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Board of Certification Examination Pass/Fail Analysis

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Board of Certification Examination Pass/Fail Analysis

A Senior Honors Thesis

Submitted in Partial Fulfillment of the Requirements
for Graduation in the College Honors Program

By
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Athletic Training and Exercise Physiology Major

The College at Brockport
May 5, 2013

Thesis Director: Dr. Timothy Henry, Program Director, Athletic Training

Educational use of this paper is permitted for the purpose of providing future students a model example of an Honors senior thesis project.

Athletic Training is a growing field in health care that focuses on prevention and treatment of injuries in active individuals. According to the National Athletic Trainers' Association (NATA) Board of Directors, Athletic Training is "practiced by athletic trainers, health care professionals who collaborate with physicians to optimize activity and participation of patients and clients. Athletic training encompasses the prevention, diagnosis, and intervention of emergency, acute, and chronic medical conditions involving impairment, functional limitations, and disabilities."¹ Athletic Trainers have recently expanded their scope of practice to hold positions in educational settings of high schools and universities, clinical settings in rehabilitation clinics and hospitals, and are now found in the workplace promoting ergonomics and proper lifting mechanics to prevent workplace injuries.

Athletic Trainers can treat an injury from onset to a full return to normal functioning. They are able to diagnose injuries using a variety of special tests and measure muscular strength using manual muscle strength testing. These will lead the Athletic Trainer to the proper diagnosis and then will use that diagnosis to develop a rehabilitation protocol. Athletic Trainers can then develop a rehabilitation protocol utilizing therapeutic modalities and therapeutic exercise to promote an optimal healing environment. After the injury is adequately healed, the Athletic Trainer can progress the individual through a functional examination to allow for the proper adaptations to occur.

In order for an Athletic Trainer to be able to practice, they must pass the Board of Certification (BOC) examination. This is a national exam that establishes the amount of information that must be known for an entry level Athletic Trainer. Students are eligible to take

the BOC exam once they are enrolled in their last semester in a program accredited by the Commission on Accreditation of Athletic Training Education. There are two types of accredited programs, Bachelor's or entry level Master's degrees. In order to evaluate the pertinent material for an entry level Athletic Trainer, the NATA created a Role Delineation/ Practice Analysis (RD/PA) which used survey data from current Athletic Trainers to determine "essential knowledge and skills for the athletic training profession."² The Board of Certification uses this study to create questions that are then used in their test.

In order to maintain certification as an Athletic Trainer, each Athletic Trainer must complete continuing education requirements to further their knowledge as a health care professional. Each Athletic Trainer must complete 75 continuing education units (CEUs) in order to maintain their certification.³ Athletic Trainers must also stay in compliance with the *BOC Standards of Professional Practice* and the *NATA Code of Ethics*.⁴

Each examination goes through a lengthy development process. Each question is "written, validated, and reviewed by a panel of content experts in coordination with psychometricians. Each question is referenced to at least two textbooks that can be found in the BOC Exam References."⁵ Every question is designed to assess knowledge in one of the five domains of Athletic Training, Injury/Illness Prevention and Wellness Protection, Clinical Evaluation and Diagnosis, Immediate and Emergency Care, Treatment and Rehabilitation, and Organizational and Professional Health and Well-being.⁶ Each question also can be related to a component of the current Role Delineation Study/ Practice Analysis.⁷

In 2006, there was a drastic change in the format of the BOC examination. The 2005 and prior test included 3 portions of the exam, a written multiple choice section, a practical hands-on section, and a written simulation section.⁸ During the 2006 exam year, there was a shift to create an online assessment which combined the practical portion of the exam with the written and simulation portions to create a hybrid computerized assessment. Beginning in May/June 2007, the shift was completed and the fully computerized exams were being administered to qualifying candidates.⁹

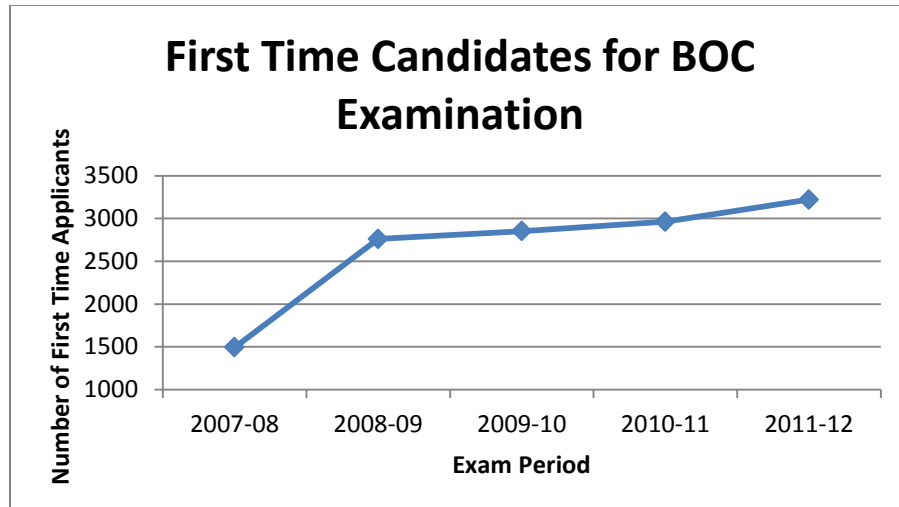
The current format of the BOC Examination includes 175 scored and unscored (experimental) questions asked in several different formats. These formats include multiple choice questions, drag-and-drop, text based simulation, multi-select, hot spot, and focused testlets. Focused testlets creates a mock scenario for the candidate to analyze and then answer questions based on the scenario. Candidates may move between questions throughout the exam as they do not need to be completed in order. The candidate must complete the exam within four hours.¹⁰

Each domain of Athletic Training has a certain emphasis which some domains having more questions related to them on the test than others. Injury/ Illness Prevention and Wellness Protection consists of 25% of the exam, Clinical Evaluation and Diagnosis consists of 22%, Immediate and Emergency Care consists of 19%, Treatment and Rehabilitation consists of 22%, and Organizational and Professional Health and Well-Being consists of 12%.¹¹

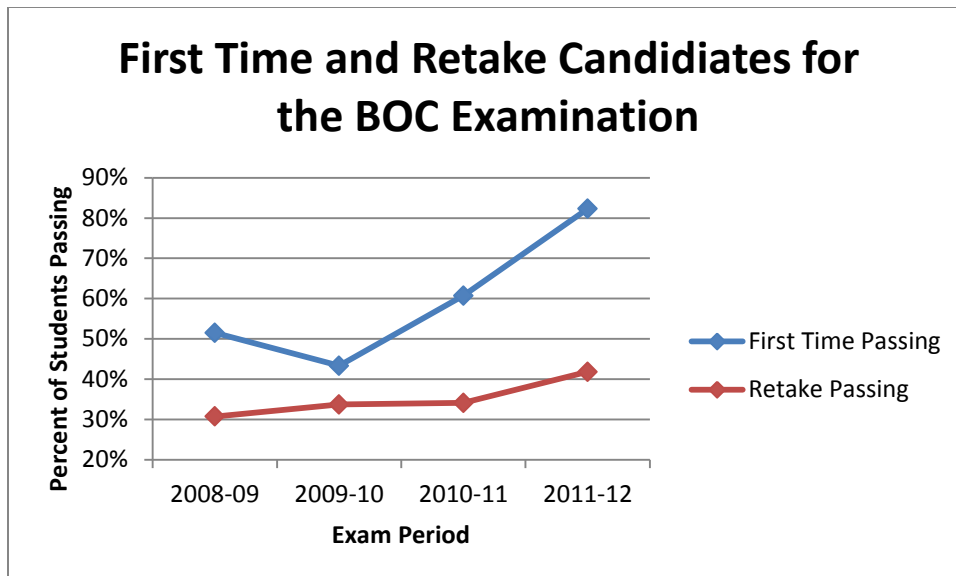
There have been several statistical trends that have occurred over the past 17 years.¹² Athletic Training is a growing field shown by an increase in the number of first time applicants

and the quality of applicants is increasing which is shown by the percentage of first time passing rate. First time passing students usually perform at a much higher standard than students who retake the exam. Over the past decade, there are a few domains that students struggle with and have consistently lower scores. Data collected by the BOC shows that students who take the exam sooner often perform better than their colleagues who take the exam later in the exam window. All of the following graphs have been made using the exam reports which are available to the public on the BOC website.¹³ The following charts and graphs will show the statistical differences in these observations. Statistical significance is set at alpha value $p=.05$.

Athletic Training is a growing field in health care. Being recognized as a health care profession by the American Medical Association was monumental for the growth of the field.¹⁴ Athletic Trainers are getting recognition for the skilled work that they perform on a daily basis and are being rewarded by being able to practice in additional job markets that were previously inaccessible. Athletic Trainers are currently employed in professional and collegiate sports, secondary and intermediate schools, sports medicine clinics, hospital emergency rooms and rehab clinics, occupational settings, fitness centers, and physician offices.¹⁵ As noted in the following graph, the number of first time candidates is at an all-time high.¹⁶

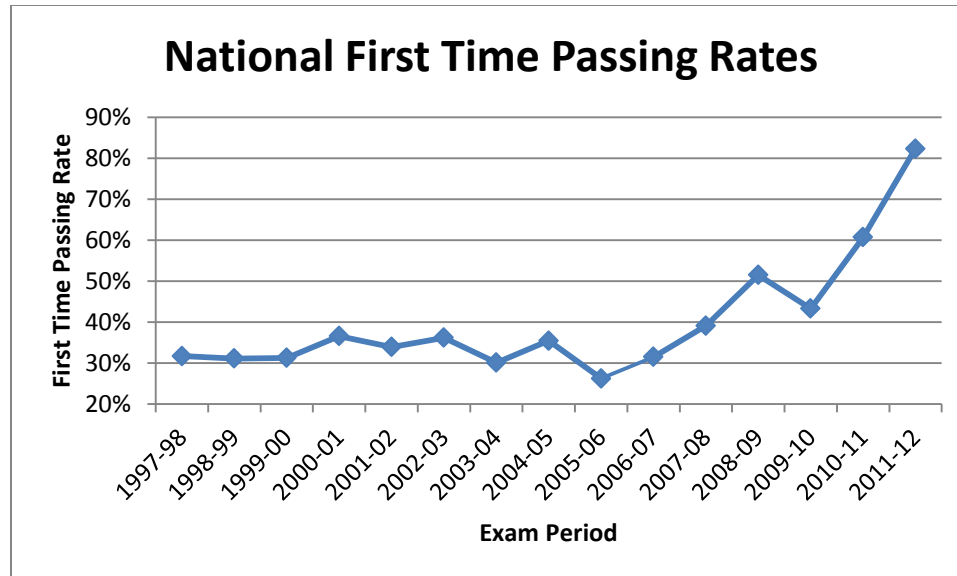


Over the past 17 years, first time candidates have a higher rate of passing the examination than candidates who are retaking the exam.¹⁷ This shows that the most qualified individuals are able to become certified promptly after graduation and those who are less qualified are unable to become certified. This ensures that the profession always has qualified individuals promoting the field and maintaining the reputation of being health care professionals. The following graph shows the relationship between first time candidates and retake candidates on their likelihood of passing the exam over the past four years. First time candidates pass the exam at a significantly higher rate than those who retake the examination (p=.01)



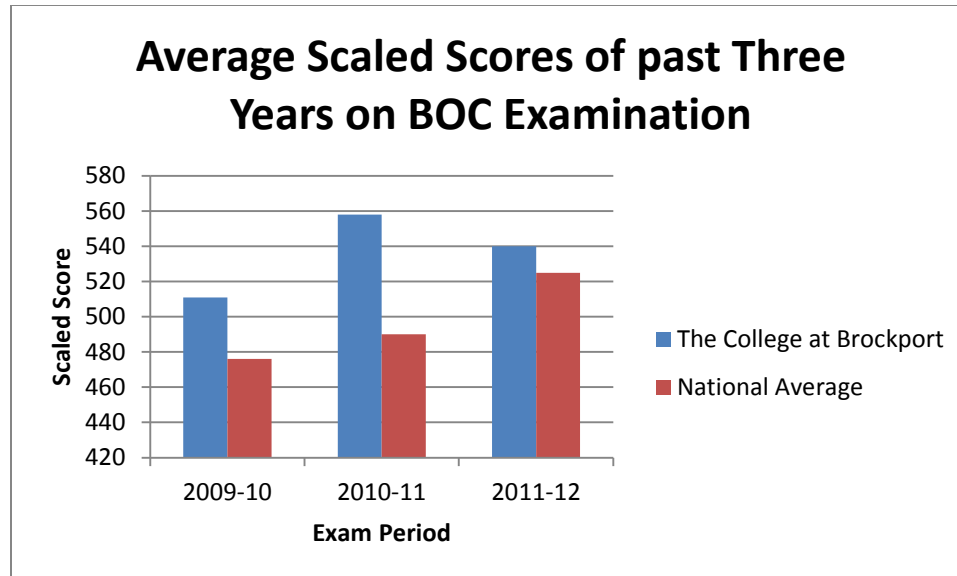
Not only is the number of applicants increasing, but so is the caliber of students that are accepted into accredited programs. CAATE accredited programs have limited spots available to new students in order to maintain an adequate ratio of students to instructors and preceptors. With more applicants, programs are becoming more difficult to gain acceptance.

CAATE accreditation establishes the required material that must be instructed during class lectures and during the clinical experiences. Utilizing a set list of proficiencies establishes a minimum level of education required for an entry level Athletic Trainer which coincides with the requirements of the BOC.

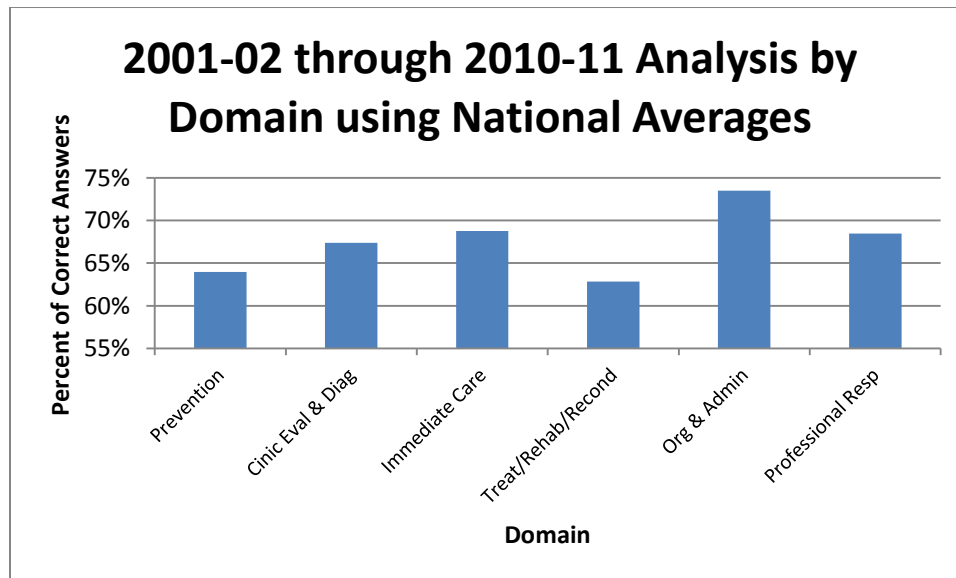
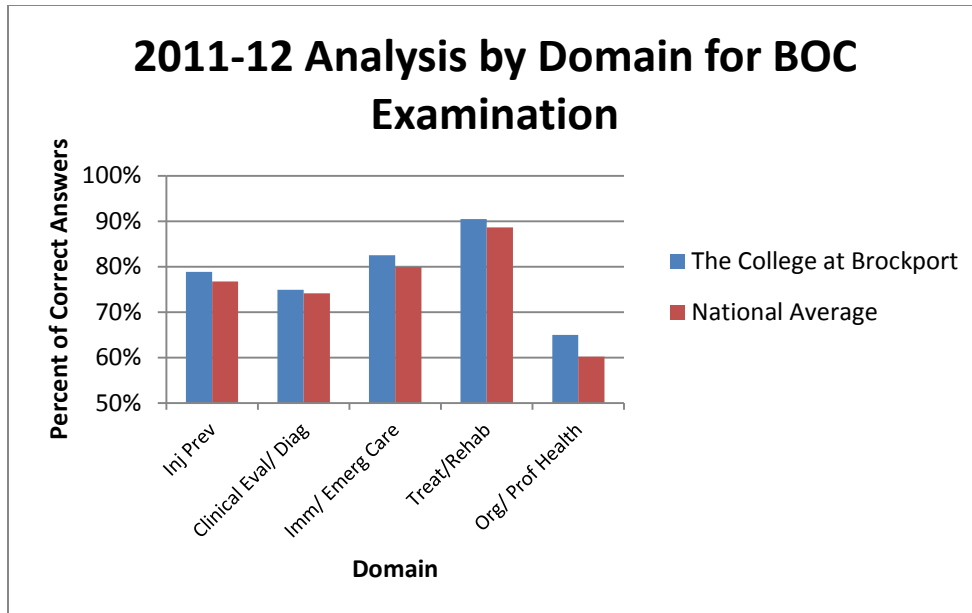


An example of a CAATE accredited program that is seeing the benefits of the increase in applicants is the CAATE accredited program at The College of Brockport (Brockport, NY). Over the past three years, candidates at The College at Brockport have scored higher than the national average.¹⁸ The amount of applicants into the CAATE accredited program at The College at Brockport has been higher than ever. This had made the application process to be accepted into the program very competitive. The increase in qualified applicants combined with the CAATE accredited education that candidates receive at The College at Brockport result in higher test scores compared to the national average.

The increase in qualified applicants and the quality of CAATE accredited program nationwide can also be seen with the increase in the average scaled scores. This further strengthens the relationship of the percent of first time passing candidates and the increased number of applicants.



There are a few domains that candidates typically incorrectly answer the most questions.¹⁹ With the restructuring of names of the domains due to changes in the Role Delineation Study, some of the domains do not completely correlate. However, there is enough of a trend over time to determine areas of weaknesses. The three main areas of weakness are in Injury Prevention and Wellness Protection, Organizational and Professional Health, and Treatment and Rehabilitation. The following charts show the percentage of questions answered correctly within each domain.



Topics included in the domain of Injury Prevention are the Pre-Participation Physical, heat related injuries, taping, wrapping, bracing, and the use of protective equipment. Since Injury Prevention is primary focus of Athletic Trainers, it holds the most importance.

The Pre-Participation Examination (PPE) has been studied to determine the proper use and different strategies that can be implemented to have it be an effective and efficient.²⁰

There are two main types of PPEs. The first option is for the individual's primary care provider

to perform an exhaustive evaluation of the patient's total health. The second option is for a group or station format in which several patients are able to go from station to station in which a variety of health care professionals can evaluate the individual based on their specialty. In the example of a primary care provider completing the whole examination, there is more privacy; however there is an increased cost and time commitment.²¹

Heat related injuries are another major topic in the domain of Injury Prevention. Heat related injuries are easily the most preventable injuries to an individual. Athletic Trainers must be aware of the signs and symptoms of heat related injuries and be able to prevent the injury from occurring or prevent the injury from getting worse. The National Athletic Trainers' Association published a position statement in 2002 regarding proper policy and procedure which is to be followed in any situation where environmental heat could induce injury.²²

Proper equipment fitting, primarily focusing on proper fitting of a football helmet, can prevent catastrophic life threatening injury. Football helmets go through rigorous testing to prove that they are resilient enough to withstand intense repeated impact. Football helmets are inspected and regulated by the National Operation Committee on the Standards for Athletic Equipment (NOCSAE).²³ Proper fit of a football helmet requires the helmet to not move when the facemask is grabbed and rotated opposite of the direction of movement of the athlete. Padding should be snug to the skin. Appropriate inflation of the air bladder pads can be conducted using a tongue depressor. An Athletic Trainer should be able to slide a tongue depressor along the cheek pads and feel some resistance to ensure a snug fit. Helmets must be refurbished occasionally to maintain the integrity of the outer shell and inner air bladder pads.

Every football helmet that is NOCSAE certified will have the following statement on a label inside of the helmet²⁴:

Warning: Do not strike an opponent with any part of this helmet or facemask. This is a violation of football rules and may cause you to suffer severe brain or neck injury, including paralysis or death. Severe brain or neck injury may also occur accidentally while playing football. NO HELMET CAN PREVENT ALL SUCH INJURIES. USE THIS HELMET AT YOUR OWN RISK.

It is the responsibility of the Athletic Trainer to warn the athletes of the risks associated with playing football. Athletic Trainers should produce a statement in which athletes sign stating that they are aware of the risks associated with football and have read the NOCSAE warning label.²⁵ While helmets prevent and reduce the significance of many head injuries, there is no perfect helmet that can prevent them all.

The domain of Organizational and Professional Health and Well-being includes several important topics for candidates to understand in order to successfully pass the BOC examination. These topics include burnout, insurance information and medical records, ethics, and special considerations involving minors and educational settings.

Burnout is a common psychological and physical impairment that many Athletic Trainers experience throughout their career. Burnout is related to the stress of a job and the emotional exhaustion that results from the stress.²⁶ Some of the symptoms of burnout include lack of motivation to perform a role and a low level of personal accomplishment. The primary cause of burnout is role strain. There are several components to role strain including role conflict, role ambiguity, role incongruity, role incompetence, and role overload. Role overload is the most

common component that affects Athletic Trainers due to the high patient loads and extensive amounts of time working per week.²⁷

Medical records and documentation is crucial in any health care field. Keeping comprehensive and accurate medical records can prevent any litigation against the Athletic Trainer and will allow for improved communication between health care professionals regarding treatment of an individual. Athletic Trainers must be careful to protect the privacy of the patients they treat. Two major laws associated with privacy of an individual are the Family Education Rights and Privacy Act and the Health Insurance Portability and Accountability Act.²⁸ Depending on the setting that the Athletic Trainer works in, these laws must be followed to protect the privacy of the individuals that are being treated.

Documentation is typically formatted using SOAP notes. SOAP is an acronym for Subjective, Objective, Assessment, and Plan.²⁹ In order for a note to be accurate and complete, all components must be documented. Subjective information is any information that is provided by the patient that can assist with your diagnosis or treatment. This may include a mechanism of injury, pain levels, onset of injury, and a past medical history. Objective information is information that can be measured or any special tests that are performed and can be reproduced. Objective information can include measurements of edema, range of motion, strength, special tests, pain, and balance. The Assessment section will include the diagnosis of injury, any impairment that the patient has as well and functional limitations, and then the prognosis. The Plan section involves the rehabilitation procedure that the Athletic Trainer is going to implement as well as anticipated adjustments that will be made at future

visits. The patient will create goals for therapy and these will be documented in this section as well.³⁰

The domain of Treatment and Rehabilitation has several topics that are important for candidates to be aware of and have a level of mastery in understanding in order to be successful on the BOC examination. These topics include the use of therapeutic modalities, plyometrics, proprioceptive neuromuscular facilitation, and some common surgical rehabilitation protocol milestones. Candidates with a thorough understanding of these topics will be able to perform well and correctly answer several questions regarding this domain.

Therapeutic modalities are designed to create the optimal healing environment for an injury. Each modality creates a stress upon the tissues and promotes a certain process to occur in the injury site. There are five common signs of inflammation which results from injury. These signs can be remembered using the acronym “PRISH” which stands for pain, redness, immobility and guarding, swelling and edema, and heat. There are three phases of healing which have to occur in sequence for an injury to resolve. These include the inflammatory-response phase, the fibroblastic-repair phase, and the maturation-remodeling phase.³¹

Therapeutic Modalities can be classified by the type of energy used to stress the tissues. The types of energy used to treat injuries are thermal, mechanical, electrical, or chemical.³² Thermal modalities utilize heat and cold to induce change in tissues. Cold is used to decrease cellular metabolism and to prevent secondary hypoxic injury, while heat is used to increase cellular metabolism and promote the increase in vascularization of the area. Modalities that utilize mechanical energy are ultrasound units and intermittent compression units. Modalities

that utilize electrical energy are diathermy units as well as electrical stimulators. Chemical energy is used through vapocoolant sprays, iontophoresis and phonophoresis, and medication.³³

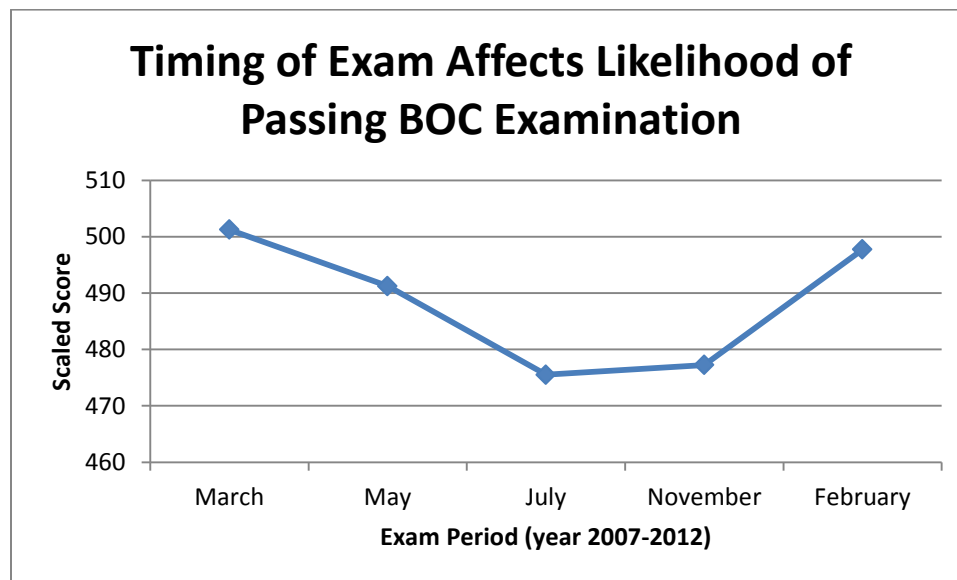
Proprioceptive Neuromuscular Facilitation (PNF) is another topic that can be questioned extensively on the BOC examination. PNF can be utilized to increase strength, increase range of motion through stretching, and increase neuromuscular coordination.³⁴ There are five techniques utilized to strengthen the muscles that act on a joint. They are rhythmic initiation, repeated contraction, slow reversal, slow reversal hold, and rhythmic stabilization. The three techniques used for increasing range of motion are contract-relax, hold-relax, and slow-reversal-hold-relax. These stretching techniques utilize the reciprocal inhibition used by muscles in order to allow for motion.³⁵ For example, if the quadriceps muscle group is activated, then there is a neuromuscular relaxation that occurs in the hamstring group.

In order for the stretch to occur, the muscle spindles in the muscles must be overridden. Muscle spindles provide a reflexive contraction of the muscle due to rapid changes in length as a protective mechanism against injury. However, in controlled stretching scenarios, this response prevents the musculotendinous unit from reaching maximal length to provide a significant stretch.

Success rate can also be correlated to the time that the test is taken within a given exam period. Over the past 5 years, there is a noticeable decline in the scaled test score among candidates if they take the exam later in the exam window.³⁶ The increase in the February

scores is due to the fact that February is the first window that graduating seniors are eligible for since they typically are registered and taking classes in their final semester before graduation.

Due to the format of the exam period, November candidates typically have classmates that are taking exams in the following exam period. For example, a group of seniors who are graduating in May 2013 could have candidates taking the exam in February (which would be considered the 2012-13 exam period) and candidates taking the exam in May or August (which would be considered the 2013-14 exam period). In order to have a more accurate assessment of classmates, the February window should be the beginning of the exam period not at the end. Students who take the exam in July show a significantly lower test score than those who take the exam in March ($p=.04$).



Understanding the relationships shown by this data analysis will allow candidates to be more prepared to take the BOC examination. CAATE accredited programs can utilize this information to improve their education in the domains of weakness to better prepare their students for successful passing of the exam. These relationships provide a better

understanding of the exam, ways it can be improved, and tells researchers more about the candidates that are taking the test.

¹ National Athletic Trainers' Association. (2013). *Terminology*. Retrieved May 3, 2013, from National Athletic Trainers' Association: <http://www.nata.org/athletic-training/terminology>

² Board of Certification, Inc. (2012). *Role Delineation Study/ Practice Analysis*. Retrieved May 3, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/resources/role-delineation-study-practice-analysis>

³ Board of Certification, Inc. (2012). *Continuing Education*. Retrieved May 3, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/ats/maintain-certification/continuing-education>

⁴ Anderson, M. K., Parr, G. P., & Hall, S. J. (2009). *Foundations of Athletic Training: Prevention, Assessment, and Management*. Philadelphia: Lippincott Williams & Wilkins.

⁵ Board of Certification, Inc. (2012). *Exam Development & Scoring*. Retrieved May 3, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/educators/exam-development-scoring>

⁶ Ibid.

⁷ Ibid.

⁸ CASTLE Worldwide, Inc. (2006, April). *2006 Annual Report for the National Athletic Trainers' Association Board of Certification*. Retrieved May 3, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/images/stories/public/2005examreport.pdf>

⁹ CASTLE Worldwide, Inc. (2008, April). *2007 Annual Summary: Board of Certification (BOC) Certification Examination for Athletic Trainers*. Retrieved May 3, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/images/stories/public/2007examreport.pdf>

¹⁰ Board of Certification, Inc. (2012). *Exam Development & Scoring*. Retrieved May 3, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/educators/exam-development-scoring>

¹¹ Board of Certification, Inc. (2013, January). *BOC Exam Candidate Handbook*. Retrieved May 3, 2013, from Board of Certification for the Athletic Trainer: http://www.bocatac.org/images/stories/candidates/boc_candidate_handbook_1301af.pdf

¹² Board of Certification, Inc. (2012). *Exam Reports*. Retrieved May 4, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/resources/exam-reports>

¹³ Ibid.

¹⁴ Board of Certification, Inc. (2012). *Defining Athletic Training*. Retrieved May 4, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/about-us/defining-athletic-training>

¹⁵ Ibid.

¹⁶ Board of Certification, Inc. (2012). *Exam Reports*. Retrieved May 4, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatac.org/resources/exam-reports>

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Anderson, M. K., Parr, G. P., & Hall, S. J. (2009). *Foundations of Athletic Training: Prevention, Assessment, and Management*. Philadelphia: Lippincott Williams & Wilkins.

²¹ Ibid.

²² Binkley, H. M., Beckett, J., Casa, D. J., Kleiner, D. M., & Plummer, P. E. (2002). National Athletic Trainers' Association Position Statement: Exertional Heat Illness. *Journal of Athletic Training*, 329-343.

²³ Anderson, M. K., Parr, G. P., & Hall, S. J. (2009). *Foundations of Athletic Training: Prevention, Assessment, and Management*. Philadelphia: Lippincott Williams & Wilkins.

²⁴ Ibid.

²⁵ Ibid.

²⁶ Harrelson, G. L., Gardner, G., & Winterstein, A. P. (2009). *Administrative Topics in Athletic Training: Concepts to Practice*. Thorofare: SLACK Incorporated.

²⁷ Capel SA. Psychological and organizational factors related to burnout in athletic trainers. *Res Q Exercise Sport*. 1986;57(4):321-328.

²⁸ Harrelson, G. L., Gardner, G., & Winterstein, A. P. (2009). *Administrative Topics in Athletic Training: Concepts to Practice*. Thorofare: SLACK Incorporated.

²⁹ Ibid.

³⁰ Ibid.

³¹ Starkey, C. (2004). *Therapeutic Modalities*. Philadelphia: F.A. Davis.

³² Ibid.

³³ Starkey, C. (2004). *Therapeutic Modalities*. Philadelphia: F.A. Davis.

³⁴ Prentice, W. E. (2011). Proprioceptive Neuromuscular Facilitation Techniques in Rehabilitation. In W. E. Prentice, *Rehabilitation Techniques for Sports Medicine and Athletic Training* (pp. 296-317). New York: McGraw Hill.

³⁵ Ibid.

³⁶ Board of Certification, Inc. (2012). *Exam Reports*. Retrieved May 4, 2013, from Board of Certification for the Athletic Trainer: <http://www.bocatc.org/resources/exam-reports>

Therapeutic Modalities

By Matthew Jones

Biggest Misconception

- ⦿ Cannot “speed up” injury recovery time
 - Sets up optimal environment for healing to occur on its own
 - Must allow inflammatory response to go through all phases

Inflammatory Response

- ⑤ 5 common signs of inflammation “PRISH”
 - Pain
 - Redness
 - Immobility/Guarding
 - Swelling/Edema
 - Heat

Phases of Healing

- Inflammatory-response phase
 - Moment of injury- 4 days
- Fibroblastic-repair phase
 - 2 days – 6 weeks
- Maturation-remodeling phase
 - 3 weeks- 2 years

Inflammatory-Response Phase

- ◉ Leukocytes

- White blood cell that fights infection

- ◉ Phagocytes

- Consume dead cells from trauma

Inflammatory-Response Phase

○ Chemical Mediators

- Histamine
 - Increase vasodilation
 - Increase cell permeability
- Leucotaxin
 - Increase cell permeability
 - Increase fluid and WBC (creates exudate)
- Necrosin
 - Increases phagocytic activity

Inflammatory-Response Phase

◉ Clotting Process

- Complex conversion process beginning with thromboplastin
- Thromboplastin
 - Prothrombin
 - Thrombin
 - Fibrinogen
 - Fibrin Clot

Fibroblastic-Repair Phase

○ Revascularization

- Increase in capillaries
 - Increase in blood flow for tissue growth and repair

○ Scar Formation

- Absorption of clot into avascular connective tissue
- Extracellular matrix
 - Collagen
 - Elastin
 - Ground Substance

Maturation-Remodeling Phase

- Realignment of collagen fibers along parallel lines of tensile forces
 - Wolff's Law
 - Progressive demands on tissue for optimal alignment of fibers

Thermal Modalities

◉ Cold Modalities

- Ice pack/ immersion
- Vapocoolant

◉ Heating Modalities

- Hot Pack
- Ultrasound
- Diathermy

Cold Modalities

- ◉ Decreased cellular metabolism
 - Limit secondary hypoxic injury
- ◉ Decreased inflammation
- ◉ Decreased pain
- ◉ Decreased muscle spasm

Heating Modalities

- ⦿ Increased vasodilation
- ⦿ Increased capillary permeability
- ⦿ Increased rate of vasodilation
- ⦿ Increased elasticity of collagen-rich tissues

Ultrasound

- Thermal and Non-thermal Parameters
 - Continuous vs Pulsed waveforms

- Depth of penetration
 - 1MHz vs 3MHz

Ultrasound

◉ Conversion of energy

- Acoustic energy enters and vibrates the tissues
- Vibration of the tissues creates friction and heat
- Utilizes all the effects of a thermal modality

Phonophoresis

- Use of ultrasound to increase absorption of medication
- Allows for large molecules of drug to enter cells
- Important to find a medium that allows adequate coupling and transmission
- Drugs used include anti-inflammatories and analgesics

Iontophoresis

- Introduction of drug ions into body through use of direct current
- Anode- positive electrode
- Cathode- negative electrode
- Drug must be water and fat soluble
 - Maintain ion form on electrode
 - Fat soluble to pass through membranes

Common Drugs used in Iontophoresis

- ⊙ Positive drugs

- Lidocaine (anesthetic/analgesic)

- ⊙ Negative drugs

- Dexamethasone (anti-inflammatory)

Shortwave Diathermy

- Radio Frequency
 - 27.12 MHz or 13.56 MHz
- Creates thermal energy through conversion
- Has been shown to have thermal effects at equivalent depth of 1MHz ultrasound
- Capacitive vs Inductive Electrodes
 - Capacitive uses similar techniques to e-stim pad placement creates electrical field
 - Inductive coils wire around limb creating eddy currents and strong magnetic fields

Massage

- Improve flexibility of tissue
- Increase circulation
 - Blood Flow
 - Lymph Fluid
- Removal of lactic acid
- Psychological effects

Massage Techniques

○ Effleurage

- Soft superficial strokes without trying to affect deep tissues

○ Petrissage

- Kneading, pressing, rolling deeper muscles

○ Tapotment

- Swift percussive motions

○ Vibration

○ Cross Friction

Reference

- Starkey, C. (2004). *Therapeutic Modalities*. Philadelphia: F.A. Davis.
 - One of the referenced text of the BOC Examination

Shoulder Labrum Tears

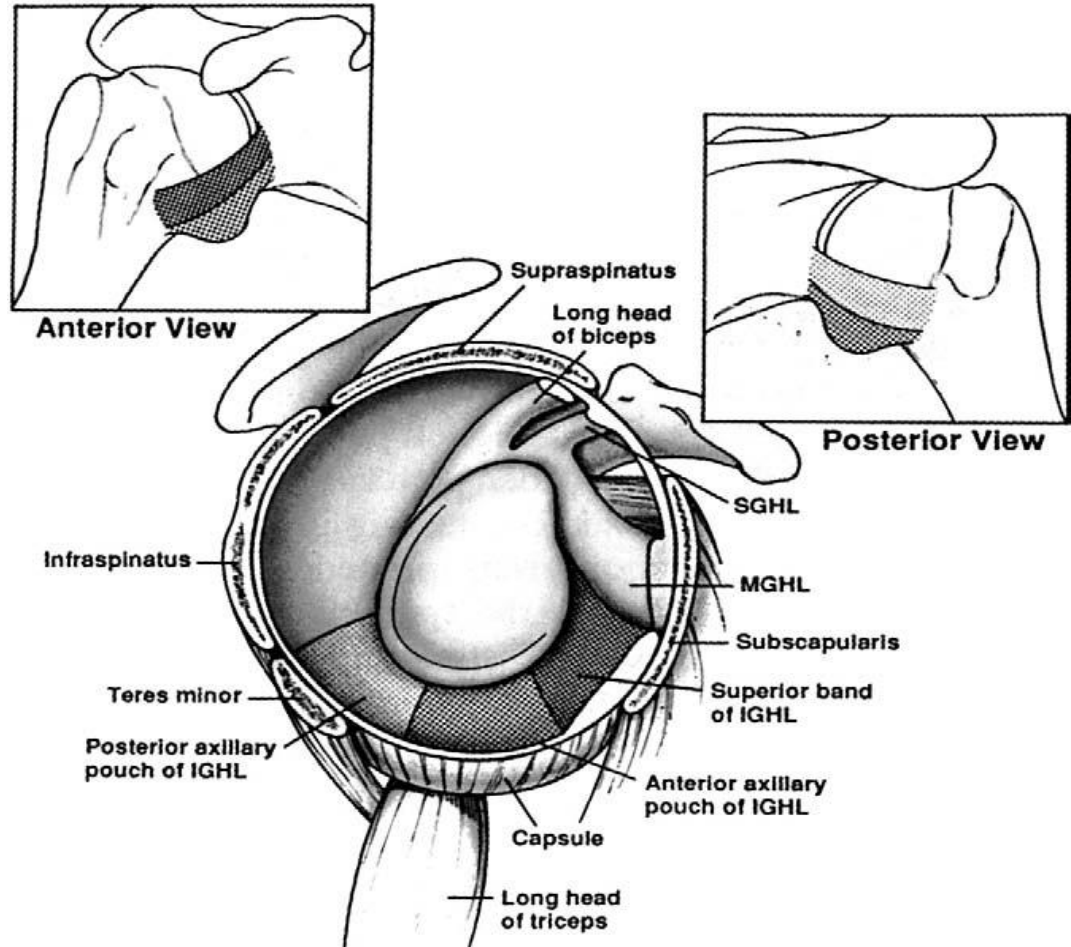
Matthew Jones

What Types of Tears are there?

- Bankart
- Perthes
- Hill-Sach
- SLAP

Anatomy of the Shoulder

- Rotator Cuff
- GH Ligaments
- Labrum



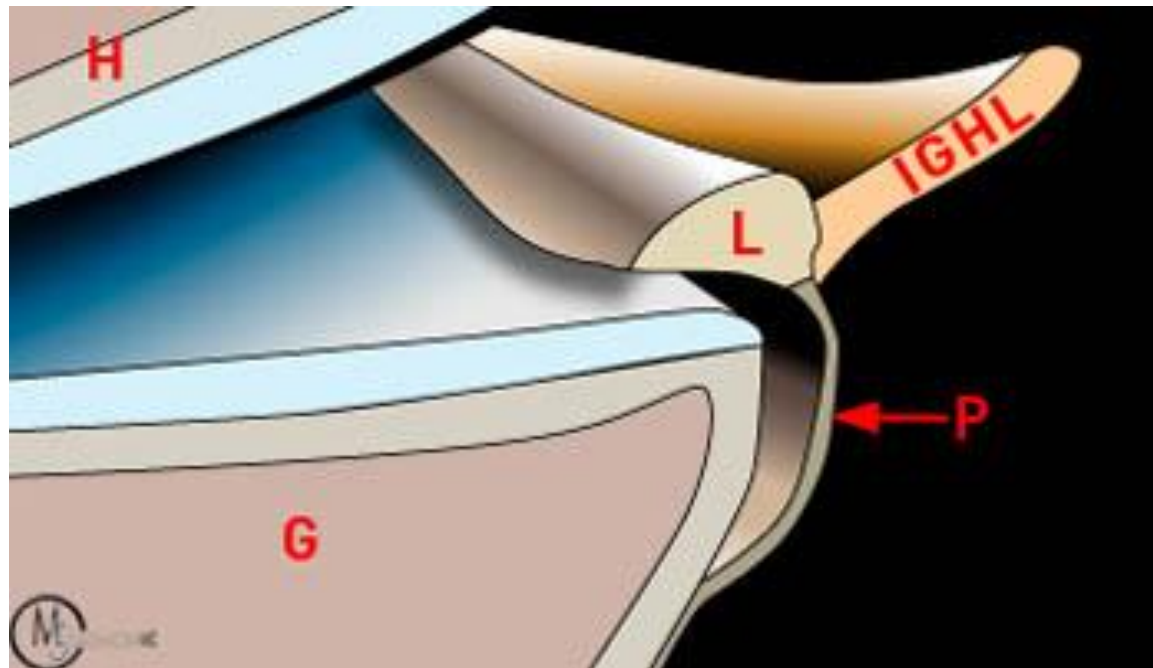
Anterior Instability of GH Capsule

- Bankart
 - Avulsion of inf. GH ligament from glenoid labrum
- Perthes
 - Similar to Bankart, but periosteum of glenoid fossa is avulsed
- Hill-Sach
 - Chondral or Osteochondral defect of posterior head of humerus

Bankart Lesion

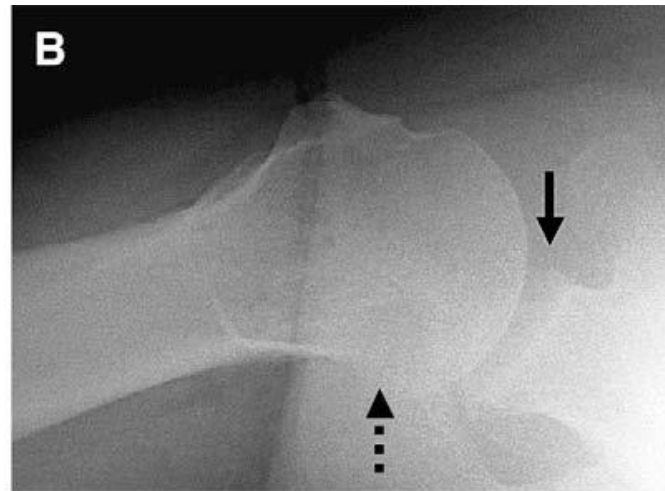


Perthes Lesion



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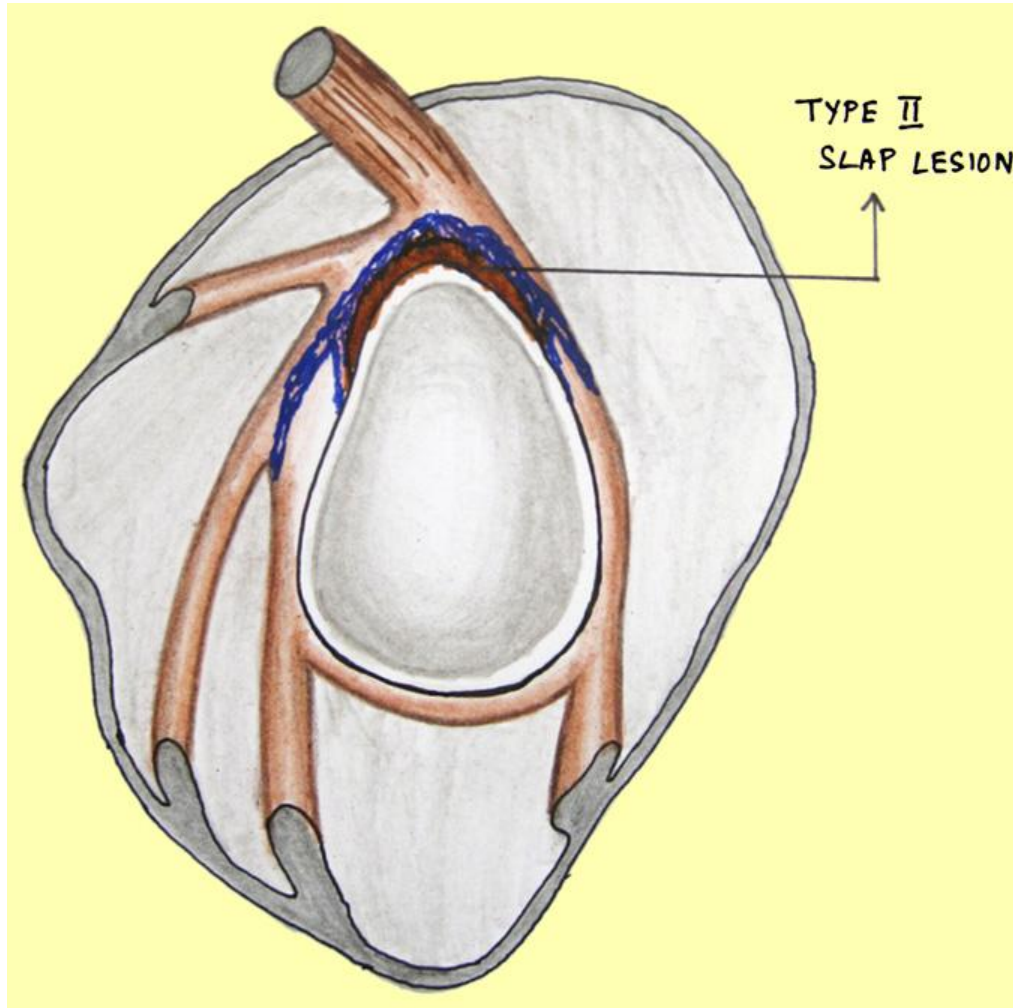
Hill-Sachs Lesion



Superior Lesions

- Superior Lesion Anterior Posterior
 - SLAP Tear
 - Associated with long head of bicep tendon
 - Usually repetitive microtrauma
 - Studies have identified up to 10 different variations and severities
 - Can also be caused by chronic superior impingement of the rotator cuff

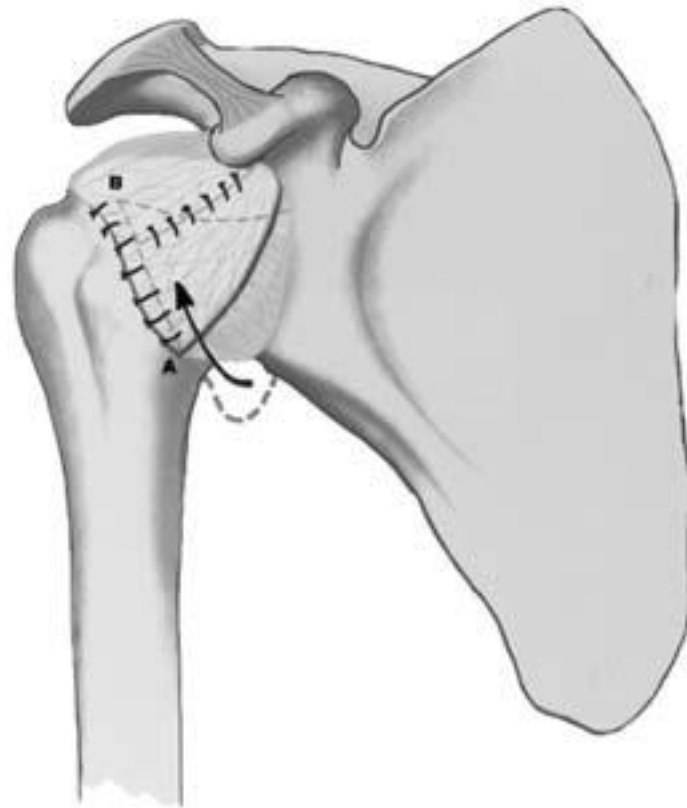
SLAP Lesion



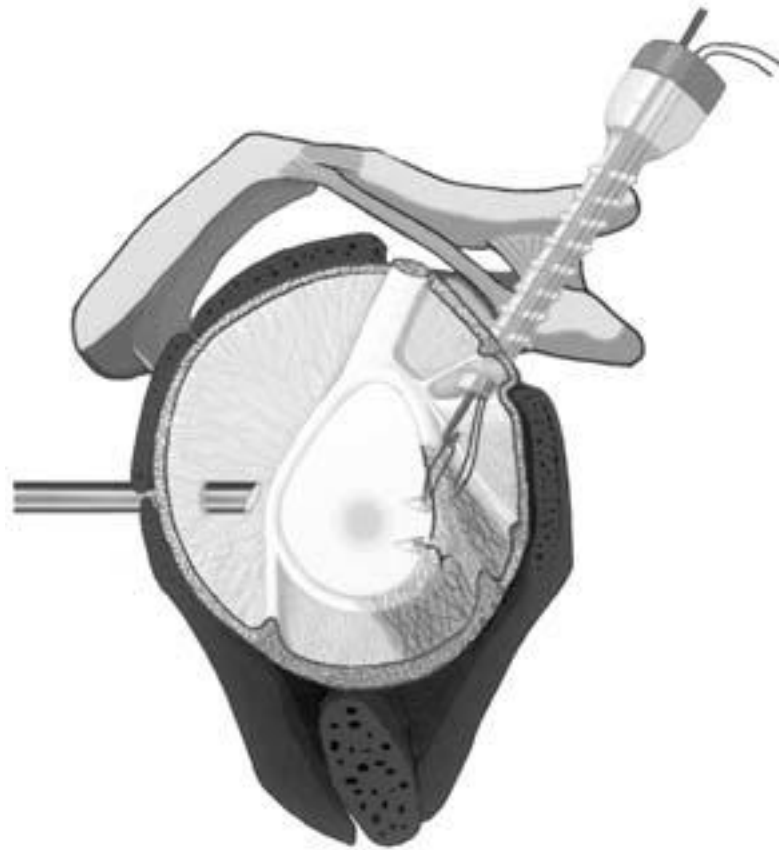
Surgical Techniques

- Open Repair
 - More invasive
 - Involves capsular shift
- Arthroscopic Repair
 - Minimally invasive
 - Much more common procedure

Open Repair and Capsular Shift



Arthroscopic Repair



Rehabilitation

- 4 main phases
 - Protection
 - First 6 weeks
 - Intermediate
 - Weeks 7-12
 - Advanced Activity and Strengthening
 - Weeks 12-24
 - Functional Return To Play
 - Weeks 24-36+

Protection Phase

- Immobilization
 - Sling use for up to 6 weeks
- Limited ROM to allow for adequate healing of repair
- Exercises
 - PROM
 - Rhythmic Stabilization (PNF)

Intermediate Phase

- Restore Full ROM
- Dynamic Stabilization
 - Promote initial baseline muscular strength
- Exercises
 - AROM begins
 - DAPRE method
 - PNF Patterns
- Joint mobilizations as indicated to regain ROM
 - Grade I/II

Advanced Activity and Strengthening

- Full AROM
- Exercises
 - DAPRE
 - Sport Specific Training
 - Isokinetic Testing
 - Plyometrics
 - Slide Board

Full Functional ROM

Movement	Involved	Uninvolved
Flexion		
Extension		
Abduction		
Adduction		
Internal Rotation		
External Rotation		

Muscular Strength Comparison using Isokinetic Dynamometer

Movement	Involved	Uninvolved
Flexion (slow/fast)		
Extension (slow/fast)		
Abduction (slow/fast)		
Adduction (slow/fast)		
Internal Rotation (slow/fast)		
External Rotation (slow/fast)		

Physician's Signature: _____

Date: _____

References

- Prentice, W. E. (2011). *Rehabilitation Techniques for Sports Medicine and Athletic Training*. New York: McGraw Hill.
- Robinson, C. M., & Dobson, R. J. (2004). Anterior instability of the shoulder after trauma. *Journal of Bone & Joint Surgery (Br)*, 469-79.
- Sandhu, B., Sanghavi, S., & Lam, F. (2011). Superior Labrum Anterior to Posterior (SLAP) lesions of the shoulder. *Orthopaedics and Trauma*, 190-197.
- Wischer, T. K., Bredella, M. A., Genant, H. K., Stoller, D. W., Bost, F. W., & Tirman, P. F. (2002). Per thes Lesion (A Variant of the Bankart Lesion): MR Imaging and MR Arthrographic Findings with Surgical Correlation. *American Journal of Roentgenology*, 233-237.

Environmental Conditions: Heat Related Injury

By Matthew Jones

A decorative graphic consisting of several horizontal lines of varying lengths and colors (teal, light blue, and white) extending from the right side of the slide.

Thermoregulation

- Body's ability to maintain a stable internal environment
- Controlled by the hypothalamus in the brain
- Hyperthermia – increased body temperature

Transfer of Heat Energy

- 4 methods of heat transfer
 - Conduction
 - Convection
 - Radiation
 - Evaporation
- Body uses all 4 methods to dissipate heat when required

Conduction

- Direct transfer of heat from a warmer to a colder object
- Rate of temperature change depends on temperature gradient between object
 - More significant difference in temperature will cause rapid temperature increase in the cooler object

Convection

- Transfer of heat through a fluid (usually water or air)
- Effectiveness of heat transfer is dependent on the speed of the fluid next to skin
 - Wind chill effect: New colder air molecules are rapidly replaced near the skin causing more heat to dissipate

Radiation

- Loss of heat from a warmer object to a cooler object through infrared waves without physical contact
 - Sun energy transfers to warm Earth
 - Skin temperature higher than environment
- Shaded areas decrease the effects of radiant heat

Evaporation

- Most effective heat dissipation method of the body
- Utilization of sweat to lose heat
- Water must evaporate in order for heat to be lost
- Relative environmental humidity affects amount of sweat that can be evaporated
 - High humidity yields limited sweat evaporation
- Heat is also dissipated through evaporation of water vapor from exhalation

Factors that Modify Heat Tolerance

- Acclimatization
- Fluid Rehydration
- Electrolyte Replacement
- Clothing
- Age
- Sex
- Diuretics/ Supplements/ Medications
- Practice Schedules
- Weight Charts

Acclimatization

- The body's physical adaptation to a new environment
- Occurs over 10-14 days
- Gradual progression of exercise duration and intensity to allow for body to adjust
- Cannot optimally perform in a new environment on first day
- Increased regulation of preseason football practices allow for this process to occur

Higher Risk Individuals in Heat Environment

- Age extremes (children, elderly)
- Excessive muscle mass, large and obese
- Poorly acclimatized
- Previous history of heat illness
- Electrolyte or water depleted
- Sleep deprived

Signs and Symptoms of Heat Illness

Heat Exhaustion	Heat Stroke
Dizzy	Disoriented
Headache	Unconscious
Profuse sweating	No sweating in later stages
Rapid, shallow breathing	Shallow breathing
Cool, clammy skin	Hot, dry skin
Ashen or gray skin	Reddish skin
Body Temperature normal or slightly elevated	Body Temperature markedly elevated
Rapid, weak pulse	Rapid, strong pulse
Uncoordinated gait	

Exertional Hyponatremia

- Exercise induced low plasma sodium levels
- Caused by loss of sodium in sweat
- Often occurs in marathon runners who drink only water and do not replenish electrolytes which can be found in sports drinks
- Increased water content without increasing sodium intake will further increase the symptoms since concentration will continue to decrease

Reference

- Anderson, M. K., Parr, G. P., & Hall, S. J. (2009). *Foundations of Athletic Training: Prevention, Assessment, and Management*. Philadelphia: Lippincott Williams & Wilkins.

One of the official referenced sources of the BOC Examination

BURNOUT

By Matthew
Jones

COMPLEXITIES OF THE WORK SETTING

- Even with a certification exam that establishes a minimal entry level qualification, not all ATs are prepared for the new work environment out of college
- ATs often experience the following in their new role:
 - Reality Shock
 - Role Stress/Strain
 - Job Dissatisfaction
 - Quality of Life concerns

REALITY SHOCK

- Work setting differs from educational setting
- Job requirements are different than what is anticipated
- This is caused by an inappropriate socialization process
- Increased responsibility, longer work hours, higher volume of patients
- Reality shock usually only lasts a year or two then AT will become more adjusted and prepared

ROLE STRAIN

- Caused by an individual's perception of occupation is complex, conflicting, difficult, or too demanding
- Components of role strain are:
 - Role Conflict
 - Role Ambiguity
 - Role Incompetence
 - Role Incongruity
 - Role Overload

ROLE CONFLICT

- Two aspects of role are contradictory
- Can either be having two job titles or two requirements of job requiring attention at the same time
 - Athletic Trainer hired to also be the Strength and Conditioning Coach (Inter-role conflict)
 - Time needed to completely and accurately complete medical documentation and need to maintain supervision of patients completing rehabilitative exercises (Intra-role conflict)

ROLE AMBIGUITY

- Professional responsibilities or expectations are unclear/vague
- Indicates poor communication with employers
- AT hired to work with a specific team and then is later told that they must also teach classes

ROLE INCOMPETENCE

- Lack of knowledge or skill required to perform duties
- Continuing Education Requirements as well as in service training and workshops usually help to avoid this situation

ROLE INCONGRUITY

- Personality traits, abilities, attitudes do not “fit” with the requirements of a position
- Need to have detailed and concise job descriptions
- AT needs to know his/her strengths/weaknesses in order to know if they are prepared to take on additional responsibility
- Thorough interview process will allow employers to determine if candidate meets the requirements of the position

ROLE OVERLOAD

- Most common component experienced by Athletic Trainers
- More obligations than time to complete them
- Job requirements require individual to utilize personal time to complete tasks

BURNOUT

- Hard to define, but easy to experience
- Role Strain will lead to burnout if not eliminated
- Results in:
 - Emotional Exhaustion
 - Lack of motivation to fulfill a role
 - Low levels of personal accomplishment
- Significant loss in productivity

REFERENCE

- Harrelson, G. L., Gardner, G., & Winterstein, A. P. (2009). *Administrative Topics in Athletic Training: Concepts to Practice*. Thorofare: SLACK Incorporated.

One of the official referenced sources for the BOC Examination

MEDICAL DOCUMENTATION

By Matthew Jones

Confidentiality

- Number one requirement of record keeping
- Introduction of electronic records creates need for new legislation
 - ▣ Health Insurance Portability and Accountability Act (HIPAA)
- Significant fines/penalties if HIPAA is not followed

Purpose of Medical Documentation

- Provision of an accurate, thorough medical record
- Used for billing purposes, communication with other health care professionals
- Proper documentation can prevent litigation against an Athletic Trainer

Initial Evaluation

- SOAP Note
- Subjective
 - ▣ Information provided by the patient about injury
- Objective
 - ▣ Quantified impairments using reproducible tests
- Assessment
 - ▣ Diagnosis, Functional Limitations, Prognosis
- Plan of Care
 - ▣ Duration of treatment expected, frequency of visits, intervention list, goals

Subjective

- Components needed for a effective subjective assessment:
 - Current level of pain and symptoms
 - Date of onset
 - Mechanism of injury
 - Knowing mechanism of injury will allow a clinician to significantly reduce differential diagnosis
 - Current limitations
 - Past relevant medical history of involved region
 - Requirements of work/school/sport
 - Patient goals for rehabilitation

Objective

- Edema: trace, 1+, 2+, 3+
- Range of motion: Goniometry
- Strength: Manual Muscle Tests, Isokinetic Dynamometer
- Special Tests for specific injuries: + or –
- Point Tenderness
- Pain: Visual Analog Scale

Assessment

- Athletic Trainer's diagnosis must be the same as the physicians, however it can be more specific
- Functional limitations must be listed as these are primary focus of rehabilitation
 - ▣ Ex: Patient is unable to sleep through the night without waking due to pain
- Prognosis states the likelihood of reaching goals in a timely manner without obstacles

Plan of Care

- Duration of treatment
 - ▣ How many weeks with the patient need therapy?
- Frequency of treatment
 - ▣ How often will the patient need to receive therapy per week?
- Intervention List
 - ▣ Modalities used
 - ▣ Therapeutic Exercises
- Progress Goals
 - ▣ One goal every two weeks must be obtained to show adequate progress

Effective Goal Writing

- Specific
- Measurable
- Attainable
- Realistic
- Timely
- Related to a functional impairment
- Ex: Increase Right Upper Extremity strength in order to carry groceries from the car to the kitchen without stopping

Daily Note

- Shortened version of SOAP note
- Decrease in symptoms
- Record new measurements of strength, ROM etc.
- Goal Progression
- Continue Plan of Care and progress as tolerated to maintain optimal stresses to promote healing and positive adaptations

Reference

- Harrelson, G. L., Gardner, G., & Winterstein, A. P. (2009). *Administrative Topics in Athletic Training: Concepts to Practice*. Thorofare: SLACK Incorporated.

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