diagnostic tests have also been found to exaggerate the accuracy of the test being evaluated (Lijmer et al., 1999). Therefore, critically appraising the evidence may be the
most difficult step for novice EBP clinicians because they are unfamiliar of the necessary skills to evaluate research evidence (Steves & Hootman, 2004).

The purpose of critically appraising research evidence is to determine whether the results can be translated and applied during clinical practice (Fineoutoverholt et al., 2005). Essentially, the clinician should be able to answer three general questions for each study that is analyzed. First, what are the results of the study and are they reliable; can they be reproduced if the same study was conducted again? Second, are the results of the study valid? More specifically, did the results produce answers to what the researcher was initially looking for? And finally, are the findings of the study clinically relevant to the particular clinical question (Fineoutoverholt et al., 2005; Forrest & Miller, 2003)? It is also important for a clinician to be able to identify the positive aspects of a study as well as the negative ones. As is human nature, no single research study is perfect. Therefore, being able to identify flaws, limitations, and threats to validity will not necessarily eliminate the study from consideration but will aid the clinician in making a thorough clinical decision (Fineoutoverholt et al., 2005).

There are several different ways in which research can be conducted and as a result, critical appraisal must take into account the characteristics of each type of research study design previously described. Each type of design has its own advantages as well as disadvantages and it is important for the clinician to be able to recognize both. To begin the critical appraisal process, it is necessary to determine whether the type of study design utilized to answer the clinical question is appropriate and well implemented (Fisher & Wood, 2007). Simultaneously, it is important to appraise specific aspects of the research study. However, before reviewing the reported results of a study, the clinician
must have a comprehensive knowledge of the statistical and evidence-based concepts
most often reported in a research manuscript. Concepts related to evidence-based practice
that are frequently discussed within research literature include, but are not limited to: p-
values, confidence intervals, reliability, validity, intra-class correlation coefficients,
kappa coefficients, specificity, sensitivity, likelihood ratios, predictive values, odds
ratios, numbers needed to treat, patient-reported outcomes, clinical prediction rules, and
disablement models.

Step Four – Applying the Evidence

The fourth step of evidence-based practice entails applying the research evidence
to clinical practice. Once the clinical question has been formulated, properly investigated
through a literature review, and then critically appraised for its quality and validity, it can
now be applied to the specific patient problem or population in question. It is important to
note with this step however, that the clinician should not be forced to provide a certain
treatment or act in a particular way that they are uncomfortable with (Steves & Hootman,
2004). To reiterate the message again, evidence-based research merely provides another
tool, alongside patient preference and clinical expertise that a clinician can utilize on a
day-to-day basis.

Step Five – Evaluating the Outcomes

The last step of the evidence-based practice progression involves evaluating the
outcomes of the particular patient or population. More specifically, did the PICO
formulated question, literature search, thorough critical appraisal and application of the
best evidence achieve the appropriate outcomes and benefit both the clinician and the
setting in which it was being utilized. For successful evidence implementation into a
clinical setting, it is important for clinicians to consider appropriate outcomes (Fineoutoverholt et al., 2005). When evaluating such outcomes, the clinician must remember that EBP principles focus on improved patient care through a collaboration of best practices (Fineoutoverholt et al., 2005).

**Clinician Barriers towards Evidence-Based Practice**

The term evidence-based practice is vastly spanning across medical and health professions, however many clinicians are timid about its particular applications to health care. Some clinicians believe that evidence-based practice will only advocate cookbook health care that will focus exclusively on treating patients according to a formula or algorithm and not on an individual basis (Haynes, 2002). Another assumption about EBP is that clinicians whose practice is based on applied health care from evidence research provide superior patient care when compared to those practitioners who solely practice traditional health care. However, no direct evidence indicates that this supposition is correct (Haynes, 2002). Nevertheless, clinical decisions should be made from a combination of the best research evidence, clinical circumstances, and patient requests (Haynes, 2002). As evidence-based practice transforms to become the foundation of health care, it is important for all allied health professions to accept and implement this fundamental idea into clinical practice and education.

**Incorporation of Evidence-Based Practice**

With the rapid evolvement of evidence-based practice throughout health care professions, it is evident that for EBP clinical practice to prosper and strengthen in the future generations of health care, effective strategies to teach evidence-based practice must be implemented into educational curricula as early as the undergraduate freshman
year. To date, many health care undergraduate and graduate programs have already begun the implementation process; however, there has been very little to no evaluation of the skills taught and whether the students are taking what is learned in the classroom and applying it to their clinical practices (Ciliska, 2006). Therefore, without any form of evaluation, it is difficult to know if the evidence-based practice that is currently being implemented into the didactic curricula of numerous health care educational programs is producing effective results or whether changes need to be made in the future.

**EBP in Other Health Professions**

Before the current status of evidence-based practice implementation in the athletic training profession can be discussed, it is important to have an appreciation of where other health care professions stand. Even though evidence-based practice is integrating its way into all health care occupations, each profession is currently at a different place in developing and implementing EBP concepts into their discipline (Kronenfeld et al., 2007). The nursing profession, for example, has modeled EBP into clinical practice as well as nursing education over the past decade. Accrediting bodies, governing agencies, health care payers and the increase of malpractice litigations are only a few of the several influences for the push towards EBP in the nursing profession (Zinberg, 1997). Although opponents argue that there is no direct evidence implicating that evidence-based practice makes a difference in healthcare, there have been several reviews in nursing research indicating otherwise (Ciliska, 2006). Heater, Becker, and Olsen (1988) illustrated that considerable gains were observed in patients’ physiological, psychological and behavioral outcomes when compared to patients who were treated with routine nursing care. However, Banning (2005) concluded that nurses have difficulty making the
distinction between evidence-based practice and a regular research process and therefore believed that the two were the same thing (Banning, 2005). While future research is needed to determine the true effectiveness of evidence-based practice in health care, the profession of nursing has become the frontrunner of evidence-based clinical practice among health care professions.

Even though EBP is still a relatively new concept in nursing, it has not only flourished throughout the profession, but has also begun to refocus the curricula of both undergraduate and graduate nursing educational programs. Evidence-Based Nursing, a journal containing research articles relevant to nurses was established in 1998 (Ciliska, 2006). Alongside each article in this journal is a commentary discussing the clinical application of the research findings in regards to nursing clinical practice. Another journal focusing on evidence-based practice, Worldviews on Evidence-Based Nursing, began publication in 2004 and focuses on research utilization in clinical nursing practice. Thirdly, at least five evidence-based practice textbooks have been published and implemented within nursing over the past several years. Sales and revenues of such textbooks have indicated a high level of interest for the topic (Ciliska, 2006).

One of the biggest issues of evidence-based practice within nursing curricula to date is improper implementation. In some undergraduate nursing education programs, evidence-based practice research is being taught throughout nursing courses, however educators are not instructing students on how to ask, find, critique and apply the actual evidence to their own clinical practice (Ciliska, 2006). Conversely, other programs may be teaching their students the four fundamental steps to evidence-based practice without recognizing this approach. Throughout the Master’s degree level, nursing students often
graduate with the knowledge of how to design and conduct studies but not necessarily understand the proper ways to critique and utilize current research evidence (Ciliska, 2006).

Another issue that affects the implementation of evidence-based nursing education is the awareness of EBP at the educator level. Evidence-based practice cannot successfully be incorporated in nursing education unless the faculty and staff fully understand the concept themselves. This may require professors to tread in uneasy waters to adjust their current teaching styles as well as participate in more continuing education opportunities that will allow them to determine how to overcome these barriers (Ciliska, 2006). It is necessary to make sure education faculty and staff are on board with evidence-based practice before successfully integrating EBP into nursing education. In the future, application of evidence-based research into clinical practice as well as critical appraisal skills may need to be incorporated into job descriptions and postings to ensure faculty and staff preparedness for implementation of EBP into the program’s curriculum (Ciliska, 2006). Thus, while there are a few dilemmas that affect the execution of evidence-based practice into nursing educational curriculum, to date the nursing profession is the most advanced of the allied healthcare professions in regards to teaching students how to utilize the EBP process within clinical practice.

**EBP in Athletic Training**

Due to the lack of clinically relevant evidence available for the athletic training profession, the National Athletic Trainers’ Association Research & Education Foundation (NATAREF) has requested proposals for applicable clinical research as well as increased the amount of funds available for prospering research investigators over the past seven
years (Steves & Hootman, 2004). By doing so, the NATAREF hopes to support aspiring researchers to produce outcomes that can be applied to clinical practice as well as aid in the advancement of the profession. While the majority of health peer-reviewed journals have been distributing numerous research studies for decades, research published in athletic training journals has only recently begun to become more substantial. Prior to 2002, the majority of athletic training publications solely included narratives, editorials, and subjective summations (Steves & Hootman, 2004). Furthermore, in a study investigating the literature of athletic training, Delwiche and Hall (2007) revealed that the AT profession relied heavily on the research literature from closely related professions due to the insufficient amount of clinical research currently published specifically for athletic training. Thus, it has been discussed that well-designed randomized controlled trials and systematic reviews based off of randomized controlled trials will provide the strongest outcomes to be applied to clinical practice (Bleichley, 2002), and therefore need to be conducted for athletic training research to prosper in the future years.

To date, very little research has been conducted in regards to evidence-based practice and athletic training. Several articles exist identifying the importance and need for EBP within the profession, as well as recommendations for potential ways to implement evidence-based concepts into athletic training curricula (Fineoutoverholt et al., 2005). However, the infiltration of evidence-based practice within athletic training is currently still in the initial stages (Kronenfeld et al., 2007). Before evidence-based concepts can effectively make their way into athletic training didactic curricula, program directors, educators, and clinicians not only need to be comfortable with particular
aspects of EBP, but also must recognize and appreciate its importance for implementation.

**Knowledge**

As evidence-based practice becomes integrated within the athletic training profession, it is important to have an understanding of athletic trainers' knowledge level of the various EBP concepts. Within the last several years, studies have been conducted to assess EBP baseline knowledge among various subsets of athletic training.

Additionally, two studies focused on assessing knowledge prior to and following an evidence-based practice educational intervention. Welch et al. (2011a) assessed baseline knowledge levels of 141 athletic training educators that attended the 2009 NATA Educators’ Conference. By utilizing the *Evidence-Based Concepts for Clinical Practice Assessment* (EBCPA), an instrument that included a knowledge subsection of 20 multiple-choice questions, the researchers reported that athletic training educators had a baseline knowledge level of 64.4%. Characteristics associated with higher knowledge scores include terminal degree, number of hours of research conducted per week, and number of hours of teaching-related tasks conducted per week. Similarly, Hankemeier et al. (Accepted-b) used the *Evidence-Based Concepts Assessment* (EBCA), a survey tool that included six multiple-choice questions evaluating knowledge of the steps of evidence-based practice, to assess knowledge levels in various groups of athletic trainers. Professional athletic training education program directors achieved an average knowledge score of 4.18 ± 1.18 (69.7%) while post-professional athletic training educators achieved a mean score of 4.54 ±0.88 (75.7%) and post-professional athletic training students scored 4.65 ± 0.91 (77.5%) (Hankemeier et al., Accepted-b).
Furthermore, approved clinical instructors achieved a baseline knowledge score of 4.03 ± 1.13 (67.2%) and athletic training clinicians, achieving the lowest baseline score, scored 3.62 ± 1.35 (60.3%) (Hankemeier et al., Accepted-b).

Although athletic training educators seemed to appear to perform better on the knowledge subsection of the Evidence-Based Concepts Assessment (EBCA), it is important to understand that this instrument only includes six knowledge questions assessing the primary steps of the evidence-based practice process. Conversely, the Evidence-Based Concepts for Clinical Practice Assessment (EBPCA) included multiple-choice questions pertaining to information on numerous EBP concepts. Although the EBCPA was more in depth than the EBCA, the EBP concepts included in the instrument drastically varied in difficulty. Furthermore, the EBPCA was designed based on a specific single day EBP workshop (Welch et al., 2011a).

The development of the fifth edition of the Athletic Training Education Competencies to include an evidence-based practice content area has ignited the need for evaluations of various educational techniques to educate athletic trainers about the concepts that are essential for evidence-based practice. Welch et al. (2011b) assessed the effectiveness of a single-day evidence-based practice workshop. Utilizing the EBCPA, a small sample (n=10) of athletic training educators completed the survey instrument prior to and following a five-hour single-day workshop detailing three presentations on EBP fundamentals, implementing systematic reviews, and utilizing clinical predication rules (Welch et al., 2011b). Post-workshop knowledge slightly increased from 66.0% to 69.5%; along with the small sample size, a key limitation to this investigation was the nature of the workshop in relation to the content included within the survey (Welch et al.,
2011b). The instrument included information pertaining to only one of the three presentations in the workshop.

Utilizing a short course mechanism, Manspeaker, Van Lunen, Turocy, Pribesh, and Hankemeier (2011b) developed an evidence-based teaching model (EBTM) consisting of lecture materials, class assignments, and guided discussion for clinical instructors and students during a clinical experience. Seventy-eight students from nine CAATE-accredited athletic training education programs completed a knowledge assessment via the Evidence-Based Concept Knowledge, Attitude, and Use (EBCKAU) prior to and following the implementation of the EBTM. Post-EBTM knowledge scores (66%) significantly increased from scores achieved (50%) on the EBCKAU prior to implementation of the EBTM ($p < 0.001$); 23% of participants increased their score by three points or more (Manspeaker et al., 2011b).

As it has been demonstrated throughout the literature of various healthcare professions (Chumley-Jones, Dobbie, Alford, 2002; Fritsche, 2001; Manspeaker et al., 2011b; Nicholson, 2007; Welch et al., 2011b; Wilkes, 2001; Williams, Aubin, Harkin, Cottell, 2001), numerous mechanisms of educational interventions have been found effective for increasing knowledge levels regarding evidence-based practice. However, the educational interventions assessed within athletic training greatly vary in level of difficulty as well as the sample group being assessed. Therefore, it is important to develop an educational intervention that not only progresses the learner through the more difficult concepts of evidence-based practice, but it also designed to be utilized by athletic training students, educators, and clinicians alike.

*Implications for Implementation*
Several implications emphasize why the implementation of evidence-based practice is necessary. To begin, increasing access to computers and the internet will provide clinicians with the physical means to search for answers to their evidence-based questions. Internet access also allows the most current research to be available worldwide as well as promotes global sharing of clinical results and expertise (Ciliska, 2006).

The main purpose of healthcare is to improve patient outcomes. To do so however, evidence from both clinician- and patient-based outcomes (step five of the EBP process) need to be provided. Clinician-based outcomes can be described as outcome measures that assess patient healthcare from the clinician’s perspective (Snyder, Valovich McLeod, & Sauers, 2007). Conversely, patient-based outcomes are typically self-reported outcomes perceived from the patient (Snyder et al., 2007). By acquiring these values, practitioners will be able to identify if particular treatments applied in the clinical setting (step four of the EBP process) were successful. If the outcomes prove to be not beneficial, clinicians will then be able to refer back to the literature retrieved (step two) and reappraise research evidence (step three) for future clinical problems and patient cases. However, without the knowledge or confidence of the EBP process, clinicians will not be able to perform the cycle described above, therefore further neglecting the enhancement of patient healthcare.

Within the curriculum, the need for evidence-based practice implementation is evident. First, learning the EBP process throughout an undergraduate career allows our future clinicians to be prepared with the skills to analyze and interpret the quality of evidence for clinical application. Throughout several athletic training courses, educators rely heavily on textbooks to provide essential information. However, the difficulty with
textbooks is staying current (Steves & Hootman, 2004). Since new research is consistently being published, a textbook can be outdated or contradicted even within weeks of its initial release (Heinrichs, 2002; Steves & Hootman, 2004). Secondly, for novice athletic training students, inconsistency between diagnostic skills, judgment, and clinical experience is often large (Heinrichs, 2002). With the implementation of EBP early on however, novice students will hopefully be able to more quickly apply critical thinking to clinical practice scenarios.

Challenges for Implementation

Several challenges restrict clinicians and educators from accepting evidence-based practice and implementing it throughout every day clinical and didactic education. One such challenge in the EBP learning process is for both educators and clinicians to be able to recognize and admit uncertainties within their practice (Johnston & Fineout-Overholt, 2005). Without being able to identify such uncertainties and potential weaknesses, individuals will never be able to even successfully approach the first step of EBP, let alone implementing it into lesson plans and course outlines.

Next, because evidence is not available for all diagnostic tests, treatments, or patient circumstances, it may leave educators confused as to whether they should be teaching students efficacy or futility (Welch & Lurie, 2000). More specifically, both educators and students may question whether interventions for clinical practice should be considered worthwhile until proven of no use, or ineffective until proven valuable (Welch & Lurie, 2000). Without solid answers to these questions, educators may severely restrict their willingness to implement evidence-based practice into their didactic courses. Furthermore, an additional challenge may be to persuade an educator to transition from
their habitual teaching styles and strategies potentially practiced for years, towards the new and unfamiliar territory of evidence-based practice implementation (Bilsker, 2004).

The largest challenge for any health care educational program is to produce clinicians who are independent and capable of critical thinking and problem solving, and who can identify circumstances in which a critical decision must be made rapidly (Heinrichs, 2002). Program directors and educators must often ask themselves which teaching strategies will be best for individual courses within the curriculum (Heinrichs, 2002). Within athletic training curricula, these educational leaders contemplate teaching techniques that will most effectively and accurately demonstrate a particular competency, which can therefore be carried over to the student’s clinical experience.

**Evidence-Based Practice Educational Interventions**

**Teaching Evidence-Based Practice**

With the vast evolvement of technology, current knowledge and information has become readily available with the click of a mouse. Therefore, because the millennial student is multimedia-savvy, traditional teaching methods, such as the lecture format, that were once utilized to teach students critical thinking and decision making skills may no longer be appropriate or effective for the students of today (Heinrichs, 2002). Over the past decade, educational instructors have begun to move away from a passive lecture model and shift towards a more practical student-centered teaching strategy (Heinrichs, 2002). This teaching strategy engages the students and encourages them to take a more active role in the learning process. Active learning, therefore, has been defined as “environments that allow students to talk and listen, read, write, and reflect as they approach course content through problem-solving exercises, informal small groups,
simulations, case studies, role playing, and other activities - all of which require students to apply what they are learning” (Heinrichs, 2002, p. S-190). Case studies in particular are a fantastic way in which an individual can learn a large scope of knowledge from a single given scenario, and therefore should be highly emphasized throughout a student’s educational career (Heinrichs, 2002). Active teaching tactics, such as the utilization of case studies, have been incorporated for more than 60 years and it has been observed that students are more likely to become active classroom participants when a real-life scenario or problem that relates to their field of study is being discussed (Heinrichs, 2002). Active learning also provides the opportunity for students to verbalize their thought processes and provide justifiable rationales behind their decision-making as well as recognize other potential solutions gained from the insight of their peers (Heinrichs, 2002).

Problem-based learning (PBL) is one of the most commonly used teaching techniques among health educational programs. PBL teaches students how to think critically and engages them to recognize, attack, and solve problems that they may encounter both clinically and in everyday life (Heinrichs, 2002). It is an active-learning technique that focuses on presenting problems to students, which directs them to use educational tools to hypothesize possible solutions, research pertinent data related to the problem, apply self-directed study and/or group communication, and ultimately develop a conclusive resolution to the initial issue (Heinrichs, 2002). Problem-based learning therefore teaches the student how to utilize the most available resources, communicate with others and in some instances work as a team to efficiently solve the problem at hand (Heinrichs, 2002).
Problem-based learning is an important concept that should be highly emphasized in athletic training educational curriculum. Although problem-based learning may seem like a long and tedious process to give students information that is essential to their field of study, it allows individuals to develop the skills that will enable them to sort through abundant amounts of information, decipher which facts are appropriate and confidently attain conclusive answers. PBL will also stretch the boundaries of the student’s intellect to reach a conclusion concerning an issue in which they have not learnt any prior knowledge. By doing so, the student will learn how to think critically as well as become a lifelong learner; something that may not be achieved in a traditional lecture-based classroom setting. Especially in the field of athletic training, problem-based learning will prepare entry-level and graduate students for situations in which they may come across as a certified athletic trainer. (Heinrichs, 2002).

It is important to note that problem-based learning scenarios and experiences must be formulated in such a way that the student can fluently transfer the knowledge gained in the classroom to more critical and unanticipated real-life problems encountered in the clinical setting (Heinrichs, 2002). However, if the PBL technique is used correctly, it will afford numerous advantages to the student. To begin, students tend to become more engaging and enthusiastic learners when a problem-based learning strategy it utilized in the classroom. PBL scenarios can be found more enjoyable for both the students as well as the educational instructor as they allow for exploration, creativity, discussion, debate, and identification of more open-minded approaches to solving a given problem (Saarinen-Rahiika & Binkley, 1998). It has also been found that information discussed is
better received, retained and utilized during their clinical experience when PBL is incorporated in the didactic curriculum (Saarinen-Rahiika & Binkley, 1998).

By utilizing active learning techniques such as problem-based learning, educators are already preparing students to think critically and analyze patient cases. The incorporation of evidence-based practice along with problem-based learning should prove to be an easy process as they share numerous features. Both concepts identify the area of uncertainty, formulate clinical questions, assess the clinical relevance of research evidence, assess the clinical application as it applies to the area of uncertainty, and finally measure the outcomes of the clinical treatment (Heinrichs, 2002). However, before focus can be shifted to the implementation of evidence-based practice into didactic curriculum, methods of efficiently educating the individuals responsible for a student’s education must be solidified.

**EBP Workshops & Courses**

Throughout the past several years, numerous “evidence-based”-related workshops and courses have been conducted in anticipation of enlightening both students and educators. Unfortunately, many of today’s health care educators lack the quality of skills for attainment, appraisal, and application of research evidence into clinical practice (Nicholson, Warde, & Boker, 2007). Before such skills can be required of athletic training students, it is necessary for educators to master the knowledge of these tasks and gain comfort so that they may begin implementation into the curriculum as well as their own clinical practice. A study conducted by Houston et al. (2004) revealed that almost half (46%) of clinicians desired more guidance and instruction in evidence-based practice (Houston, Ferenchick, Clark, & Bowen, 2004).
Several studies have illustrated that "evidence-based"-related workshops and short courses have indeed proven to be successful in increasing educators’ knowledge and comfort of EBP. Nicholson et al. (2007) revealed that a 90-minute workshop occurring every 4-6 weeks for a 1-year period significantly improved clinical educators literature retrieval and critical appraisal skills. Fritsche (2002) concluded that an intensive 3-day evidence-based medicine course increased postgraduate doctors’ evidence-based knowledge and skills by 57%. Thirdly, by providing seven 1-hour evidence-based training courses focusing on literature searching and critical appraisal, Straus et al revealed that attending physicians were significantly more likely to base patient interventions on high-quality research after completing the courses (Straus, Ball, Balcombe, Sheldon, & Mcalister, 2005).

In regards to attitudes and beliefs, several clinicians have expressed concerns that although evidence-based practice seems important, their lack of research training would significant affect their abilities to clinically practice utilizing an evidence-based approach. Stevenson et al. (2004) revealed that prior to an intervention training, clinicians agree that evidence-based practice is important, albeit were generally reluctant to changes their current practices. However, six months after completing an interactive evidence-based educational program, clinicians reported higher confidence levels in their abilities to conduct literature searches as well as critically appraise research (Stevenson, Lewis, & Hay, 2004).

Particularly in athletic training, the majority of "evidence-based"-related workshops solely focus on identifying what evidence-based practice is, the implications and challenges of EBP, and why its implementation is important for the advancement of
the profession. More courses need to be made available on how to assess patients' values, ask the appropriate clinical question, acquire the best evidence for the case, appraise the results, and finally to apply it to the patient or population if appropriate (Nicholson et al., 2007). Thus, since the majority of practicing clinicians rely on courses and in-service training sessions to keep up-to-date with current information, it is important that "evidence-based"-related workshops continue to be made available. More specifically, such courses and workshops should continuously aim to enhance the knowledge and skills of health care professionals, particularly in the areas of acquisition and appraisal of research evidence.

**Online Tutorials**

As the athletic training profession shifts towards the infusion of evidence-based practice, it is becoming increasingly important to properly instruct the membership and provide them with the necessary tools to effectively implement EBP. One of the most efficient ways to educate athletic trainers about the various components of evidence-based practice may be via online tutorials. As society progresses through a digital era, online tutorials provide a flexible option for distance learners as well as "hidden learners" (Blummer & Kritskaya, 2009; Viggiano, 2004, p. 50). In the realm of athletic training, a hidden learner would be classified as the individual who cannot make it to state, district, or national conferences. Identifying such individuals will be essential in ensuring that the entire athletic training population receives the necessary foundations of evidence-based practice for clinical implementation.

**Advantages and Caveats**
Online tutorials promote several advantages for the athletic training profession. To begin, such tutorials facilitate easy dissemination to a large population, such as the National Athletic Trainers’ Association (NATA) membership, which currently includes approximately 27,798 athletic trainers and 6,831 athletic training students (About the NATA, 2012). Often, individuals of a given population are geographically dispersed, making it difficult for them to attend specifically designated training sessions or workshops (Ardis, 1998). Therefore, the ability to efficiently provide an abundant amount of information to the masses is an important feature when trying to advance a cohort of individuals.

Online tutorials also provide learners with the opportunity to complete the lesson at their own speed (Ardis, 1998; Jacoby, Smith, Albanese, 1984), and at their own convenience (Ardis, 1998; Bassano, 2005; Jacoby et al., 1984). Tutorials offer concise instructions and allow the individual to return as needed (Ardis, 1998; Rose, 2002). Unlike a face-to-face classroom setting where the student is most often only provided the information once, online tutorials permit learners to view the information numerous times to ensure comprehension (Ardis, 1998; Rose, 2002). Furthermore, online tutorials are considered to be versatile training instruments that free up an instructor’s time (Ardis, 1998). By providing evidence-based practice online tutorials throughout the athletic training membership, seminars and workshops at state, district, and national conferences can eliminate the need to repeatedly provide information sessions to educate participants on evidence-based practice principles and instead use the extra time to present on various other pertinent topics.
Although online tutorials provide a mechanism to educate a large group of people during a time that is most suitable to their distinct schedules, such a training mode presents challenges that must be addressed. First, the utilization of online tutorials requires self-regulation from the participant (Ardis, 1998). Unlike an instructor in a classroom setting, no one will be available to make sure the individual fully comprehends the given material except for the individual himself or herself. Furthermore, it is the participant's responsibility to make sure they seek answers to questions they may develop during the tutorial session. Thus, self-regulation requires the individual to be a self-motivated, active, goal-oriented learner (Ardis, 1998). Participation in an online tutorial creates a large challenge particularly when the individual is not directly interested in the material being presented. Therefore, when a tutorial is made a requirement, a person may not take it seriously or may miss out on the full potential that the tutorial has to offer.

Along with the challenges participants present towards the successful completion of an online tutorial, information accuracy is another caveat that needs to be addressed. Along with the development of the online tutorial, it is important to ensure that the tutorial is maintained over time. More specifically, it is essential that the information presented remains up to date and properly aligns with the production of current research. It is unfortunate for a tutorial to disappear after a few short years since its creation because there was no plan for maintenance and regular updates.

**Preliminary Strategies for Tutorial Design**

Before a tutorial can be developed, it is critical to identify various key components. First, a solid idea needs to be distinguished and all relevant information and materials must be collected (Ardis, 1998). Such information can be easily brought
together by identifying subject matter experts: that is, individuals who are well known for their expertise on the pertinent topic. Along with collecting relevant materials, it is essential to consider the target audience that the online tutorial will be presented to (Ardis, 1998). More specifically, it is necessary to determine if the tutorial will be specific to one discipline or will have a multi-disciplinary approach. Distinguishing the appropriate target audience will aid the developer during the design process to ensure that the content will be accurately comprehended.

Mode of delivery must also be considered before a tutorial can be created (Ardis, 1998). Due to the numerous software packages and Internet tools available, it is important to identify a specific manner in which the online tutorial will be disseminated. This mode of delivery will also aid in determining costs and expenditures for tutorial production, which will therefore help the developer determine if any funding mechanisms will be required (Ardis, 1998). Due to the extensive planning and development required for an online module, it is often necessary to have funds available to cover any supplies, licensing fees, and/or salaries accrued throughout the process.

Finally, before a developer begins to layout a design plan for an online tutorial, it is critical to search to see what other tutorials have already been created (Blummer & Kritskaya, 2009). Becoming familiar with existing tutorials or modules can benefit a developer in several ways. First, it will allow the individual to determine whether their ideas and content have already been created. Additionally, it will allow the developer to keep an eye out to watch if similar products are concurrently being designed (Hegarty, Quinlan, Lynch, 2004). Understanding what has already been developed or is currently being created can protect a developer from wasting time trying to reinvent something that
has already been produced. Along with assuring that the individual is not designing a product that has already been marketed, researching other modules can provide a means for acquiring further ideas or effective design strategies (Donaldson, 2000). Furthermore, well-known tutorials may present unique techniques or implementation approaches that had not been previously considered (Hunn & Rossiter, 2006).

Tutorial Development Process

Once all pertinent materials and content have been collected and organized, the next step is to determine the tutorial design. Although developing the tutorial design allows the researcher to be artistic and creative (Ardis, 1998), there are several components that must be considered. To begin, it is important to consider the legibility of the tutorial; that is, the total format that will be presented on the screen (Ardis, 1998). It is important that users can distinguish various factors that appear on the screen. Therefore, tutorial developers must make several decisions including whether a page appears crowded with information and includes too many flashy or unnecessary buttons, as well as overwhelming background colors and/or irrelevant pictures (Ardis, 1998).

Visibility and recognizability are other components that should be considered when designing an online tutorial (Ardis, 1998). Visibility refers to the ability of the reader to distinguish between information presented on the page as well as discriminate essential components versus unimportant components. Tutorial visibility can be affected by poor color choices for text and background, the use of various differing fonts and font sizes, and too little or too much spacing provided between lines of text (Ardis, 1998). Recognizability on the other hand, focuses on the cohesiveness of the tutorial itself. It is important for the content each page, segment, or module to flow in an organized manner
that not only effective convey the meaning, but will also maximize the user's ability to comprehend that material (Ardis, 1998). By ensuring that each of the three design concepts (i.e. legibility, visibility, and recognizability) have been thoroughly considered, online tutorial developers will be one step closer to efficiently transferring information to their users.

Once developers have selected the most appropriate tutorial design, they must progress to the tutorial layout. To begin a tutorial layout, it is often most helpful to create a basic framework and apply it to every page of the module (Ardis, 1998). Providing consistency throughout the tutorial will not only help developers achieve legibility and visibility, but it was also help users distinguish important information (Ardis, 1998). Next, developers should take into consideration the amount of scrolling a user will have to do to progress through the tutorial. Scrolling often frustrates users and discourages them to continue with the tutorial (Ardis, 1998). Additionally, developers must ensure that several different browsers support the tutorial since not all users will be able to access the tutorial from a single browser (Ardis, 1998). Finally, it is essential to confirm that the finished tutorial complies with the American with Disability Act. Although colorblind individuals are not covered under this act, developers should consider their color choices throughout the tutorial layout (Ardis, 1998).

**Tutorial Dissemination**

Throughout the tutorial development process, it is essential for designers to constantly be asking themselves the best and most effective ways to keep the interest of their target audiences (Blummer & Kritskaya, 2009; Reece, 2007). One of the largest challenges of online tutorials is distinguishing ways to disseminate the material in a
manner that is engaging to various types of learners (Dent, 2003). More specifically, developers must determine methods to overcome barriers that may be presented by users’ various learning strategies (Zhang, 2006). One way to prevail such barriers is to incorporate numerous instructional strategies that require active learning (Hegarty et al., 2004; Zhang, 2006). Techniques for active learning can include ideas ranging from simulations and frequent quizzes, to any activity that will promote critical thinking and problem solving (Hegarty et al., 2004). Furthermore, incorporating active learning techniques throughout the tutorial and requiring individuals to make choices will aid users to stay engaged on the materials they need to learn (Clay, Harlan, Swanson, 2008). However, developers need to remember that active learning techniques utilized to get material across must remain relevant to the tutorial goals and objectives and avoid becoming trite (Hunn & Rossiter, 2006). More specifically, it is critical to use examples and scenarios that will directly relate to situations the learner may experience, so that he or she may apply this information directly to their real-life practices (Association of College and Research Libraries, 2003).

Other ways to overcome learning style barriers is to clearly identify tutorial objectives and provide users with multimedia choices. To help prepare users get in the proper mind-frame, tutorial developers often stress the learning outcomes, key points, and common misconceptions up front at the start of the tutorial as well as throughout the module (Dewald, 1999; Li, Leung, Tam, 2007; Reece, 2007). Additionally, some developers choose to conduct a branching technique which allows the user to chose a particular learning style (e.g., visual, audio, verbal) on the first page of the tutorial; based on which style they choose, the user will then be guided through the material that is
presented in a manner to enhance the learning of the selected style (Reece, 2007). This branching technique can also be employed to allow users to progress through a tutorial based on their knowledge level prior to the start of the module (Donaldson, 2000; Hunn & Rossiter, 2006).

Evaluation is one of the final, yet important, considerations of tutorial development. Evaluation components can include a variety of techniques (i.e., tests, closed-ended and open-ended surveys, and observations) that provide developers with important feedback (Blummer & Kritskaya, 2009). Developers often choose to include optional surveys at the end of a tutorial that permit users the opportunity to identify what they learned as well as provide suggestions (Phillips & Kearley, 2003). User suggestions not only can confirm tutorial effectiveness, but can also help improve the tutorial’s content and other features (Ferguson & Ferguson, 2005; Phillips & Kearley, 2003). Pre-tutorial and post-tutorial tests and surveys also allow developers to determine the effectiveness of a tutorial. Assessing a user’s knowledge or familiarity level prior to the commencement of a tutorial as well as once the tutorial has been completed can help to distinguish if the tutorial objectives are being met, if there are any segments that create conflict or confusion, and whether the module is a valid medium to educate and disseminate particular materials (Armstrong & Georgas, 2006; Blummer & Kritskaya, 2009; Rutter & Matthews, 2002).

Online Tutorials Among Health Care Professions

Balancing classroom hours and clinical hours can often be a challenge for individuals aspiring to become a healthcare professional. Within most professions, hours spent on patient care are also utilized to enhance clinical education opportunities.
Incorporating online tutorials and computer-based instruction within clinical education offers students with the prospect to experience numerous instructional techniques to enhance clinical learning (Cook, Dupras, Thompson, Pankratz, 2005; Ruiz, Mintzer, Leipzig, 2006). More specifically, components such as computer graphics, animations, and videos of clinical findings or specific procedures can allow a growth of experience that ultimately would take a lot of time if instructors waited for a case to arise in the clinical setting (Pusic, Pachev, MacDonald, 2007). A direct benefit of providing healthcare students with online tutorials is that the material can be manipulated in a manner, which allows for knowledge acquisition to be gained through examples that relate to real-life application, versus textbooks that are often more removed (Anderson, Reder, Simon, 1996; Pusic et al., 2007; Tripp, 1993).

A randomized study conducted by Pusic et al. (2007) evaluated the integration of six online tutorials for 75 medical students over a 46-week period. Each tutorial was designed to include 33-85 screens of information and take approximately 10-15 minutes to complete. Upon completion of the study, students perceived the tutorials to be a valuable resource and 54% indicated that they prefer the tutorials to small group teaching sessions with a clinical preceptor (Pusic et al., 2007). Various other studies have also revealed that online tutorials are considered to be a constructive learning tool among the healthcare professions (Chumley-Jones, Dobbie, Alford, 2002; Osman & Muir, 1994; Wilkes, 2001; Williams, Aubin, Harkin, Cottrell, 2001). Thus, online tutorials are a strong resource to educate students within clinical practice, and can be a valuable tool for any healthcare profession.

*Questionnaires*
Along with a multitude of workshops exclusively on evidence-based practice, numerous survey instruments and questionnaires have recently been developed to assess the knowledge and perception levels of various healthcare clinicians. The use of questionnaires provide an advantageous method of obtaining information from psychological factors such as attitudes, beliefs, behaviors, motivations, and fears, as well as important demographic information (Portney & Watkins, 2008; Turocy, 2002). However, investigators utilizing questionnaires must be aware that disadvantages include the possibilities for misinterpreting questions or response choices as well as the known limitation of the self-reporting system (Portney & Watkins, 2008). Furthermore, it is important to note that the typical response rate for web-based surveys and questionnaires via e-mail is only 36.83% (Sheehan & McMillian, 2001).

Unfortunately, a majority of the evidence-based practice questionnaires available have not been validated and therefore have weakened the conclusions gained from research studies (Smith et al., 2000). Furthermore, a greater portion of the EBP survey instruments designed focus to exclusively evaluate a particular evidence-based curriculum developed (Shaneyfelt et al., 2006). Therefore, most of these survey assessments lack the exactitude of examining psychological factors effecting evidence-based practice as well as deciphering appropriate educational interventions for EBP implementation (Shaneyfelt et al., 2006).

Two particular instruments that have been validated are the Fresno Test of Evidence Based Medicine and the Berlin Questionnaire. Although developed to distinguish the effectiveness of an evidence-based curriculum in the University of California, San Francisco’s Fresno family practice residency program, the Fresno Test of
Evidence Based Medicine has frequently been adopted by other allied health investigators seeking similar findings. This instrument was designed to involve short answers based off of clinical scenarios, therefore requiring the participant to demonstrate knowledge of applying the steps of the evidence-based practice process (Ramos, 2003). The Berlin Questionnaire on the other hand, was developed to assess physicians’ knowledge in regards to interpreting research evidence as well as the ability to utilize quantitative information to resolve patient problems (Fritsche, 2002). Similarly to the Fresno Test of Evidence Based Medicine, the Berlin Questionnaire has also been adopted by other investigators in the creation of new evidence-based practice questionnaires.

As previously mentioned, several EBP questionnaires focus to identify the attitudes and perceptions of allied healthcare professionals. Jette et al. (2003) utilized a self-reported questionnaire for physical therapists that was designed based off of a previous questionnaire to assess general practitioners’ perceptions of EBP (Jette et al., 2003; McColl, Smith, White, Field, 1998). The questionnaire not only assessed physical therapists’ attitudes towards evidence-based practice, but also investigated their motivations and perceived barriers to engage in EBP. Interestingly, 90% of the respondents indicated that evidence-based practice was necessary; however, 67% rated insufficient time as one of the main barriers to implementing EBP into their clinical practice (Jette et al., 2003). In another study, a questionnaire was utilized to assess educators’ importance levels for various topics within evidence-based practice courses (Yousefi-Nooraie, Rashidian, Keating, & Schonstein, 2007). The investigation revealed that educators’ agreed that the basics of EBP, question formation, literature retrieval, and critical appraisal are considered introductory concepts and should primarily be discussed
in preliminary courses and workshops, while more in-depth statistical concepts should be focused on in advance-level courses (Yousefi-Nooraie et al., 2007). Furthermore, particular topics should be avoided and/or less stressed in novice evidence-based practice workshops and courses.

To date, there are very few questionnaires or surveys that exclusively focus on the psychological factors of athletic trainers in regards to the implementation of evidence-based practice. To accurately collect and assess such variables, a valid instrument must be created and distributed to the athletic training education population.

**Behavioral Changes Following Education Interventions**

While it is important to assess attitudes and beliefs regarding EBP as well as knowledge gains following an educational intervention, it is also critical to determine whether a clinician takes this newfound knowledge and makes appropriate changes to his or her clinical practice. More specifically, it is necessary to determine which strategies will be effective to get clinicians to implement EBP within their daily clinical practice, what variables influence knowledge transition, and which steps can clinicians take to overcome the perceived barriers preventing them from making essential changes (Ciliska, 2006). Unfortunately, current literature is sparse regarding clinical practice changes following educational interventions, especially relating to evidence-based practice.

While it is unclear whether EBP educational interventions are effective in influencing clinical practice behavioral changes, literature is available to support clinical practice changes among health professionals following educational interventions on various other topics. A systematic review assessing the effectiveness of continuing education meetings (i.e., courses and workshops in various formats) among medical
professionals concluded that educational meetings elicit small improvements of professional practice and healthcare outcomes (Forsetlund et al., 2009). Furthermore, increasing the effectiveness of educational meetings has been demonstrated when strategies to increase attendance, utilizing mixed formats (e.g., interactive and didactic), and shifting the primary focus to outcomes that are perceived to be more serious were taken into consideration (Forsetlund et al., 2009).

A majority of studies conducted to assess clinical practice changes following an intervention indicate that most interventions are effective under some circumstances, but that no single intervention is effective for all circumstances (Grimshaw et al., 2001; Grimshaw, Eccles, Walker, Thomas, 2002; Grol & Grimshaw, 2003). Interventions including interactive small group meetings (Davis et al., 1999) computerized decision support (Balas, Austin, Mitchell, Ewigman, Bopp, Brown, 1996; Hunt, Haynes, Hanna, Smith, 1998; Johnston, Langton, Haynes, Mathieu, 1994), mass media campaigns (Grilli et al., 2000), and combined interventions (Hulscher, Wensing, Grol, van der Weijden, van Wheel, 1999; Oxman, Thomson, Davis, 1995; Solomon, Hasimoto, Daltroy, Liang, 1998) have been shown to be most effective, while conferences/short-courses (Cameron & Naylor, 1999; Forsetlund et al., 2009; Grimshaw et al., 2001), use of opinion leaders (Thomson, Oxman, Haynes, 1997), feedback on performance (Grol & Grimshaw, 2003) have been shown to have mixed effects on clinical practice changes.

Barriers preventing clinical practice changes following an educational intervention are also important to consider. The primary barriers affecting clinical practice changes often reflect practice and knowledge (Oxman & Flottorp, 2001). Practice barriers include financial disincentives (e.g., lack of reimbursement),
organizational constraints (e.g., lack of time), as well as perceptions of liability and patients' expectations (Grol & Grimshaw, 2003; Oxman & Flottorp, 2001). Knowledge barriers include clinical uncertainty, self-confidence in skills, a compulsion to act, and the inability to appraise evidence (Grol & Grimshaw, 2003; Kennedy, Regehr, Rosenfield, Roberts, Lingard, 2004; Oxman & Flottorp, 2001). It is important to consider these barriers as well as any other challenges that may arise when trying to determine which educational intervention format will be most suitable for a particular group of healthcare professionals. Barriers can occur at varying levels of clinical practice (i.e., individual, facility, organizational; Grol & Grimshaw, 2003); identifying any barriers early in the educational process may more effectively promote the desired changes within clinical practice.

Currently, no published research exists regarding athletic training clinical practice changes following an educational intervention on evidence-based practice. Not only is it important to identify and develop numerous strategies to promote EBP education, but it is also critical to recognize the specific barriers that may exist preventing athletic trainers from making changes within their daily clinical practice. Although recent literature has discussed athletic trainers' perceived barriers towards implementing evidence-based practice (Hankemeier & Van Lunen, Accepted-a; Manspeaker & Van Lunen, 2011c; Welch McCarty, Hankemeier, Walter, Newton, Van Lunen, Accepted), it is necessary to shift focus on identifying potential barriers affecting clinical practice behavioral changes.
References


*Standards for the accreditation of entry-level athletic training education programs.* Retrieved from http://www.caate.net/imis15/CAATE/Forms/CAATE/Forms/Forms.aspx?hkey=lec27fcc-9a33-4d74-8660-975d67e610a0


*Accredited programs.* Retrieved from http://www.caate.net/imis15/CAATE/Accredited_Programs/Core/directory.aspx?hkey=b91f27b1-2a93-4ed1-b1e6-55cc82ae0fc3


Haynes, R. (2002). What kind of evidence is it that Evidence-Based Medicine advocates want health care providers and consumers to pay attention to? *BMC Health Services Research, 2*(1), 3.


CHAPTER III

PROJECT I

Attitudes, Beliefs, Barriers, and Accessibility to Evidence-Based Practice Resources
Among Athletic Training Educators, Clinicians, and Students

Title: Attitudes, beliefs, barriers, and accessibility to evidence-based practice resources among athletic training educators, clinicians, and students

Authors: Cailee Welch McCarty, Dorice A. Hankemeier, Jessica M. Walter, Eric J. Newton, Bonnie L. Van Lunen

Accepted to: Journal of Athletic Training – November 14, 2011
Introduction

In the spring of 2011, the National Athletic Trainers’ Association (NATA) Executive Committee for Education released the 5th edition of the *Athletic Training Education Competencies* (National Athletic Trainers’ Association, 2011). These competencies, which must be fully implemented in the Commission on Accreditation of Athletic Training Education (CAATE)-accredited professional athletic training education programs by the end of the 2012-2013 academic year, contain several new changes. Of particular interest is the addition of an evidence-based practice (EBP) content area (National Athletic Trainers’ Association, 2011). This area contains new competencies pertaining to the various aspects of EBP in which the students will have to be proficient before they graduate and sit for the Board of Certification (BOC) exam.

To effectively educate athletic training students, it is imperative that educators and clinicians are fully competent in the content areas of evidence-based practice as well (Welch et al., 2011). Overall, the goal of the athletic training profession is to provide efficient patient care (Snyder, Valovich McLeod, Sauers, 2007); therefore, we must produce evidence-based clinicians who will routinely search the evidence for optimal treatment methods and interventions for each patient or problem. However, without a full understanding of the various concepts of EBP, we may never achieve this end goal. The infusion of evidence-based practice will require a multifaceted approach to educating the profession on the concepts associated with EBP as well as effective strategies for implementation within clinical practice.

Several challenges may restrict athletic trainers and athletic training students from accepting evidence-based practice and incorporating it throughout every day clinical
practice. The most prevalent barrier towards implementing EBP is athletic trainers’ perceived lack of knowledge of the evidence-based practice process as well as concepts associated with EBP (Hankemeier & Van Lunen, Accepted-a; Manspeaker & Van Lunen, 2011b). Other health care professions have also reported lack of knowledge as a barrier (Bidwell, 2004; Brown, Wickline, Ecoff, Glaser, 2009; Jette et al., 2003; O’Donnell, 2004), however these professions have begun to incorporate strategies to educate its members about EBP (Cullen, Titler, Rempel, 2011; Davis et al., 2007; Fritsche, 2002; Nicholson, Warde, Boker, 2007). Other commonly reported barriers include time (Hankemeier & Van Lunen, Accepted-a; Jette et al., 2003; Manspeaker & Van Lunen, 2011b) and accessibility and utilization of resources (Jette et al., 2003; Kitto et al., 2007; Mensik, 2011). Although previous research among nurses and physical therapists has reported that a majority of clinicians are aware they have access to professional literature (Jette et al., 2003), one study revealed that only 20% of clinicians read professional literature on a regular basis (Mensik, 2011).

As evidence-based practice becomes infused within athletic training education, it is important to have an understanding of athletic trainers’ perceptions regarding evidence-based concepts and practices. More specifically, it is critical to assess athletic trainers’ knowledge, attitudes and beliefs, accessibility to resources, as well as barriers preventing EBP implementation within clinical practice and didactic education. Previous research has attempted to identify these factors, however each investigation primarily focused on one subgroup of athletic trainers: educators (Manspeaker & Van Lunen, 2010; Welch et al., 2011), approved clinical instructors (Hankemeier & Van Lunen, 2011), and professional athletic training students (Manspeaker, Van Lunen, Turocy, Pribesh,
Hankemeier, 2011a). Therefore, the purpose of this study was to assess the attitudes and beliefs and perceived barriers of evidence-based practice among athletic training educators, clinicians, and students. Additionally, we sought to determine participants’ accessibility to resources related to evidence-based practice. We hypothesized the following: (1) Individuals affiliated with athletic training education programs (ie., educators, ACIs, students) would achieve significantly higher composite scores on the benefits to practice items, indicating they agree that evidence-based practice provides various benefits to practice, (2) Clinicians would achieve significantly lower negative perception composite scores regarding the implementation of EBP than all other athletic training groups, (3) Professional program directors, post-professional educators, and post-professional students utilize resources relating to evidence-based practice more frequently than ACIs and clinicians not affiliated with education programs, (4) Professional program directors, post-professional educators, and post-professional students would report higher rates of direct access to resources than ACIs and clinicians not affiliated with education programs, (5) Clinicians would achieve significantly higher composite scores regarding perceived barriers relating to personal skills and attributes than all other athletic training groups, and (6) Clinicians would achieve significantly higher composite scores regarding perceived barriers relating to support and accessibility to resources than all other athletic training groups.

Methodology

Participants

Professional athletic training education program directors, approved clinical instructors (ACIs), post-professional educators, post-professional students, and clinicians
not affiliated with athletic training education programs (n=6,702) were solicited for participation during the spring of 2010. One thousand two hundred and nine individuals responded to the Evidence-Based Concepts Assessment (EBCA) for an overall response rate of 18.04%. Demographics of the participants are presented in Table III.1. The University Institutional Review Board approved this study as exempt research and consent was implied upon voluntary submission of the completed survey.

**Instrumentation**

Within the past decade, several instruments have been developed to assess numerous aspects of evidence-based practice (Fritsche, 2002; Jette et al., 2003; Kitto et al., 2007; Manspeaker et al., 2011a; Ramos, 2003, Welch et al., 2011). However, each EBP instrument differs from one another and often was originally developed to target a specific population. Due to the lack of pre-existing instruments to assess various concepts of EBP across several groups within athletic training, the research team created an online survey utilizing Inquisite 8.0 Corporate Survey Builder (Catapult System Corporation, Austin, TX). The Evidence-Based Concepts Assessment consisted of six sections: (1) Perceived Importance of EBP concepts, (2) Attitudes & Beliefs towards EBP, (3) Accessibility to EBP resources, (4) Knowledge of EBP, (5) Confidence in Knowledge, and (6) Barriers to EBP implementation (Appendix I). Additionally, participants were asked to complete a demographic questionnaire included at the end of the online instrument. Each section of the EBCA included 4-point Likert scale items (ie., “strongly agree”, “agree”, “disagree”, “strongly disagree”), multiple-choice questions, or multi-part questions. With permission from the authors, some questions were adopted from previously established EBP instruments (Jette et al., 2003; Kitto et al., 2007; Manspeaker
& Van Lunen, 2011a). Once the instrument was developed, a panel of five experts assessed the survey for content validity and changes were made as necessary. The EBCA was deemed a valid instrument to assess perceived importance, attitudes and beliefs, accessibility, knowledge, confidence in knowledge, and perceived barriers among various groups of athletic trainers within the profession. The focus of this manuscript is to discuss attitudes and beliefs, accessibility, and perceived barriers among the different athletic training groups; subsequent manuscripts will discuss perceived confidence, knowledge, and confidence in knowledge (Hankemeier et al, Accepted-b).

Reliability of the Likert-scale items within the survey instrument was determined via principle component analysis, while cronbach’s alpha was utilized to assess internal consistency. The four sections of the instrument that included 4-point Likert scale items were shown to have good reliability: perceived importance ($\alpha = .69$), attitudes and beliefs ($\alpha = .76$), confidence in knowledge ($\alpha = .76$), and perceived barriers ($\alpha = .87$). Percent agreement was used to determine the reliability of the multiple-choice questions within the knowledge section. A sample of 27 athletic trainers was asked to complete the knowledge questions twice with two weeks separating each testing session. The reliability of the multiple-choice questions ranged from 0.63-0.96, indicating that the knowledge questions were fair to extremely reliable.

**Attitudes and Beliefs**

The attitudes and beliefs section included 15 items on a 4-point Likert-scale assessing participants’ perceptions of the various aspects of evidence-based practice. The participant had four ordered choices where a score of “1” indicated the participant “strongly disagreed” with the statement and a score of “4” indicated the participant
"strongly agreed" with the statement. Principle component analysis revealed two distinct groupings of questions. The first grouping, negative perceptions (α = .74), included six Likert-scale items that provided negative statements towards EBP. The second group, benefits to practice (α = .73), included five Likert-scale items that comprised statements, which promoted the implementation of EBP within clinical practice. The remaining five Likert-scale items within the attitudes and beliefs section did not fit well with the rest of the items; therefore these items were reported independently. The composite score for each grouping was averaged and normalized to the Likert scale; a score of "4" was the maximum achievable score. Statements relating to negative perceptions are displayed in Table III.2 while statements relating to benefits to practice are displayed in Table III.3.

Accessibility

The accessibility section included two multi-part questions assessing participants’ access to resources that enhance clinical decision-making. The first question asked participants how often they utilized ten common resources: systematic reviews and/or meta-analyses, peer-reviewed journal articles (e.g., Journal of Athletic Training, Journal of Sport Medicine, Journal of Strength and Conditioning Research), clinical prediction rules, professional literature (e.g., NATA News, Training & Conditioning, BioMechanics), Cochrane databases, Medline/Pub Med databases (e.g. Ovid SP, Pub Med, Medline), NATA think tanks, textbooks, websites (e.g., Google Scholar, Wikipedia, WedMD), NATA position statements. The participant had six choices that ranged from “never” to “more than once a week.” A seventh choice was available if the participant was “unfamiliar with the source.” The second multi-part question asked participants to identify which of the 10 resources they had direct access to. Direct access was defined as
being able to access the resource and its content through work or home without assistance from other individuals.

**Perceived Barriers**

The perceived barriers section included 16 Likert-scale items assessing the participants' own barriers preventing them from evidence-based practice implementation. The participants had the same choices as the attitudes and beliefs section where a “1” indicated “strongly disagree” and a “4” indicated “strongly agree.” Principle component analysis revealed two groupings of questions. The first grouping, personal skills and attributes barriers ($\alpha = .83$), included eight Likert-scale items that assessed participants’ perceived barriers relating to their own practices. The second grouping, support and accessibility to resources barriers ($\alpha = .71$), included six Likert-scale items that assessed participants’ perceived barriers relating to external resources. Similarly to the attitudes and beliefs section, the remaining two Likert-scale items were reported independently. Again, the composite score for each group was averaged and then normalized to the Likert scale. Statements relating to each of these two groups are displayed in Table III.4 and Table III.5 respectively.

**Procedures**

During the data collection period, participants were sent an email, which included the purpose and importance of the study, the estimated time to complete the survey, a hyperlink to the survey webpage, the date for when the survey should be completed, and a request for their participation. Participants were given four weeks to complete the EBCA. Reminder emails were sent biweekly to thank those individuals who completed the survey while simultaneously reminding those who had not yet responded. Although
survey distribution was consistent, recruitment for each group of participants differed slightly.

*Professional Athletic Training Education Program Directors and Approved Clinical Instructors*

A list of names and contact information for program directors of CAATE-accredited athletic training education programs was obtained via the CAATE website (www.caate.net). Three hundred forty-eight programs directors were solicited for participation via telephone. Each program director was provided with the purpose of the study and asked for their consent. Additionally, program directors were asked if they were willing to disseminate the survey instrument to the remainder of the associated faculty and approved clinical instructors (ACI) affiliated with their respective institution. If a program director was not reached within four phone calls, an email was sent asking for their participation in the study. Two hundred and nine program directors agreed to participate and disseminated the survey to a total of 2,346 additional faculty and ACIs; one hundred thirty-two programs directors (63.16%) and 266 approved clinical instructors (11.34%) completed the EBCA.

*Post-Professional Educators*

Contact information for post-professional educators was obtained via the NATA Post-Professional Athletic Training Education Program Evaluation Annual Report. An email was sent to educators from 15 of the 16 post-professional athletic training programs detailing the purpose of the study and requesting their participation. Educators of the institution in which this research investigation took place were excluded from the study.
Twenty-four of the 47 post-professional educators completed the EBCA for a response rate of 51.06%.

*Post-Professional Education Athletic Training Students*

The request for participation of post-professional athletic training students was conducted through the approval of the program director at each institution. Fifteen of the 16 post-professional education program directors were contacted via email. The email identified the purpose of the research investigation and asked if he or she would forward the survey request to the post-professional students at that institution. Fourteen programs directors agreed to send the EBCA to their students; some institutions provided its students’ email addresses directly on the school website. Seventy-one of the 223 students contact completed the survey for a response rate of 31.84%.

*Athletic Training Clinicians*

A list of the names and email addresses for all participants was obtained from the National Office for the NATA via the *NATA Survey List Request Form*. Information for athletic trainers from the ten NATA districts in all work settings, except college/university, secondary school, or business/sales/marketing, were requested for this survey. The National Office database produced 3,937 members that met the requested criteria and the research team purchased the email addresses of these members. These individuals were sent a letter via email requesting participation in the research investigation. The letter contained a description of the overall purpose and importance of the research study, the estimated time to complete the survey, the URL hyperlink directing them to the survey webpage, and a request for their participation. The email also provided contact information of the primary researcher for comments or questions that
concerned either the research study or the survey instrument. A total of 3,877 emails were successfully sent; 60 email addresses were returned as a delivery failure due to an unknown or expired address. Seven hundred sixteen clinicians responded for a response rate of 18.47%.

Data Analysis

Statistical Package for Social Sciences (version 16.0, SPSS Inc. Chicago, IL) was used to calculate the statistical components. Descriptive statistics were used to calculate the means, standard deviations, and frequencies of the data within each section. A Kruskall-Wallis (H) test was used to detect differences for the ordinal data in the attitudes and beliefs and perceived barriers sections among the five athletic training groups. A Mann-Whitney (U) test with a Bonferroni adjustment was used to correct for Type I error commonly associated with multiple comparisons. The significance level was set at $p \leq 0.05$ for each Kruskall-Wallis (H) test; taking into consideration the Bonferroni adjustment for five comparison groups, the significance level for each Mann-Whitney (U) test was set at $p \leq 0.01$.

Results

Attitudes and Beliefs

Overall, 60.07% of participants reported they “agree” and 24.1% reported they “strongly agree” with the statement, “I need to increase the use of evidence in my daily practice.” A majority of participants (93.2%) reported they are “interested in learning or improving the skills necessary to incorporate evidence-based practice into clinical practice.” Approximately 66% of ACIs and 72.1% of clinicians indicated they “disagree” or “strongly disagree” with the statement, “strong evidence is lacking to support most
interventions I use with my patients”, while 60.5% of post-professional students and 79.2% of post-professional educators “agree” or “strongly agree” with the statement. Program directors were fairly even regarding this statement with 54% of the participants in this group reporting the “disagree” or “strongly disagree.”

**Negative Perceptions**

The composite score for negative perceptions towards evidence-based practice was 2.23 (“disagree”). There was a significant difference in negative perceptions composite scores among the different athletic training groups ($\chi^2 = 31.26, p < .001$).

Negative perceptions composite scores reported by post-professional students were significantly lower than program directors ($U = 3446, z = -3.13, p = .002$), ACIs ($U = 6371, z = -4.25, p < .001$), and clinicians ($U = 16606, z = -4.87, p < .001$). Furthermore, post-professional educators also had significantly lower scores than clinicians ($U = 5456, z = -3.08, p = .002$) and ACIs ($U = 2061, z = -2.90, p = .004$). Although statistically significant differences occurred between groups, group means ranged from 1.93 to 2.26, indicating that all five athletic training groups reported they “disagree” on the negative perceptions towards evidence-based practice (Table III.2).

While all groups’ composite scores indicated they “disagree” that there are negative perceptions associated with evidence-based practice, percentage differences were noted for particular statements. With the exception of post-professional students, the program directors (54.6%), post-professional educators (58.4%), ACIs (61.3%), and clinicians (58.3%) reported they “agree” with the statement, “evidence-based practice does not take into account the limitation of [their] clinical practice setting.” These four
groups also “agree” (52.3%-62.1%) with the statement, “evidence-based practice does not take into account patient preferences.”

Benefits to Practice

Overall, participants reported they “agree” (3.27) that evidence-based practice has benefits to clinical practice. A significant difference was found between groups in regard to benefits to practice composite scores ($x^2 = 16.56, p = .002$). Benefits to practice composite scores reported by post-professional educators were significantly higher than post-professional students ($U = 519, z = -2.91, p = .004$), program directors ($U = 1001, z = -2.90, p = .004$), ACIs ($U = 1736, z = -3.76, p < .001$), and clinicians ($U = 5025, z = -3.51, p < .001$) (Table III.3). No other significant differences were found between groups. It is important to note however, regardless of the significant differences found between post-professional athletic training educators and the other four groups, all groups reported they “agree” that evidence-based practice permits benefits to clinical practice (3.23-3.53).

Accessibility

Direct Access to Resources

Nearly all participants reported they have direct access to textbooks (97.7%) and websites (98.5%). More than 90% of the respondents indicated they have direct access to NATA position statements. More than 90% of program directors, post-professional educators, and post-professional students reported they had direct access to Medline/Pub-Med databases; only 82.7% of ACIs and 66.8% of clinicians indicated having direct access to this resource. Direct access to NATA Think Tanks remained moderate, with a range of 65.8-84.8% access among the five groups. Direct access to professional literature was reported above 89% for all groups, while access to peer-reviewed journal
articles was averaged about 87.3%. Approximately 92% of post-professional educators and post-professional students indicated they have direct access to systematic reviews and/or meta-analyses, while only 34.9% of clinicians reported access. Direct access to Cochrane databases varied greatly; 79.2% of post-professional athletic training educators reported they had access, while only 14.5% of clinicians indicated access to Cochrane databases. Finally, direct access to clinical prediction rules was the overall lowest reported resource with a range from 18.2-50.7% among all five athletic training groups. Figure III.1 displays the frequency distribution among the athletic training groups for each resource.

Resource Utilization

Utilization of several evidence-based practice related resources varied greatly for all participants. Textbooks (29.2%) and websites (27.1%) were reported to be the most frequently used resources more than once a week. Professional literature (38.3%) and peer-reviewed journal articles (35.7%) were most frequently utilized once a month, while NATA position statements (39.4%), Medline/Pub Med Databases (33.7%), and systematic reviews and/or meta-analyses (35.7%) were reported to be most frequently utilized less than once a month. Approximately 40% of participants indicate they never utilize NATA Think Tanks within their clinical practice or didactic education. Interestingly, Cochrane databases and clinical predication rules were reported to be the two least familiar EBP-related resources; 37.6% of respondents indicated they were unfamiliar with clinical prediction rules and 52.5% of respondents reported they were unfamiliar with Cochrane databases. The frequency distribution for the resources utilized by all participants is provided in Figure III.2.
Perceived Barriers

Participants' responses to statements regarding barriers to implementing evidence-based practice within clinical practice were diverse. Post-professional athletic training students (81.6%), ACIs (83.0%), program directors (78.1%), and clinicians (74.4%) reported they “agree” or “strongly agree” that time is a barrier preventing EBP implementation within clinical practice or didactic education. Contrary to these results, 58.4% of post-professional educators “disagree” or “strongly disagree” that time is a barrier for EBP implementation. In regard to the “availability of evidence-based practice mentors” as a barrier for EBP implementation, 78.0% of program directors, 70.8% of clinicians, and 70.3% of ACIs “agree” or “strongly agree.” Thirty-eight percent of post-professional educators and 50.7% of post-professional students reported they “disagree” or “strongly disagree.”

Personal Skills and Attributes

The composite score for personal skills and attribute barriers was 2.29, indicating that participants reported they “disagree” with the perceived barriers. A significant difference was found between groups in regards to personal skills and attributes composite scores ($\chi^2 = 53.29, p < .001$). Composite scores reported by post-professional educators were significantly lower than program directors ($U = 717, z = -4.27, p < .001$), ACIs ($U = 1072, z = -5.41, p < .001$), clinicians ($U = 2583, z = -5.85, p < .001$), and post-professional students ($U = 389, z = -3.98, p < .001$). Furthermore, post-professional students had significantly lower scores than clinicians ($U = 17703, z = -4.24, p < .001$) and ACIs ($U = 7263, z = -3.00, p = .003$). While program directors, ACIs, post-professional students, and clinicians reported they “disagree” that personal skills and
attributes are barriers preventing EBP implementation, post-professional educators reported they “strongly disagree.” Table III.4 displays the composite means and percentages for the personal skills and attributes items.

Individual group frequency analyses revealed that responses varied for two perceived barriers associated with personal skills and attributes. Fifty-one percent of ACIs reported they “agree” that “understanding of the evidence-based practice process” is a barrier, while all other groups reported they “disagree.” Furthermore, both ACIs (54.2%) and clinicians (57.0%) reported they “agree” that understanding statistical analyses is a barrier to evidence-based practice implementation.

Support and Accessibility to Resources

Overall, participants reported they “disagree” (2.40) that support and accessibility to resources are barriers for EBP implementation. A significant difference was found between groups in regard to support and accessibility to resources composite scores ($\chi^2 = 27.33, p< .001$). Post-professional educators’ composite scores were significantly lower than ACIs ($U = 1974, z = -3.12, p = .002$) and clinicians ($U = 5064, z = -3.45, p = .001$). Additionally, post-professional students also had significantly lower scores than clinicians ($U = 18954, z = -3.56, p< .001$) and ACIs ($U = 7304, z = -2.95, p = .003$). Composite means and percentages for the items associated with support and accessibility to resources barriers are provided in Table III.5.

A few group frequency differences were noted for the support and accessibility to resources barriers. Program directors (62.1%) and post-professional educators (54.2%) “agree” or “strongly agree” that the “ability to find research literature that related to my patient population” is a barrier, while ACIs (55.3%) and post-professional students
Clinicians’ responses to this barrier were even, with 50.3% of participants indicating they “disagree” or “strongly disagree.” In regard to the “accessibility of patient outcome assessments” barrier, 67.5% of program directors, 70.9% of post-professional educators, and 59.1% of post-professional students “disagree” or “strongly disagree.” Meanwhile, ACIs (59.4%) and clinicians (59.7%) “agree” or “strongly agree” that accessibility to patient outcome assessments is a barrier to EBP implementation.

Discussion

The foundations of evidence-based practice have become recognized across various healthcare professions over the past decade. While EBP begins to transform athletic training education at the professional and post-professional levels, it is also important to focus on the incorporation of EBP within clinical practice. If clinicians are unable to routinely administer effective patient care by balancing the best available evidence, clinician expertise, and patient values, the athletic training profession may continue to struggle to provide solid justification toward the acquisition of state legislation and third-party reimbursement. Identifying factors such as perceived barriers and accessibility issues to resources will allow administrators and facilitators to understand common concerns prohibiting athletic trainers from a smooth transition into becoming evidence-based clinicians.

Attitudes & Beliefs

Our results indicate that athletic trainers have a relatively positive attitude towards the implementation of evidence-based practice and that it promotes benefits to practice. Ninety-eight percent of the participants in this investigation believe that the application of
EBP is important to the credibility of the profession. Furthermore, participants also believe that EBP improves the quality of patient-care and will help clinicians make decisions about patient care. Similar results have been found in numerous investigations among physical therapists (Heiwe et al., 2011; Jette et al., 2003; Salbach et al., 2007), dieticians (Heiwe et al., 2011), occupational therapists (Heiwe et al., 2011), nurses (Retsas, 2000; Waters, Crisp, Rychetnik, Barratt, 2009), and physicians (Flores, Lee, Bauchner, Kastner, 2000; McColl, Smith, White, Field, 1998; Young & Ward, 2001). Our findings also indicate that 93.2% of participants believe they need to increase their use of evidence within their daily clinical practices. These results are similar to those reported by Jette et al. (2003) in which 84% of physical therapists reported they need to increase their daily use of evidence.

Although athletic trainers believe evidence-based practice will improve patient-care, some negative perceptions associated with implementation still remain. Our findings, similar to those reported by Heiwe et al. (2011) indicate that a majority of participants believe EBP does not take into account the limitations of their clinical practice settings. On the other hand, all groups disagreed that EBP places unrealistic demands on daily practices. Contrary to our findings, Jette et al. (2003) reported 61% of physical therapists believe EBP places unrealistic demands on their clinical practices. However, literature is sparse regarding the common patient populations athletic trainers provide care for. Therefore, ATs may not perceive that EBP places unrealistic demands on daily practices because they believe there is no evidence available that relates to their specific patient population.
Bridge, Bierema, Valentine (2007) suggested that taking individual attitudes into consideration is crucial when intending to adopt evidence-based practices. While the athletic training profession has already begun to implement EBP within didactic curricula and clinical practices, it is important to ensure that educators, students, and clinicians alike support these changes and are prepared with the appropriate tools and strategies for effective implementation. The results from this investigation match those of other healthcare professionals; athletic trainers support EBP and have positive attitudes regarding its implementation. Now that attitudes and beliefs towards evidence-based practice have been identified, it is essential to enhance athletic trainers’ knowledge of evidence-based concepts, provide resources and tools for successful application, and eliminate barriers preventing implementation.

**Accessibility**

It is believed that efficient access to resources and the skills to retrieve evidence are necessary for clinicians to appropriately implement evidence-based practice (Jette et al., 2003). The accessibility to evidence-based practice related resources and utilization of these resources among athletic trainers varies greatly. Our results indicated that textbooks and websites (e.g., Google Scholar, Wikipedia, WebMD) were the two resources most frequently utilized on a weekly basis. Simultaneously, nearly all participants (98%) reported having direct access to these two resources. It can be hypothesized that access to textbooks and websites may be reported as the highest among the ten resources assessed simply because they are the two resources the participants are most familiar with. Sigouin and Jadad (2002) reported that 100% of oncologists used the internet to access health information. Furthermore, 72% of nurses and 64% of physicians also retrieved health
information via the Internet (Sigouin & Jadad, 2002). However, our instrument only asked participants to identify if they were unfamiliar with a particular resource; therefore we cannot make a conclusive statement regarding the familiarity of textbooks and websites.

Ninety-two percent of participants also reported having direct access to professional literature, which was most frequently utilized once a month. Heiwe et al. (2011) used an EBP instrument developed by Jette et al. (2003) and found that 93% of physical therapists, dieticians, and occupational therapists had access to professional literature via paper or Internet form. Similarly, Jette et al. (2003) found that 96% of physical therapists had access to professional journals; however, 74% of participants reported they read less than five articles per month. Other studies investigating the utilization of resources among physical therapists found that approximately 75% of respondents read their professional journal once or less than once a month (Turner & Whitfield, 1996; Turner & Whitfield, 1997). Although athletic trainers report a high percentage of direct access to professional literature, they may not be utilizing this resource frequently within their daily practice.

Seventy percent of athletic trainers reported they have direct access to NATA Think Tanks, however 40% of these individuals reported they never utilize this resource. Our data does not provide us with further information as to why this resource is rarely used within clinical practice. NATA Think Tanks were developed in 2008 and replaced what was formerly known as athletic training listservs. This resource was conceived concurrently with the technological updates and changes made to the NATA website in 2008. NATA Think Tanks are online discussion forums available to all NATA members.
Think Tanks are broken into topic and setting-specific categories to promote idea exchange as well as peer-to-peer collaboration (www.nata.org/thinktanks). As of June 2011, there are only 2,800 members registered for the NATA Think Tanks. The members of the NATA under utilize this resource albeit it provides an excellent mechanism to collaborate with peers and mentors to share clinical experiences. Evidence-based practice requires a balance between the best available research evidence, clinician expertise, and patient values (Sackett, Rosenberg, Gray, Haynes, Richardson, 1996); NATA Think Tanks may be a great way to infuse clinician expertise as part of the EBP process.

Direct access to clinical prediction rules remained low across all five athletic training groups. Interestingly, 37.6% of participants reported they are unfamiliar with this resource, which may have influenced the low response regarding direct access. Clinical prediction rules (CPR) are decision-making tools that identify predictor variables (e.g., patient history, physical examination, diagnostic tests), which assist clinicians with identifying a specific diagnosis, predicting a particular outcome, or determining an appropriate management strategy (Childs & Cleland, 2006). Several CPRs have been developed to enhance clinicians’ decision-making processes for a multitude of conditions (i.e., diagnosis of DVTs, strep throat, low-back pain patients who benefit from spinal manipulation, etc.). Currently, there is no central mechanism provided for athletic trainers to access CPRs, however these rules are located in various accessible journals through Internet searching. Glynn and Weisbach (2011) have recently published *Clinical Prediction Rules: A Physical Therapy Reference Manual*, which includes several CPRs relevant to clinical practice.
Along with clinical prediction rules, athletic trainers also reported limited access to Cochrane databases. More than half of the participants (52.5%) also indicated they were unfamiliar with this resource. Similarly, McColl et al. (1998) reported less than 28% of physicians utilized resources such as the Cochrane Database. Cochrane databases, which are a part of the Cochrane Collaboration (www.thecochranelibrary.com), were developed in 1993 to emphasize the importance of current research and assist health care providers during the clinical decision-making process (Fineoutoverholt, Melnyk, Schultz, 2005). To date, the Cochrane Collaboration contains over 190,000 randomized controlled trials and 4,500 systematic reviews (The Cochrane Collaboration, 2010). The Cochrane Collaboration is proclaimed the best and most thorough source to obtain evidence for clinical practice (Bigby, 1998). Currently, brief summaries are available for free on the Cochrane Library website, however full access requires the purchase of a license. Institutions such as colleges and universities often have purchased several licenses for its faculty, administrators, and students to access the Cochrane Library free of charge. Free online access to the Cochrane databases may also be available through funded provisions (The Cochrane Collaboration, 2010). For example, all residents of the state of Wyoming can access the Cochrane Library for free via that state’s public library databases. Smaller work settings however, such as clinics, secondary schools, and athletic training facilities not affiliated with a college or university, may not have access to this resource unless the license is purchased.

Educating athletic trainers on the various mechanisms and search engines available to access high quality research is an important step to enhancing the use of EBP within daily clinical practice. As educators, students, and clinicians become more
knowledgeable and familiar with the types of resources available to them, the level of resource utilization may increase as well. However, along with increasing familiarity, it is critical that athletic trainers' accessibility to such resources be improved as well. Individuals that are not affiliated with academic institutions may not be provided the same access to resources, such as the Cochrane Library, CINAHL, or MEDLINE. Therefore, policy makers and administrators should be encouraged to provide adequate access to resources that will promote current evidence and enhance clinical decision-making (Farmer & Richardson, 1997; Hankemeier & Van Lunen, Accepted-a).

**Barriers towards Implementation**

Interestingly, although athletic trainers reported having limited access to some EBP-related resources (i.e., Cochrane databases, clinical prediction rules, systematic reviews or meta-analyses), all groups did not perceive the accessibility of information resources as a barrier towards implementation. These results are similar to those reported by Heiwe et al. (2011); less than 15% of physical therapists, dieticians, and occupational therapists perceived lack of information resources as a barrier for implementation. It has been found that physicians often choose to seek sources of information from personal contacts rather than research literature that must be read and appraised (Fairhurst & Huby, 1998). However, data retrieved from our study does not provide a reason as to why participants do not feel accessibility of resources is a barrier for EBP implementation.

As we had expected, 76.6% of participants reported insufficient time as a barrier towards implementation. Insufficient time has been reported as a barrier towards EBP implementation across numerous research investigations (Fairhurst & Huby, 1998; Hankemeier & Van Lunen, Accepted-a; Jette et al., 2003; Manspeaker & Van Lunen,
Although participants in this investigation report time as a barrier, we are currently unaware of the specific factors that lead individuals to believe they do not have time to implement the evidence-based practice process. Each athletic training role carries different responsibilities; whether an individual is a student, educator, or clinician, athletic trainers are often asked to juggle multiple tasks simultaneously. Salbach et al. (2007) reported that while 80% of physical therapists had internet access, only 8% were provided time during working hours to search literature for current evidence.

Although time is most often reported as a perceived barrier among clinicians in various healthcare professions (Fairhurst & Huby, 1998; Hankemeier & Van Lunen, Accepted-a; Jette et al., 2003; Manspeaker & Van Lunen, 2011b; McColl et al., 1998; Retsas, 2000), insufficient time as a barrier for evidence-based practice implementation may be inflated due to other perceived barriers. It has been suggested that the lack of time as a constraint is more complex; clinicians often misinterpret mental time for physical time (Thompson et al., 2008). Thompson et al. (2008) suggests that mental time accounts for the cognitive processes necessary to understand, interpret, and apply research in clinical practice, and that mental time may more accurately reflects clinicians' perceptions of insufficient time. Along with time constraints, other commonly reported barriers include lack of knowledge (Brown et al., 2009; Fairhurst & Huby, 1998; Hankemeier & Van Lunen, Accepted-a; Jette et al., 2003; Manspeaker & Van Lunen, 2011b; McColl et al., 1998; Retsas, 2000), confidence (Jette et al., 2003), generalizability of findings to a specific patient or population (Jette et al., 2003), and the ability to interpret or appraise research literature (Fairhurst & Huby, 1998; Jette et al., 2003;
McColl et al., 1998). Fairhurst and Huby (1998) reported that physicians acknowledged that they lack the skills necessary for critical appraisal. In a more recent investigation, Heiwe et al. (2011) revealed lack of knowledge in statistics, lack of research skills, and poor ability to appraise research literature as major barriers for EBP implementation.

Most personal skills and attributes were not perceived as barriers in this investigation; clinicians and ACIs reported understanding statistical analyses as a barrier. Furthermore, ACIs also reported understanding of the EBP process as a barrier as well. Hankemeier and Van Lunen (Accepted-a) reported similar findings in a qualitative investigation assessing perceived barriers ACIs have towards EBP. In order to overcome barriers relating to personal skill, it is imperative to acknowledge athletic trainers’ knowledge levels of the foundational components relating to evidence-based practice (Hankemeier & Van Lunen, Accepted-a). By having an appreciation for this level of knowledge, future steps to educate athletic trainers on evidence-based concepts can be initiated.

Another barrier often reported involves personal support. Our participants disagreed that support from administration and colleagues in their facility were barriers for implementation of evidence-based practice. These findings are similar to previous research. Jette et al. (2003) found that 67% of physical therapists felt that their facility supports the use of EBP, while Heiwe et al. (2011) reported that less than 15% of participants indicated lack of support as a barrier for EBP implementation. In the past, it has been reported that physical therapists utilize colleagues rather than research literature as information resources (Bohannon, 1990; Carr et al., 1994; Turner & Whitfield, 1996; Turner & Whitfield, 1997). Additionally, Fairhurst & Huby (1998) suggest that
physicians only generally implement research after a consensus that the evidence fits within the practice. Thus, the support from colleagues and administration may be important for athletic trainers as we shift towards evidence-based practices.

Finally, the relevance and applicability of research literature to patient populations has been reported as a barrier towards EBP implementation. Post-professional athletic training educators agree that the ability to find research literature that relates to a specific population is a barrier, while clinicians and approved clinical instructors agree that the accessibility of patient outcome assessments is a barrier for implementation. All five athletic training groups perceive the application of research findings to individual patients with unique characteristics as a barrier as well. Other healthcare professionals have also reported these barriers (Heiwe et al., 2011; Flores et al., 2000; Jette et al., 2003; Retsas, 2000). In addition, Young and Ward (2001) found patient demands for a particular intervention regardless of the evidence as a barrier for implementation. Our findings, similar to those of Heiwe et al. (2011), indicate that athletic trainers do not believe EBP takes into account patient preferences. The third tier of evidence-based practice however, is in fact patient preferences (Sackett et al., 1996). In time, as research literature continues to flourish and clinicians become more familiar with implementing the balance between evidence, clinician expertise, and patient preferences, this barrier may dissolve.

Limitations

Certain limitations exist that may have affected the results of this investigation. Different sampling procedures were used while targeting the various groups within the athletic training profession. These methods however, may have automatically excluded
potential athletic trainers from participating in this investigation. For example, while clinicians not affiliated with athletic training education programs were solicited for participation, those individuals working in a college/university or secondary school setting were excluded to prevent potential cross-over of the approved clinical instructors solicited with different sampling procedures. Therefore, clinicians working in the college/university or high school setting who are not affiliated with education programs may not be appropriately represented in this study. Athletic trainers working in the secondary school setting in particular may not have access to various evidence-based practice related resources; data for this group of individuals will be important to gather in the future to ensure effective EBP implementation strategies are developed. Due to the lack of a gold standard for comparison, the validity of the EBCA may be questioned. To combat the issue of validity, a panel of EBP and survey research experts who also have several years of experience as athletic trainers assessed the instrument. However, without a gold standard for comparison, it is difficult to assess the true validity of the instrument.

Conclusions

Overall, athletic trainers have generally positive attitudes towards the implementation of evidence-based practice within clinical practices and didactic education. However, enhancing the accessibility of resources and eliminating the barriers towards the implementation of EBP will take both time and patience. As the athletic training profession embraces evidence-based practice processes into didactic education and clinical practice, it will be important for individuals to be conscious of their own personal barriers preventing them from implementing EBP. Collaborative efforts and support amongst all members of the profession will be vital to the successful installation
of modern day, evidence-based practices. Furthermore, it is important to develop and provide effective educational methods to enhance athletic trainers and athletic training students knowledge of the various components involved within EBP.

Due to the positive attitudes athletic trainers have towards the implementation of evidence-based practice, future research should progress towards identifying mechanisms (i.e., workshops, online modules, and other educational resources) to enhance knowledge levels of the various evidence-based concepts as well as promote strategies for incorporating evidence into daily clinical practices. While it is important for athletic trainers to have a solid understanding of the concepts associated with EBP, it is also critical to educate these individuals on the best ways to locate, appraise, and apply research literature in the clinical setting.
References


### Table III.1. Participant Demographics (n=1209)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Program Directors n = 132</th>
<th>Approved Clinical Instructors n = 266</th>
<th>Clinicians n = 716</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - 29 years</td>
<td>5 (3.8%)</td>
<td>122 (45.9%)</td>
<td>218 (30.4%)</td>
</tr>
<tr>
<td>30 - 39 years</td>
<td>50 (38.2%)</td>
<td>96 (36.1%)</td>
<td>227 (31.7%)</td>
</tr>
<tr>
<td>40 - 49 years</td>
<td>50 (38.2%)</td>
<td>33 (12.4%)</td>
<td>158 (22.1%)</td>
</tr>
<tr>
<td>50 - 59 years</td>
<td>23 (17.5%)</td>
<td>14 (5.3%)</td>
<td>98 (13.7%)</td>
</tr>
<tr>
<td>60 - 69 years</td>
<td>3 (2.3%)</td>
<td></td>
<td>15 (2.1%)</td>
</tr>
<tr>
<td>70 - 79 years</td>
<td></td>
<td>1 (0.4%)</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>68 (51.5%)</td>
<td>138 (51.9%)</td>
<td>400 (55.9%)</td>
</tr>
<tr>
<td>Female</td>
<td>64 (48.5%)</td>
<td>128 (48.1%)</td>
<td>316 (44.1%)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>3 (2.3%)</td>
<td>3 (1.1%)</td>
<td>11 (1.5%)</td>
</tr>
<tr>
<td>Asian</td>
<td>2 (1.5%)</td>
<td>10 (1.4%)</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>126 (95.5%)</td>
<td>246 (92.5%)</td>
<td>648 (90.5%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1 (0.8%)</td>
<td>3 (1.1%)</td>
<td>29 (4.1%)</td>
</tr>
<tr>
<td>Latin American</td>
<td>5 (1.9%)</td>
<td>9 (1.3%)</td>
<td></td>
</tr>
<tr>
<td>Native American</td>
<td>5 (1.9%)</td>
<td>5 (0.7%)</td>
<td></td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>4 (3.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2 (1.5%)</td>
<td>2 (0.8%)</td>
<td></td>
</tr>
<tr>
<td><strong>Years AT Exp.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 – 5 years</td>
<td>3 (2.3%)</td>
<td>96 (36.1%)</td>
<td>190 (26.5%)</td>
</tr>
<tr>
<td>6 – 10 years</td>
<td>18 (13.6%)</td>
<td>84 (31.6%)</td>
<td>167 (23.3%)</td>
</tr>
<tr>
<td>11 – 15 years</td>
<td>32 (24.2%)</td>
<td>36 (13.5%)</td>
<td>109 (15.2%)</td>
</tr>
<tr>
<td>16 – 20 years</td>
<td>31 (23.5%)</td>
<td>23 (8.6%)</td>
<td>99 (13.8%)</td>
</tr>
<tr>
<td>21 – 25 years</td>
<td>18 (13.6%)</td>
<td>13 (4.9%)</td>
<td>69 (9.6%)</td>
</tr>
<tr>
<td>26 – 30 years</td>
<td>18 (13.6%)</td>
<td>7 (2.6%)</td>
<td>41 (5.7%)</td>
</tr>
<tr>
<td>31 – 35 years</td>
<td>7 (5.3%)</td>
<td>4 (1.5%)</td>
<td>27 (3.8%)</td>
</tr>
<tr>
<td>36 – 40 years</td>
<td>5 (3.8%)</td>
<td></td>
<td>13 (1.8%)</td>
</tr>
<tr>
<td>40 + years</td>
<td></td>
<td>1 (0.1%)</td>
<td></td>
</tr>
<tr>
<td><strong>Highest Education Level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelors</td>
<td>46 (17.3%)</td>
<td>232 (32.4%)</td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>63 (47.4%)</td>
<td>203 (76.3%)</td>
<td>423 (59.4%)</td>
</tr>
<tr>
<td>EdD</td>
<td>28 (21.2%)</td>
<td>2 (0.8%)</td>
<td>3 (0.4%)</td>
</tr>
<tr>
<td>PhD</td>
<td>41 (31.3%)</td>
<td>9 (2.4%)</td>
<td>7 (1.0%)</td>
</tr>
<tr>
<td>DPT</td>
<td>4 (1.5%)</td>
<td></td>
<td>42 (5.9%)</td>
</tr>
<tr>
<td>DO</td>
<td>1 (0.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC</td>
<td>5 (0.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD</td>
<td>3 (0.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA</td>
<td>1 (0.4%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( ^a \) There was one missing value for age on program directors

\( ^b \) There were three missing values for ACI years of experience

\( ^c \) There were three missing values for highest education level in Post-professional students
Table III.1. Participant Demographics (n=1209) cont.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Post-Professional Educators (n = 24)</th>
<th>Post-Professional Students (n = 71)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - 29 years</td>
<td>67 (94.4%)</td>
<td></td>
</tr>
<tr>
<td>30 - 39 years</td>
<td>15 (62.5%)</td>
<td>1 (1.4%)</td>
</tr>
<tr>
<td>40 - 49 years</td>
<td>6 (25.0%)</td>
<td>2 (2.8%)</td>
</tr>
<tr>
<td>50 - 59 years</td>
<td>1 (4.2%)</td>
<td>1 (1.4%)</td>
</tr>
<tr>
<td>60 - 69 years</td>
<td>2 (8.3%)</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12 (50.0%)</td>
<td>24 (33.8%)</td>
</tr>
<tr>
<td>Female</td>
<td>12 (50.0%)</td>
<td>47 (66.2%)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>2 (2.8%)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>1 (4.2%)</td>
<td>1 (1.4%)</td>
</tr>
<tr>
<td>Caucasian</td>
<td>22 (91.7%)</td>
<td>62 (87.3%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1 (4.2%)</td>
<td>3 (4.2%)</td>
</tr>
<tr>
<td>Latin American</td>
<td></td>
<td>3 (4.2%)</td>
</tr>
<tr>
<td><strong>Years AT Exp.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 – 5 years</td>
<td>68 (95.7%)</td>
<td></td>
</tr>
<tr>
<td>6 – 10 years</td>
<td>4 (16.7%)</td>
<td></td>
</tr>
<tr>
<td>11 – 15 years</td>
<td>9 (37.5%)</td>
<td></td>
</tr>
<tr>
<td>16 – 20 years</td>
<td>3 (12.5%)</td>
<td>2 (2.8%)</td>
</tr>
<tr>
<td>21 – 25 years</td>
<td>4 (16.7%)</td>
<td></td>
</tr>
<tr>
<td>26 – 30 years</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>31 – 35 years</td>
<td>1 (4.2%)</td>
<td>1 (1.4%)</td>
</tr>
<tr>
<td>36 – 40 years</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>40 + years</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td><strong>Highest Education Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelors</td>
<td>68 (95.7%)</td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>EdD</td>
<td>2 (8.3%)</td>
<td></td>
</tr>
<tr>
<td>PhD</td>
<td>21 (87.5%)</td>
<td></td>
</tr>
</tbody>
</table>

*a* There was one missing value for age on program directors  
*b* There were three missing values for ACI years of experience  
*c* There were three missing values for highest education level in Post-professional students
| Table III.2. Negative Perceptions Among Five Athletic Training Groups |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Attitudes and Beliefs           | Professional    | Approved        | Athletic         | Post-Professional | Post-Professional |
| Negative Perception Items       | Athletic Training Education Program Director | Clinical Instructor | Training Clinician | Athletic Training Educator | Athletic Training Student |
| M=2.22                          | M=2.25          | M=2.26          | M=1.93           | M=2.04           |
| The adoption of evidence-based practice places unreasonable demands in my daily practice | 33.4% agree 66.6% disagree | 23.0% agree 77.0% disagree | 20.1% agree 79.9% disagree | 20.9% agree 79.1% disagree | 12.7% agree 87.3% disagree |
| Evidence-based practice does not take into account the limitations of my clinical practice setting | 54.6% agree 45.4% disagree | 61.3% agree 38.7% disagree | 58.3% agree 41.7% disagree | 58.4% agree 41.6% disagree | 46.5% agree 53.5% disagree |
| Evidence-based practice does not take into account patient preferences | 52.3% agree 47.7% disagree | 60.5% agree 39.5% disagree | 62.1% agree 37.9% disagree | 54.1% agree 45.9% disagree | 38.0% agree 62.0% disagree |
| Using evidence-based practice is a “cook book” clinical practice | 18.2% agree 81.1% disagree | 29.4% agree 70.6% disagree | 26.6% agree 73.4% disagree | 4.2% agree 95.8% disagree | 18.3% agree 81.7% disagree |
| Using evidence-based practice will reduce my professional independence in clinical decision-making | 17.4% agree 82.9% disagree | 16.5% agree 83.5% disagree | 14.4% agree 85.6% disagree | 8.3% agree 91.7% disagree | 14.0% agree 86.0% disagree |
| The concept of evidence-based practice is a “fad” that will come and go | 14.4% agree 85.6% disagree | 6.0% agree 94.0% disagree | 10.1% agree 89.1% disagree | 4.2% agree 95.8% disagree | 7.0% agree 93.0% disagree |
Table III.3. Benefits to Practice Among Five Athletic Training Groups

<table>
<thead>
<tr>
<th>Attitudes and Beliefs Benefits to Practice Items</th>
<th>Professional Athletic Training Education Program Director</th>
<th>Approved Clinical Instructor</th>
<th>Athletic Training Clinician</th>
<th>Post-Professional Athletic Training Educator</th>
<th>Post-Professional Athletic Training Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application of evidence-based practice is important to the credibility of the athletic training profession</td>
<td>$M = 3.28$</td>
<td>$M = 3.23$</td>
<td>$M = 3.26$</td>
<td>$M = 3.53$</td>
<td>$M = 3.33$</td>
</tr>
<tr>
<td>99.2% agree</td>
<td>98.1% agree</td>
<td>98.9% agree</td>
<td>100.0% agree</td>
<td>97.2% agree</td>
<td>0.8% disagree</td>
</tr>
<tr>
<td>Literature and research findings are useful in my day-to-day practice</td>
<td>89.4% agree</td>
<td>92.9% agree</td>
<td>91.9% agree</td>
<td>91.7% agree</td>
<td>93.0% agree</td>
</tr>
<tr>
<td>Evidence-based practice improves the quality of patient care</td>
<td>91.7% agree</td>
<td>93.2% agree</td>
<td>93.6% agree</td>
<td>91.7% agree</td>
<td>95.8% agree</td>
</tr>
<tr>
<td>Evidence-based practice is a process that helps me make decisions about patient care</td>
<td>86.3% agree</td>
<td>89.0% agree</td>
<td>90.5% agree</td>
<td>91.7% agree</td>
<td>95.8% agree</td>
</tr>
<tr>
<td>Developing a clinical question helps direct my search for evidence</td>
<td>89.4% agree</td>
<td>88.7% agree</td>
<td>90.6% agree</td>
<td>95.8% agree</td>
<td>95.8% agree</td>
</tr>
<tr>
<td>Barriers</td>
<td>Professional Athletic Training Education Program Director</td>
<td>Approved Athletic Training Clinical Instructor</td>
<td>Athletic Training Clinician</td>
<td>Post-Professional Athletic Training Educator</td>
<td>Post-Professional Athletic Training Student</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>----------------------------</td>
<td>----------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Ability to critically appraise the literature</td>
<td>$M = 2.21$</td>
<td>$M = 2.29$</td>
<td>$M = 2.35$</td>
<td>$M = 1.61$</td>
<td>$M = 2.11$</td>
</tr>
<tr>
<td>Personal confidence to implement changes in my clinical practice</td>
<td>32.5% agree, 67.5% disagree</td>
<td>36.8% agree, 63.2% disagree</td>
<td>41.8% agree, 58.2% disagree</td>
<td>8.4% agree, 91.6% disagree</td>
<td>23.9% agree, 76.1% disagree</td>
</tr>
<tr>
<td>Personal interest in evidence-based practice</td>
<td>37.1% agree, 62.9% disagree</td>
<td>36.8% agree, 63.2% disagree</td>
<td>33.9% agree, 66.1% disagree</td>
<td>16.7% agree, 83.3% disagree</td>
<td>42.3% agree, 57.7% disagree</td>
</tr>
<tr>
<td>Understanding of the evidence-based practice process</td>
<td>46.2% agree, 53.8% disagree</td>
<td>39.4% agree, 60.6% disagree</td>
<td>42.0% agree, 58.0% disagree</td>
<td>16.7% agree, 83.3% disagree</td>
<td>26.8% agree, 73.2% disagree</td>
</tr>
<tr>
<td>Understanding statistical analyses</td>
<td>47.0% agree, 53.0% disagree</td>
<td>51.1% agree, 48.9% disagree</td>
<td>46.6% agree, 53.4% disagree</td>
<td>8.4% agree, 91.6% disagree</td>
<td>21.1% agree, 78.9% disagree</td>
</tr>
<tr>
<td>Ability to make independent clinical decisions</td>
<td>43.9% agree, 56.1% disagree</td>
<td>54.2% agree, 45.8% disagree</td>
<td>57.0% agree, 43.0% disagree</td>
<td>8.4% agree, 91.6% disagree</td>
<td>42.3% agree, 57.7% disagree</td>
</tr>
<tr>
<td>Ability to develop an answerable clinical question</td>
<td>19.7% agree, 80.3% disagree</td>
<td>19.2% agree, 80.8% disagree</td>
<td>22.2% agree, 77.8% disagree</td>
<td>4.2% agree, 95.8% disagree</td>
<td>16.9% agree, 83.1% disagree</td>
</tr>
<tr>
<td>Familiarity with Internet databases and search engines</td>
<td>28.8% agree, 71.2% disagree</td>
<td>32.4% agree, 67.6% disagree</td>
<td>32.1% agree, 67.9% disagree</td>
<td>8.3% agree, 91.7% disagree</td>
<td>31.0% agree, 69.0% disagree</td>
</tr>
</tbody>
</table>
Table III.5. Support and Accessibility of Resources Barriers Among Five Athletic Training Groups

<table>
<thead>
<tr>
<th>Barriers Support and Accessibility of Resources Items</th>
<th>Professional Athletic Training Education Program Director</th>
<th>Approved Clinical Instructor</th>
<th>Athletic Training Clinician</th>
<th>Post-Professional Athletic Training Educator</th>
<th>Post-Professional Athletic Training Student</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M = 2.32$</td>
<td>$M = 2.40$</td>
<td>$M = 2.44$</td>
<td>$M = 2.01$</td>
<td>$M = 2.20$</td>
</tr>
<tr>
<td>Accessibility of information resources</td>
<td>25.0% agree</td>
<td>34.6% agree</td>
<td>43.8% agree</td>
<td>12.5% agree</td>
<td>21.1% agree</td>
</tr>
<tr>
<td></td>
<td>75.0% disagree</td>
<td>65.4% disagree</td>
<td>56.2% disagree</td>
<td>87.5% disagree</td>
<td>78.9% disagree</td>
</tr>
<tr>
<td>Support from administration</td>
<td>21.2% agree</td>
<td>30.4% agree</td>
<td>31.3% agree</td>
<td>8.4% agree</td>
<td>23.9% agree</td>
</tr>
<tr>
<td></td>
<td>78.8% disagree</td>
<td>69.6% disagree</td>
<td>68.7% disagree</td>
<td>91.6% disagree</td>
<td>76.1% disagree</td>
</tr>
<tr>
<td>Ability to find research literature that relates to my patient population</td>
<td>62.1% agree</td>
<td>44.7% agree</td>
<td>49.7% agree</td>
<td>54.2% agree</td>
<td>40.9% agree</td>
</tr>
<tr>
<td></td>
<td>37.9% disagree</td>
<td>55.3% disagree</td>
<td>50.3% disagree</td>
<td>45.8% disagree</td>
<td>59.1% disagree</td>
</tr>
<tr>
<td>Accessibility of patient outcome assessments</td>
<td>32.5% agree</td>
<td>59.4% agree</td>
<td>59.7% agree</td>
<td>29.1% agree</td>
<td>40.9% agree</td>
</tr>
<tr>
<td></td>
<td>67.5% disagree</td>
<td>40.6% disagree</td>
<td>40.3% disagree</td>
<td>70.9% disagree</td>
<td>59.1% disagree</td>
</tr>
<tr>
<td>Collective support among colleagues in my facility</td>
<td>40.1% agree</td>
<td>34.5% agree</td>
<td>34.5% agree</td>
<td>12.5% agree</td>
<td>33.8% agree</td>
</tr>
<tr>
<td></td>
<td>59.9% disagree</td>
<td>65.5% disagree</td>
<td>65.5% disagree</td>
<td>87.5% disagree</td>
<td>66.2% disagree</td>
</tr>
<tr>
<td>Application of research findings to individual patients with unique characteristics</td>
<td>56.0% agree</td>
<td>59.4% agree</td>
<td>56.5% agree</td>
<td>58.3% agree</td>
<td>50.7% agree</td>
</tr>
<tr>
<td></td>
<td>44.0% disagree</td>
<td>40.6% disagree</td>
<td>43.5% disagree</td>
<td>41.7% disagree</td>
<td>49.3% disagree</td>
</tr>
</tbody>
</table>
Figure III.1. Direct Access to Resources Among Five Athletic Training Groups

Direct Access to Resources

Direct Access (%)

- Textbooks
- Websites
- NATA Position Statements
- Professional Literature
- Peer-Reviewed Journal Articles
- Medline/Pub Med Databases
- Systematic Reviews and/or Meta-Analyses
- NATA Think Tanks
- Cochrane Databases
- Clinical Prediction Rules

Legend:
- PD
- ACI
- PPEducator
- PPStudent
- Clinician
Figure III.2. Resource Utilization Among All Participants (n=1,209)

Frequency of Resource Utilization

- More Than Once A Week
- Once A Week
- Bi-Weekly
- Once A Month
- Less Than Once A Month
- Never

Resource Utilization (%)

Resources:
- Textbooks
- Websites
- NATA Positions Statements
- Professional Literature
- Peer-Reviewed Journal Articles
- Medline/Pub Med Databases
- Systematic Reviews and/or Meta-Analyses
- NATA Think Tanks
- Cochrane Databases
- Clinical Prediction Rules
CHAPTER IV

PROJECT II

Effectiveness of an Evidence-Based Practice Educational Intervention for Athletic Trainers: A Randomized Controlled Trial

Title: Effectiveness of an evidence-based practice educational intervention for athletic trainers: A randomized controlled trial

Authors: Cailee Welch McCarty, Bonnie L. Van Lunen, Dorice A. Hankemeier

Submitted to: Journal of Athletic Training – March 8, 2012
Introduction

The approach to create a culture of evidence-based practice (EBP) needs to be multi-faceted (Manspeaker & Van Lunen, 2010; Welch & Van Lunen, 2011a), signifying that athletic training educators, clinicians, and students must all become familiar with the concepts involved in EBP. The 2011 release of the fifth edition of the Athletic Training Education Competencies to include an evidence-based practice content area is a foundational starting point to this multi-faceted approach (National Athletic Trainers’ Association, 2011). In order to foster the understanding of the EBP content area educational mechanisms must be available that will effectively educate athletic trainers in a manner that is convenient for each individual.

As it has been demonstrated throughout the literature of various healthcare professions (Chumley-Jones, Dobbie, Alford, 2002; Fritsche, 2001; Manspeaker, Van Lunen, Turocy, Pribesh, Hankemeier, 2011a; Nicholson, Ward, Boker, 2007; Welch et al., 2011b; Wilkes, 2001; Williams, Aubin, Harkin, Cottrell, 2001), numerous mechanisms of educational interventions (e.g., short-courses, single day workshops, teaching models, online tutorials, weekly seminars) have been found effective for increasing healthcare professionals’ knowledge levels regarding evidence-based practice. However, only two studies have directly assessed EBP educational interventions within athletic training (Welch et al., 2011b; Manspeaker et al., 2011a). Although these interventions were reported to be effective, each mechanism varied in both level of difficulty and the sample group being assessed. Welch et al. (2011b) conducted a five-hour single day workshop geared towards athletic training educators, while Manspeaker et al. (2011a) introduced an evidence-based teaching model that was developed for
athletic training students and implemented into a modalities or rehabilitation course at
nine different professional athletic training education programs. Such differences make it
difficult to generalize the results of these investigations to the athletic training
membership as a whole.

One of the most efficient ways to educate athletic trainers about the various
components of evidence-based practice may be via online tutorials (Chumley-Jones,
2002; Osman & Muir, 1994; Pusic, Pachev, MacDonad, 2007; Wilkes, 2001; Williams et
al., 2001). As society progresses through a digital era, online tutorials provide a flexible
option for distance learners as well as “hidden learners” (Blummer & Kritskaya, 2009;
Viggiano, 2004, 50). In the realm of athletic training, a hidden learner would be classified
as the individual who cannot make it to state, district, or national conferences.

Consideration of the hidden learner will be essential in ensuring that the entire athletic
training population receives the necessary foundations of evidence-based practice for
efficient clinical implementation. Online tutorials promote several advantages for the
athletic training profession. To begin, such tutorials facilitate easy dissemination to a
large population, such as the National Athletic Trainers’ Association (NATA)
membership, which currently includes approximately 27,798 athletic trainers and 6,831
athletic training students (About the NATA, 2012). Since individuals of a given
population are often geographically dispersed, it becomes difficult for them to attend
specifically designated training sessions or workshops (Ardis, 1998). Furthermore, only
providing mechanisms that target educational programs would not suffice for facilitating
a multi-faceted approach. Therefore, it is critical to provide an educational tool to
increase EBP knowledge via online mechanisms to help accommodate the various types
of athletic trainers. The ability to efficiently provide an abundant amount of information to the masses is an important feature when trying to advance a cohort of individuals. Online tutorials provide learners with the opportunity to complete the material at their own speed (Ardis, 1998; Jacoby, Smith, Albanese, 1984), and at their own convenience (Ardis, 1998; Bassano, 2005; Jacoby et al., 1984). Tutorials offer concise instructions and allow the individual to return as needed as well as view the information numerous times to ensure comprehension (Ardis, 1998; Rose, 2002). Furthermore, online tutorials are considered to be versatile training instruments that free up precious time (Ardis, 1998). By providing evidence-based practice online tutorials to the NATA membership, seminars and workshops at state, district, and national conferences can shift focus to include presentations on various other pertinent topics.

The purpose of this study was to assess the effect of an EBP educational intervention (i.e., 10 online learning modules) on enhancing athletic trainers’ knowledge of evidence-based practice concepts. We hypothesized the following: (1) there would be no differences in pre-module scores achieved by participants in the experimental group and participants in the control group on the Evidence-Based Practice Knowledge assessment, (2) there would be no differences in pre-module scores and post-module scores for participants in the control group, (3) participants in the experimental group would achieve higher post-module scores on the knowledge assessment than participants in the control group, and (4) participants in the experimental group would achieve higher post-module scores than their pre-module scores on the knowledge assessment.

**Methodology**

**Participants**
All members of the National Athletic Trainers’ Association (NATA) were solicited and four hundred seventy-three individuals responded to the initial request to participate. Participants consisted of 53 professional athletic training students, 25 graduate students, 153 approved clinical instructors or graduate clinical preceptors, 183 clinicians, and 59 educators (Table IV.1). The Human Subjects Committee approved this study and the National Athletic Trainers’ Association Board of Directors funded the development of the online modules utilized within this investigation.

**Instrumentation**

**Evidence-Based Practice Online Modules**

The research team, comprised of five EBP subject matter experts, developed 10 evidence-based practice online learning modules. These modules were designed to educate athletic trainers about foundational concepts related to the EBP process and were made accessible to all members of the NATA following the conclusion of this study in September 2011 (http://www.nata.org/Evidence-based-Practice-in-Athletic-Training). Each module focused on a specific concept or grouping of similarly related concepts and aimed to take approximately 20-25 minutes to complete.

During commencement of the module development, the research team met to outline the breakdown of the modules as well as how each module would be formatted and organized. Original module topics stemmed from the most commonly applied concepts relating to each of the five steps of the evidence-based practice process. Once the primary outline of topics was developed, each member of the research team selected the topics they were most knowledgeable in. This designation indicated that the assigned
individual was the primary content developer of that module and responsible for all the content presented in that particular module. During the module development phase, the research team met on a weekly basis to discuss any potential concerns with the modules, provide suggestions and ideas when necessary, and answer questions that may have occurred during the development of each individual module. Also during this time, each module was specifically discussed and the research team continually assessed whether an EBP concept should be explained in a single module or if related concepts could be discussed together.

Following the development phase, nine preliminary modules were ready for internal review. Four of the five members of the research team examined each of the nine modules in a systematic approach and provided comments and suggestions related to the content area. Once all members reviewed a module, it was returned to the primary content developer for revisions. The new draft of the module was then reviewed again in the same systematic approach and the review-revision process continued until all members of the research team approved each module. Simultaneously during the review process, the modules were given to a sample group (n=11) of post-professional athletic training students who had no previous experience with evidence-based practice concepts. The sample group was given one module per week, and each student completed the module and then provided the primary content developer with specific feedback. A majority of the student feedback identified areas that were confusing and unclear as well as instances where more examples would have been beneficial. Student feedback was taken into consideration during the revision process.
Once the internal review was completed, the modules were sent to a team of external reviewers. The external reviewers consisted of three additional evidence-based practice subject matter experts. Each expert was assigned three modules to review. Following examination, the modules were returned to the primary content developer for revisions. Once all revisions were completed, all nine modules were sent to one of the external reviewers. This reviewer examined the content of each module for a final time, but more importantly checked the modules as a whole for clarity, consistency, and accuracy.

During the final review process, it was decided that one of the modules contained an abundant amount of information and would be better divided into two modules. Thus, the final result of the module development process was 10 evidence-based practice online learning modules (Table IV.2). Following the completion of module development and review, one member of the research team worked directly with the web design team at the NATA office to transfer the modules to the online mechanism, eLearning (version 3.6.8, Epignosis, Ltd. Athens, Greece).

*Evidence-Based Practice Knowledge Assessment*

Due to the lack of a pre-existing knowledge assessment to accurately represent the material covered in the evidence-based practice online modules, the research team created an online assessment utilizing Inquisite 8.0 Corporate Survey Builder (Catapult System Corporation, Austin, TX). The *Evidence-Based Practice Knowledge Assessment* (Appendix II) was developed while the online modules underwent external review. During this time, each module content developer was asked to write pertinent questions based on the information presented within each module. The questions were reviewed in
the same systematic approach as the online modules. Once the research team agreed on
the questions from the assessment, the exam was sent to the same external subject matter
expert that reviewed all 10 modules, and minor revisions were made based on the
feedback from the external reviewer. A test-retest reliability assessment was conducted
on the pre-module and post-module knowledge scores achieved by the participants in the
control group. Test-retest reliability of the knowledge assessment was determined to be
strong ($r=0.75$, $P<0.001$).

The *Evidence-Based Practice Knowledge Assessment* included two subsections:
knowledge and demographics. The knowledge section consisted of 60 multiple-choice
questions involving the evidence-based practice concepts discussed within the 10
modules. The assessment included approximately 3-8 questions pertaining to information
covered within each module. Each question had one correct response and participants’
composite scores were tabulated by awarding one point for the correct response and zero
points for an incorrect response. Therefore, a higher knowledge composite score
(max=60) indicated a higher level of knowledge pertaining to evidence-based practice
concepts. Along with the knowledge section, participants were also asked to complete a
demographic questionnaire. The questionnaire asked participants to select a pre-
determined group that most accurately represented their primary role as an athletic trainer
(Table IV.3). He or she was then guided to answer specific demographic questions
relating to the group they selected.

**Procedures**

At the commencement of the research investigation, all NATA members were
sent a letter via email requesting participation in the study. With approval from the
NATA Board of Directors, the letter was sent by the administrative staff at the NATA office. As a member, individuals have the opportunity to refuse emails from the NATA office. Therefore, it is difficult to assess how many members received the participation request. The participation letter contained a description of the overall purpose and importance of the research study, a timeline of the three phases of the investigation, general information regarding the online learning modules, and a URL hyperlink directing them to the survey webpage to provide consent. The webpage asked the individual to provide their full name, email address, current status as an NATA member (i.e., student or certified), primary role as an athletic trainer, and current job setting. The webpage also informed individuals that their names and emails would be kept confidential and that this information was necessary to gain access for the modules. Once all participation requests were received, participants were stratified by primary status as an athletic trainer as well as current job setting and then randomized into either a control group or an experimental group. The randomization process was conducted using the Statistical Package for Social Sciences (SPSS version 16.0) random number generator.

Phases of the Investigation

The first phase of the study involved the Evidence-Based Practice Knowledge Assessment. Participants were sent an individualized letter via email informing them which group they had been randomized to. The letter also contained information regarding the first phase of the study as well as the URL hyperlink directing them to the survey webpage. Additionally, participants were informed that there would be no possibility of matching their survey responses back to their name. Participants were given seven days to complete the Evidence-Based Practice Knowledge Assessment. A reminder
email was sent to each participant on the fourth day to thank those who had already completed the survey assessment as well as remind those individuals who had not yet had a chance to respond. Once the participant completed the survey (indicated by clicking “submit”), the information was automatically sent to the University database system. Individual responses to specified questions were generated in SPSS 16.0 and then matched with a file coding system to maintain participant confidentiality. On the first page of the survey assessment, participants were instructed to create a personalized participant identification code. This code was required during both the first and third phase of the study. The code could not be matched back to the participant in any way, but allowed the research team to accurately match phase one and phase three responses.

The second phase of the study began immediately following the cessation of the first phase. In phase two, the experimental group was provided access to the evidence-based practice online learning modules. Each participant was sent a letter via email from the NATA office, which provided each individual with a username and password as well as an URL hyperlink directing him or her to the online modules. Additionally, participants in the experimental group were sent an email from the research team providing them with the timeline to complete the modules as well as helpful hints to navigate through the module webpage. Participants were allotted a four-week period to complete the 10 EBP online learning modules, and reminder emails were sent once a week to remind individuals of the module timeline. The research team also sent the control group individualized emails at the beginning of the second phase. This email informed participants of the four-week timeline in which they did not have any direct responsibilities for the investigation and also highlighted the specific date in which the
next phase of the study would begin. Individuals were instructed to not use outside resources to educate themselves on the concepts of EBP during this four-week period; participants were granted access to the online modules following the completion of the investigation.

Phase three of the research investigation began immediately following the cessation of the second phase. In the third and final phase of the study, participants in both the experimental and control group were asked to complete the *Evidence-Based Practice Knowledge Assessment* for a second time. Prior to the dissemination of the assessment, access to the online modules was revoked from all experimental group participants so that they could not go back and access the information while completing the assessment. Participants were allotted seven days to complete the assessment and a reminder email was sent on the fourth day. Similarly to phase one, participant responses were automatically sent to the University database system and were generated in SPSS 16.0. Following completion of the final phase of the study, participants in both groups were sent individual emails thanking them for their time and effort to complete this investigation.

**Data Analysis**

Statistical Package for Social Sciences 16.0 for Macintosh was used to calculate the statistical components. Descriptive statistics were used to calculate the means, standard deviations, confidence intervals, and frequencies of the data. Between group (control, experimental) and with-in group (pre-assessment, post-assessment) differences were calculated using a 2x2 repeated measures ANOVA, with an *a priori* alpha value set
at $P \leq 0.05$. In the presence of an interaction, post-hoc t-tests and Hedge’s $g$ effect size ($g$) with 95% confidence intervals (CI) were calculated.

**Results**

Of the 473 individuals that responded to the initial request to participate in this investigation, 175 participants completed all three phases of the study for an overall response rate of 37.0%. However, pre-assessment data from five participants in the control group and six participants in the experimental group could not be accurately matched to the post-assessment data. Therefore, data analyses were conducted on the responses from 164 participants: 13 professional athletic training students, 23 graduate students, 29 approved clinical instructors or graduate clinical preceptors, 64 clinicians, and 35 educators. Mortality and response rates for each phase of the study among control and experimental group is displayed in Figure IV.1.

A significant group x time interaction ($P<0.001$) was reported. No differences were identified between groups ($M_{C\text{Pre}}=30.12\pm 5.73$, $M_{E\text{Pre}}=30.65\pm 5.93$) during the pre-assessment ($P=0.839;g=0.09,CI=-0.22-0.40$); however, the experimental group ($M_{E\text{Post}}=36.35\pm 8.58$) obtained significantly higher scores ($P=0.013;g=0.71,CI=0.39-1.02$) on the post-assessment compared to the control group ($M_{C\text{Post}}=30.99\pm 6.33$). No differences were identified between time instances within the control group ($P=0.080;g=-0.14,CI=-0.45-0.16$); however the experimental group obtained significantly higher scores on the post-assessment than the pre-assessment ($P<0.001;g=0.77,CI=0.45-1.09$).

Immediately following the post-module assessment, participants in both groups were asked to report descriptive information pertaining to any use of external resources to educate themselves on components related to evidence-based practice as well as whether
they had attended or completed any type of educational intervention (e.g., class, workshop, short course, webinar) during the four-week period between assessments.

Eighty-seven percent of the participants in experimental group and 87% of the participants in the control group indicated that they had not used any external resources to educate themselves on EBP concepts, while the other 13% in both groups indicated using a combination of textbooks, journals, and/or websites. In regard to completing another EBP educational intervention, 95% of the experimental group and 96% of the control group reported they did not attend any form of an educational session. Four participants in the experimental group and three participants in the control group attended an educational class, professional presentation, and/or a webinar. In addition to the questions assessing external resources and educational interventions, participants in the experimental group were asked to rate their perceptions of the online modules (Table IV.4).

Discussion

As evidence-based practice transpires throughout the athletic training profession, it is imperative to properly educate the membership and provide them with the necessary tools to efficiently implement EBP. Our results indicate that a series of online modules regarding various evidence-based practice concepts is an effective mechanism to enhance knowledge among a wide variety of athletic trainers. Prior to the implementation of the educational intervention, there were no significant differences in pre-module scores between the experimental and control group, indicating that the two groups were homogenous in regard to their knowledge level of evidence-based practice concepts. Homogeneity between groups at the start of the investigation minimized variance of
extraneous variables specific to participant characteristics that may have affected the results (Portney & Watkins, 2008). Results from this investigation confirmed our hypothesis that there would be no significant differences between pre-module and post-module scores within the control group. These findings also corroborate that improvement due to knowingly being evaluated (i.e., Hawthorne effect; Festinger & Katz, 1953) did not influence the control group. Our findings also confirmed that the experimental group achieved significantly higher scores on the post-module assessment when between group scores were compared. Furthermore, the experimental group also achieved significantly higher scores on the post-module assessment when within group pre-post scores were compared.

Similar knowledge gains were found in other investigations assessing the effectiveness of web-based tutorials (Chumley-Jones et al., 2002; Greenhalgh, 2001; Kerfoot et al., 2006; Letterie, 2003). Kerfoot et al. (2006) found that medical students’ knowledge of urology significantly increased following web-based teaching as compared to the control group who did not have access to the tutorials. Comparably, Pusic et al. (2007) also reported significant increases in knowledge following the implementation of a series of online tutorials regarding pertinent topics in emergency medicine when compared to a control group. Thus, regardless of the topic being presented, web-based learning via tutorials has been shown to be successful in accomplishing knowledge gain.

The online learning modules developed for athletic trainers, which were released to the NATA membership in September 2011, encompass numerous concepts involved in the evidence-based practice process. The first module introduces the learner to the EBP process and then presents the foundations of developing a solid clinical question. From
there, each module introduces new concepts that build upon one another and progress the learner through the five steps of evidence-based practice. The ten EBP modules discussed in this investigation (i.e., Level One Modules) are available via the NATA webpage (www.nata.org/Evidence-based-Practice-in-Athletic-Training). Numerous examples are provided throughout the modules that pertain to real-life athletic training clinical practice and NATA members may access each module as many times as they like at no cost. Additionally, two knowledge assessments, approved by the Board of Certification (BOC), are available for individuals interested in acquiring continuing education units (CEU). A second cohort of online modules (i.e., Level Two Modules), including information pertaining to sensitivity, specificity, likelihood ratios, predictive values, epidemiological measures, healthcare informatics, and clinical prediction rules, will be made available to the NATA membership in March 2012.

While it is difficult to directly compare the online learning modules to previous EBP educational interventions that have been assessed within athletic training (Welch et al., 2011b; Manspeaker et al., 2011a), it is important to highlight some of the key distinctions that make each intervention unique. Welch et al. (2011b) assessed the effectiveness of a five-hour single-day workshop detailing three presentations on EBP fundamentals, implementing systematic reviews, and utilizing clinical predication rules. Results indicated that post-workshop knowledge slightly increased from 66.0% to 69.5%. However, a key limitation to this investigation was the nature of the workshop in relation to the content included within the survey since the instrument included information pertaining to only one of the three presentations in the workshop (Welch et al., 2011b). Utilizing a short course mechanism, Manspeaker et al. (2011a) developed an evidence-
based teaching model (EBTM) consisting of lecture materials, class assignments, and guided discussion for clinical instructors and students during a clinical experience. Post-EBTM knowledge scores (66%) significantly increased from scores achieved on the assessment prior to implementation (50%) of the EBTM; 23% of participants increased their score by three points or more (Manspeaker et al., 2011a).

Although both of these EBP mechanisms were successful in enhancing knowledge levels, each intervention only focused on a small sample group of athletic trainers (i.e., athletic training educators, professional athletic training students). On the other hand, the online modules were developed with the intention to be available to the entire NATA membership, including athletic training students as well as athletic trainers who hold various types of positions in numerous diverse clinical settings. Furthermore, the online modules aimed to combat some of the barriers perceived to affect EBP implementation (Hankemeier & Van Lunen, 2011; Manspeaker & Van Lunen, 2011b; Welch & Van Lunen, 2011c). Previous research has identified several barriers athletic trainers’ perceive as issues in regard to evidence-based practice; knowledge (Hankemeier & Van Lunen, 2011; Manspeaker & Van Lunen, 2011b) and insufficient time (Hankemeier & Van Lunen, 2011; Manspeaker & Van Lunen, 2011b; Welch & Van Lunen, 2011c) are the two most frequently reported barriers. The most convenient aspect of the online modules is that this learning medium can be utilized from anywhere Internet or WiFi access is available. The EBP online modules were effective in increasing knowledge scores among participants. The average effect size of a computer-based learning mechanism is 0.42 (Kulik & Kulik, 1991), indicating that online tutorials have a small to medium effect for increasing short-term knowledge (Cohen, 1992). However,
results from this investigation reveal a large effect size (0.77; Borenstein, Hedges, Higgins, Rothstein, 2009; Cohen, 1992), which indicates that this online mechanism is a credible option for knowledge gain among athletic trainers.

Following the four-week implementation phase, a large majority of participants in the experimental group perceived the online modules to be moderately to extremely helpful in enhancing knowledge of EBP concepts. Furthermore, most participants reported the modules were moderately to extremely easy to understand and nearly all of the participants would recommend them to their peers, colleagues, and fellow clinicians. Pusic et al. (2007) also reported favorable results and reported that 54% of medical students preferred web-based tutorials over face-to-face learning. Interestingly, York, Nordengren, and Stumbo (2009) reported that although students achieved significantly higher knowledge scores following the implementation of web-based tutorials, 78% of participants would prefer to have live lectures in conjunction with the availability of online learning. Thus, although participants of this investigation had satisfactory perceptions of the EBP online modules, it is important to consider that online learning is not the most effective mechanism for every type of learner and that additional mechanisms would possibly benefit this group.

Although online tutorials provide a mechanism to educate a large group of people during a time that is most suitable to their distinct schedules, this form of training mode presents challenges that must be considered. First, the utilization of online tutorials requires self-regulation from the participant (Ardis, 1998). Participants in the experimental group of this investigation were asked to complete all 10 online modules in a four-week period. However, it was not specified how many times they should go
through each module to ensure full comprehension of the information. Unlike an instructor in a classroom setting, no one was available to make sure the individual fully comprehended the given material except for the individual. Furthermore, it is the participant’s responsibility to make sure they seek answers to questions they may develop during the tutorial session. Thus, self-regulation requires the individual to be a self-motivated, active, goal-oriented learner (Ardis, 1998). Participation in an online tutorial creates a large challenge particularly when the individual is not directly interested in the material being presented. Additionally, when a tutorial is made a requirement, a person may not take it seriously or may miss out on the full potential that the tutorial has to offer.

One of the largest challenges of online tutorials is distinguishing ways to disseminate the material in a manner that is engaging to various types of learners (Dent, 2003). However, incorporating numerous instructional strategies that require active learning is one way to prevail this barrier (Hegarty, Quinlan, Lynch, 2004; Zhang, 2006). Techniques for active learning can include ideas ranging from simulations and frequent quizzes, to any activity that will promote critical thinking and problem solving (Hegarty et al., 2004). Furthermore, incorporating active learning techniques throughout a tutorial and requiring individuals to make choices will aid users to stay engaged on the materials they need to learn (Clay, Harlen, Swanson, 2008). The use of examples and scenarios that directly relate to situations the learners may experience are a critical component to aid them in applying this information directly to their real-life practices (Association of College and Research Libraries, 2003). Although the EBP online modules do not currently offer features that provide immediate feedback, several examples and scenarios
that include critical thinking are included. Participants are encouraged to actively challenge themselves by exploring the various scenarios provided throughout the modules. Additionally, the online modules contain numerous additional hyperlinks, in which individuals can acquire further information if they are interested.

Although the evidence-based practice online modules presented in this study provide a solid foundation of concepts relating to EBP, it is important to remember that this educational intervention is not all-inclusive. These modules provide athletic trainers with an effective mechanism to enhance knowledge of EBP. However, it may be beneficial to combine this online learning tool with other mediums to maximize knowledge acquisition and impact change throughout clinical practice. A majority of studies conducted to assess clinical practice changes following an intervention indicate that most interventions are effective under some circumstances, but that no single intervention is effective for all circumstances (Grimshaw et al., 2001; Grimshaw, Eccles, Walker, Thomas, 2002; Grol & Grimshaw, 2003). Interventions including interactive small group meetings (Davis et al., 1999) computerized learning (Balas, Austin, Mitchell, Ewigman, Bopp, Brown, 1996; Hunt, Haynes, Hanna, Smith, 1998; Johnston, Langton, Haynes, Mathieu, 1994), mass media campaigns (Grilli et al., 2000), and combined interventions (Hulscher, Wensing, Grol, van der Weijden, van Wheel, 1999; Oxman, Thomson, Davis, 1995; Solomon, Hasimoto, Daltroy, Liang, 1998) have been shown to be most effective. Thus, athletic trainers who are interested in utilizing the EBP learning modules should determine if online learning is an effective mechanism for their particular learning style as well as consider which other information delivery methods (e.g., workshops, face-to-face lecture, reading supplement, peer discussion) may compliment
the modules to augment knowledge acquisition.

Limitations

Certain limitations exist that may have affected the results of this investigation. All phases of this study (i.e., recruitment, pre- and post-module assessment, the educational invention) as well as all communication with the primary researcher were conducted via Internet, which promoted the inherent risk of technological error. Internet malfunctions may have prevented NATA members from receiving the initial email requesting voluntary participation in this study, therefore limiting individuals from having the opportunity to participate. Furthermore, specific Internet domains may have prevented potential participants from accessing the initial participation survey webpage, therefore preventing them from providing their consent to participate in the study. In attempt to combat any initial technological issues, the NATA office sent two emails within a one-week period requesting participation. The second email specifically provided an email address and directions for individuals having difficulty accessing the participation survey webpage.

Due to the online nature of this investigation, several external factors could also not be controlled. The amount of time participants in the experimental group spent on each online module could not be controlled. Generally, one of the benefits of online learning is that the individual can go back to the material as many times as necessary to ensure knowledge comprehension. Since participants' access to the online modules was disabled after the four-week intervention phase, they may not have utilized the online modules as much as they would have under normal circumstances. The ability for participants in the experimental group to share their personal access code to the online
modules with other individuals could also not be controlled. Finally, the researchers were unable to prevent participants in the control group from utilizing external resources to educate themselves about EBP concepts during the four-week intervention phase. However, recommendations were made to participants and during the post-module assessment, they were asked to report any uses of external resources during the four-week period. Additionally, participants were informed that they would gain full access to the modules following the conclusion of this investigation.

Conclusions

A series of evidence-based practice online learning modules is an effective mechanism for enhancing EBP knowledge levels among athletic trainers. The online modules provide a versatile approach to comprehending the concepts involved in evidence-based practice through a medium that is easily accessible and regulated by each individual learner. However, to maximize the learning potential for the various types of learners, it will be important to continue to assess the most successful mechanisms to combine this educational intervention with other learning mediums. While the development of the online learning modules has created a solid learning foundation for the NATA membership, this investigation only assessed short-term learning. Future research should progress towards identifying whether increased knowledge levels of evidence-based practice concepts impacts clinical behavior within athletic training practice. Additionally, focus should be given to effective EBP implementation strategies that can be applied both in the didactic and clinical practice setting.
References


Table IV.1. Primary Athletic Training Role Definitions

<table>
<thead>
<tr>
<th>Athletic Training Role</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Athletic Training Students</td>
<td>Enrolled in a professional undergraduate or professional entry-level athletic training education program; recently became certified or recently graduated from an ATEP but had not begun employment in an athletic training setting</td>
</tr>
<tr>
<td>Graduate Students</td>
<td>A graduate student in a master's or doctoral program and were BOC certified; recently graduated from a graduate program but had not begun employment in an athletic training setting; a graduate student and also had clinical supervision responsibilities (i.e., ACI or clinical preceptor)</td>
</tr>
<tr>
<td>Approved Clinical Instructors and Graduate Clinical Preceptors</td>
<td>Currently acting as an approved clinical instructor or graduate clinical preceptor affiliated with an athletic training education program; held a dual-role (didactic and clinical supervision responsibilities)</td>
</tr>
<tr>
<td>Full-Time Educators and Researchers</td>
<td>Currently a full-time educator in an athletic training education program with no clinical responsibilities; full-time researcher affiliated with an athletic training education program; an educator in a program other than athletic training as long as he or she had no clinical responsibilities</td>
</tr>
<tr>
<td>Full-Time Clinicians</td>
<td>A practicing clinician with no current affiliation to an athletic training education program or no clinical supervision responsibilities; practice in the high school setting and also teach within the high school setting</td>
</tr>
</tbody>
</table>
Table IV.2. Final Module Breakdown by Evidence-Based Practice Step

<table>
<thead>
<tr>
<th>Steps of Evidence-Based Practice</th>
<th>Module Order</th>
<th>Module Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Developing a Clinical Question</td>
<td>1</td>
<td>Developing Clinical Questions Within the EBP Process</td>
</tr>
<tr>
<td>2. Literature Searching</td>
<td>2</td>
<td>Literature Searching</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Types of Research</td>
</tr>
<tr>
<td>3. Critical Appraisal</td>
<td>4</td>
<td>Levels of Evidence &amp; Strength of Recommendation</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Appraisal Scales</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Statistics Terminology</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Reliability Coefficients</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Critically Appraised Papers &amp; Critically Appraised Topics</td>
</tr>
<tr>
<td>4. Applying the Evidence</td>
<td>9</td>
<td>Patient-Reported Outcomes</td>
</tr>
<tr>
<td>5. Assessing Outcomes</td>
<td>10</td>
<td>Disablement Models</td>
</tr>
<tr>
<td>Athletic Training Role</td>
<td>Control</td>
<td>Experimental</td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td></td>
<td>Demographic</td>
<td>Demographic</td>
</tr>
<tr>
<td></td>
<td>Pre-Module</td>
<td>Post-Module</td>
</tr>
<tr>
<td>Professional Athletic Training Students</td>
<td>N = 7 (Age = 23.7 ± 3.90)</td>
<td>26.43 ± 7.50</td>
</tr>
<tr>
<td>Graduate Students</td>
<td>N = 10 (Age = 25.80 ± 2.66)</td>
<td>38.10 ± 5.34</td>
</tr>
<tr>
<td>Approved Clinical Instructors and Graduate Clinical Preceptors</td>
<td>N = 13 (Age = 35.15 ± 11.39)</td>
<td>29.69 ± 6.02</td>
</tr>
<tr>
<td>Full-Time Educators and Researchers</td>
<td>N = 20 (Age = 38.75 ± 8.28)</td>
<td>33.35 ± 5.20</td>
</tr>
<tr>
<td>Full-Time Clinicians</td>
<td>N = 32 (Age = 36.69 ± 11.36)</td>
<td>28.81 ± 4.98</td>
</tr>
</tbody>
</table>
Table IV.4. Experimental Group Perceptions of the EBP Online Learning Modules (%)

<table>
<thead>
<tr>
<th>Perception Statement</th>
<th>Response Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, the EBP modules were _________ in enhancing my knowledge of evidence-based practice</td>
<td>Extremely easy to understand</td>
</tr>
<tr>
<td></td>
<td>11.0</td>
</tr>
<tr>
<td>Overall, the information provided within the EBP online modules was _________ in enhancing my knowledge of evidence-based practice</td>
<td>Extremely helpful</td>
</tr>
<tr>
<td></td>
<td>35.3</td>
</tr>
<tr>
<td>I would recommend these online modules to my peers, colleagues, and fellow clinicians to further enhance their own knowledge of evidence-based practice concepts.</td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td>90.2</td>
</tr>
<tr>
<td>I am interested in continuing to enhance my knowledge of additional EBP concepts such as sensitivity, specificity, epidemiological measures, and clinical prediction rules.</td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td>87.8</td>
</tr>
</tbody>
</table>
Figure IV.1. Investigation Mortality and Response Rates

153 Approved Clinical Instructors & Clinical Preceptors

473 NATA members responded to the initial request

53 Professional AT Students
25 Graduate Students

183 Clinicians
59 Educators

Randomization via SPSS

236 participants were placed in the CONTROL group

237 participants were placed in the EXPERIMENTAL group

Pre-Module Exam

157 control participants completed the pre-module exam
Mortality: 79 66.5% response

175 experimental participants completed the pre-module exam
Mortality: 62 73.8% response

One-Month Access to Modules
(Experimental Group Only)

Post-Module Exam

87 control participants completed the post-module exam
Mortality: 70 55.4% response

88 experimental participants completed the post-module exam
Mortality: 87 50.3% response

CONTROL GROUP
Mortality: 149
36.9% Response

EXPERIMENTAL GROUP
Mortality: 149
37.1% Response
CHAPTER V

PROJECT IIIA

Perceived Outcomes of Online Modules Designed to Enhance Athletic Trainers’ Knowledge of Evidence-Based Practice

Title: Perceived outcomes of online modules designed to enhance athletic trainers’ knowledge of evidence-based practice

Authors: Cailee Welch McCarty, Bonnie L. Van Lunen, Dorice A. Hankemeier, Aimee L. Thornton, Jessica M. Mutchler, William A. Pitney, Danica G. Hays

To Be Submitted: Journal of Athletic Training
Introduction

Over the past five years, research has expanded regarding evidence-based practice within athletic training. Current literature indicates that although athletic trainers believe EBP is important for the profession (Hankemeier & Van Lunen, 2011a; Hankemeier, 2011c; Manspeaker & Van Lunen, 2011b; Welch et al., 2011a; Welch et al., 2011b), their knowledge of the concepts involved in the process are limited (Hankemeier & Van Lunen, 2011b; Hankemeier, 2011c; Manspeaker & Van Lunen, 2011a; Manspeaker & Van Lunen, 2011b; Welch et al., 2011a; Welch et al., 2011b). Numerous barriers preventing athletic trainers from implementing EBP into education and clinical practice have also been identified (Hankemeier & Van Lunen, 2011b; Manspeaker & Van Lunen, 2011a; Manspeaker & Van Lunen, 2011b; Welch & Van Lunen, 2011c). Time (Hankemeier & Van Lunen, 2011b; Manspeaker & Van Lunen, 2011a; Manspeaker & Van Lunen, 2011b; Welch & Van Lunen, 2011c), access to resources (Hankemeier & Van Lunen, 2011b; Manspeaker & Van Lunen, 2011a; Welch & Van Lunen, 2011c), and knowledge (Hankemeier & Van Lunen, 2011b; Manspeaker & Van Lunen, 2011b; Welch & Van Lunen, 2011c) were the most common barriers reported. In an attempt to diminish the knowledge barrier, a series of online educational modules focusing on the foundational concepts of EBP were developed and made available to all NATA members. Welch, Van Lunen, and Hankemeier (2012) conducted a randomized controlled trial to assess the effectiveness of these online modules for enhancing knowledge among 164 athletic trainers. The modules were found to significantly increase athletic trainers’ knowledge of the concepts involved in EBP.
While it is important to assess attitudes and beliefs regarding EBP within the profession as well as knowledge gains following an educational intervention, it is also critical to determine whether athletic trainers take this newfound knowledge and make appropriate changes to his or her didactic curricula or clinical practice. More specifically, identifying which strategies are effective in getting athletic trainers to implement EBP in daily practice is important. This involves identifying what variables influence knowledge transition, and which steps athletic trainers can take to overcome the perceived barriers preventing them from making essential changes (Ciliska, 2006). Although it is unclear at this point whether EBP educational interventions are effective in influencing clinical practice behavioral changes, literature is available to support clinical practice changes among other health professionals following educational interventions on various other topics (Cameron & Naylor, 1999; Fritsche, Greenhalgh, Falck-Ytter, Neumayer & Kunz, 2002; Kennedy, Regehr, Rosenfield, Roberts & Lingard, 2004; Miller & Mount, 2001; Nicholson, Warde & Boker, 2007).

Several authors have aimed to increased knowledge and promote clinical practice changes through the implementation of some type of educational intervention (Cameron & Naylor, 1999; Fritsche, Greenhalgh, Falck-Ytter, Neumayer & Kunz, 2002; Kennedy, Regehr, Rosenfield, Roberts & Lingard, 2004; Miller & Mount, 2001; Nicholson, Warde & Boker, 2007). While these interventions have typically been shown to increase knowledge, the authors reported mixed results in actually altering clinical practice. Cameron and Naylor (1999) used active dissemination of the Ottawa Ankle Rules (OAR) in an effort to reduce the number of unnecessary radiographs being ordered by physicians. Participants reported they felt confident that the OAR were supported by
evidence and they felt they had gotten enough training to implement the clinical prediction rule. However, results of the study indicated that the number of patients referred for ankle radiographs did not decline (Cameron & Naylor, 1999). Kennedy et al. (2004) administered an educational intervention to family-medicine residents and then qualitatively assessed the knowledge-behavior gap that was evident following the intervention. Results revealed that, while the intervention significantly increased knowledge, clinical decision-making did not necessarily change (Kennedy et al., 2004).

Although educational interventions are a necessary component to increase knowledge within an area, it is essential to determine if the increase in knowledge of EBP concepts following the implementation of the online modules has actually translated to the incorporation of EBP into athletic training education and clinical practice. While quantitative measures provided useful information when assessing changes in knowledge following the online modules (Welch et al., 2012), a qualitative inquiry provides a more in-depth understanding of the experiences and perspectives athletic trainers have, and may give a richer picture of the long-term effects of the educational intervention. Therefore, the purpose of this study was to explore the effectiveness of these educational modules on didactic instruction patterns of educators and clinical practice for clinicians. Specifically, we aimed to assess educators’ and clinicians’ perceptions of whether the implementation of the EBP online modules provoked immediate changes within the classroom or clinical practice setting.

**Methodology**

**Design**
The emergent study design of this investigation was modeled after the consensual qualitative research (CQR) approach. Derived from the integration of grounded theory (Corbin & Strauss, 2008), phenomenology (Giorgi, 1985) and comprehensive process analysis (Elliott, 1989), CQR provides an in depth descriptive analysis of participants' experiences as well as the phenomena in which these experiences occur (Hill, Knox, Thompson, Nutt-Williams, Hess & Ladany, 2005). Furthermore, CQR focuses on the utilization of multiple researchers, the process of reaching a consensus and a methodological approach to constantly and repetitively analyzing multiple cases to reach a comprehensive representativeness of the results (Hill et al., 2005). The CQR approach was selected for this particular qualitative inquiry to explore the experiences and theories athletic trainers had in regard to an educational intervention (i.e., 10 evidence-based practice online learning modules) implemented to enhance evidence-based practice within clinical practice and didactic education. The study was designed to be an inductive interpretation of what these individuals believed to be important concepts, principles or ideas of EBP as they relate to didactic education and clinical practice, as well as how these beliefs and practices were influenced by the educational intervention.

Due to the consensual process of CQR, multiple researchers are essential to the construction of a solid research team. As complex issues arise within qualitative data, multiple perspectives, opinions, and levels of awareness are needed to increase the approximation of truth and simultaneously diminish researcher bias (Hill et al., 2005). The research team for this study consisted of five athletic trainers. Three of the researchers comprised the primary research team, the fourth researcher held a dual role as a primary research team member as well as the internal auditor, and the fifth researcher
acted as the external auditor. Auditors are often utilized within CQR to verify the interpretations made by the research team and provide continual appraisal during each stage of data analysis (Hill et al., 2005). It is essential that the auditor ensure the data were closely and appropriately analyzed and multiple perspectives were considered and discussed before consensus was reached (Hill et al., 2005). For this particular study, the internal auditor provided detailed feedback throughout all stages of data analysis while the external auditor offered additional feedback following cross-analysis. The roles and experience of each research team member for this investigation are displayed in Table V.1.

Participants

Athletic trainers who were participants in the experimental group of a previous research investigation involving the implementation of 10 evidence-based practice online learning modules (n=166) were considered to be potential participants for this study. To recruit participants, we utilized stratified purposeful sampling and criterion-based sampling methods. Stratified purposeful sampling is often thought of as a sample within samples and allows the researchers to capture major variations that may occur across a population (Patton, 2002). To provide ample representativeness of the athletic training population, an equal number of clinicians and educators were invited to participant in this study. Criterion-based sampling allowed the researchers to select individuals based on a predetermined set of criteria, which therefore provided meaningful results that can be more applicable to the population (Goetz & LeCompte, 1984; Hill et al., 2005). To be considered a viable candidate in this study, each athletic trainer had to have been a participant within the experimental group of the "Assessment of Athletic Trainers’
Evidence-Based Practice Concept Knowledge Following an Educational Intervention study and had to have accessed all 10 online learning modules, as determined via the online module usage data sheet provided by the NATA office.

Due to the exploratory nature of CQR, it is suggested to obtain approximately 10-15 participants in hopes of achieving saturation (Hill et al., 2005). Since the interview protocol for this study consisted of two branches, the research team aimed to include 20-30 participants. Twenty-five athletic trainers (14 females and 11 males) participated in this investigation before the research team determined that saturation of both branches had been reached. Twelve of the participants were athletic training educators while the other 13 individuals were athletic training clinicians. On average, the participants had 16.00 ± 9.41 years of athletic training experience. All athletic trainers were given last-name pseudonyms to maintain participant anonymity (Table V.2). This study was approved by the University Human Subjects Committee for Exempt Research, and participant consent was obtained via email prior to data collection as well as verbally at the beginning of each individual interview.

**Instrumentation**

One of the essential components of CQR is to use open-ended questions (i.e., interviews, questionnaires) and a semi-structured approach (Hill et al., 2005). Due to the lack of a preexisting interview protocol that specifically addressed the research aims of this investigation, the research team developed a unique semi-structured interview protocol (Appendix C) consisting of 12 open-ended questions along with potential probe questions to be used when necessary. The primary researcher constructed the initial interview questions utilizing the study’s research aims as guidelines for question
development. To capture appropriate responses from educators and clinicians, two interview branches were developed. The educator branch tailored the 12 questions to didactic education while the clinician branch tailored the questions to clinical practice. Two members of the research team reviewed the initial interview protocols and changes were made accordingly. Following review, two pilot interviews were conducted with athletic trainers who had previously accessed the EBP online modules but did not meet the predetermined inclusion criteria for this investigation. Each pilot interview helped to revise the wording of questions to ensure clarity, as well as provided the research team with insight on the type of data that would likely be obtained during data collection.

**Procedures**

the primary researcher contacted the potential participants via email once participants who met the predetermined criteria were identified and the sample was stratified. The email included the purpose of the investigation, contact information for any questions and a request for his or her voluntary participation. Due to the anticipated locations of the athletic trainers participating in this research, the primary mode of data collection was conducted via telephone. Once the candidate agreed to participate, an individual 30-40 minute interview time was scheduled via telephone and the participant completed a brief demographic questionnaire via email. Based on the semi-structured interview protocol designed for this study, the primary researcher placed athletic trainers into one of two distinguished branches: (a) the participant’s primary athletic training role was clinical and they were more apt to provide in-depth feedback on questions relating to clinical practice, or (b) the participant’s primary athletic training role was educational and they were more apt to provide in-depth feedback on questions relating to didactic
curricula. This investigation began in November 2011 and continued until data saturation was met in each interview branch.

Once an individual interview was completed, a transcriptionist transcribed the audio file. Proper names, places and any other identifying information were masked within each transcript to protect the participants’ confidentiality (Hill et al., 2005). Each transcription was then sent to the participant as a means of enhancing trustworthiness. Member checks allow the participant to provide any additions or clarifications to the transcript (Lincoln & Guba, 1985). However, it was essential to provide the participant with clear instruction that the information already presented within the transcript could not be deleted or altered in any way.

**Data Analysis and Management**

Data analysis for the CQR approach was an intricate process involving three progressive stages: (a) identifying initial code domains; (b) extracting core ideas from each domain; and (c) cross-analysis of multiple participant interviews via development of categories and themes. Initial code domains were utilized to group data about similar topics (Hill et al., 2005). Once the domains were identified, researchers coded the initial transcripts and placed the data in a domain as they saw fit. Coding multiple transcripts at this stage allowed the researchers to get a clearer sense of the content that will represent each domain (Hill et al., 2005). Once the data were placed in domains, the next stage of data analysis involved constructing core ideas from each domain. This process is often called ‘abstracting’ (Corbin & Strauss, 2008), and essentially involved summarizing what the participant said in each domain in a more concise manner (Hill et al., 2005). Finally, cross-analyses of multiple participant interviews occurred. During this phase, the
researchers looked for relationships, similarities and differences that emerged from the interviews when they were examined together. Cross-analysis allowed the researchers to distinguish categories in which the core ideas could be placed (Hill et al., 2005). These categories were discovered based on the data provided and were not established from the literature or preconceived ideas (Mahrer, 1988; Hill et al., 1997). Additionally, categories were often modified as the researchers became more familiar with the data.

Once cross-analysis was completed, it was also necessary to characterize the frequency of occurrence for all categories. More specifically, frequency counting allowed the research team to determine how often each category was applied across the whole sample, which therefore provided a sense of representativeness of the entire sample (Hill et al., 1997). Frequency of the categories was broken into four components: (a) general, (b) typical, (c) variant, or (d) rare. A category was considered general if it applied to all, or all but one case, typical if it applied to more than half of the cases, variant if it applied to less than half of the cases, and rare if the data related to only 2-3 cases (Hill et al., 2005).

Prior to the start of data collection for this study, research team members and auditors were trained on the CQR data analysis process. Training suggestions from Hill et al. (2005) were applied to ensure all members had the same understanding of how the process would occur throughout the investigation. The primary researcher conducted additional training sessions with the novice qualitative researcher. Inclusion of the novice researcher was deemed advantageous to data analysis, as the novice researcher may provide a fresh perspective and interpretation of the results since her biases at that point
were limited. Since involvement of the research team and auditors varied throughout the data analysis process, Figure V.1 displays an outline of events.

To enhance the trustworthiness of the results from this qualitative study, it was important to implement several strategies. The CQR approach inherently guaranteed that triangulation and peer debriefing occurred. By including multiple researchers in the data analysis of this investigation, we were able to continually triangulate the data (i.e., multiple-analyst triangulation) by ensuring that at least two researchers were involved in every phase of analysis to diminish research bias. Additionally, the inclusion of two auditors enhanced the realm of additional perspectives to ensure that multiple avenues had been considered (Hill et al., 2005). Another strategy utilized within the investigation to ensure trustworthiness was member checks (Patton, 2002). Member checking was employed in this investigation to ensure coherence between the study’s intended purpose and the methodology. This strategy was utilized in various forms throughout the data collection process. First, the primary researcher used probing questions during the individual interviews to confirm participant responses as well as explore concepts further. Secondly, each participant was provided the opportunity to review the transcript once it was transcribed to confirm its accuracy and representativeness of their expressions and ideals.

**Results**

The CQR emergent design revealed five themes relating to the EBP online modules, and the conceptual framework of themes is displayed in Figure V.2. For the purposes of this manuscript, we solely focused on educators’ and clinicians’ perceptions
of the outcomes achieved within the six months following the implementation of the online modules.

**Outcomes Following the Modules**

During the interviews, it was evident that athletic trainers generally perceived the EBP online modules to produce various types of outcomes regarding athletic training education or clinical practice. Data analyzed from this theme was further reduced to six pertinent categories: knowledge gain, importance and scope of EBP, positive impact on didactic teaching, instill value and practice of EBP among students, enhance ability to implement EBP within clinical practice, and no current impact on clinical practice.

**Knowledge Gain.** Generally, athletic training educators and clinicians described the online modules as a beneficial educational medium to promote knowledge enhancement of the various EBP concepts.

*I thought I knew what it was until after going through these modules; I learned so much more about it... I definitely feel more comfortable talking about that information. I still think I have a ways to grow with it, but after doing the modules and taking the post-test I felt so much better; I was like "wow, I feel like I’ve actually learned something."* - Dr. Fosgate

*It definitely gave a better understanding exactly what [evidence-based practice] is. I have been able to read [literature] a little bit more concisely and find a little bit more material from it and I know what is good and what is not good from reading the articles.* – Homier

*That’s really when I was realizing okay this isn’t that intimidating; this really does relate to what we already do. For example, as I was going through the PICO format, that’s where I was like “okay I already do this. I’m just going to restructure how I approach it based on what I’m learning here.” So, it seemed more manageable and it helped me break down the big umbrellas of EBP into how I could approach it and then also how I could teach students.* – Dr. Dominique

*I got a much better understanding of the process and why the evidence-based practice is a tool that we could use. I didn’t really know anything about it beforehand, so it gave me a much better understanding of the use of it. I feel like this is something that I will be able to use.* – Moran
**Importance and Scope of Evidence-Based Practice.** Along with the ability to enhance knowledge, participants typically expressed that the modules enriched their perceptions of EBP and highlighted why this approach to clinical practice is an important shift for the athletic training profession.

*It made me realize I have a long way to go, but that this is really important and that we need to get on it.* – Dr. Cavins

*I think it gave me a little bit different perspective on being more conscientious about best practice procedures; a little sort of reminder of the importance of following best practices. I mean just the concept and importance of following best practice procedures and realizing the importance of that in the progression of our profession.* - Rose

*I definitely have a better understanding of why it’s important; I definitely have a higher opinion of evidence-based practice after doing these modules.* - Varner

*I think that it reinforced the fact that we need that evidence-based practice in our profession, but I had a firm belief already that we needed that.* – Wilson

**Positive Impact on Teaching.** The 12 educators generally described the online modules as having a positive impact on their ability to implement the teaching of evidence-based practice throughout their athletic training curricula.

*I think it definitely had a positive outcome on the way I approach the classroom because a lot of times it’s easy for somebody that’s in academia, especially doing research, to take a lot of these concepts for granted. But you just can’t assume that people know this stuff and it’s easy to kind of just brush over the details with these, especially because I work with these concepts all of the time. I paid really good attention to the examples that the modules provided and the way the material was presented because it was meant to be presented as an introduction to evidence-based practice. And, that’s what I’m giving to my students. I think for a lot of these concepts you really need to have examples and make the students apply these concepts to those examples until they’ve done enough repetitions to understand it.* – Dr. Birch

*The modules really allowed me to go ahead and use some of the language to explain to students in better words than I could come up with. In the past I would just go up there and talk to students about [EBP concepts], and my guess is that I was talking to them probably at a level that some of them just didn’t understand. So, I was able to use quite a bit of it in my teachings, and will continue to do so. I think that’s important so it’s really changed how talk to my students about how they do what they do, and why they do what they do.* – Carr
The modules gave me a very good basis to have discussions about it, to implement assignments about it, and to just field questions from students as we talk about evidence based practice in athletic training. So I think it gave me a good basis of information for all of that. I guess I'm starting to incorporate it more so and I think for me, talking to our clinicians and asking what questions they have or what answers they want and kind of taking a look at that and coming up with clinical questions based on that. – Dr. Fosgate

It changed my confidence in talking about it and teaching it. I think they had a positive impact for sure. The modules gave me more confidence because they gave me more information and so it became something I was thinking about all the time because it made more sense in my head so it was something I was willing to start talking about in class and start really using the information that we were given and I really started trying to look now as I am teaching and ask what is evidence say about this. So I think having that EBP in the back of my head now because I feel like I know so much more about it. It makes me look for that as I am teaching. – Lavoy

Instill Value and Practice of EBP Among Students. Along with an enhanced ability to instruct students on the concepts of EBP in the classroom, the educators generally indicated specific techniques they have begun to utilize to incorporate EBP within their daily teaching practices. Educators most often discussed how they have begun to incorporate the PICO format and literature searching/usage with their students. They discussed several other implementation strategies as well.

I'm bringing in research articles as much as I can as we're talking about the topic, to help them understand how it relates and just making sure that they don't just associate research and informed practice in their statistics class and in their research methods class; it really does have a role in all parts of athletic training. So, hopefully they realize that it's a part of everything that we do. I would say the most is just getting associated with the literature and the process of how do you go about it if you have a question or if you're making a decision. You don't just do what your ACI does. – Dr. Dominique

I really try to get our students to draw back to the evidence-based practice model regularly to see where different pieces of evidence fit when we're talking about some kind of clinical problem in class. If we first ask ourselves what we know about the problem, a lot of times we draw to our clinical experience and what we think our patients find meaningful and then we go to the research experience. I think whenever you start with your theoretical model, which in this case is our evidence-based practice model, it gets students in the habit of going to the three sources of evidence to begin to make a decision versus just automatically saying well this is what I've done before, or this is what the research says this is what we have to do. – Dr. Birch
I actually had my students do a critically appraised topic paper and also presented that to the ACIs to say this tells you how clinically applicable this is without having to read that whole article. So trying to incorporate some assignments for them to get that practice of doing this to have a better understanding of some of this information. – Dr. Fosgate

Additionally, educators typically discussed how the online modules inspired them to change assignments within the classroom to incorporate more evidence-based practice concepts.

In the past we have had our seniors do an actual research project, but now what we’re trying to do is get them to be more users of the evidence. So, they’re going to be doing a critically appraised topic where, you know, they have an advanced clinical question and then they’re trying to really thoroughly review the literature. And then be able to turn around and write that in a paper and then present it to ACIs and other students. – Dr. Dominique

This year, I completely changed this assignment that I’ve been doing in my classroom for years. This experience was the impetus for me to say you know it’s time to do something different, its time to do something more applicable and this is where our students need to get some practice and some experience. So instead of doing an article review they’re now doing this evidence based assignment where they have to develop a clinical question using the PICO format and then they have to do a map of their search. – DiLorenzo

I have actually changed the way I had them create and develop their project for that class more based on evidence-based practice and you know doing some hierarchy as far as diagnostic techniques and comparing and contrasting rehab programs and what the evidence says about each one of those. I really tried to use more of the principles of EBP in that class, more for them to go out and find their own evidence so they’ve had to develop a clinical question and really use the concept of evidence-based practice to develop a paper. – Lavoy

Enhance Ability to Implement EBP Within Clinical Practice. Athletic training clinicians variantly described how the online modules have enhanced their skills that will allow them to incorporate EBP into their daily clinical practices.

As far as in my practice, I’ve actually used more research databases than I used to, try and figure out different solutions to different injuries that I’ve been having. I think it’s just something that you have to practice using I guess and get used to how it works in your everyday work. So it’s just kind of getting used to and using it regularly I guess. – Moran
It just gave me some better strategies to access some things. I don't find it easy necessarily to go digging through the literature, but it did give me some places to go and strategies to use so I think it's definitely had a positive impact on how I can actually search some literature. Some of the stuff in the later modules like processing the evidence and defining evidence, I find that information gave me a broader sense of understanding some of the literature. It puts it into context of how the rest of the medical world sees things. I think the things I took immediately were some of the search engine uses; what databases to look through, how to process some searches. How to use PubMed a little better, how to access some of the databases, how to actually find those databases and use them, that helped immediately which I was able to dig into. – Parker

It got me more interested in reading more of the research articles and taking the time to understand the statistics and not just read the conclusions, but reading the methods and the results too. I'm just going a little bit more in depth with it and deciding for myself, “okay, how do I think this will work with my patients in this setting.” – Varner

**No Current Impact on Clinical Practice.** Although clinicians typically perceived EBP to be an important concept for the athletic training profession following the implementation of the online modules, they generally described that the modules did not have a current impact on their clinical-decision making process.

I wouldn't really say they had that much of an impact; nothing new and exciting came up. I've got 30 years of experience under my belt now so most of the stuff I see is something I've seen before. If something new and different had come up it might have been fun cause then I could have tied it all together, but nothing new and exciting came up. – Boyce

I think just a lack of actually putting what I learned into practice; I think it might not have had an effect. I'm just still not looking at a research article and determining what the level of evidence is, you know? Maybe I have a wrong perception of my clinical skills but I feel like where I'm at and how I'm getting my information and how I'm dictating my practice, has worked thus far... I just don't think I'm motivated enough to do it. I would need to kind of take a look and say well why am I doing this, but I don't think I've hit that point yet. – Clements

Probably not a real impact; working in the high school environment I am not actually doing research and stuff. Not really an impact on how I work other than the fact of the reinforcement, the need that – yeah, I do need to keep current and we need to ask questions about why we're doing that. But I am not sure if directly if I could point something where it changed my view or my treatment pattern. I am not sure if I actually took anything in particular from the subject matter and it went directly towards the kids. But since I am not doing research and I am not teaching, I generally don't have to use
terms like that; that's kind of outside the scope of my day-to-day practice. But if I decide to teach or have a sports medicine class, I feel comfortable that with some of that stuff, I can add in and talk about it. – Wilson

In rare cases, clinicians described the online modules as providing more academic information than components that could be implemented directly in their personal clinical practices. Therefore, they reported the modules had no impact on their clinical practice.

It was involved enough that it didn't really provide a learning experience for me as much as it was an exposure. It was way too much for me to swallow personally; I don't know that it really had any effect on my clinical practice. – Rose

It hasn't been something that I use other than when I am reading the journal or reading other publications; to just be aware whether this research is something I should trust or not trust. The impact has been pretty negligible, other than paying attention to the article and the research that's coming out. Nothing applicable because I don't feel that the modules led to anything clinically; they were academic as far as how to do a literature search and that type of thing. – Schaffer

Discussion

This qualitative inquiry established that the implementation of 10 EBP online modules did, in fact, have some perceived effects on both educators and clinicians. Knowledge gain and enforcing the importance and scope of evidence-based practice were two principle benefits athletic training educators and clinicians identified from the implementation of the modules. Educators indicated that this educational intervention had an immediate positive impact on how they approach EBP in the classroom and discussed several examples of how they have begun to instill the value and practice of EBP to their students throughout the curriculum. Clinicians suggested that the online modules enhanced their ability to implement EBP within their clinical practice, yet no specific changes have been made regarding how they approach patient care. To effectively incorporate EBP within all realms of athletic training (i.e., clinical practice, education, research), it is not only crucial to distinguish how to increase knowledge of the various
concepts involved, but we must also focus on identifying the most successful ways to translate knowledge to clinical practice. To do so, we must focus on integrating educational teachings alongside best evidence that practicing clinicians can utilize to affect patient care.

**Knowledge Gain and Knowledge Translation of EBP**

Several researchers have examined the effect of educational interventions to enhance healthcare professionals’ immediate knowledge of EBP concepts and have reported successful outcomes (Chumley-Jones, Dobbie & Alford, 2002; Fritsche et al., 2002; Greenhalgh, 2001; Kerfoot et al., 2006; Letterie, 2003; Nicholson et al., 2007). In a review focusing on web-based educational interventions, Chumley-Jones et al. (2002) determined that web-based learning was effective in enhancing healthcare professionals’ knowledge of a topic, and was a comparable method to other educational interventions. Kerfoot et al. (2006) also reported significant increases in medical students’ urology test scores after accessing a series of web-based tutorials when compared to a control group. Specific to athletic training, Welch et al. (2012) reported significant short-term knowledge increases among the participants of this investigation, however it is unclear whether those improvements remain six months after the initial implementation of the educational intervention.

Assessment of knowledge retention of the EBP concepts following an educational intervention may be an important component to effectively move forward with the integration of EBP into athletic training education and clinical practice. However, it is also vital that we look beyond knowledge retention and begin to focus on knowledge translation. Knowledge translation is most accurately described as “a dynamic and
iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of patients, provide more effective health services and products and strengthen the health care system” (Canadian Institutes of Health Research, 2009). More directly, knowledge translation focuses on methods that will ensure the transfer of clinicians’ knowledge to practice for the purpose of improved patient care and healthcare outcomes. This, in turn, may help to diminish the evidence-based practice knowledge-behavior gap (Kent, Hutchinson & Fineout-Overholt, 2009).

Although the study of knowledge translation is fairly new to healthcare professions, the infusion of EBP across medicine and healthcare has ignited the need to determine the most effective manner of converting knowledge attained into knowledge used in practice. Several theories and models have been proposed for knowledge translation (Bandura, 1986; Fox, Mazmanian & Putnam, 1989; Pathman, Konrad, Freed, Freeman & Koch, 1996; Tyler, 1949; Wenger 1998), however research on which model is most successful regarding EBP in healthcare is limited.

One model that is commonly discussed across healthcare disciplines is the Precede-Proceed Model of Health Program Planning and Evaluation (Green, Kreuter, Deeds & Partridge, 1980). The foundation of this model outlines three essential steps that can be used in moving the athletic training profession toward an EBP culture. First, athletic trainers must be predisposed to change by increasing knowledge of EBP concepts (Green et al., 1980; Davis et al., 2003). Strides have been taken over the past five years to accomplish this goal among various groups of athletic trainers (Hankemeier, 2011c; Manspeaker et al., 2011a; National Athletic Trainers’ Association, 2011; Welch et al., 2012). Secondly, change must be enabled by promoting ideal conditions in both the
educational and practice settings. And finally, once the EBP paradigm shift occurs for athletic training, athletic trainers’ must continue to reinforce it (Green et al., 1980; Davis et al., 2003).

The Precede-Proceed model (Green et al., 1980) has been incorporated in other health professions such as medicine and nursing, and current literature shows promise that it is successful at achieving the desired goal of improving patient care (Chiang, Huang, Yeh & Lu, 2004; Mirtz, Thompson, Greene, Wyatt & Akagi, 2005; Tu, Mamdani, Jacka, Forde, Rothwell & Tu, 2003). Thus, as athletic trainers begin to determine the best mechanisms to promote knowledge translation of EBP concepts into practice, the profession should consider adopting a knowledge translation model such as the Precede-Proceed model used in other healthcare professions.

**Positive Impact on Athletic Training Educators**

Participants in this investigation reported that the EBP online modules had a positive impact on their instruction mode as well as encouraged positive changes to how they approach EBP in the classroom. This is an important step forward in removing the lack of knowledge barrier educators expressed in previous literature (Manspeaker 2011b, Welch & Van Lunen, 2011c). In addition, many participants discussed the integration of EBP throughout the curriculum and a holistic approach to implementation of these concepts rather than just adding an independent EBP class. This supports strategies suggested by athletic training educators (Manspeaker & Van Lunen, 2011b) and ACIs (Hankemeier & Van Lunen, 2011a). There are several ways many of the EBP concepts can be incorporated throughout didactic curricula, as there is no set place a concept must to be discussed, or single strategy to effectively discuss it. As athletic training education
programs continue to develop the curricula to align with the 5th edition of the *Athletic Training Education Competencies*, they should focus on implementation techniques that work best for the faculty and clinical staff at that specific institution. However, since the EBP concepts are foundational to clinical practice and may impact how a student chooses to effectively make clinical decisions based on evidence, educators should aim to introduce the EBP concepts to athletic training students early and often. It is not only imperative that students learn the foundations of EBP, but they must also learn how to routinely incorporate the EBP paradigm into their decision-making process in the clinical setting.

As educators make changes to align their didactic curricula with the new EBP competencies, they must ascertain their own views on incorporating the EBP paradigm. Educators must ensure that the material included in their courses not only meets the needs of the athletic training competencies, but also provides real-life examples that will resonate with the students. Classroom instruction may reach students on an academic level, but unless it has relevance to clinical practice students will unlikely transfer that information into practice (Fineout-Overholt, Williamson, Kent & Hutchinson, 2010). For students to truly embrace EBP and carry it with them throughout their career, they must understand, respect, and foster the blend of research evidence, clinician expertise, and patient preferences for optimal patient care (Melnyk, Fineout-Overholt, Stillwell & Williamson, 2010). Therefore, students must learn early on in their academic career that incorporating evidence into clinical practice requires active inquiry (Doanes & Varcoe, 2008). Current techniques and strategies to apply best practices to patient care must also be continually questioned to determine if they are the best mechanism for any given case.
Influence on Athletic Training Clinicians

Clinicians in this investigation indicated the online modules elicited small changes in their perceived ability to implement EBP within practice. Clinicians remarked that the online modules provided them with tools and strategies to be able to more effectively search for literature and have a more comprehensive understanding of what they read. Results from this investigation also indicated that the online modules enhanced clinicians’ confidence with the concepts of evidence-based practice. Hankemeier (2011c) previously assessed athletic trainers’ confidence in their knowledge of EBP concepts. A weak positive relationship was found between participants’ knowledge of EBP and confidence, indicating that individuals with a higher knowledge score also perceived themselves more confident in their knowledge of EBP. Therefore, we can hypothesize that athletic trainers’ increased confidence in this investigation may be due to increased knowledge of EBP concepts following the implementation of the online modules.

Although clinicians reported an enhanced ability to implement EBP concepts within their practice, they also indicated that no current changes to their daily practice or clinical decision-making had been made. Results from this study are similar to those found by other authors investigating outcomes following an educational intervention (Cameron & Naylor, 1999; Kennedy et al., 2004). Although multiple studies have found mixed results in behavioral changes following an educational intervention, the most common types of interventions that promote positive changes in clinical practice and improved patient care are interactive interventions and strategies that are multi-faceted (e.g., didactic lecture combined with interactive discussion; Bero et al., 1998; Davis et al., 1999; Wensing, Van der Weijden & Grol, 1998). Single-strategy educational
interventions (e.g., lecture format only) designed to translate evidence into practice have been shown to have a poor effect on sustained practice changes (Grimshaw et al., 2004). Likewise, purely didactic interventions have failed to produce behavioral changes in healthcare professionals (Bero et al., 1998). This implies that future educational interventions targeted at altering the clinical behaviors of athletic trainers should focus on mixed modes of delivery and interactive strategies. Kent et al. (2009) suggested that multiple approaches should be initiated and that each approach should be alternative and proactive. Incorporating reminders, educational outreach visits, and mechanisms that provide evaluation and feedback have been identified as suitable hands-on approaches that allow individuals to be proactive in the learning process (Grimshaw et al., 2004; Kent et al., 2009). Continued investigation needs to identify strategies to help clinicians understand and implement the concepts of EBP, as well as highlight the direct clinical benefits of incorporating EBP to improve patient care.

Athletic trainers are expected to be active decision makers on a daily basis, and the EBP process aligns with the active decision-making process of athletic training. Athletic trainers must recognize that being informed about evidence is not the only factor that is vital to actually practicing in an evidence based manner, and they must embrace the various sources of evidence that may contribute to their body of knowledge. Contrary to what clinicians may perceive, evidence can come in forms other than laboratory research. While strict controlled research is widely regarded as the primary form of evidence, it must be conducted in a manner that ensures both internal validity and clinical applicability. Evidence that may be of use to clinicians can also be generated via peer and expert dialogue as well as clinical outcomes. According to Ciliska et al. (2005), EBP
mentors can help a clinician guide his or her own EBP by acting as a facilitator in evidence consumption. Thompson et al. (2000) determined that nurses utilize human resources as the primary means of gathering evidence in uncertain situations. The most common resources they utilized were “experts” (i.e., clinical nurse specialists, experienced colleagues) and peer dialogue (i.e., primary and secondary care colleagues). They also utilized other healthcare professionals when outside of their primary expertise (i.e., pharmacists). To facilitate the incorporation of EBP within athletic training, practicing clinicians should identify appropriate mentors and reach out to other athletic trainers who are experts regarding EBP implementation.

Athletic trainers should be comfortable utilizing expert and peer sources of information in situations where they are uncertain, especially when research evidence in a particular topic area is unavailable. Expert and peer dialog should not be limited strictly to athletic trainers, but should include an interdisciplinary collaboration with other healthcare professionals that may be experts on EBP implementation (Thompson et al., 2000). Individuals must be motivated to pursue EBP from a patient-centered care perspective. Athletic trainers should be inspired to integrate research evidence and their patients’ goals and values with their clinical expertise in the hopes of optimizing individual patient outcomes.

**Changing the Use of Evidence in Daily Practice**

To stay in line with other health care professions and truly become an evidence-based profession, athletic training needs to embrace cognitive and behavioral changes from both local and global perspectives (Welch et al., 2011a; Winterstein, 2006). Athletic trainers need to develop a mutually beneficial model of enhancing evidence-based
practices within all realms of the profession. While it is important to ensure that individual athletic trainers enhance their practices through the use of multiple evidence sources, it is imperative for change to occur at an organizational level as well. The need for a paradigm shift in athletic training is not a new concept (Winterstein, 2006), and previous research has confirmed that athletic trainers perceive the incorporation of EBP as a necessary cultural shift to enhance the profession (Hankemeier & Van Lunen, 2011a; Welch & Van Lunen, 2011c). As with any transformation, the shift from clinical decisions based in tradition and authority to decisions supported by evidence will require an organizational change (Hankemeier & Van Lunen, 2011a). The nursing profession has outlined several EBP models that facilitate organizational change to foster the incorporation of EBP into practice (Fineout-Overholt et al., 2010). One model of particular interest is the Advancing Research & Clinical practice through close Collaboration (ARCC) model. This model is designed to aid profession-wide application and sustainability of EBP to enhance quality healthcare outcomes (Fineout-Overholt et al., 2010). The primary strategy of this model is the incorporation of EBP mentors, who work directly with clinicians to develop strategies to diminish the barriers commonly reported for EBP implementation (e.g., inadequate time, lack of available resources, knowledge; Finout-Overholt et al., 2010). The premise of the ARCC model is that if the barriers of EBP diminish, clinicians will be more likely to adopt EBP and make changes to their daily practices (Fineout-Overholt et al., 2010). Thus, by providing EBP mentors to help clinicians reduce implementation barriers, the ARCC model is promoting an avenue for organizational change and a paradigm shift towards an EBP culture.
Athletic training educators must accept a pivotal role in the translation of evidence into practice. Since they facilitate students' professional development, professional learning and personal growth on a daily basis (Davis et al., 2003), educators are the fundamental first step in getting students familiar and comfortable with accessing, appraising, translating and, when applicable, applying research evidence into clinical practice (Kent et al., 2009). Therefore, educators must realize they are the foundation to knowledge translation in future generations of athletic trainers, and that they serve as the link between the researchers that produce evidence and the development of clinicians who are being asked to apply the evidence (Dobbins et al., 2009). Results from a systematic review suggest that nursing educators are the perfect individuals to facilitate knowledge translation since they are familiar with nursing practices and have a strong background in the field as well (Milner, Estabrooks & Myrick, 2006). Thus, since large portions of athletic training educators also practice clinically, they are well suited to take on the role for knowledge translation. They are well versed in athletic training practices and can draw from their own experiences as a clinician to progress students forward.

Specific mechanisms for change at an organizational level need to include constant revisions of the NATA educational competencies to include new and developing healthcare reforms as well as eliminate required competency in skills that are not supported by an evidence-based practice. By continuing to teach these ideas and skills, the perpetual cycle of practice based in tradition will not be broken. In addition, a reform on continuing education that requires more active participation in CEUs may enhance the shift to EBP. Organizational change can also be facilitated with frequently updated position statements and guidelines. The NATA occasionally releases position statements
that give an overview of the suggested plan of care for various conditions and situations that athletic trainers may encounter. However, position statements are generally only compiled on hot topics and issues that may be associated with profound legal issues. If more position statements or practice guidelines focusing on conditions, treatments and situations that athletic trainers face daily were made available, the way clinicians approach situations may be more consistently in line with the best research evidence. While research has been divided on the effectiveness of dissemination of clinical practice guidelines (citations), multiple studies have concluded that clinicians prefer information that is easy to apply and sources of evidence that do not require active search and appraisal of the literature. Thompson et al. (2000) interviewed nurses who communicated they preferred sources of information that were quick to access and easy to understand as well as those that were grounded in clinical usefulness. Likewise, a review by Grol and Grimshaw (2003) found that clinical guidelines offering a more concrete description of a desired clinical application were associated with better compliance with the recommendations.

A cultural shift from the current model of athletic training practice to a more evidence-based practice is going to require dedication from every facet of the profession. Clinicians, educators, researchers, and students need to be willing to embrace this change. In addition, leaders in the profession need to continue to take action to facilitate this shift at the organizational level. By embracing the integration of patient values, clinical expertise, and the best available research evidence to improve patient care and healthcare outcomes, the profession of athletic training can hope to advance and gain recognition as an integral part of the healthcare community.
Limitations

The individuals that participated in this investigation were selected from a specific group of athletic trainers that took part in a study to assess the effect of online modules to enhance knowledge of EBP concepts, and therefore were from a nonrandomized sample of the population. Participants’ perceptions of the online modules themselves may have influenced whether they had a successful or unsuccessful outcome in terms of implementing EBP within their teaching or clinical practices. The online modules that were utilized in the previous investigation were not designed in a way that would appeal to all types of learners. If a participant in this investigation did not learn well from online learning, it may have impacted their responses for this study. Although we assumed all participants spoke truthfully about their experiences with the online modules, the self-report nature of the educators’ and clinicians’ implementation of EBP within practice may be a limitation as well. During this investigation, we did not compare participants’ responses with their quantitative knowledge scores of the EBP concepts involved in the online modules. Therefore, participants’ perceptions of knowledge gain and actual knowledge retention cannot be justified. Further research is necessary to determine if the short-term knowledge gained immediately following the educational intervention was retained after a six-month period.

Conclusions

As the athletic training profession continues to assimilate as an evidence-based profession, significant focus needs to be given to diminishing the evidence to practice gap. Strategies to bridge this gap should target individual athletic trainers as well as change at an organizational level. This investigation sheds light on the outcomes
sustained from an educational intervention to enhance knowledge of EBP concepts among athletic trainers. While it is a step in the right direction to have a mechanism to increase knowledge of EBP within athletic training, the ultimate goal is to change clinical practice in a manner that enhances patient outcomes. Based on a multitude of research in other healthcare professions, it is suggested that future strategies should focus on multiple approaches and continual follow-up. Future research should aim to identify effective strategies to aid athletic trainers in effectively implementing EBP into education and clinical practice. Additionally, research should assess which approaches and educational interventions are effective for increasing knowledge translation into practice. Further consideration should also be given to the adoption of a knowledge translation model to assist the athletic training profession in the paradigm shift to fostering an EBP culture.
References


health promotion practice utilizing the PRECEDE-PROCEED model.

*Chiropractic & Osteopathy, 13*(25).


*Athletic Training Education Competencies (5th ed)*, 1-32.


<table>
<thead>
<tr>
<th>Study Role</th>
<th>Researcher #1</th>
<th>Researcher #2</th>
<th>Researcher #3</th>
<th>Researcher #4</th>
<th>Researcher #5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary researcher; Research team member</td>
<td>Research team member</td>
<td>Research team member</td>
<td>Research team member; Internal auditor</td>
<td>External auditor</td>
</tr>
<tr>
<td>Qualitative</td>
<td>Experienced qualitative researcher with a background in CQR</td>
<td>Novice qualitative researcher new to the CQR approach</td>
<td>Experienced qualitative researcher with previous experience in CQR</td>
<td>Experienced qualitative researcher with experience in various approaches. Moderately familiar with the CQR approach</td>
<td>Experienced qualitative researcher with experience in various approaches. Moderately familiar with the CQR approach</td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBP Experience</td>
<td>Research experience on the topic of EBP</td>
<td>Moderately familiar with the concepts of EBP</td>
<td>Moderately familiar with the concepts of EBP</td>
<td>Research experience on the topic of EBP</td>
<td>Research experience on the topic of EBP</td>
</tr>
<tr>
<td>Participant</td>
<td>Pseudonym</td>
<td>Sex</td>
<td>Years Experience as Athletic Trainer</td>
<td>Primary Athletic Training Role</td>
<td>Clinical Practice Setting</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
<td>-----</td>
<td>-------------------------------------</td>
<td>-------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Dr. Birch</td>
<td>Male</td>
<td>5.5</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boyce</td>
<td>Female</td>
<td>22</td>
<td>Clinician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carr</td>
<td>Male</td>
<td>29</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Cavins</td>
<td>Female</td>
<td>18</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clements</td>
<td>Male</td>
<td>10</td>
<td>Clinician</td>
<td>College/University</td>
<td></td>
</tr>
<tr>
<td>DiLorenzo</td>
<td>Female</td>
<td>17</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Dominique</td>
<td>Female</td>
<td>6</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eckert</td>
<td>Female</td>
<td>4.5</td>
<td>Clinician</td>
<td>College/University</td>
<td></td>
</tr>
<tr>
<td>Farrar</td>
<td>Male</td>
<td>37</td>
<td>Educator</td>
<td>Clinic</td>
<td>High School</td>
</tr>
<tr>
<td>Dr. Fosgate</td>
<td>Female</td>
<td>17</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Gangler</td>
<td>Female</td>
<td>14</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Harvey</td>
<td>Female</td>
<td>30</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homier</td>
<td>Male</td>
<td>9.5</td>
<td>Clinician</td>
<td>College/University</td>
<td></td>
</tr>
<tr>
<td>Lavoy</td>
<td>Female</td>
<td>14</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MacIntosh</td>
<td>Male</td>
<td>5</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. McDaniel</td>
<td>Male</td>
<td>33</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meier</td>
<td>Male</td>
<td>15</td>
<td>Educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moran</td>
<td>Female</td>
<td>6</td>
<td>Clinician</td>
<td>College/University</td>
<td></td>
</tr>
<tr>
<td>Parker</td>
<td>Male</td>
<td>15</td>
<td>Clinician</td>
<td>College/University</td>
<td></td>
</tr>
<tr>
<td>Pessefall</td>
<td>Female</td>
<td>6</td>
<td>Clinician</td>
<td>College/University</td>
<td></td>
</tr>
<tr>
<td>Rose</td>
<td>Male</td>
<td>25</td>
<td>Clinician</td>
<td>High School</td>
<td></td>
</tr>
<tr>
<td>Schaffer</td>
<td>Female</td>
<td>16</td>
<td>Clinician</td>
<td>High School</td>
<td></td>
</tr>
<tr>
<td>Schlade</td>
<td>Female</td>
<td>18</td>
<td>Clinician</td>
<td>College/University</td>
<td></td>
</tr>
<tr>
<td>Varner</td>
<td>Female</td>
<td>10.5</td>
<td>Clinician</td>
<td>High School</td>
<td></td>
</tr>
<tr>
<td>Wilson</td>
<td>Male</td>
<td>17</td>
<td>Clinician</td>
<td>High School</td>
<td></td>
</tr>
</tbody>
</table>
Figure V.1. Research Team Involvement During CQR Data Analysis

Each RTM independently coded 1st three transcripts for domains and core ideas

Research team met as a group to abstract core ideas and compile a consensus codebook

Each RTM independently coded 4th transcript with consensus codebook

Research team met as a group and made necessary changes to the codebook

Primary researcher (CWM) used consensus codebook to code all transcripts

RTMs coded 4 randomly selected transcripts and compared codes with primary researcher

Research team discussed final themes and categories via cross-analysis until consensus was met

External auditor reviewed coded transcripts and confirmed final themes and categories

Research team discussed participant cases that best represented the sample for each category

Internal auditor reviewed participant case choices to ensure selection provided the most accurate representation of the data
Figure V.2. Conceptual Framework of Themes and Categories

Implementation of Evidence-Based Practice Online Learning Modules

Interest in the modules
- Learn approaches to EBP
- Teach EBP to Students
- Value the athletic training profession

Perceptions of the modules
- Addressed multiples levels of learners
- Appropriate for audience
- Negative perceptions

Improvements for the modules
- Change length or order of modules
- More applicable to clinical practice
- More examples and interaction

Outcomes following the modules
- Knowledge gain
- Importance and scope of EBP
- Positive impact on teaching
- Instill value and practice of EBP
- Enhance ability to implement EBP
- No impact on clinical practice

Future direction of evidence-based practice
- Professional Responsibility
- Repetition
- Focused Workshops
- Peer discussion and mentorship
- Provide more resources
- More processed information
CHAPTER VI

PROJECT IIIB

Future Directions of Evidence-Based Practice in Athletic Training: Perceived Strategies to Enhance the Utilization of EBP

Title: Future directions of evidence-based practice in athletic training: perceived strategies to enhance the utilization of EBP

Authors: Cailee Welch McCarty, Dorice A. Hankemeier, Aimee L. Thornton, Danica G. Hays, William A. Pitney, Bonnie L. Van Lunen,

To Be Submitted: Journal of Athletic Training
Introduction

The athletic training profession has begun to place greater emphasis on evidence-based practice (EBP) to align with the 2003 recommendations from the Institute of Medicine. These recommendations focus on the inclusion of five core competencies: (1) delivering patient-centered care, (2) working as part of interdisciplinary teams, (3) practice evidence-based medicine, (4) focusing on quality improvement, and (5) using information technology (Institute of Medicine, 2003). While focusing on the EBP competency, multiple investigations have reported that athletic training students, educators, and clinicians believe that EBP is an important shift for the profession (Hankemeier & Van Lunen, 2011a; Hankemeier, 2011c; Manspeaker & Van Lunen, 2011b; Welch et al., 2011a; Welch et al., 2011b), but barriers including time, accessibility to resources, and knowledge of EBP concepts are preventing athletic trainers from applying this paradigm to clinical practice (Hankemeier & Van Lunen, 2011b; Manspeaker & Van Lunen, 2011a; Manspeaker & Van Lunen, 2011b; Welch & Van Lunen, 2011c). The release of the 5th edition of the Athletic Training Education Competencies, which includes an EBP focus, has provided a preliminary mechanism for overcoming some of these barriers at the professional education level (National Athletic Trainers’ Association, 2011). The hope is that the inclusion of EBP concepts within didactic curricula will promote a new generation of clinicians who will incorporate EBP into their daily clinical practice. The incorporation of EBP will require athletic trainers to understand and teach the principles of EBP didactically, as well as be familiar with and willing to implement the concepts of EBP into clinical practice.
As athletic training education begins to move towards EBP, it is vital that practicing clinicians also embrace and adopt this paradigm shift. The approach to create a culture of evidence-based practice needs to be multi-faceted (Manspeaker & Van Lunen, 2010; Welch & Van Lunen, 2011c) and must be targeted at all athletic trainers, including those who have been raised in a culture of tradition. Overall, one of the main goals of athletic training is to improve the care provided to patients (Snyder, Valovich McLeod & Sauers, 2007). However, until all members of the profession are willing to accept this paradigm shift, athletic training may never fully embrace an EBP culture.

Leaders in the profession recognize the need for change, and are attempting to move in this direction (Albohm, 2011). In addition to updating the educational competencies, more continuing education in the area of EBP has become available to athletic trainers (Hertel, 2005). The NATA Board of Directors provided funding for the development and dissemination of educational EBP modules made available to the entire NATA membership free of cost (Welch, Van Lunen & Hankemeier, 2012). A randomized controlled trial on the ability of these modules to increase knowledge of EBP concepts reported that they were an effective mechanism to teach these concepts to athletic trainers (Welch et al., 2012). It is important to note that only an immediate knowledge increase was assessed, and no current literature has explored long-term knowledge retention among athletic trainers or implementation practices resulting from the online modules.

While education of current athletic trainers is a vital step in shifting the culture of the profession, merely increasing knowledge cannot be assumed to correlate with an actual change in clinical practice. Multiple systematic reviews have been conducted assessing the effectiveness of educational interventions on clinical practice changes.
Forsetlund et al. (2009) concluded that educational meetings elicit small improvements in professional practice and healthcare outcomes. Freemantle et al. (2005) reported that printed educational materials, audit and feedback and meetings/workshops had little to no impact on clinical practice. Most literature determined that multi-faceted educational interventions (e.g., didactic lecture combined with interactive discussion), and active rather than passive interventions, are most effective in changing professional behavior (Bero et al., 1998; Forsetlund et al., 2009; Grol & Grimshaw, 2003; Thomson O'Brien, Freemantle, Oxman, Wolf, Davis & Herrin, 2009; Wensing, Weijden & Grol, 1998). Oxman et al. (1995) and Foy et al. (2002) both found that interventions can only be effective in changing behaviors under ideal conditions, so multiple factors including the condition as well as patient and clinician attributes should be taken into consideration when developing an educational intervention. Overall, a majority of studies conducted to assess clinical practice changes following an intervention indicate that most interventions are effective under some circumstances, but that no single intervention is effective for all circumstances (Grimshaw et al., 2001; Grimshaw, Eccles, Walker & Thomas, 2002; Grol & Grimshaw, 2003).

The true shift to EBP in the profession of athletic training requires not only enhanced knowledge of EBP concepts but also a translation of this knowledge into practices that will improve patient care. Therefore, it is important not only to assess if a knowledge gain has occurred, but also to determine if and how this knowledge has translated to clinical practice. Recent literature has revealed that while athletic trainers perceive they have retained knowledge gained from the online modules, they have not yet shifted that knowledge to their daily practices in patient care (Welch McCarty et al., In
Review). For this reason it is necessary to seek out strategies that will be most effective in bridging the knowledge-practice gap. Qualitatively exploring athletic trainers' perceptions and experiences will lend to a rich perspective of what mechanisms they perceive will be most effective in shifting ideas and behaviors towards clinical practice and didactic education. A qualitative exploration allows participants to provide ideas that are not limited by the researchers’ opinions and biases as well as ones they personally believe will ultimately influence their behaviors. Therefore, the purpose of this qualitative study was to explore the experiences and theories athletic trainers have toward identifying beneficial strategies and techniques to promote successful implementation of evidence-based practice within athletic training education and clinical practice.

**Methodology**

**Design**

The emergent study design of this investigation was modeled after the consensual qualitative research (CQR) approach. Derived from the integration of grounded theory (Corbin & Strauss, 2008), phenomenology (Giorgi, 1985) and comprehensive process analysis (Elliott, 1989), CQR provides an in depth descriptive analysis of participants’ experiences as well as the phenomena in which these experiences occur (Hill, Thompson & Williams, 2005). Furthermore, CQR focuses on the utilization of multiple researchers, the process of reaching a consensus and a methodological approach to constantly and repetitively analyzing multiple cases to reach a comprehensive representativeness of the results (Hill et al., 2005). The CQR approach was selected for this particular qualitative inquiry to explore the experiences and theories athletic trainers had in regard to an educational intervention (i.e. 10 evidence-based practice online learning modules).
implemented to enhance evidence-based practice within clinical practice and didactic education. The study was designed to be an inductive interpretation of what these individuals believed to be important strategies, interventions, and techniques to integrate EBP throughout didactic education and clinical practice.

Due to the consensual process of CQR, multiple researchers are essential to the construction of a solid research team. As complex issues arise within qualitative data, multiple perspectives, opinions, and levels of awareness are needed to increase the approximation of truth and simultaneously diminish researcher bias (Hill et al., 2005). The research team for this study consisted of five athletic trainers. Three of the researchers comprised the primary research team, the fourth researcher held a dual role as a primary research team member as well as the internal auditor and the fifth researcher acted as the external auditor. Auditors are often utilized within CQR to verify the interpretations made by the research team and provide continual appraisal during each stage of data analysis (Hill et al., 2005). It is essential that the auditor ensure the data was closely and appropriately analyzed and multiple perspectives were considered and discussed before a consensus was reached (Hill et al., 2005). For this particular study, the internal auditor provided detailed feedback throughout all stages of data analysis while the external auditor offered additional feedback following cross-analysis. The roles and experience of each research team member for this investigation are displayed in Table V.1.

Participants

Athletic trainers who were participants in the experimental group of a previous research investigation involving the implementation of 10 evidence-based practice online
learning modules \((n=166)\) were considered to be potential participants for this study. To recruit participants, we utilized stratified purposeful sampling and criterion-based sampling methods. Stratified purposeful sampling is often thought of as a sample within samples and allows the researchers to capture major variations that may occur across a population (Patton, 2002). To provide ample representativeness of the athletic training population, an equal number of clinicians and educators were invited to participant in this study. Criterion-based sampling allowed the researchers to select individuals based on a predetermined set of criteria, which therefore provided meaningful results that can be more applicable to the population (Goetz & LeComte, 1984; Hill et al., 2005). To be considered a viable candidate in this study, each athletic trainer had to have been a participant within the experimental group of the “Assessment of Athletic Trainers’ Evidence-Based Practice Concept Knowledge Following an Educational Intervention” study and had to have accessed all 10 online learning modules, as determined via the online module usage data sheet provided by the NATA office.

Due to the exploratory nature of CQR, it is suggested to obtain approximately 10-15 participants in hopes of achieving saturation (Hill et al., 2005). Since the interview protocol for this study consisted of two branches, the research team aimed to include 20-30 participants. Twenty-five athletic trainers (14 females and 11 males) participated in this investigation before the research team determined that saturation of both branches had been reached. Twelve of the participants were athletic training educators while the other 13 individuals were athletic training clinicians. On average, the participants had 16.00 ± 9.41 years of athletic training experience. All athletic trainers were given last-name pseudonyms to maintain participant anonymity (Table V.2). This study was
approved by the University Human Subjects Committee for Exempt Research, and participant consent was obtained via email prior to data collection as well as verbally at the beginning of each individual interview.

**Instrumentation**

One of the essential components of CQR is to use open-ended questions (i.e. interviews, questionnaires) and a semi-structured approach in order to collect consistent data across all participants (Hill et al., 2005). Due to the lack of a preexisting interview protocol that specifically addressed the research aims of this investigation, the research team developed a unique semi-structured interview protocol (Appendix C) consisting of 12 open-ended questions along with potential probe questions when necessary. The primary researcher constructed the initial interview questions utilizing the study's research aims as guidelines for question development. To capture appropriate responses from educators and 12, two interview branches were developed. The educator branch tailored the twelve questions to didactic education while the clinician branch tailored the questions to clinical practice. Two members of the research team reviewed the initial interview protocols and changes were made accordingly. Following review, two pilot interviews were conducted with athletic trainers who had previously accessed the EBP online modules but did not meet the predetermined inclusion criteria for this investigation. Each pilot interview helped to revise the wording of questions to ensure clarity, as well as provided the research team with insight on the type of data that would likely be obtained during data collection.

**Procedures**
Once participants who met the predetermined criteria were identified and the sample was stratified, the primary researcher contacted the potential participants via email. The email included the purpose of the investigation, contact information for any questions and a request for his or her voluntary participation. Due to the anticipated locations of the athletic trainers participating in this research, the primary mode of data collection was conducted via telephone. Once the candidate agreed to participate, an individual 30-40 minute interview time was scheduled via telephone and the participant completed a brief demographic questionnaire via email. Based on the semi-structured interview protocol designed for this study, the primary researcher placed athletic trainers into one of two distinguished branches: (a) the participant’s primary athletic training role was clinical and they were more apt to provide in-depth feedback on questions relating to clinical practice, or (b) the participant’s primary athletic training role was educational and they were more apt to provide in-depth feedback on questions relating to didactic curricula. This investigation began in November 2011 and continued until data saturation was met for all questions in each interview branch.

Once an individual interview was completed, a transcriptionist transcribed the audio file. Proper names, places and any other identifying information were masked within each transcript to protect the participants’ confidentiality (Hill et al., 2005). Each transcription was then sent to the participant as a means of enhancing trustworthiness. ‘Member checks’ allow the participant to provide any additions or clarifications to the transcript (Lincoln & Guba, 1985). However, it was essential to provide the participant with clear instruction that the information already presented within the transcript could not be deleted or altered in any way.
Data Analysis and Management

Data analysis for the CQR approach was an intricate process involving three progressive stages: (a) identifying initial code domains, (b) extracting core ideas from each domain, and (c) cross-analysis of multiple participant interviews via development of categories and themes. Initial code domains were utilized to group data about similar topics (Hill et al., 1997). Once the domains were identified, researchers coded the initial transcripts and placed the data in a domain as they saw fit. Coding multiple transcripts at this stage allowed the researchers to get a clearer sense of the content that will represent each domain (Hill et al., 2005). Once the data was placed in domains, the next stage of data analysis involved constructing core ideas from each domain. This process is often called ‘abstracting’ (Corbin & Strauss, 2008), and essentially involved summarizing what the participant said in each domain in a more concise manner (Hill et al., 2005). Finally, cross-analyses of multiple participant interviews occurred. During this phase, the researchers looked for relationships, similarities and differences that emerged from the interviews when they were examined together. Cross-analysis allowed the researchers to distinguish categories in which the core ideas could be placed (Hill et al., 2005). These categories were discovered based on the data provided and were not established from the literature or preconceived ideas (Mahrer, 1988; Hill et al., 2005). Additionally, categories were often modified as the researchers became more familiar with the data.

Once cross-analysis was completed, it was also necessary to characterize the frequency of occurrence for all categories. More specifically, frequency counting allowed the research team to determine how often each category was applied across the whole sample, which therefore provided a sense of representativeness of the entire sample (Hill
et al., 2005). Frequency of the categories was broken into four components: (a) general, (b) typical, (c) variant, or (d) rare. A category was considered *general* if it applied to all, or all but one case, *typical* if it applied to more than half of the cases, *variant* if it applied to less than half of the cases, and *rare* if the data related to only 2-3 cases (Hill et al., 2005).

Prior to the start of data collection for this study, research team members and auditors were trained on the CQR data analysis process. Training suggestions from Hill et al. (2005) were applied to ensure all members had the same understanding of how the process would occur throughout the investigation. The primary researcher conducted additional training sessions with the novice qualitative researcher. Inclusion of the novice researcher was deemed advantageous to data analysis, as the novice researcher may provide a fresh perspective and interpretation of the results since her biases at that point were limited. Since involvement of the research team and auditors varied throughout the data analysis process, Figure V.1 displays an outline of events.

To enhance the trustworthiness of the results from this qualitative study, it was important to implement several strategies. The CQR approach inherently guaranteed that triangulation and peer debriefing occurred. By including multiple researchers in the data analysis of this investigation, we were able to continually triangulate the data by ensuring that at least two researchers were involved in every phase of analysis to diminish research bias. Additionally, the inclusion of two auditors enhanced the realm of additional perspectives to ensure that multiple avenues had been considered (Hill et al., 2005). Another strategy utilized within the investigation to ensure trustworthiness was member checks (Patton, 2002). Member checking was employed in this investigation to ensure
coherence between the study’s intended purpose and the methodology. This strategy was utilized in various forms throughout the data collection process. First, the primary researcher used probing questions during the individual interviews to confirm participant responses as well as explore concepts further. Secondly, each participant was provided the opportunity to review the transcript once it was transcribed to confirm its accuracy and representativeness of their expressions and ideas.

Results

The CQR emergent design revealed five themes relating to the EBP online modules, and the conceptual framework of themes is displayed in Figure VI.1. For the purposes of this manuscript, we solely focused on educators’ and clinicians’ perceptions of useful strategies to continue to integrate EBP throughout all facets of the athletic training profession.

Future Direction of Evidence-Based Practice

Throughout data analysis it was evident that athletic trainers had several ideas for strategies that would be beneficial to help the profession incorporate EBP into didactic education as well as clinical practice. Data from this theme was further reduced into six categories: provide more resources for implementation, more processed information, offer focused workshops, peer discussion and mentorship, continual repetition and exposure, and professional responsibility.

Provide More Resources for Implementation. Athletic trainers’ typically discussed the need for more resources. Participants reported that these resources are essential for effective implementation into didactic curricula, and that the profession of athletic training is lacking such resources. Suggestions ranged from general EBP
resources such as books to very specific resources such as project examples/ideas and how to meet competencies.

*I don’t feel like we necessarily have a really good EBP athletic training source. I think a lot of it is just having a source that they can use that might explain things a little differently than I do.* – Dr. Birch

*I don’t know if it’s a website that contains a list of ideas, or a place where you can find samples or sample assignments. So something that shows you where to start, how to keep going, and how to keep refining assignments to make your students better consumers of evidence as well as practitioners of the evidence.* – DiLorenzo

*Providing some source looking at the competencies and proficiencies and saying this is a great way to incorporate EBP 1.2, and here is how you can tie this back to the module or here is another example of a way the educator can teach this.* – Lavoy

*Maybe another module online, similar to this module format, but change it up to be teaching the educator how to plug it in to the curriculum and how is it going to affect you.* – MacIntosh

**More Processed Information.** Typically, athletic trainers expressed the desire for more processed information in regard to research literature. Participants explained that more processed information would help to minimize the time barrier by reducing the amount of time they perceive they would need to spend searching through the vast amount of literature available.

*If there’s a way for that information to be processed or if every article came with like a quick summary or something like that. If there’s a way to get that information and actually get it processed so you get the understanding of it without the immense time commitment of searching and then reading.* – Parker

*If there was any way to send something on a different topic each week or one each month that would be really helpful because that’s somebody’s taking the time to get that information to us. Especially even for the clinicians, I think this kind of summary would be very helpful to them because they have even less time. If somebody was sending me a weekly or a monthly little blurb about best practices and whatever it is, that would be extremely helpful. So maybe, if they got put in the ROM, because at least with the range of motion that comes with the email, where you are able to just scroll through it and click on the things that are most relevant to you or the most interest.* – Dr. Cavins
I almost wish there was somebody who could hand feed it to me; a specific journal that says this is all level one evidence and anything you read here as long as you are smart enough to apply it within the correct parameters, you can pretty much take it at face value and you don’t have to sit there and dissect it all. It’s like they’re doing all the hard work and in twenty minutes you can get the benefits from it. – Clements

I’m really not that interested in how the evidence is found, I want to see that to a degree, but I’m more interested in the outcome. Tell me which tests do I need to throw out and which ones do I keep. What practices in rehab do I throw out and which ones do I keep. That is the information we all want to get from this; not so much the process, but more focus on the application. That’s the type of information that’s going to affect my clinical practice. – Schaffer

In rare cases, athletic trainers furthered the discussion of more processed information by indicating a disconnect between research literature and clinical practice.

You know there is some aspects that are lost in translation right now of what the evidence is showing how you can apply it just based on how it’s presented, and how especially with the Journal of Athletic Training we are wanting things to be presented with p values and words that might not necessary be needed in order just to explain the findings and how you can apply that to the overall practice. – Pessefall

There’s still a little bit of a disconnect in the research and then the clinical application of it. We have a lot of researchers and their job is to do the research and try to create the best science possible even with all the biases that are out there. Whereas if I’m here and I don’t really interpret data. I don’t look at the statistics on a regular basis, how am I supposed to interpret that to make it a clinical impression? It would be beneficial if researchers gave a better clinical impression of it versus having every clinician be able to interpret the same things a researcher does; or hopefully the two can meet somewhere in the middle. – Parker

**Offer Focused Workshops.** Athletic trainers generally described the need for more focused workshops to be offered throughout the year. State, district, and national conferences were reported to be the most common venue to hold such workshops.

Participants typically expressed an interest in workshops focusing on one or two specific concepts within EBP as building blocks rather than intimidating courses dedicated to a large overview of all concepts involved in EBP.

There needs to be a session on how to take the EBP competencies and implement them into your program. Here is where this could go and granted it is not going to be the same
across the board for everyone, but I just think some examples the ways that you can group these together may be helpful. – Lavoy

Perhaps at the NATA or at the district level, sessions that identify ways to incorporate evidence based practice into the classroom. For example, how to create evidence based practice assignments or how to foster developing good clinical questions. – DiLorenzo

You can offer some sort of course or class, or maybe it would be a couple of classes, I don’t know how long it would take to go over this stuff, but where clinicians in the local area could come, and could try and learn and start implementing some of this stuff. – Clements

I think probably the most bang-for-your-buck is doing workshops and doing stuff either at the convention and district meetings or something like that, I think you will get more and I think you will learn a lot more. If workshops or the sessions were broken up in certain parts or certain tasks, and do something where each topic is kind of discussing and breaking it down individually while letting people do little steps instead of doing it all at once. – Homier

Peer Discussion and Mentorship. Athletic trainers typically expressed the need for peer discussion and mentorship in regard to EBP implementation. More specifically, participants discussed the value of being able to talk about the various concepts involved in EBP with both peers and “experts”. Participants indicated peer discussions on all levels, from staff meetings to the national convention, as well as via some form of web-based open message board would be beneficial.

Eventually, you need to start openly discussing these things with other peers. If you take the modules and you don’t move forward from there, I think you’re not going to be at the point where you can effectively incorporate these things because when you engage the students in the conversations with this, they come up with questions that are hard to answer unless you have your own experience with it. If you’re not actively engaged in them yourself, and if you’re not open to dialogue with peers in these areas, I think it’s going to be challenging to effectively implement them in the classroom. I think people working in education need to take it upon themselves to start having conversations with their own faculty. – Dr. Birch

I think it’s really important to have discussions. Face-to-face discussions at conferences and things, because that’s when you can really weed things out and get some clarity and find out what other people are doing and how they’re doing it, and what they’re using and what’s working well and all those kinds of things. I don’t know whether that could be done in a chat format or something like that if face-to-face is not an option, since across
the country it's hard to get too many people together. But having some way to discuss it with others is kind of the bottom line for me. I can go through it on my own but I need to talk through stuff with other people. – Dr. Harvey

I just like things like either face-to-face like a conference where you can sit and hear what other people are doing because obviously that is where we get a lot of our ideas; I just think it would be helpful. – Lavoy

**Continual Repetition and Exposure.** Participants variably described the importance of repetition and constantly exposing athletic trainers to the concepts involved in EBP.

I think one of the challenging things is that things like the modules are good, but you know if you don’t apply these concepts all the time, you know if you don’t use it you lose it. You need something to come back to that will remind you. Repetition is probably the key to a lot of the more technical concepts at least. – Dr. Birch

I think this point, where EBP is within the profession itself, I think the biggest strategy, which the NATA is doing quite well, is just exposing athletic trainers to EBP. Letting them know the good things that can come from it. Putting it in different publications like the NATA News and the Journal of Athletic Training as much as they can. I think that’s a very good way of doing it. I think exposure is going to be the biggest part just to get people used to hearing about it. – Eckert

So I think that the information just has to keep coming out and there should always be at least one article in the journal on evidence based practices; something that is going to just always keep reminding us. – Schaffer

Again it’s multi-factorial, the modules and the journal; you just need to keep coming at it from angle after angle after angle until it gets better. There’s no single strategy to solve it. – Dr. McDaniel

**Professional Responsibility.** Typically, participants indicated that athletic trainers have a professional responsibility to learn and implement EBP within education and clinical practice and that the responsibility needs to be acknowledged at all levels.

Participants expressed that individuals need to take a personal responsibility to learn the information, and governing bodies to be responsible for continuing to “sell” the necessity of EBP to enhance the profession.
I think people working in AT education need to take it upon themselves to be in the habit of reading what's out there, you need to know how you can find the evidence, and you need to understand these theories before you can discuss them in class. But I really think it's a lot of the responsibility of the educators to learn these things if they don't already. It's your responsibility, just like you're responsible for any other content in your course; you're just as responsible to know that. – Dr. Birch

I think it needs to be clear that it's a balanced approach and [the modules] only takes us so far and we have to figure out how we're going to go the rest of the way. I think the individual educator has to take the initiative to learn the things. I mean, I think there's a lot of stuff out there from books to the modules, it's just a matter of the person becoming educated, and willing to take the time to do it. – Meier

You need to prove that this is something that isn't just for the researchers or ATEP programs. You've got to sell it. I think it needs to be talked about it, and put in journals and magazines. Just get it out there in a way that is friendly to people, easy to apply, non-threatening, lots of examples and talk about it in a way that's inviting rather than scary; remove the thought that they need to go to graduate school again to learn this stuff. – Schalde

This is the wave of the future, join it or you're not fulfilling one of your roles as an athletic trainer. – Schaffer

Discussion

Based on the results of this qualitative investigation it appears that athletic trainers in both educational and patient care roles value the need for evidence-based practice in the profession. These findings are in agreement with previous research on perceptions of EBP in athletic training (Hankemeier & Van Lunen, 2011a; Hankemeier, 2011c; Manspeaker & Van Lunen, 2011b; Welch et al., 2011a; Welch et al., 2011b) as well as EBP perceptions in other healthcare professions (Heiwe, Kajermo, Tyni-Lenne, Guidetti, Samuelsson, Anderson & Wengstrom, 2011; Jette et al., 2003; Waters, Crisp, Rychetnik & Barratt, 2009). While recent research and other mechanisms (e.g., release of the 5th edition of the Athletic Training Education Competencies, development of EBP online modules) have been aimed at facilitating a shift in the culture of athletic training from one of tradition to a more evidence based approach, it appears that the transfer from
increased knowledge and awareness of EBP to an actual change in clinical practice may take time. Therefore, we must strive to find successful approaches that will bridge this knowledge-behavior gap.

In an attempt to define appropriate mechanisms for this change, one of the research aims of this study was to determine what strategies athletic trainers felt would be effective in bridging the gap between knowledge and clinical application. Athletic trainers generally proposed similar ideas concerning the future direction that evidence based athletic training should take. Core ideas included more evidence based practice resources and processed information, more focused workshops, peer discussions and mentorship, continual exposure and repetition and professional responsibility.

**More Resources and Processed Information**

The primary motive for practicing in an evidence-based manner is to increase the certainty that a clinical decision will lead to a desirable outcome (Sackett et al., 2000). One of the critical steps in the process of evidence-based practice is to identify information that can guide clinical decision-making. Participants in this investigation reported the need for more concrete resources to help them make a shift to EBP. Such resources include good sources that will educate athletic trainers on the process of EBP itself (e.g. textbooks, online learning modules, webinars) as well as sources of evidence that are directly applicable to athletic training clinical practice (i.e. more research on relevant patient populations). In addition to more resources, participants indicated they believe more processed information will be an effective way to translate research evidence into information that can be utilized in clinical practice, thus helping to diminish the "evidence-practice gap" (Kent, Hutchinson & Fineout-Overholt, 2009, p 183).
Athletic trainers feel that information presented in less scientific terms, and information that clearly demonstrates a positive effect on patient outcomes will help overcome time and knowledge barriers that have previously been reported (Hankemeier & Van Lunen, 2011b; Manspeaker & Van Lunen, 2011a; Manspeaker & Van Lunen, 2011b; Welch & Van Lunen, 2011c). The desire for more digested information is not a novice idea. Thompson et al. (2004) interviewed nurses and found that they preferred sources of information that were quick to access and easy to understand as well as those that were grounded in clinical usefulness. Likewise, Grol and Grimshaw (2003) published a review that focused on effective strategies for changing patient care, and reported that clinical guidelines offering a more concrete description of a desired clinical application were associated with better compliance with the recommendations. More processed information will also eliminate the need for the traditional “search-appraise-implement cycle” (Thompson et al., 2004, p. 71) that is often considered intimidating by athletic trainers who are unfamiliar with research methodology and statistics terminology.

To date, numerous efforts have been made towards offering athletic trainers resources and more processed information. The NATA Executive Committee for Education (ECE) has developed the EBP Task Force Initiative, which focuses on provided athletic training educators and clinicians with the resources they may need to enhance their knowledge of EBP and begin to take the steps towards translating that information into clinical practice (Brown, 2011). Along with the development of online modules to enhance athletic trainers’ knowledge of EBP, another resource initiated by the EBP Task Force is the inclusion of the ‘Clinical Bottom Line’ in the NATA News. The ‘Clinical Bottom Line’ offers processed information that addresses practices and
procedures supported by evidence, and includes additional references and resources. This column has appeared in the *NATA News* periodically since 2010 and has covered topics such as soft tissue tests to evaluate ACL injuries and meniscal injuries, how to incorporate the global rating of change (GRoC) scale into clinical practice, and the effects of interferential current to reduce pain of musculoskeletal conditions.

Other valuable resources for athletic trainers looking for more processed information are Critically Appraised Topics (CATs). A CAT is published summary of evidence that synthesizes multiple studies (no fewer than three) assessing the same general topic of interest (Wingerchuk, 2007). A CAT provides its reader with a mechanism to incorporate current evidence into clinical practice in a manner that minimizes the time necessary to search and appraise the literature (Welch, Yakuboff & Madden, 2008). Critically appraised topics have been published on numerous topics relating to athletic training practices, and full CATs can be accessed at no cost via the *Journal of Sport Rehabilitation* (http://journals.humankinetics.com/jsr-extras/jsr-critically-appraised-topics-cats).

**Focused Workshops**

One commonly employed mechanism for disseminating information in the hopes of altering knowledge and behavior is through conventions and workshops. This strategy seems appealing because it allows a large group of people to receive the same information in a relatively time-efficient and inexpensive manner, and generally takes little to no active engagement with research evidence on the part of the audience. However, many times this format may serve as a platform for researchers to promote evidence that may not necessarily be clinically applicable. In addition, many attendees of
these conventions are merely looking to fulfill a continuing education requirement and are not focused on understanding or retaining the information presented. Throughout this investigation it became apparent that athletic trainers believe smaller more focused workshops would be a better strategy to change clinical practices than large group sessions or workshops that incorporate too much information. They feel that learning things in smaller pieces and practicing those pieces one at a time before trying to fit all the pieces of the puzzle together will benefit them. This finding is consistent with other investigations in healthcare professionals. Nicholson et al. (2007) found that a series of workshops focused on literature acquisition and appraisal skills was successful in increasing actual EBM skills and participants’ comfort with those skills, however it is unclear whether these increased skills translated into clinical practice. Additionally, Freemantle et al. (2005) reported that workshops and meetings had very little impact on clinical practice.

Workshops covering EBP concepts have been offered at athletic training conferences for several years. The theme of the entire 2009 Athletic Training Educators’ Conference was “Creating a Culture of Evidence-Based Practice” and specifically focused on various topics directly related to evidence-based practice and healthcare outcomes. However, this conference was specifically held for educators and clinicians may not have received the information. Regardless of the venue, there should be a clear differentiation between introductory and advanced level EBP workshops. Introductory workshops should typically include information pertaining to the basics of EBP as well as literature searching and critical appraisal, while more advanced courses should focus on higher-level statistical concepts (Yousefi-Nooraie et al., 2007). Introductory workshops
that are offered frequently change attitudes of the participants, however many individuals do not usually change their practices after attending a single workshop or short course (Coomarasamy, 2004). Furthermore, including information about advanced level concepts in an introductory workshop may overwhelm a participant and therefore decrease his or her willingness to incorporate these concepts into clinical practice even more. Thus, future workshops and short-courses must be carefully distinguished by the type of material being presented so that athletic trainers will not be engulfed with new information that they were not expecting to receive. This may be accomplished by having a series of workshops that must be attended in sequence, therefore building on the information gained over the course of time.

In addition to workshops and presentations geared towards enhancing skills needed for EBP, many presenters have begun to brand their sessions with the “EBP” qualifier. As “EBP” workshops at the state, district and national level become more common, it is important to ensure that the workshops are focused rather than all-inclusive. Additionally, it is imperative that presenters who advertise an “EBP” workshop actually present clinically useful information that is supported by all facets of EBP (research evidence, clinical expertise and patient values). Often times the content of these sessions is related only to a couple of research articles that support a particular health intervention (Melnyk, Fineout-Overholt, Stillwell & Williamson, 2010). Athletic trainers in educational programming roles should also take these suggestions into consideration when developing district, regional and national conventions.

Peer Discussion and Mentorship
Peer discussion and mentorship is an easy and inexpensive way of transferring information in any realm. Many participants discussed the importance of peer discussions. They felt that peer-to-peer discussion is when and how you learn the most, and sharing ideas will be an ideal way to promote an evidence-based practice. Peer-discussions on multiple levels were suggested as a strategy to enhance the use of EBP. Participants suggested strategies such as intimate faculty and staff discussions, peer discussion groups at conventions and remote discussions via electronic message boards. The concept of peer discussions aligns with previous research on the topic of clinical practice change. Bero et al. (1998) conducted a systematic review and determined that interactive meetings, which promoted discussion were a consistently effective intervention. Thompson et al. (2004) found that nurses preferred human sources of evidence over any other sources. In addition to peer discussions, participants commonly discussed the possibility of mentors to promote the use of EBP. EBP mentors are individuals identified as subject matter experts who have the skills to provide in-depth knowledge and skill to individuals seeking assistance (Fineout-Overholt, Williamson, Kent & Hutchinson, 2010). Additionally, mentors can help athletic trainers overcome barriers they perceive to be precluding successful EBP implementation into athletic training education or clinical practice. Participants of this investigation suggested the availability of personal mentors that they could call if they had questions as well as the need for experts in the concepts and implementation of EBP that could act as a support system. As the profession continues to shift towards an EBP culture, it will be important athletic trainers to identify EBP experts that can help them overcome barriers as well as develop strategies for successful EBP integration. The NATA ThinkTanks
(www.nata.org/thinktanks) may be a great mechanism for administrators to identify experts in various areas of EBP, who can lead open member forum discussions in which issues and suggestions above that given area can be discussed.

**Continual Repetition and Exposure**

Most participants firmly believed that one of the most effective strategies for changing the culture of the profession is constant repetition and exposure to EBP concepts as well as constant reminders that practicing in an evidence-based manner will lead to optimal patient care. Many participants discussed the need for multiple exposures or “interventions” to give them a better understanding of EBP and how it can be implemented within clinical practice. The same results have been demonstrated in numerous studies involving a multitude of health care professionals. Davis et al. (1999) reviewed the literature and found that mixed-model interventions led to positive performance changes in physicians and sometimes to better health care outcomes. It has also been demonstrated that the use of multi-faceted interventions led to positive changes in professional behavior and health care outcomes (Oxman et al., 1995). Similarly, it has been reported that a single educational intervention is rarely effective in changing clinical practice (Davis et al., 1999; Grol & Grimshaw, 2003; Wensing et al., 1998). One investigation reported that a single educational intervention did not impact physicians’ practices regarding the detection of depression (Thompson et al., 2000). Likewise, Cameron and Naylor (1999) found that active dissemination of the Ottawa Ankle Rules did not correlate to a decrease in the number of radiographs ordered. Thus, it has been identified that multiple interventions were superior to a single intervention (Wensing et al., 1998). Over the next several years, it will be important for athletic trainers and
leaders in the profession to continue to search for strategies that will enhance the utilization of EBP, as well as continue to implement multiple modes of exposure to EBP. Increasing athletic trainers’ exposure to EBP may be conducted through various mechanisms already available to athletic trainers (e.g., Journal of Athletic Training, NATA News, NATA ThinkTanks, conferences at state, district, and national levels, evidence-based practice online courses).

**Professional Responsibility**

As health care professionals, athletic trainers are responsible for being competent in all knowledge areas and skills that are included in the scope of practice, a notion that can be extrapolated to evidence-based practice. Many participants discussed the ultimate path to change in clinical practice lies in a self-motivated sense of responsibility. Participants agreed that EBP is an important shift in thinking that the profession needs to embrace, and that athletic trainers in all facets of the paradigm need to take on a personal responsibility to advance the profession and move towards a culture of EBP. These results support the findings of Hankemeier & Van Lunen (2011a), which reported that approved clinical instructors perceived that a paradigm shift of thinking is necessary for EBP to successfully become integrated within the athletic training culture.

Often athletic trainers use rationalizations to support their clinical decisions. This concept is not unique to athletic trainers. Kennedy et al. (2004) conducted a qualitative investigation of the knowledge-behavior gap that existed in family medicine residents following an educational intervention and found that a major theme that emerged was rationalizations. In addition, Thompson et al. (2004) revealed that nurses often utilize research only to confirm or support their current practices. Athletic trainers, similar to
other health care professionals, tend to rationalize their lack of applying research knowledge to clinical practice in the form of admitted barriers (Hankemeier & Van Lunen, 2011b; Heiwe et al., 2011; Jette et al, 2003; Manspeaker & Van Lunen, 2011b; Welch & Van Lunen, 2011c). Individuals need to take the responsibility to seek out ways of overcoming those barriers. In addition, they should be willing to proactively engage with the research evidence in hopes of enhancing patient care rather than relying on evidence only to support their current practices (Thompson et al., 2004). One of the barriers identified by athletic trainers is the lack of available research on patient populations they commonly treat (Welch & Van Lunen, 2011c). However, until more research on these populations becomes available, it is essential that athletic trainers seek evidence from other healthcare professions to help make informed decisions within clinical practice.

Athletic training education is responsible for shaping the knowledge, skills and habits of future generations of athletic trainers. It is imperative to note that athletic trainers must recognize their responsibility not only to teach the concepts of EBP in the classroom, but also to adhere to those concepts when discussing clinical skills and competencies. Athletic trainers must play a role in facilitating the transfer of EBP to the clinical component of athletic training education, and must also be willing to alter the way they approach EBP in their daily clinical practice in order to transfer these skills and habits to their students. Fineout-Overholt et al. (2010) suggests that unless students are able to apply the concepts that they learn in the classroom clinically, they will be unlikely to adopt these concepts into their own clinical practice.
Research that is conducted within athletic training should focus on topics that are relevant and applicable to clinical practice as well as be reported in more clinically applicable ways. Furthermore, research should be progressive in nature, conducted on populations that athletic trainers treat (e.g., the physically active population), and should address issues that affect a large number of clients and patients. To help initiate more specific athletic training research, the NATA Research and Education Foundation has announced a request for proposals of investigations designed to produce athletic training clinical outcomes (NATAREF, 2012). This request aligns with the Foundations’ list of research priorities, which includes several areas that will provide evidence for the effectiveness of athletic training services (NATAREF, 2012). However, it is important to note that the funding for these clinical outcome studies may exceed the capabilities of the Foundation, and athletic trainers may need to seek other sources of funding to conduct research. Regardless, producing research on issues that are most relevant to athletic training with findings that are presented in a manner that is easy to understand is a necessary component needed to facilitate a culture of EBP within athletic training.

Limitations

The individuals that participated in this investigation were selected from a specific group of athletic trainers that took part in a study to assess the effect of online modules to enhance knowledge of EBP concepts, and therefore were from a nonrandomized sample of the population. Participants’ experiences or involvement with techniques to effectively implement EBP into athletic training curricula or clinical practice may have influenced their views on which strategies are the most effective. Although we assumed all participants spoke truthfully about their experiences with
strategies to integrate evidence-based practice within the profession, the self-report nature of the educators’ and clinicians’ implementation of EBP within practice may be a limitation as well.

Conclusions

Evidence based practice entails much more than just the understanding of research methodology and data analysis. The proper shift to this culture in athletic training is going to take not only time, but also a continued dedication by athletic trainers to create mutually beneficial strategies that will enhance the implementation of EBP across the profession. No party is more or less important than another and no athletic training venue is excluded. Each and every athletic trainer needs to make a commitment to improving patient care and take the responsibility of playing his or her part in this culture shift. It is important to note that the discussion of EBP in other healthcare professions (e.g., nursing, physical therapy, occupational therapy) began long before it did in athletic training, and these professions are still searching for strategies to fully implement EBP and improve patient care. Just as an athletic trainer’s clinical aim is to facilitate the healing process and promote positive patient outcomes, it should be the aim of the profession as a whole to seek out strategies to accelerate the shift in clinical practice to a culture of EBP and improved patient care. Future research should focus on continuing to identify effective educational interventions for athletic trainers as well as to determine successful strategies to implement EBP into didactic curricula and clinical practice. Additional focus should be given to which strategies most effectively achieve knowledge translation to impact change in clinical practice.
References


Elliott, R. (1989). Comprehensive process analysis: Understanding the change process in significant therapy events. In M. J. Parker & R. B. Addison (Eds.), *Entering the*


knowledge, comfort, and perceived importance of evidence-based practice.


Figure VI.1. Conceptual Framework of Themes and Categories

Implementation of Evidence-Based Practice Online Learning Modules

Interest in the modules
- Learn approaches to EBP
- Teach EBP to Students
- Value the athletic training profession

Perceptions of the modules
- Addressed multiple levels of learners
- Appropriate for audience
- Negative perceptions

Improvements for the modules
- Change length or order of modules
- More applicable to clinical practice
- More examples and interaction

Outcomes following the modules
- Knowledge gain
- Importance and scope of EBP
- Positive impact on teaching

Future direction of evidence-based practice
- Professional Responsibility
- Repetition
- Focused Workshops
- Peer discussion and mentorship
- Provide more resources
- More processed information
CHAPTER VII
CONCLUSIONS

The projects included in this compilation provide insight on the progression of EBP implementation within the athletic training profession over the past several years. The first project identified athletic trainers' attitudes, beliefs, perceived barriers, and accessibility to EBP resources. Athletic trainers had generally positive attitudes towards EBP and believed it was necessary for the advancement of the profession. However, participants reported time, knowledge, and a lack of available resources as the primary barriers preventing successful EBP implementation into athletic training practice.

The barriers identified by athletic trainers led to the development of a series of online learning modules focusing on the concepts involved in EBP. The NATA Board of Directors funded the development of these online modules and the project conducted to assess the effectiveness of the online modules was supported by the NATA. Utilizing a randomized controlled trial research design, we found that participants who access to the online modules had significantly higher post-module EBP knowledge scores than individuals who were not provided access. These results revealed that the implementation of online learning modules is an effective way to enhance athletic trainers' knowledge of EBP.

Although results revealed that the online modules elicited enhanced knowledge of EBP concepts among athletic trainers, it was unclear whether this increase of knowledge had any immediate impact on athletic trainers' behaviors in didactic education and clinical practice. This inquiry led to the third project, which explored athletic trainers' perceived outcomes six months following the initial implementation of the online...
learning modules. Athletic trainers reported the online modules promoted knowledge gain and enhanced the importance of EBP within athletic training, had a positive impact on instruction modes used within didactic curricula, and enhanced their ability to implement EBP within clinical practice. However, most athletic trainers indicated that the online modules had not elicited any direct changes in how they approach patient care in the clinical setting.

Athletic trainers also discussed numerous strategies they perceived would be beneficial for the successful implementation of EBP within the profession. Participants indicated that more resources including more processed information, as well as focused workshops at the state, district, and national level would be helpful mechanisms to help educate athletic trainers on ways to implement EBP into daily practices. Participants also reported need for continual repetition and exposure to EBP, and the benefits of having EBP mentors and experts. Finally, athletic trainers discussed that for a paradigm shift towards an EBP culture to occur, members of the profession must take responsibility and have an open mind to change.

The findings from these projects have demonstrated that although athletic trainers have made improvements regarding EBP over the past few years, the profession still has a long way to go in becoming an EBP culture. Therefore, future research should continue to focus on identifying effective educational interventions for athletic trainers as well as successful strategies to implement EBP throughout the profession. Additional focus should be given to revealing which strategies most effectively achieved knowledge translation to impact change in athletic training clinical practice as well as enhancing the care delivered to patients.
APPENDIX I

THE EVIDENCE-BASED CONCEPTS ASSESSMENT
Evidence-Based Concepts Assessment

The purpose of this study is to assess the knowledge, importance, and accessibility of evidence-based practice of athletic training educators and clinicians. This research study has been approved by the Human Subjects Committee of the Darden College of Education at Old Dominion University.

This survey is broken into 6 main sections:
1. Importance (6 Likert scale questions)
2. Attitudes & Beliefs (15 Likert scale questions)
3. Accessibility (2 multiple part questions)
4. Knowledge (6 Multiple Choice questions)
5. Barriers (16 Likert scale questions)
6. Demographics

The survey will take you approximately 15-20 minutes to complete. Please read all questions and answer them to the best of your ability. Your completion of this survey will be considered your consent to participate in this study. All information that you provide will be kept confidential. Upon completion of each survey page press the NEXT button and the next page of questions will appear. If you need to stop the survey and return to it later, please press the SAVE button. This will allow you to start the survey from where you left off. When you have completed the survey, please push the FINISH button to submit your responses.

Thank you in advance for your participation.

Evidence-Based Concepts Assessment
Part One: Importance

DIRECTIONS:
Please rate how important each concept of the evidence-based practice process is to you using the following choices

EBP Concept
A. This concept is very important for the evidence-based practice process
B. This concept is moderately important for the evidence-based practice process
C. This concept is minimally important for the evidence-based practice process
D. This concept is not important for the evidence-based practice process

1. Developing a clinical question
   [Choose one]
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

2. Identifying a clinical question
   [Choose one]
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

3. Identifying evidence
   [Choose one]
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

4. Evaluating evidence
   [Choose one]
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

5. Applying evidence
   [Choose one]
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

6. Integrating evidence
   [Choose one]
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

7. Disseminating evidence
   [Choose one]
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important
2. Critically appraising the literature for use in decision making
   {Choose one}
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

3. Basing clinical decision making on current best evidence
   {Choose one}
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

4. Using evidence-based practice to influence patient outcomes
   {Choose one}
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

5. Searching the literature for information to support clinical practice
   {Choose one}
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

6. Allowing your personal experience to influence a clinical decision
   {Choose one}
   ( ) Very Important
   ( ) Moderately Important
   ( ) Minimally Important
   ( ) Not Important

Evidence-Based Concepts Assessment
Part Two: Attitudes & Beliefs

DIRECTIONS:
For the following series of questions, please assess your beliefs using these choices:

A. I strongly agree with this statement
B. I agree with this statement
C. I disagree with this statement
D. I strongly disagree with this statement
1. Application of evidence-based practice is important to the credibility of the athletic training profession.

   (Choose one)
   ( ) Strongly Agree
   ( ) Agree
   ( ) Disagree
   ( ) Strongly Disagree

2. Literature and research findings are useful in my day-to-day practice.

   (Choose one)
   ( ) Strongly Agree
   ( ) Agree
   ( ) Disagree
   ( ) Strongly Disagree

3. I need to increase the use of evidence in my daily practice.

   ( ) Strongly Agree
   ( ) Agree
   ( ) Disagree
   ( ) Strongly Disagree

4. The adoption of evidence-based practice places unreasonable demands in my daily practice.

   (Choose one)
   ( ) Strongly Agree
   ( ) Agree
   ( ) Disagree
   ( ) Strongly Disagree

5. I am interested in learning or improving the skills necessary to incorporate evidence-based practice in to my practice.

   (Choose one)
   ( ) Strongly Agree
   ( ) Agree
   ( ) Disagree
   ( ) Strongly Disagree

6. Evidence-based practice improves the quality of patient care.

   (Choose one)
   ( ) Strongly Agree
   ( ) Agree
   ( ) Disagree
   ( ) Strongly Disagree

7. Evidence-based practice does not take into account the limitations of my clinical practice setting.

   (Choose one)
   ( ) Strongly Agree
   ( ) Agree
   ( ) Disagree
   ( ) Strongly Disagree
8. Strong evidence is lacking to support most of the interventions I use with my patients. 
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

9. Evidence-based practice is a process that helps me make decisions about patient care. 
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

10. Evidence-based practice does not take into account patient preferences. 
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

12. Using evidence-based practice will reduce my professional independence in clinical decision making. 
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

13. The concept of evidence-based practice is a "fad" that will come and go. 
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

14. Developing a clinical question helps direct my search for evidence. 
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
15. Strong evidence is lacking to support the primary population(s) I work with.

{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

Evidence-Based Concepts Assessment
Part Three: Accessibility

DIRECTIONS:
Use of Literature
For the next series of questions, please respond to the following statement using the provided responses:

Which of the following time frames best describes the number of times you utilize the following resources to influence your clinical practice?

1. Systematic Reviews and/or Meta-Analyses
{Choose one}
( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source

2. Peer-Reviewed Journal Articles
(e.g. Journal of Athletic Training, American Journal of Sports Medicine, Journal of Strength and Conditioning Research, etc.)
{Choose one}
( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source

3. Clinical Prediction Rules
{Choose one}
( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source
4. Professional Literature
(e.g. NATA News, Training & Conditioning, BioMechanics, etc.)

[Choose one]

( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source

5. Cochrane Databases

[Choose one]

( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source

6. Medline/Pub Med Databases
(e.g. Ovid SP, Pub Med, Medline, etc.)

[Choose one]

( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source

7. NATA Think Tanks

[Choose one]

( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source

8. Textbooks

[Choose one]

( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source
9. Websites
(e.g. Google Scholar, Wikipedia, WebMD, etc.)
{Choose one}
( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source

10. NATA Position Statements
{Choose one}
( ) More than once a week
( ) Once a week
( ) Bi-weekly
( ) Once a month
( ) Less than once a month
( ) Never
( ) I am unfamiliar with this source

DIRECTIONS:
Availability of Information
Direct Access is defined as being able to access the resource and its content through work or home yourself without assistance from other individuals.

Which of the following resources do you have direct access to? (Please check all that apply)
{Choose all that apply}
( ) Systematic Reviews and/or Meta-Analyses
( ) Peer-Reviewed Journal Articles
( ) Clinical Prediction Rules
( ) Professional Literature
( ) Cochrane Databases
( ) Medline/Pub Med Databases
( ) NATA Think Tanks
( ) Textbooks
( ) Websites
( ) NATA Position Statements

Evidence-Based Concepts Assessment
Part Four: Knowledge

1A. What is the first step in evidence-based practice process?
{Choose one}
( ) Searching for research literature
( ) Critically appraising the current research
( ) Defining a clinical question
( ) Choosing a research database
1B. How confident are you that you answered this question (1A) correctly?
{Choose one}
   ( ) Not at all
   ( ) Mildly
   ( ) Moderately
   ( ) Extremely

2A. Which type of research design is considered to have the highest quality of evidence?
{Choose one}
   ( ) Randomized controlled trial
   ( ) Independent laboratory investigation
   ( ) Case study
   ( ) Single subject design

2B. How confident are you that you answered this question (2A) correctly?
{Choose one}
   ( ) Not at all
   ( ) Mildly
   ( ) Moderately
   ( ) Extremely

3A. When defining a clinical question using the PICO technique, which factor should you consider first?
{Choose one}
   ( ) Return to play criteria
   ( ) Patient goals
   ( ) Potential interventions
   ( ) Personal experience

3B. How confident are you that you answered this question (3A) correctly?
{Choose one}
   ( ) Not at all
   ( ) Mildly
   ( ) Moderately
   ( ) Extremely

4A. When assessing the outcome of a treatment you used, what factor would MOST likely lead you to use it again?
{Choose one}
   ( ) Patient satisfaction with outcome
   ( ) Outcome agreement with current literature
   ( ) Short length of treatment time to achieve outcome
   ( ) Outcome achieved consistent with selected goals

4B. How confident are you that you answered this question (4A) correctly?
{Choose one}
   ( ) Not at all
   ( ) Mildly
   ( ) Moderately
   ( ) Extremely
5A. When conducting a literature search, which of the following online sources holds the highest quality content?

{Choose one}

( ) Google Scholar
( ) Medline
( ) Cochrane Database
( ) WebMD

5B. How confident are you that you answered this question (5A) correctly?

{Choose one}

( ) Not at all
( ) Mildly
( ) Moderately
( ) Extremely

6A. In what way should your personal experience with a particular treatment contribute to your clinical practice?

{Choose one}

( ) Develop expertise that can be passed on to students
( ) Guide future clinical practice and decision making
( ) Provide solid evidence in the support to treatments
( ) Create standard treatment protocols for all patients

6B. How confident are you that you answered this question (6A) correctly?

{Choose one}

( ) Not at all
( ) Mildly
( ) Moderately
( ) Extremely

Evidence-Based Concepts Assessment
Part Five: Barriers

EBP Barrier
A. I strongly agree this item is a barrier preventing me from utilizing EBP
B. I agree this item is a barrier preventing me from utilizing EBP
C. I disagree this item is a barrier preventing me from utilizing EBP
D. I strongly disagree this item is a barrier preventing me from utilizing EBP

1. Accessibility of information resources

{Choose one}

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
2. Support from Administration

Choose one

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

3. Ability to critically appraise the literature

Choose one

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

4. Ability to find research literature that relates to my patient population

Choose one

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

5. Personal confidence to implement changes in my clinical practice

Choose one

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

6. Personal interest in evidence-based practice

Choose one

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

7. Accessibility of patient outcome assessments

Choose one

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

8. Understanding of the evidence-based practice process

Choose one

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
9. Collective support among colleagues in my facility
   \( \texttt{Choose one} \)
   \(-\) Strongly Agree
   \(-\) Agree
   \(-\) Disagree
   \(-\) Strongly Disagree

10. Application of research findings to individual patients with unique characteristics
    \( \texttt{Choose one} \)
    \(-\) Strongly Agree
    \(-\) Agree
    \(-\) Disagree
    \(-\) Strongly Disagree

11. Understanding of statistical analyses
    \( \texttt{Choose one} \)
    \(-\) Strongly Agree
    \(-\) Agree
    \(-\) Disagree
    \(-\) Strongly Disagree

12. Ability to make independent clinical decisions
    \( \texttt{Choose one} \)
    \(-\) Strongly Agree
    \(-\) Agree
    \(-\) Disagree
    \(-\) Strongly Disagree

13. Ability to develop an answerable clinical question
    \( \texttt{Choose one} \)
    \(-\) Strongly Agree
    \(-\) Agree
    \(-\) Disagree
    \(-\) Strongly Disagree

14. Time
    \( \texttt{Choose one} \)
    \(-\) Strongly Agree
    \(-\) Agree
    \(-\) Disagree
    \(-\) Strongly Disagree

15. Familiarity with Internet databases and search engines
    \( \texttt{Choose one} \)
    \(-\) Strongly Agree
    \(-\) Agree
    \(-\) Disagree
    \(-\) Strongly Disagree
16. Availability of evidence-based practice mentors

{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

Evidence-Based Concepts Assessment
Part Six: Demographics

1. Age:
{Enter text answer}

2. Gender:
{Choose one}
( ) Male
( ) Female

3. Ethnicity:
{Choose one}
( ) African American
( ) Asian
( ) Caucasian
( ) Latin American
( ) Native American
( ) Pacific Islander
( ) Other

4. How many years of experience do you have as a certified athletic trainer:
{Enter text answer}

5. Which of the following degrees have you earned? (select all that apply)
{Choose all that apply}
( ) Bachlors degree
( ) Masters degree
( ) EdD
( ) PhD
( ) DPT
( ) MD
( ) DO
( ) PA
( ) Other [ ]

6. What year did you receive your most recent educational degree?
{Enter text answer}
[ ]
7. Professional Credentials
(choose all that apply)

( ) ATC
( ) CSCS
( ) EMT
( ) MD
( ) OT
( ) PA
( ) PT
( ) PTA

8. Which of the following best describes the setting at which you do the majority of your patient care:

(choose one)

( ) Clinic
( ) College/University
( ) High School
( ) Hospital
( ) Industrial
( ) Military/Law Enforcement
( ) Performing Arts
( ) Professional Sports
( ) I do not do patient care

9. Which of the following job titles most closely describes your current position in the athletic training facility?

(choose one)

( ) Head Athletic Trainer
( ) Assistant Athletic Trainer
( ) Graduate Assistant Athletic Trainer
( ) Director of Sports Medicine
( ) Physician Extender
( ) I do not work in the athletic training facility
( ) Other [ ]

10. How many years have you been employed at your current place of employment?

(enter text answer)

[ ]

11. How many full-time certified athletic trainers (including yourself if applicable) are in the facility in which you do the majority of your patient care?

(enter text answer)

[ ]

12. On average, how many hours per week do you work clinically?

(enter text answer)

[ ]
13. In which of the following NATA districts do you do the majority of your patient care?

(Choose one)

( ) District 1 (ME, NH, MA, RI, CT, VT)
( ) District 2 (NY, PA, NJ, DE)
( ) District 3 (SC, NC, VA, WV, MD, DC)
( ) District 4 (OH, MI, IL, IN, WI, MN)
( ) District 5 (OK, KS, NE, SD, ND, IA, MO)
( ) District 6 (TX, AR)
( ) District 7 (NM, AZ, UT, CO, WY)
( ) District 8 (CA, NV, HI)
( ) District 9 (FL, GA, AL, MS, LA, TN, KY)
( ) District 10 (WA, OR, ID, MT, AK)

Thank you for your time and participation in this study. It is greatly appreciated!

All comments and questions should be directed towards:

Cailee Welch, MSEd, ATC
Doctoral Student, Human Movement Sciences
Old Dominion University
cewelch@odu.edu
APPENDIX II

THE EVIDENCE-BASED PRACTICE KNOWLEDGE ASSESSMENT
Evidence-Based Practice Knowledge Assessment

The purpose of this study is to assess the effectiveness of online learning modules with information pertaining to evidence-based practice (EBP) concepts. These modules have been developed for the NATA to educate the membership on important components of evidence-based practice within education and clinical practice. This study has been approved by the Old Dominion University Human Subjects Committee and is funded by the NATA.

This assessment is broken into 2 sections:
1. Knowledge assessment (60 Multiple Choice questions)
2. Demographics

The assessment will take you approximately 35 minutes to complete. Please read all questions and answer them to the best of your ability. Your completion of this assessment will be considered your consent to participate in this study. All information that you provide will be kept confidential. Upon completion of each survey page press the NEXT button and the next page of questions will appear. If you need to stop the survey and return to it later, please press the SAVE button. This will allow you to start the survey from where you left off. When you are finished, be sure to press the FINISH button to submit your responses.

Thank you in advance for your participation.

Evidence-Based Practice Knowledge Assessment

Before you continue, you must create your participant identification code. This code will be used to match your responses from the multiple choice exams; this code will not be linked back to you in any way. Your code will consist of the following information:

First Initial - Last Initial - Last 2 digits of the year you were born - State you were born in - Last 2 digits of your NATA membership number

For example: John Doe was born in Massachusetts in 1971 and his NATA membership number is 00010. His participant identification code will therefore be JD71MA10

Please enter your specific participant identification code
(Do not include spaces or dashes)

{Enter text answer}

[ ]
Evidence-Based Practice Knowledge Assessment
Part One: Knowledge

DIRECTIONS: Please answer the following questions to the best of your ability.

1. What does the letter "I" correspond to in the PICO format for developing a clinical question?
   {Choose one}
   ( ) A. Interdisciplinary
   ( ) B. Interference
   ( ) C. Intersession
   ( ) D. Intervention

2. Which step of the evidence-based practice process incorporates clinical expertise?
   {Choose one}
   ( ) A. Appraising the evidence
   ( ) B. Assessing the outcome of applying the evidence
   ( ) C. Integrating the evidence
   ( ) D. Searching the evidence

3. Which component of the PICO format can be excluded when developing a clinical question?
   {Choose one}
   ( ) A. Comparison
   ( ) B. Intervention
   ( ) C. Patient
   ( ) D. Outcome

4. Which of the following is the National Library of Medicine's controlled vocabulary of biomedical terms?
   {Choose one}
   ( ) A. Boolean operators
   ( ) B. Keywords
   ( ) C. MeSH terms
   ( ) D. Truncated terms

5. Which PubMed tool will divide the results of a literature search into clinical studies, systematic reviews, and medical genetics?
   {Choose one}
   ( ) A. Clinical queries
   ( ) B. Display settings
   ( ) C. My NCBI
   ( ) D. Results page

6. Which term refers to frequently occurring words that have little meaning and cannot be used alone in a literature search?
   {Choose one}
   ( ) A. Boolean operators
   ( ) B. Keywords
   ( ) C. Stop words
   ( ) D. Truncated terms
7. Which EBSCOhost feature allows up to 5,000 characters to be typed or pasted into the search box and then summarizes the text into the most relevant terms before conducting the literature search?

{Choose one}
( ) A. Boolean/Phrase
( ) B. Find all search terms
( ) C. Find any of my search terms
( ) D. SmartText searching

8. When typing two keywords into the search bar that must appear together in the same document, which Boolean operator(s) should be inserted between them?

{Choose one}
( ) A. AND
( ) B. NOT
( ) C. OR
( ) D. All of the above

9. Which PubMed feature allows users to save search results and create personal search preferences?

{Choose one}
( ) A. Advanced search page
( ) B. Basic search page
( ) C. My NCBI
( ) D. Results page

10. Which EBSCOhost feature allows personal notes to be typed and saved in a file for future viewing?

{Choose one}
( ) A. Create note
( ) B. My NCBI
( ) C. Search history
( ) D. SmartText searching

11. Google Scholar Beta ranks articles according to which of the following factors?

{Choose one}
( ) A. How many versions exist of the article
( ) B. How often the article has been cited
( ) C. Where the article was published
( ) D. B and C

12. An article in which the author describes the evaluation and treatment of a football player with effort thrombosis in the nondominant arm is considered what type of research?

{Choose one}
( ) A. Case-control
( ) B. Case report
( ) C. Case series
( ) D. Cohort
13. Which type of research compiles individual studies to increase statistical power?
(Choose one)
( ) A. Case series
( ) B. Cohort
( ) C. Meta-analysis
( ) D. Systematic review

14. Which type of research collects evidence from multiple research studies through a rigorous literature searching and critical appraisal process?
(Choose one)
( ) A. Case-control
( ) B. Literature review
( ) C. Randomized controlled trial
( ) D. Systematic review

15. Which type of research involves observing a patient who has a particular condition while simultaneously observing similar individuals who do not have the condition?
(Choose one)
( ) A. Case-control
( ) B. Case report
( ) C. Randomized controlled trial
( ) D. Systematic review

16. Randomly assigning subjects into either a group of whole-body vibration and resistance training or a group of resistance training only in order to assess the effects of a novel vibration intervention directed at the upper extremity is an example of what type of research?
(Choose one)
( ) A. Cohort
( ) B. Meta-analysis
( ) C. Randomized controlled trial
( ) D. Systematic review

17. In which type of study does the researcher develop research questions based upon available data?
(Choose one)
( ) A. Compilation study
( ) B. Prospective study
( ) C. Retrospective study
( ) D. Systematic review

18. Which of the following is a number rating system that is assigned to assess the validity of a study?
(Choose one)
( ) A. Grade of recommendation
( ) B. Grade of recommendation for patient-oriented evidence
( ) C. Level of evidence
( ) D. All of the above
19. Which of the following examples is NOT representative of patient-oriented evidence?

Choose one
- A. Blood pressure
- B. Cost reduction
- C. Mortality
- D. Quality of life

20. Which appraisal scale is commonly used to assess the quality of a randomized controlled trial?

Choose one
- A. Jadad
- B. PEDro
- C. QUORUM
- D. A and B

21. According to the Oxford Centre for Evidence-Based Medicine (CEBM), which of the following grading criteria is representative of a "B" grade of recommendation?

Choose one
- A. Evidence that comes from Level 4
- B. Inconsistent Level 1 evidence that shows promise
- C. Insufficient evidence to make a recommendation
- D. Level 1 evidence with consistent results

22. Which of the following best describes the purpose of the Quality of Reports of Meta-Analyses of Randomized Controlled Trials (QUORUM)?

Choose one
- A. To assess the methodological quality of the meta-analysis and provide a rating score
- B. To provide a grade of recommendation for the randomized controlled trials included in the meta-analysis
- C. To suggest a standardized guideline for authors to use when reviewing and reporting meta-analyses
- D. All of the above

23. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) appraisal checklist identifies items that should be included in which of the following type(s) of research studies?

Choose one
- A. Case-control studies
- B. Cohort studies
- C. Cross-sectional studies
- D. All of the above

24. Which of the following three criteria is the Jadad appraisal scale based on?

Choose one
- A. Blinding, randomization, withdrawals/dropouts
- B. Number of participants, randomization, accuracy of results
- C. Type of research design, withdrawals/dropouts, accuracy of results
- D. Number of participants, blinding, outcome measurements
25. According to the Strength of Recommendation Taxonomy (SORT), which of the following type of research provides the highest level of evidence?

Choose one

A. Case report
B. Clinical observation
C. Prospective cohort
D. Randomized controlled trial

26. The Consolidated Standards of Reporting Trials (CONSORT) appraisal checklist provides guidelines for reporting which of the following type(s) of research?

Choose one

A. Meta-analysis
B. Randomized controlled trial
C. Systematic review
D. All of the above

27. Which of the following statements is considered to be an identified disadvantage of the Physiotherapy Evidence Database (PEDro) appraisal scale?

Choose one

A. Criteria are not well defined therefore making the scale difficult to apply to a research article
B. It includes the same criteria as another appraisal scale (Jadad)
C. Reliability has not been established at an acceptable level
D. Three separate blinding criteria make it difficult to attain a high quality score

28. The Quality Assessment of Studies of Diagnostic Accuracy Included in Systematic Reviews (QUADAS) assesses which of the following criteria?

Choose one

A. Description of index test execution
B. Description of reference standard execution
C. Reporting of selection criteria
D. All of the above

29. According to the Oxford Centre for Evidence-Based Medicine (CEBM) levels of evidence rating scale, a rating of "5" is associated with which type of study?

Choose one

A. Case control
B. Cohort
C. Expert opinion
D. Randomized controlled trial

30. The Jadad scale is an appraisal scale that assesses the methodological quality of which of the following types of research?

Choose one

A. Case report
B. Clinical observation
C. Prospective cohort
D. Randomized controlled trial
31. Which "Model" for intraclass correlation coefficients is used when the raters represent the only raters of interest for the reliability study?

( ) A. 1
( ) B. 2
( ) C. 3
( ) D. 4

32. Which of the following is a characteristic associated with the Kappa statistic?

( ) A. Used for the assessment of interval data
( ) B. Used for the assessment of nominal data
( ) C. Used for more than two raters
( ) D. Used to assess validity of a measure

33. Which intraclass correlation coefficient equation is applicable when the raters are randomly chosen from a larger population of raters, each subject is assessed by the same rater, and the mean of several recordings of a measure is used?

( ) A. 1,k
( ) B. 1,1
( ) C. 2,k
( ) D. 2,1

34. Which "Model" for intraclass correlation coefficients is rarely useful in clinical reliability studies?

( ) A. 1
( ) B. 2
( ) C. 3
( ) D. 4

35. Which statistic would be used to assess the proportion of agreement between raters when evaluating the presence or absence of a condition?

( ) A. Percent agreement
( ) B. Interclass correlation coefficient
( ) C. Intraclass correlation coefficient
( ) D. Kappa statistic

36. Which of the following intraclass correlation coefficient values corresponds to a "moderate reliability" interpretation?

( ) A. 0.00 - 0.50
( ) B. 0.51 - 0.75
( ) C. 0.76 - 0.90
( ) D. 0.91 - 1.00
37. Which Intraclass correlation coefficient equation is applicable when the raters used are the only ones of interest, the same raters assess each subject, and the reliability of a single measure is assessed?

{Choose one}
( ) A. 1,1
( ) B. 2,1
( ) C. 3,1
( ) D. 4,1

38. Which Kappa statistic value below would fit into the "substantial agreement" category?

{Choose one}
( ) A. 0.58
( ) B. 0.75
( ) C. 0.85
( ) D. 0.90

39. How many research studies are analyzed in a Critically Appraised Paper (CAP)?

{Choose one}
( ) A. 1
( ) B. 2
( ) C. 3
( ) D. 4

40. What is the purpose of the "Clinical Scenario" in a Critically Appraised Topic (CAT)?

{Choose one}
( ) A. To apply the findings to a patient
( ) B. To compare studies on a particular condition
( ) C. To decide a course of action
( ) D. To provide an introduction to the topic

41. Which of the following types of validity is defined by the degree to which the results from a sample group can be generalized to a larger population?

{Choose one}
( ) A. External validity
( ) B. Internal validity
( ) C. Predictive validity
( ) D. Statistical validity

42. What symbol is used to designate the experimental intervention in the "Summary of Key Evidence" section of a Critically Appraised Paper (CAP)?

{Choose one}
( ) A. O
( ) B. R
( ) C. T
( ) D. X
43. What is the purpose of the "Clinical Bottom Line" section of a Critically Appraised Paper (CAP)?

{Choose one}
- ( ) A. Assess the validity of the study
- ( ) B. Compare the results of the study to other studies
- ( ) C. Summarize how the study relates to the clinical question
- ( ) D. Summarize the feasibility of applying the study results to a broader spectrum of patients

44. In assessing the "Level of Evidence" of a Critically Appraised Paper (CAP), which rating would be considered higher on the CEBM scale?

{Choose one}
- ( ) A. 1b
- ( ) B. 2a
- ( ) C. 4
- ( ) D. 5

45. Which section of the Critically Appraised Topic (CAT) would include the Boolean operators inserted between two terms?

{Choose one}
- ( ) A. Results of the Search
- ( ) B. Search Strategy
- ( ) C. Search Validity
- ( ) D. Summary of Search

46. Which term best describes the ability of a patient-reported outcome instrument to represent all of the components which it is intended to assess?

{Choose one}
- ( ) A. Applicability
- ( ) B. Comprehensiveness
- ( ) C. Precision
- ( ) D. Reliability

47. Which of the following is an advantage of using a "generic" patient-reported outcome?

{Choose one}
- ( ) A. Can be used with a wide variety of patients
- ( ) B. Detailed assessment of a particular area of concern
- ( ) C. More likely to detect changes across time with a treatment
- ( ) D. Relevant for a specific condition

48. Which of the following is an example of a "specific" patient-reported outcome?

{Choose one}
- ( ) A. Lower Extremity Functional Scale
- ( ) B. Pediatric Quality of Life Inventory
- ( ) C. Short Form 36
- ( ) D. Sickness Impact Profile
49. Which of the following characteristics of a patient-reported outcome can be influenced by day-to-day variations in patients?
   {Choose one}
   ( ) A. Applicability
   ( ) B. Comprehensiveness
   ( ) C. Practicality
   ( ) D. Reliability

50. When determining "applicability" of a patient-reported outcome, which of the following should be a consideration?
   {Choose one}
   ( ) A. The ability to discriminate between patients
   ( ) B. That norms are established for your patient
   ( ) C. That the scale is scored easily
   ( ) D. A and B

51. What is the best term to describe the ability of a patient-reported outcome to detect change over the course of a treatment?
   {Choose one}
   ( ) A. Applicability
   ( ) B. Practicality
   ( ) C. Reliability
   ( ) D. Responsiveness

52. Which of the following scales would be best used to capture a broad range of health status concerns?
   {Choose one}
   ( ) A. Asthma Quality of Life Scale
   ( ) B. Child Health Questionnaire
   ( ) C. Lower Extremity Functional Scale
   ( ) D. McGill Pain Questionnaire

53. What would a patient-reported outcome be considered if it measures what it is intended to measure?
   {Choose one}
   ( ) A. Applicable
   ( ) B. Precise
   ( ) C. Reliable
   ( ) D. Valid

54. Which of the following types of scales may not be able to assess changes to a patient's health-related quality of life?
   {Choose one}
   ( ) A. Disease specific
   ( ) B. Generic
   ( ) C. Region specific
   ( ) D. A and C
55. Which level of a disablement model would include clinician tasks of manual muscle and range of motion testing?
{Choose one}
   ( ) A. Origin
   ( ) B. Organ
   ( ) C. Person
   ( ) D. Societal

56. Which of the following aspects of disablement refers to the impact of acute or chronic conditions?
{Choose one}
   ( ) A. Day to day functioning
   ( ) B. Human performance
   ( ) C. Societal expectations
   ( ) D. All of the above

57. Which level of a disablement model would the inability to throw a baseball fall under?
{Choose one}
   ( ) A. Origin
   ( ) B. Organ
   ( ) C. Person
   ( ) D. Societal

58. Which level of a disablement model is typically assessed using patient-reported outcomes?
{Choose one}
   ( ) A. Organ
   ( ) B. Person
   ( ) C. Societal
   ( ) D. B and C

59. Which level of a disablement model involves understanding how an individual's injury has affected his/her athletic participation role(s)?
{Choose one}
   ( ) A. Origin
   ( ) B. Organ
   ( ) C. Person
   ( ) D. Societal

60. Which level of a disablement model identifies the pathology of injury?
{Choose one}
   ( ) A. Origin
   ( ) B. Organ
   ( ) C. Person
   ( ) D. Societal
Evidence-Based Practice Knowledge Assessment
Part Two: Demographics

The following pages will include several groups of demographic questions. Below, you will find a description of each group. Please select one group that most closely represents your status as an athletic trainer at this time.

Undergraduate or Entry-Level Master's Students Currently Enrolled in a Professional Athletic Training Education Program
Participants should select this group if they are an undergraduate or entry-level master's student in a professional athletic training education program. Students who have recently become certified or recently graduated from an ATEP but have not begun employment in an athletic training setting should select this group.

Graduate Students Currently Enrolled in a Master's or Doctoral Program
Participants should select this group if they are a graduate student in a master's or doctoral program and are BOC certified. Participants who have recently graduated from a graduate program but have not begun employment in an athletic training setting should select this group. Participants who are a graduate student and also have clinical supervision responsibilities (ie, ACI or clinical preceptor) should select this group.

Approved Clinical Instructors or Graduate Clinical Preceptors Affiliated With an Athletic Training Education Program
Participants should select this group if they are currently acting as an approved clinical instructor or graduate clinical preceptor affiliated with an athletic training education program. Participants that hold a dual-role (didactic and clinical supervision responsibilities) should select this group.

Full Time Educator or Researcher
Participants should select this group if they are currently a full-time educator in an athletic training education program with no clinical responsibilities or are a full-time researcher affiliated with an athletic training education program. Participants that are educators in programs other than athletic training, as well as high school, should select this group as long as they have no clinical responsibilities.

Full Time Clinician
Participants should select this group if they are a practicing clinician with no current affiliation to an athletic training education program or no clinical supervision responsibilities. Participants who practice in the high school setting and also teach within the high school setting should select this group. Participants who are clinicians but are not currently practicing at this time should also select this group.

Which demographic group most closely represents your current status as an athletic trainer?
(Choose one)
( ) Undergraduate or Entry-Level Master Student Group
( ) Graduate Student Group
( ) Approved Clinical Instructor/Preceptor Group
( ) Full Time Educator/Researcher Group
( ) Full Time Clinician Group
On the following pages, please answer the demographic questions for the group you have selected above.

Did you select the Undergraduate or Entry-Level Master Student group on the previous page?
{Choose one}
( ) Yes
( ) No

1. Age:
{Enter text answer}

2. Gender:
{Choose one}
( ) Male
( ) Female

3. Ethnicity:
{Choose one}
( ) African American
( ) Asian
( ) Caucasian
( ) Latin American
( ) Native American
( ) Pacific Islander
( ) Other

4. Which type of professional athletic training program are you currently enrolled in?
{Choose one}
( ) Professional Undergraduate
( ) Professional Entry-Level Masters

5. How many years have you been enrolled in the formal athletic training program at your institution?
{Choose one}
( ) 1 year
( ) 2 years
( ) 3 years
( ) 4 years

6. Have you ever taken a course solely focusing on research methods?
{Choose one}
( ) Yes
( ) No

7. Have you ever taken a course solely focusing on evidence-based practice?
{Choose one}
( ) Yes
( ) No
8. Have you received any instruction on evidence-based practice concepts?
   (ie, workshop, tutorial, educators conference)
   {Choose one}
     ( ) Yes
     ( ) No

8a. When did you last receive instruction on evidence-based practice concepts?
   {Choose one}
     ( ) Not applicable
     ( ) Less than 1 month ago
     ( ) Less than 3 months ago
     ( ) Less than 6 months ago
     ( ) Less than 1 year ago
     ( ) Less than 3 years ago
     ( ) Less than 5 years ago
     ( ) More than 5 years ago

Did you select the Graduate Student group on the previous page?
   {Choose one}
     ( ) Yes
     ( ) No

1. Age:
   {Enter text answer}

2. Gender:
   {Choose one}
     ( ) Male
     ( ) Female

3. Ethnicity:
   {Choose one}
     ( ) African American
     ( ) Asian
     ( ) Caucasian
     ( ) Latin American
     ( ) Native American
     ( ) Pacific Islander
     ( ) Other

4. Which type of graduate program are you enrolled in?
   {Choose one}
     ( ) Post-professional athletic training education program
     ( ) Masters degree program in a related health field (eg, exercise science)
     ( ) Masters degree program in physical therapy
     ( ) Masters degree program - Other
     ( ) Doctoral program to obtain a PhD
     ( ) Doctoral program to obtain an EdD
     ( ) Doctoral program to obtain a DPT
     ( ) Doctoral program - Other
5. How many years of experience do you have as an athletic trainer? (please only include numbers in years)

{Enter text answer}

6. Which of the following best describes the setting in which you do a majority of your patient care?

(Choose one)

( ) Clinic
( ) College/University
( ) High School
( ) Hospital
( ) Industrial
( ) Military/Law Enforcement
( ) Performing Arts
( ) Professional Sports
( ) I do not currently do patient care

7. Have you ever taken a course solely focusing on research methods?

(Choose one)

( ) Yes
( ) No

8. Have you ever taken a course solely focusing on evidence-based practice?

(Choose one)

( ) Yes
( ) No

9. Are you currently conducting a research project for your degree?

(Choose one)

( ) Yes
( ) No

10. Have you received any instruction on evidence-based practice concepts? (ie, workshop, tutorial, educators conference)

(Choose one)

( ) Yes
( ) No

10a. When did you last receive instruction on evidence-based practice concepts?

(Choose one)

( ) Not applicable
( ) Less than 1 month ago
( ) Less than 3 months ago
( ) Less than 6 months ago
( ) Less than 1 year ago
Did you select the Approved Clinical Instructor/Preceptor group on the previous page?
{Choose one}
( ) Yes
( ) No

1. Age:
{Enter text answer}
[_______]

2. Gender:
{Choose one}
( ) Male
( ) Female

3. Ethnicity:
{Choose one}
( ) African American
( ) Asian
( ) Caucasian
( ) Latin American
( ) Native American
( ) Pacific Islander
( ) Other

4. How many years of experience do you have as an athletic trainer? (please only include numbers in years)
{Enter text answer}
[_______]

5. Which of the following best describes the setting in which you do a majority of your patient care?
{Choose one}
( ) Clinic
( ) College/University
( ) High School
( ) Hospital
( ) Industrial
( ) Military/Law Enforcement
( ) Performing Arts
( ) Professional Sports
( ) I do not currently do patient care

6. What is the highest degree you have earned?
{Choose one}
( ) Bachelors degree
( ) Masters degree
( ) EdD
( ) PhD
7. Which BOC certification route did you take?  
{Choose one}  
( ) Internship athletic training program  
( ) Accredited athletic training program

8. Which type of program are you an ACI or clinical preceptor for?  
{Choose one}  
( ) CAATE-accredited professional athletic training program  
( ) NATA-accredited post-professional athletic training program  
( ) Both

9. How many students do you supervise per semester?  
{Enter text answer}  
[ ]

10. What is the average number of hours you practice clinically per week?  
{Choose one}  
( ) Less than 10 hours  
( ) 11-20 hours  
( ) 21-30 hours  
( ) 31-40 hours  
( ) Greater than 40 hours

12. Do you teach any classes in a professional or post-professional athletic training education program?  
{Choose one}  
( ) Yes  
( ) No

13. Do you teach a course solely focusing on research methods?  
{Choose one}  
( ) Yes  
( ) No  
( ) Not applicable

11. Have you received any instruction on evidence-based practice concepts?  
(ie, workshop, tutorial, educators conference)  
{Choose one}  
( ) Yes  
( ) No
11a. When did you last receive instruction on evidence-based practice concepts?

Choose one
( ) Not applicable
( ) Less than 1 month ago
( ) Less than 3 months ago
( ) Less than 6 months ago
( ) Less than 1 year ago
( ) Less than 3 years ago
( ) Less than 5 years ago
( ) More than 5 years ago

14. Do you teach a course solely focusing on evidence-based practice?

Choose one
( ) Yes
( ) No
( ) Not applicable

15. On average, how many hours do you dedicate to academic coursework and teaching?

Choose one
( ) Not applicable
( ) Less than 5 hours
( ) 6-10 hours
( ) 11-20 hours
( ) 21-30 hours
( ) 31-40 hours
( ) Greater than 40 hours

Did you select the Full Time Educator/Researcher group on the previous page?

Choose one
( ) Yes
( ) No

1. Age:

Enter text answer

2. Gender:

Choose one
( ) Male
( ) Female

3. Ethnicity:

Choose one
( ) African American
( ) Asian
( ) Caucasian
( ) Latin American
( ) Native American
( ) Pacific Islander
4. How many years of experience do you have as an athletic trainer? (please only include numbers in years)
   \{Enter text answer\}

5. What is the highest degree you have earned?
   \{Choose one\}
   - Bachelors degree
   - Masters degree
   - EdD
   - PhD
   - ScD
   - DPT
   - MD
   - DO
   - PA

6. Which BOC certification route did you take?
   \{Choose one\}
   - Internship athletic training program
   - Accredited athletic training program

7. What type of education program are you affiliated with?
   \{Check all that apply\}
   - A. CAATE-accredited ATEP
   - B. NATA-accredited PPATEP
   - C. Doctoral Program
   - D. Other - Bachelor degree program
   - E. Other - Master degree program
   - F. Other - High School

8. Do you have academic rank at the institution are you affiliated with?
   \{Choose one\}
   - Yes
   - No

8a. What is your current academic rank?
   \{Choose one\}
   - Not applicable
   - Professor
   - Associate Professor
   - Assistant Professor
   - Full professor
   - Instructor
   - Clinical Instructor
   - Department Chair
   - Other

9. How many years have you been teaching in your current position?
   \{Enter text answer\}
10. Do you teach evidence-based practice concepts within your classes?

{Choose one}

( ) Yes
( ) No

11. Do you teach a course solely focusing on research methods?

{Choose one}

( ) Yes
( ) No

12. Do you teach a course solely focusing on evidence-based practice?

{Choose one}

( ) Yes
( ) No

13. On average, how many hours do you dedicate to academic coursework and teaching?

{Choose one}

( ) Less than 5 hours
( ) 6-10 hours
( ) 11-20 hours
( ) 21-30 hours
( ) 31-40 hours
( ) Greater than 40 hours

14. Have you received any instruction on evidence-based practice concepts? (ie, workshop, tutorial, educators conference)

{Choose one}

( ) Yes
( ) No

14a. When did you last receive instruction on evidence-based practice concepts?

{Choose one}

( ) Not applicable
( ) Less than 1 month ago
( ) Less than 3 months ago
( ) Less than 6 months ago
( ) Less than 1 year ago
( ) Less than 3 years ago
( ) Less than 5 years ago
( ) More than 5 years ago

10a. What is the primary mechanism in which you teach EBP concepts?

{Choose one}

( ) Not applicable
( ) An entire class dedicated to EBP concepts
( ) Incorporated throughout numerous courses in the program
( ) One lecture/seminar on EBP
( ) Incorporated into student assignments
( ) Other
15. During the average academic year, what percentage of your time is spent on research?
{Enter text answer}

16. What type of research is related to the majority of your current research agenda?
(Check all that apply)
{Choose all that apply}
( ) Systematic Reviews/Meta-Analyses
( ) Randomized Controlled Trials
( ) Cohort Studies
( ) Outcomes Research
( ) Case-Control Studies
( ) Case Series, Case Reports
( ) Survey Research
( ) Other
( ) I do not currently produce research

Did you select the Full Time Clinician group on the previous page?
{Choose one}
( ) Yes
( ) No

1. Age:
{Enter text answer}

2. Gender:
{Choose one}
( ) Male
( ) Female

3. Ethnicity:
{Choose one}
( ) African American
( ) Asian
( ) Caucasian
( ) Latin American
( ) Native American
( ) Pacific Islander
( ) Other

4. How many years of experience do you have as an athletic trainer? (please only include numbers in years)
{Enter text answer}

5. What is the highest degree you have earned?
{Choose one}
( ) Bachelors degree
( ) Masters degree
( ) EdD
6. Which BOC certification route did you take?
   {Choose one}
   ( ) Internship athletic training program
   ( ) Accredited athletic training program

7. Which of the following best describes the setting in which you do a majority of your patient care?
   {Choose one}
   ( ) Clinic
   ( ) College/University
   ( ) High School
   ( ) Hospital
   ( ) Industrial
   ( ) Military/Law Enforcement
   ( ) Performing Arts
   ( ) Professional Sports
   ( ) I do not currently do patient care

8. Which of the following job titles most closely describes your current position in the athletic training facility?
   {Choose one}
   ( ) Head Athletic Trainer
   ( ) Assistant Athletic Trainer
   ( ) Graduate Assistant Athletic Trainer
   ( ) Director of Sports Medicine
   ( ) Physician Extender
   ( ) I do not work in the athletic training facility
   ( ) Other

9. How many years have you been employed at your current place of employment?
   {Enter text answer}

10. How many full-time certified athletic trainers (including yourself if applicable) are in the facility in which you do the majority of your patient care?
    {Enter text answer}

11. What is the average number of hours you practice clinically per week?
    {Choose one}
    ( ) Less than 10 hours
    ( ) 11-20 hours
    ( ) 21-30 hours
( ) 31-40 hours
( ) Greater than 40 hours

12. Have you received any instruction on evidence-based practice concepts?
(ie, workshop, tutorial, educators conference)
{Choose one}
( ) Yes
( ) No

12a. When did you last receive instruction on evidence-based practice concepts?
{Choose one}
( ) Not applicable
( ) Less than 1 month ago
( ) Less than 3 months ago
( ) Less than 6 months ago
( ) Less than 1 year ago
( ) Less than 3 years ago
( ) Less than 5 years ago
( ) More than 5 years ago

Evidence-Based Practice Knowledge Assessment

Thank you for your time and participation in this study. It is greatly appreciated!

All comments and questions should be directed towards:

Cailee Welch, MSEd, ATC
Old Dominion University
ebpmodule@gmail.com
APPENDIX III

POST-MODULE QUALITATIVE INTERVIEW PROTOCOL
The purpose of this interview is to discuss your views on evidence-based practice as it relates to your daily educational practice. Thank you for agreeing to speak with me today. This interview will last approximately 45 minutes and will consist of several questions. This conversation will be digitally recorded. Do you provide your consent to have this interview recorded? 

The information you provide during this interview will be held in complete confidentiality. No information you present to me will be linked back to you in any way. If at any time during the interview you feel uncomfortable, you have the right to stop the interview and withdraw from the study. Do you have any questions?

1. Tell me about your background as an athletic training educator.

2. Please discuss what evidence-based practice means to you:
   a. What role do you feel research plays in the EBP process?
   b. What role do you feel the clinician plays in the EBP process?
   c. What role do you feel the patient plays in the EBP process?
   d. What perceptions do you have of the EBP process?

3. Why did you become interested in going through the online modules?
   a. What expectations did you have for the online modules?
   b. Did you have any previous EBP training prior to completing the online modules?

4. What were your perceptions of the online modules after completing them?

5. In what ways, if any, do you feel the online modules can be improved?

6. Did the online modules change your perceptions of evidence-based practice in any way?

7. Please discuss any barriers you encountered while completing the online modules.

8. Do you feel these online modules had a positive or negative impact on your daily teaching style in the classroom? Please explain.

9. What concepts, if any, did you take from the modules and begin to implement within your didactic curriculum?
   a. Are there concepts you feel like you need more information on before you can implement?
   b. Are there any barriers preventing you from implementing these concepts into the didactic curriculum?

10. What strategies do you feel will be useful to educate educators on implementing EBP concepts within didactic curricula?

11. Is there anything else you would like to add about EBP, AT education, or your personal classroom experiences?

12. Are there any questions or topics I have not asked about that you would like to discuss?

Thank you for your time during this interview. The information you have provided has been very helpful. Once the interview has been transcribed, I will send you a copy of the transcript. This will allow you to read over our conversation and check it for accuracy. During this time, you will also have the opportunity to provide any clarifications or updates to your initial responses. Again, I appreciate your willingness to participate in this research study. Thank you.
The purpose of this interview is to discuss your views on evidence-based practice as it relates to your daily clinical practice. Thank you for agreeing to speak with me today. This interview will last approximately 45 minutes and will consist of several questions. This conversation will be digitally recorded. Do you provide your consent to have this interview recorded? The information you provide during this interview will be held in complete confidentiality. No information you present to me will be linked back to you in any way. If at any time during the interview you feel uncomfortable, you have the right to stop the interview and withdraw from the study. Do you have any questions?

1. Tell me about your background as an athletic trainer.

2. Please discuss what evidence-based practice means to you.
   a. What role do you feel research plays in the EBP process?
   b. What role do you feel the clinician plays in the EBP process?
   c. What role do you feel the patient plays in the EBP process?
   d. What perceptions do you have of the EBP process?

3. Why did you become interested in going through the online modules?
   a. What expectations did you have for the online modules?
   b. Did you have any previous EBP training prior to completing the online modules?

4. What were your perceptions of the online modules after completing them?

5. In what ways, if any, do you feel the online modules can be improved?

6. Did the online modules change your perceptions of evidence-based practice in any way?

7. Please discuss any barriers you encountered while completing the online modules.

8. Do you feel these online modules had a positive or negative impact on your clinical practice? Please explain.

9. What concepts, if any, did you take from the online modules and begin to implement within your clinical practice?
   a. Are there concepts you feel like you need more information on before you can implement?
   b. Are there any barriers preventing you from implementing these concepts into clinical practice?

10. What strategies do you feel are useful to educate clinicians on the incorporation of EBP to improve patient care?

11. Is there anything else you would like to add about EBP, athletic training clinical practice, or your personal clinical experiences?

12. Are there any questions or topics I have not asked about that you would like to discuss?

Thank you for your time during this interview. The information you have provided has been very helpful. Once the interview has been transcribed, I will send you a copy of the transcript. This will allow you to read over our conversation and check it for accuracy. During this time you will also have the opportunity to provide any clarifications or updates to your initial responses. Again I appreciate your willingness to participate in this research study. Thank you.
VITA
Cailee Elizabeth Welch, MSEd, ATC

Department of Study

Old Dominion University
Department of Human Movement Sciences
Student Recreation Center
Norfolk, VA 23529

Education

May 2012
Doctor of Philosophy, Human Movement Sciences
Old Dominion University Norfolk, Virginia

August 2009
Master of Science in Education, Athletic Training
Old Dominion University Norfolk, Virginia

May 2007
Bachelor of Science, Athletic Training
Boston University Boston, Massachusetts

Publications


