

# Case-Based Learning in Athletic Training

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## INTRODUCTION

The National Athletic Trainers' Association (NATA) Executive Committee for Education has emphasized the need for proper recognition and management of orthopaedic and general medical conditions through their support of numerous learning objectives and the clinical integrated proficiencies.<sup>1</sup> These learning objectives and integrated clinical proficiencies are designed to prepare athletic training students to become competent professionals. In fact, the educational competencies and integrated proficiencies related to orthopaedic clinical assessment and diagnosis are just one of the vital links in becoming either a successful or an unsuccessful athletic trainer. However, this success is not accomplished overnight; rather, it is accomplished gradually over time, as students progress through the higher levels of Bloom's taxonomy.<sup>2</sup>

Students should be challenged to comprehend, apply, analyze, synthesize, and then evaluate (Bloom's taxonomy) properly to competently diagnose an injury or illness and make rational, clinically appropriate medical decisions in the patient's best interests. These decisions include: (1) appropriate medical referrals, (2) return-to-play decisions, and (3) knowing when and how to initiate a rehabilitation or reconditioning plan. Without an accurate understanding of the condition's pathophysiology, pathomechanics, or etiology, it is difficult for the athletic trainer to develop an appropriate prevention program to reduce the likelihood of reinjury. Finally, there may be times when incorrectly diagnosing a condition may have significant repercussions, possibly increasing a patient's morbidity or mortality.

Unfortunately, in many circumstances the educational competencies taught and evaluated in the classroom are done as fragmented pieces rather than as a whole process. Students tend to learn orthopaedic and general medical assessments as a stepwise process rather than learning how to integrate and synthesize the information to generate a logical diagnosis and then act appropriately to manage the situation. To use a jigsaw puzzle analogy, athletic training students have (ie, learned the cognitive knowledge) all the puzzle pieces, but then they try to complete the puzzle by placing random pieces

in the middle rather than putting the borders together first and working towards the middle. This approach places students at a disadvantage because they lack the ability to use a systematic approach (ie, to see the bigger picture) to acquire and interpret information and make clinical connections between classroom theory and clinical practice. Therefore, the purpose of this column is to examine the use of case-based learning (CBL) as a pedagogical tool to assist students in the learning process by allowing them to step into the role of a certified athletic trainer to acquire and interpret information and make appropriate clinical decisions using critical decision making and problem solving, using classroom theory (ie, knowledge and comprehension) and clinical reality (clinical integrated proficiencies) in order to become competent entry-level athletic trainers.

## PRINCIPLES OF CBL

Case-based learning, or case study teaching, is a long-established pedagogical method.<sup>3</sup> Case-based learning typically involves the use of short and/or long, detailed events or stories that describe a fairly well-defined situation, commonly involving a decision, challenge, opportunity, problem, or issue faced by a person (or persons) in an organization.<sup>3-6</sup> Sometimes analogous to problem-based learning, CBL is a form of inquiry-based learning and fits on the continuum between structured and guided learning. It provides an opportunity to prepare students for clinical practice through the use of authentic clinical cases by linking theory to practice, through the application of knowledge to the cases<sup>3,7</sup> as well as through exposing students to new academic content.<sup>4</sup>

Case studies used by educators as part of CBL are typically fictional, virtual (online CBL), researched, actual patient experiences, or other situational experiences designed by educators or commercially prepared (ie, textbooks and textbook supplemental material). They may provide a snapshot of a specific moment in time, or they may examine a patient's condition from the onset of the condition to its final resolution (eg, case reports found in peer-reviewed journals). Different types of case study methods can be used to place students in contact with different learning<sup>3,8</sup> experiences or, in the case of athletic training, different practice analysis

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**Figure 1. Case-based learning objectives and outcomes examples.**

- Creating a culturally competent approach to meeting the emotional and physical needs of the patients and their families
- Interprofessional learning
- Developing critical thinking
- Developing diagnostics and diagnostic reasoning in clinical practice
- Establishing patient priorities
- Developing critical decision points and clinical decision making
- Clinical problem solving and solving complex problems
- Applying the course concepts of stereotypes, prejudice, and attribution to case material, examining the interrelation between attitudes and behaviors, and examining a societal implication of prejudiced attitudes
- Applying skills required for the practice of evidence-based medicine
- Applying skills required for the retrieval, access, and use of informatics

performance domains or work settings. Whether the case study method is used to focus on clinical reasoning, to focus on specific content, or to practice medical histories and physical examinations, it can be a useful method to prevent boredom in the classroom.<sup>3,9</sup>

For many athletic training educators CBL is likely a combination of actual patient experiences encountered during an educator's professional career, modifications of case reports found in the literature, and/or fictional situations created to simulate what a certified athletic trainer may experience in his or her professional career. And although many case studies are detailed, describing fairly well the defined problem(s), they can be written to contain limited information to allow students to enhance the relevance of their learning while promoting their understanding of the course concepts. Occasionally vital information may be intentionally left out, inaccurate, or designed to create ethical dilemmas, forcing students to challenge the clinical competence and decision-making skills of the athletic trainer. Some case studies provide clear learning objectives, asking students to address only one concern, whereas others are written using a variety of qualitative and quantitative information to allow students to learn and practice how to systematically approach a situation and make correct clinical decisions.<sup>10</sup> Finally, some case studies require students to think beyond the injury assessment process and incorporate other educational competencies, ethical dilemmas, and communication challenges, and allow for speculation, interpretation, contrasts, and comparisons, all of which are tools necessary to function as a competent professional.<sup>4,9</sup>

### SO WHY USE A CASE STUDY?

An extensive, systemic review examining the effectiveness of CBL in health professional education programs demonstrated inconclusive results as to the effects of CBL on learning when compared with other types of learning activity.<sup>3</sup> As a teaching strategy, though, students enjoy the use of CBL and believe this method of learning enhances their educational experiences and understanding of the course content; thus, this method creates a more active and collaborative learner.<sup>3,11</sup> Educators also enjoy CBL, reportedly because CBL fosters effective learning in small groups, possibly through the effect of having more attentive and engaged learners, but perhaps also through having more structured

learning activities closely linked to authentic learning<sup>12</sup> and clinical practice scenarios that potentially makes better use of the available teaching time.<sup>3</sup>

As a pedagogical method used in a variety of health related professional education programs, case studies create a safe, simulated learning environment that can address a wide array of learning objectives (Figure 1). Students can learn to acquire, analyze, and judge the correctness of the information presented in the case, compare and evaluate optional solutions, decide how to handle the actual or hypothetical situation, and react to and communicate the appropriate clinical decision making that connects classroom theory and clinical practice.<sup>3,4,6,8,10-12</sup> This experience creates an opportunity to facilitate active and reflective learning, which is necessary to identify and select care options and set patient priorities<sup>13</sup> as well as for developing self-directed lifelong learners.<sup>14</sup>

Case-based learning is not helpful in assisting students remember specific details and/or specific recall facts learned as part of a normal lecture,<sup>11,14,15</sup> but rather it enhances students' critical thinking and clinical decision making.<sup>3,8,11,15,16</sup> Case studies enhance critical thinking and clinical decision making by offering students an opportunity to examine and reexamine complex clinical situation actions (or inactions) from a variety of perspectives<sup>17</sup> by allowing for (1) analyzing, (2) applying standards, (3) discriminating, (4) information seeking, (5) logical reasoning, and (6) predicting and transforming knowledge.<sup>10</sup>

Educators may utilize CBL to demonstrate achievement of a wide variety of Board of Certification<sup>18</sup> role delineation/practice analysis performance domains and NATA educational competencies,<sup>1</sup> specifically those related to orthopaedic injuries and general medical illnesses.<sup>4</sup> This method also offers educators an opportunity to maintain consistent learning objectives for tracking simulated patient encounters. Case studies used as part of CBL can expose students to situations and patient experiences not always encountered during clinical education experiences,<sup>3,19</sup> which again allows for consistent learning (and tracking of learning and learning outcomes) and ensures all students have had the opportunity to be exposed to a variety of patient encounters.<sup>4</sup>

Another benefit of CBL is the ability to provide for safe experimentation and reflection without concern for the impact on real organizations or patients.<sup>19</sup> Using classroom theory and clinical practice experiences, students can make clinical decisions without any risk of harm to their patients and then reflect upon these experiences to determine the appropriateness of their actions and whether or not they actually completed the jigsaw analogy discussed above. When these reflective behaviors are taught as part of the curriculum, the potential to professional practice behavior change is also increased<sup>19</sup> and students learn how to engage in lifelong self-assessments and reflection, a necessary component in becoming a competent, self-directed lifelong learner and professional later in life.<sup>14,19</sup>

### Self-Reflection Using the WHAT Model

A modification to the “WHAT” framework is one method of assisting students in becoming reflective practitioners<sup>20</sup> and encompasses 3 phases, “What,” “So What,” and “Now What.” Students begin the WHAT framework by carefully reading through a case study. The “What” phase begins with an individual returning to the case and describing in his or her own words exactly what occurred and how he or she would have handled the situation. This is similar to reflection on action, which occurs when individuals contemplate an event (a case in this context) in order to gain insight into their current level of knowledge and understanding.<sup>21</sup> Once an individual has identified what happened and responded to the situation (often in the form of a clinical decision), either verbally or in a written format, he or she now moves on to “So What.” The So What is an opportunity for a student to examine his or her feelings regarding the case, determine the effects of what he or she did or did not do to handle the situation, and finally determine if these decisions, actions, or responses are in line with those of others and, more importantly, learn from these actions or decisions. The “Now What” phase takes what has been learned and allows a student to apply it to his or her professional practice by asking, “What can I do differently when I am confronted with this particular situation?”

### Role-Playing

Case-based learning demonstrates that in some situations there may be no easy answers and that often there is not one correct answer. The cases can also be assigned to individual students, teams, or a class to promote student-to-student exchanges and peer learning<sup>19</sup> through role-playing. Role-playing deals with problems or situations where students must analyze and interpret information, act out the problem or situation, and then reflect and discuss the consequences of these actions,<sup>22</sup> using the “WHAT” framework. When role-playing is used in conjunction with the prepared cases, students are able to see a live sample of human behavior that serves as a vehicle for students to: (1) explore their feelings; (2) gain insight into their attitudes, values, and perceptions; (3) develop their problem-solving skills and attitudes; and (4) explore subject matter in varied ways.<sup>22</sup> When case studies do not provide students with all of the necessary clinical evaluation or management information, students and educators alike can embellish upon the cases and alter them to

address a variety of cognitive and psychomotor skills as part of the role-playing.

### UTILIZING CASE STUDIES

As previously mentioned, case studies used in health-related professional education programs are often fictional, virtual (online CBL), researched, actual patient experiences/medical conditions, or other situational experiences. Case studies are often developed by faculty to meet specific learning objectives; commercial case studies<sup>4</sup> can also be used and modified as needed, again based on learning objectives.

Cases may vary from a paragraph or two to a dozen pages with supporting documentation such as patient medical notes and laboratory results, diagnostic imaging, and pain and functional outcomes instrument results. When developing case studies, as the instructor please note that students can become lost in the specific details and confused when there are more than a dozen pages.<sup>6</sup> Elaborate cases should be distributed well in advance of class. Study questions, either instructor generated<sup>11</sup> or found in commercially available case study textbooks,<sup>4</sup> can facilitate preparation for the class discussion and can loosely outline the discussion.<sup>6,11</sup> Short cases (1–2 paragraphs) can be distributed and reviewed in class to either reinforce a concept or introduce a new concept.<sup>4</sup> Whether case studies are short or long, Leenders and Erskine<sup>23</sup> identify 4 basic steps for writing cases: (1) planning, (2) writing, (3) cooling (ie, incubation period), and (4) revising.

When planning and writing the cases, remember that each case should meet a specific learning objective and each case study should have a storytelling quality (Table). The characters (ie, health care provider and patient) should be given names (remember diversity), and their titles (eg, certified athletic trainer), responsibilities (eg, head athletic trainer, team physician), and personalities should be articulated with each case. Providing a backstory or narrative helps to set the stage and identify the case’s key characters. The characters should carry on a realistic dialogue with details, and the sequence of events (ie, mechanism of injury, emergent care, sideline care, medical referral) should be easy to follow in chronological order<sup>5</sup> based upon age, gender, ethnicity, and occupation or sport. The case information should identify needed information, but not be so blatant that students are able to identify items such as the differential or clinical diagnosis with a little thought process, unless this is the learning objective.

### Recommendations for Students

Once a case or series of case studies have been assigned to students, knowing where to start to make the best use of one’s time is difficult. The simplest thing a student can do when assigned a case is to read through the case(s) assigned by the instructor once or twice. Reading the case(s) at least twice allows students to gather a better sense of the state of affairs expressed by the case. In the case of athletic training cases, specifically those associated with orthopaedic or trauma assessment, most cases should begin with a paragraph that sets the scene for the injury or illness (backstory). A history and physical examination may follow, which typically provide enough information to guide the assessment process. De-



**Table. Guidelines for Preparing Case Studies**

Concept	Interpretation
Ensure the cases are authentic and realistic	<ul style="list-style-type: none"> <li>Reality must be brought into cases.</li> <li>Cases should be relevant to real-world experiences and written as such, using direct quotes, artifacts, and media that bring cases to life.</li> </ul>
Cases should be efficient and provide a basic case structure in writing and conception.	<ul style="list-style-type: none"> <li>When planning cases, consider the narrative backstory.</li> <li>Begin with the broadest questions/concepts and narrow in on specific learning objective(s).</li> <li>Provide the character(s) with depth and a personality.</li> </ul>
Cases should be provided with sufficient background information to allow students to tackle the issue(s).	<ul style="list-style-type: none"> <li>Include not only the events that occurred, but also how the character(s) involved perceived the events.</li> <li>Provide enough description in the case itself for students to understand the case problem and understand the various issues that bear on the problem.</li> </ul>
Cases must fit with the students' educational level, needs, and clinical practice where applicable.	<ul style="list-style-type: none"> <li>Cases should be level appropriate and significant to the students for whom the case is used.</li> <li>Cases should be relevant to learning objectives and course outcomes.</li> </ul>
Cases should not just offer theories or learned concepts, but rather pose complex, controversial, and sensitive issues.	<ul style="list-style-type: none"> <li>There are no simple or clearly bounded issues.</li> <li>The controversy of cases can entail debate or contest, but should be related back to documents such as the Board of Certification Standards of Practice, the National Athletic Trainers' Association Code, and state regulatory statutes and regulations.</li> <li>Complex, controversial, or sensitive issues should be addressed as part of a larger classroom debriefing or with the preceptors.</li> </ul>
Write the case in a well-organized structure and in clear language.	<ul style="list-style-type: none"> <li>Cases should be easy to read and access.</li> <li>Prepare an outline of the case and use it to organize materials.</li> <li>Ensure the clarity and refinement of the cases, using headings, pictures with directional arrows and legends, and tables and charts.</li> </ul>

**Figure 2. Example of reading and marking up a case study. Abbreviations: DIPJ, distal interphalangeal joint; WNL, within normal limits; MMT, manual muscle testing.**

Jean, a 19-year-old basketball player and avid video gamer, was at the local athletic club playing in a recreational league basketball tournament. While she was moving down the court, her teammate passed the ball to her while Jean was not paying attention. Realizing the pass was for her, Jean attempted to catch the ball off the tip of her fingers but missed. She immediately grabbed her finger and began crying. The referee called a time-out and her coach went to see what was wrong. Her coach recognized her finger was deformed and immediately placed ice on her finger. He called the front desk and requested further medical care. Jared, a certified athletic trainer who worked for the athletic club, was asked to evaluate Jean's finger. History: As Jared began his history he noted that Jean was supporting her left index finger. [#1 Jean explained to Jared that the basketball ball "jammed" her index finger]. Further questioning by Jared revealed that when the ball struck the index finger of the involved hand, the finger was straight. Jean denied any popping or unusual sounds; however, she rated her pain 7/10. Physical Examination: On physical examination [#1 Jean presents with moderate-severe discomfort. Jean's second DIPJ appears to be in a flexed position] and [#2 Jared tries to manipulate the joint]. No swelling or [#4 ecchymosis] is present at this time. Jared determines Jean is point tender on the dorsum of the DIPJ. Passive range of motion is WNL, and [#1 MMT reveals 0/5 during DIPJ extension.] Jared's assessment of the collateral ligament stability is unremarkable. [#3 Neurologically Jean's myotomes and dermatome are intact.] [#5 Jared decides not to call Jean's parents and leaves a voice mail at school that Jean has been hurt.] [#3 He has Jean complete some necessary paperwork and Jean goes home.]

**LEGEND**

For example, [#1] for correct actions and decisions made by the athletic trainer in the case, [#2] for incorrect actions, [#3] for questionable actions and decision, [#4] for information, terms, etc, you are not familiar with, and [#5] for ethical dilemma or other.

**Figure 3. Recommendations for students when completing case studies.**

1. If working in pairs, compare actions or decisions against those of your partner(s). If differences arise, assess why these differences occurred and discuss the different interpretations of the case.
2. After reviewing the case, answer questions attached to the assignment as if you were the athletic trainer in charge. When necessary, be critical of the decisions made by the characters in the case; they will not be offended if they were wrong or the decisions were inappropriate.
3. If follow-up questions are provided, they may require you to evaluate the current literature in order to determine if the clinical actions or decisions of the case's characters follow the best available evidence at that moment.
4. If follow-up questions are provided, there may be several interpretations for answers, so write down everything that may be pertinent or acceptable to the case.
5. Avoid waiting till the last minute to complete the assignment, especially if it is necessary to refer to the literature.
6. Review the answers with the instructor and examine any feelings expressed regarding the case before and after learning the answers. Determine if the case was handled correctly; if not, what is the takeaway from the actions or decisions to avoid making this mistake again?

pending on the learning objectives, students may need to analyze the case and determine what is missing, incomplete, or even inaccurate.

As students read the case(s), suggest using a highlighter to identify the information they believe is key. Have them restate what has just occurred in a way that is more meaningful for them to understand. Suggest to them to ask themselves how they might have acted and what might have been done differently if they were managing the case. Using different-colored highlighters may assist students in separating the information they have analyzed and interpreted by categories in order to allow them to piece together segments of

information to make correct clinical decisions (Figure 2). Figure 3 offers several other suggestions for students to utilize CBL.

### Recommendations for Instructors

Once the case and any associated questions have been written, the next most important role of the athletic training educator is that of facilitator and not of content-information source. Facilitators are responsible for creating an atmosphere that is open, safe, and nonthreatening to facilitate students' participation, especially during open discussions. In discussing case studies, multiple viewpoints need to be

**Figure 4. Alternative case-based learning teaching strategies.**

1. Cases can be assigned as individual or group homework assignments, in-class group discussions, or role-playing.
2. If role-playing is selected, assign the cases several days before class so students are able to learn their roles. Encourage students to really "play the part"; the more they engage in the role, the more lifelike it will be. This is an opportunity for educators to assess students' decision-making, application, communication (verbal and written), and interpersonal skills. Have the students critique the other students' application skills. Challenge students to identify alternative approach to handling the situation.
3. If cases are assigned as homework, modify or add any additional questions as necessary. Be sure to assign the cases several days before the due date, as the cases may require students to evaluate the current literature to determine the best evidence-based practice. Written assignments provide an opportunity for you to assess students' abilities to analyze, interpret, and synthesize the case, make clinical decisions, and evaluate the literature. They also provide a chance for the students to practice writing and time management skills.
4. If using commercially prepared cases, review any answers provided in the instructor manual before class. Adjust or modify the answers based on the current evidence, previous educational experiences, and geographical location.
5. You may opt to provide a copy of the written answers to the students. If this method is selected, ask the students to reflect on your answers, their answers, and their clinical experiences. Ask them to determine why they did or did not answer a question a certain way. Ask them to identify what they learned from the assignment.
6. Modify cases or add additional questions to focus on other athletic training, cognitive, and psychomotor skills. For example, a rotator cuff impingement case study may focus only on injury evaluation, so it may be necessary to: (1) add an additional paragraph on initial care and then have students follow up with a rehabilitation plan, (2) add additional questions focusing on the use of therapeutic modalities, and (3) devise a writing assignment out of the case.

shared, increasing the learning for each student and encouraging professional development. Boundaries should be established as to purpose of the debriefing, interrupting speakers, speaking time allocation, rules for cooperative disagreement, etc. Because cases may not have one right answer, facilitators must be able to consider alternative responses and be able to say, "I had not considered that action; let's discuss further." Facilitators also need to ensure that all students remain engaged in the learning activity. When necessary, multiple cases may be used to facilitate smaller, more manageable class discussions. Finally, summarizing the key points is essential to ensure that the students take away the most important concepts.

If you opt for a group discussion, focus on bridging classroom theory with clinical practice. What makes this case different from reality if students have had the opportunity to see the case? Again, determine why they did or did not answer a question a certain way. Ask students to identify what they have learned from the assignment and how this may change their practice behaviors. Ask them how they would handle the situation now if confronted with a similar case. Figure 4 offers suggestions based on personal experiences and are intended to help utilize the case studies to improve student learning and bridge classroom theory and clinical practice experiences so students can begin to make the appropriate clinical decisions.

## CONCLUSION

Case-based learning is a pedagogical method used in a variety of health-related professional education programs. It creates a safe, simulated learning environment and can address a wide array of learning objectives and program outcomes. As a teaching strategy, students appear to enjoy using CBL, and this encourages increased active and collaborative learning. Within athletic training, CBL has the potential to be an integral component of the educational and clinical component of preparing athletic trainers. Case-based learning can be used in a variety of athletic training courses, including orthopaedic assessment, general medical, and clinical/practicum courses to prepare future students to become competent athletic trainers. In addition, CBL can be used for capstone courses or seminars during the final academic year or semester to bridge the gap between snapshots of content and actually applying or integrating all course content into one situation.

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