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LTG Patricia D. Horoho
The Surgeon General
Commander, US Army Medical Command

MG Steve Jones
Commanding General
US Army Medical Department Center & School

By Order of the Secretary of the Army:
Official:

GERALD B. O'KEEFE
Administrative Assistant to the Secretary of the Army

Raymond T. Odierno
General, United States Army
Chief of Staff

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Perspectives

Commander's Introduction

MG Steve Jones

> *We live in a much more competitive security environment. This means that we have to learn faster and better than our future adversaries.*
>
> General Martin E. Dempsey

The Joint Publication *Capstone Concept for Joint Operations: Joint Force 2020* describes a future:

> …likely to be more unpredictable, complex, and potentially dangerous than today. The accelerating rates of change present in so many aspects of this future security environment will require greater speed in the planning and conduct of military operations. Once in a fight, adversary capabilities and tactics will also shift more quickly.[1(p3)]

To prepare the Army to win decisively in this environment, the Chief of Staff published five strategic priorities for the future:

- Adaptive Army Leaders for a Complex World
- A Globally Responsive and Regionally Engaged Army
- A Scalable and Ready Modern Army
- Soldiers Committed to Our Army Profession
- The Premier All-Volunteer Army

We can only achieve these priorities through effective education that teaches principals, concepts, facts, and Army Values.

The Army requires agile, adaptive leaders with critical analytical skills, problem solving abilities, intellectual curiosity, and intellectual discipline. These leaders will exercise Mission Command, a leadership style defined as "the exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander's intent." Unexpected threats and opportunities during military operations require responsibility and decision-making at the point of action. Agile leaders and subordinates who are comfortable with uncertainty can adapt to meet the challenges of the mission at hand. In taking action they remain within the commander's intent, integrating their efforts with the rest of the force. They exercise disciplined initiative in support of the overall objective because they understand they are part of a larger force. This approach requires much more from commanders; they must clearly understand, visualize, describe, direct, lead and assess operations. The *Army Mission Command Strategy FY13-19*,[2] *Army Leader Development Strategy 2013*,[3] and *The Army Training Strategy*[4] describe how the Army will develop these leaders though a rigorous program that includes education, training and experience.

Future leaders will better understand the social, cultural, political, and physical environment of the regions in which they operate—the "human terrain." Armed with this knowledge they will be far more relevant to the Joint Force Commander. The time to gain this in-depth knowledge is prior to an operation, not when troops are already engaged on the ground. Operational forces will be regionally aligned to specific geographic regions to allow this learning prior to deployment. The institutional Army Medical Department (AMEDD) has in-depth knowledge of the unique medical aspects of the different geographic regions of the world that affect operations. It must reorganize now to more effectively employ that information in support of regionally aligned forces.

Future military operations will unfold over hours and days rather than weeks and months. To adapt, the Army will transform to become a leaner and faster force. It will employ new warfighting concepts including expeditionary maneuver and integrated distributed operations where small, highly capable units operate across a large area. The Army's Campaign of Learning 2013[5] looks at America's Next First Battles to help guide the transition. The Campaign uses studies, science and technology, seminars, wargames, experiments, and live exercises to identify possible new challenges, and capabilities the Army should develop to meet these challenges. The AMEDD participates in the Campaign because it must transform as well. It must provide the Combatant Commander with tailorable, expeditionary and sustained medical capabilities that can operate in complex and austere environments. Creative thinking and a thorough understanding of requirements are the foundation for development of new doctrine, organizations, equipment, and processes. As the AMEDD adapts, these changes will be implemented through education and training.

The professionalism of the US Army is the basis of its success. Professionalism earned it the trust of the American people and created an environment of dignity and

respect where all can reach their full potential. The Center for the Army Profession and Ethic has implemented an education and training program for Soldiers and Army Civilians to learn and internalize the five essential characteristics of the Army Profession: trust, military expertise, honorable service, esprit de corps, and stewardship. They have developed doctrine, educational materials, case studies, virtual simulators, and Training Support Packages in support of the Army Profession Campaign.

To maintain the Premier All-Volunteer Army, we must maintain the resilience of our Soldiers, Families, and Civilians. The Army's Comprehensive Soldier and Family Fitness Program, and the AMEDD's Performance Triad build, maintain, and strengthen resilience through education. By following a thoughtful strategy and rigorous program, a Soldier can build the strength, speed, endurance, and agility required to succeed on today's battlefield. Through the same approach, Soldiers, Army Civilians, and Family members can develop their cognitive and psychological abilities.

The *Army Learning Concept for 2015*[6] supports each of the strategies, campaigns and programs above. It describes learning as a deliberate, continuous and progressive process that extends from the time Soldiers are accessed until the time they retire. It notes the responsibility for developing Soldiers and Army Civilians is shared among the institutional schoolhouse, the organizations to which individuals are assigned, and to the individuals themselves. It is a learner-centric model that provides relevant, tailored, and engaging learning that is not location dependant but delivered at the point of need. It recognizes that most Soldiers have grown up in a digital world, are adept at using technology, and require feedback and support from peers and mentors. It also understands the requirement to challenge seasoned Army professionals with repeated deployments who bring a wealth of experience to the learning system.

After twelve years of war, the US Army and its Medical Department are undergoing a major transformation guided by the Chief of Staff's five strategic priorities. The centerpiece of this transformation is education. Education is the foundation for developing effective leaders, an understanding of new requirements, the creative thinking required to adapt to new challenges, advancing the Army Profession, and maintaining the resilience of the Soldiers, Army Civilians, and Families that are the strength of the Army. The Army Medical Department's emphasis on education allowed us to achieve survival rates of 92% on recent battlefields; this same emphasis will lead to a successful transformation to meet the new challenges of future battlefields.

1. http://www.defenseinnovationmarketplace.mil/resources/JV2020_Capstone.pdf
2. http://usacac.army.mil/cac2/Repository/Army_Mission_Command_Strategy_dtd_12June%202013.pdf
3. http://usacac.army.mil/cac2/cal/ALDS.asp
4. US Army Chief of Staff Memorandum dtd October 15, 2012. Subject: Army Training Strategy (ATS).
5. http://www.army.mil/standto/archive/issue.php?issue=2012-09-21
6. http://www-tradoc.army.mil/tpubs/pams/tp525-8-2.pdf

EDITOR'S PERSPECTIVE

Healthcare is a profession within which learning must never stop, whether from experience and licensing mandates, or with additional formal education which complements that experience and equips the healthcare professional with additional knowledge, skills, and capabilities. There has always been competition among healthcare institutions for those practitioners who seek such additional education and training because they are necessary for any organization to maintain a high level of capabilities and performance. To that end, many institutions have formal programs with which to "grow their own" and assure a foundation of extended professional expertise continues to be available. Military medicine is no different. Indeed, a reservoir of comprehensive professional medical knowledge and experience is absolutely vital to military readiness and operational success. However, the costs of programs that provide graduate education must always be viewed from the perspective of the value gained by the organization, whether military or civilian, especially in the current economic environment. LTC Lee Bewley and his coauthors have examined the Army Medical Department (AMEDD) graduate programs to determine whether any economic value added to Army Medicine can be assessed, and, if so, does it justify the investment in those programs. Their article describes their approach to an economic value analysis, how they applied their concept to evaluating each of the AMEDD's graduate programs, and their findings. This article is a well organized, clearly presented treatment of a vitally important aspect of AMEDD's efforts to ensure that America's Warriors continue to receive the only the finest healthcare possible.

Perhaps no organization or institution is as dependent on effective and efficient delivery of various types of education as the military. Further, the nature of the military dictates the almost continual delivery of training and

instruction throughout its structure, from the nonstop basic training cycles of large numbers of new accessions through the various levels of career courses that prepare service members for responsibilities incumbent with advancing rank. As a result, for many years the US military has been recognized as a leader in the incorporation of leading edge concepts and innovations in the design of courseware and delivery of training targeting many levels of subject matter and student/trainee aptitude. Those responsible for the education and training of military personnel constantly explore techniques and approaches from across the spectrum of thinking and experience in the field of education, always seeking better ways to design and deliver the necessary training. This issue of the *AMEDD Journal* presents 8 articles which are excellent examples of this ongoing effort within the AMEDD, discussing approaches from formal, advanced graduate level education to workplace experiential training.

One area of research in formal education involves the manner in which information is conveyed to the student, taking in consideration a student's learning style, rather than the traditional lecture style with curriculum created primarily from the teacher's perspective. Learning style is, in essence, how a student learns, based on environment, presentation, interaction, and other factors. In their article, MAJ Renee Cole and her team of coauthors describe how the existing curriculum of the Graduate Program in Nutrition at the AMEDD Center and School (AMEDDC&S) was evaluated to assign categories to its phases according to the learning styles identified by researchers examining similar student populations and fields of study. The curriculum was then modified where possible to incorporate a variety of learning modes to support student learning style preferences. Their article is a clearly presented, detailed presentation of a carefully planned and conducted review of a curriculum and its results, and the integration of changes and the resulting changes in student outcomes. It is another example of the initiative and high level of expertise among those charged with ensuring Army medical education remains at the forefront of academic excellence.

In a similar vein, MAJ Fred Weigel and LTC Mark Bonica discuss another technique for the delivery of educational material in an effort to improve learning outcomes. They adopted an Active Learning approach in the design of the curriculum for a course at the Army-Baylor Graduate Program in Health and Business Administration, incorporating the well-respected concept of 3 learning domains (cognitive, affective, and psychomotor) generally known as Bloom's Taxonomy of Learning. This was done by incorporating game play into the coursework, actively engaging students across the learning domains in the application of the subject matter of the course. Their article is an excellent presentation of this approach to learning, as they introduce the concepts of Bloom's taxonomy and explain how they were used to design and integrate the lessons and games to be a synergistic whole. Furthermore, they developed 2 games to address different subject matter, each of which used a distinct approach in its incorporation into the lesson design. The article clearly describes the foundation for and development of the concept, the application, and the evaluation of outcomes. The high level of sophistication, expertise, and dedication to excellence among those involved in the education of our military healthcare professionals is once again obvious in the content of this article.

The Graduate School at the AMEDDC&S is comprised of a number of graduate programs, most of which confer professional degrees in clinical practice specialties. The degree is only one of the requirements to obtain a professional license to practice the respective specialty. Usually the certification and licensure process has several requirements, typically involving a period of supervised practice and completion of an examination. The supervised practice is accomplished in various ways, one of which is a collaborative internship program that is dependent on the availability of a supporting clinical environment. Medical activities must always consider the productivity and efficiency effects of any clinical internship program before a formal agreement of support can be reached. As COL Josef Moore and his coauthors point out, collaborative internship models have not been the norm for physical therapy clinical practice programs. They have contributed an article examining those aspects of the collaborative internship arrangements that the Army-Baylor University Doctoral Program in Physical Therapy established with 3 military academic medical centers and a private physical therapy practice. The study described in their article was carefully planned to ensure that the data organization provided detailed comparative information. Those comparisons are illustrated across a number of charts which support the information presented in the text. This article is a well organized, easily understood presentation of yet another proactive approach by Army medical education to maximize the skills and capabilities of military medical professionals.

In 2008, the AMEDDC&S Graduate School established another program to address an increasing demand for which recruiting of qualified professionals was unable to fill. The Master of Social Work (MSW) program was conceived and instituted to allow the Army to "grow its own" licensed clinical social workers. Similar to the physical therapist certifications discussed earlier, the social worker licensure requirements involved an extensive

period of formal postgraduation clinical supervision experience, as well as an examination. As COL (Ret) Reginald Howard relates in his article, at the time MSW program was under development, the Army's methods and resources for providing the requisite clinical experience to its graduates were not standardized and lacked focus. Social work officers were encountering significant delays in obtaining the necessary clinical experience, which was preventing them from gaining their licenses, thus contributing to the continued shortage of licensed practitioners desperately needed by the Army. The article describes how the Army revamped its approach to the process by developing and establishing the Army Social Work Internship Program, designed from the ground up to move MSW graduates through a standardized internship no matter the medical facility, with minimal administrative disruptions not related to their licensure requirements, and focused on the competencies necessary to provide services in the military environment. Most important, the program was designed to support timely licensure, to get licensed professionals working among Soldiers and Families as expeditiously as possible. This article presents an excellent example of the coordination and expertise among the multiple professionals involved in identifying the problem, conceiving the solution, and making it happen.

The Veterinary Corps had a different problem. Their new officers arrive as licensed veterinarians, with the basic skills to provide clinical veterinary medical care. However, the role of veterinarians in the military environment demands an additional number of skill sets, most of which cannot be acquired outside of the military, and learning it "on the job" at their first duty assignment had become a growing problem for effective veterinary support. The shock of lack of preparation was also a disincentive for the individual to remain in the Army after their initial obligation. In their article, COL Erik Torring and LTC Wendy May describe the Veterinary Corps' initiative to address this problem and ensure that new veterinary officers arrive at their first duty station prepared for their military responsibilities. In 2009 the Veterinary Corps developed a program to provide exposure and reinforcement of those skills required to function in the military environment. A formal, standardized internship program of curriculum and clinical case training has been implemented on 7 military bases around the country. The one-year internship is designed to provide training in 3 areas: veterinary public health (food protection, preventive medicine, etc), veterinary clinical medicine (tailored to responsibilities necessary at independent duty locations), and military leadership. When fully operational, all new Veterinary Corps officers will enter this program immediately following completion of the AMEDD Basic Officer Leader Course. The program is in its fourth year, and all locations are now receiving students. This article provides a great deal of insight into the enormously important and complex responsibilities of the Army's Veterinary Service, and how their professionals are well prepared for them.

As mentioned in the opening sentence of this Perspective, learning must never stop in the healthcare profession, and it therefore cannot be solely the province of educational institutions and organizations. LTC Leilani Siaki and her coauthors have contributed an article which clearly illustrates how the ongoing process of professional education can be addressed locally and regionally through initiatives and cooperation, both within organizations themselves, but also among different types of agencies and provider types, including government, nonprofit, and private practice. Since its introduction as a formal approach to clinical practice circa 1992, evidence-based practice (EBP) has become an accepted model among medical specialties to optimize the provision of healthcare at the point of delivery. The article describes how the Army Nurse Corps, the Tripler Army Medical Center, the Hawaii State Center for Nursing, and 15 civilian healthcare organizations across Hawaii joined in partnership to share experiences, expertise, and lessons learned in nursing practice across the different environments. This effort includes work teams formed to identify problems to investigate and identify possible resolutions, an annual educational and practice workshop where teams present their work on problem resolution for discussion among the attendees, and an internship program that focuses on applying the steps of the EBP model to the problem in a series of bimonthly meetings to address progress, garner outside input, and additional education. The statewide initiative was inspired by the Tripler-wide EBP program that had been formalized several years earlier and provided a structural and procedural model for the State Center of Nursing to adopt and implement. The success of this military-civilian partnership for nursing practices in Hawaii is proof of the synergetic benefits of such arrangements among all participants, without regard to the sizes and resources available to the respective partners. The authors argue that such arrangements can be established with similar educational and quality of practice benefit in the geographic area surrounding almost any military medical facility within the United States.

The evidence-based approach is not limited to the optimization of point-of-care practice methods and protocols, or the refinement of other processes in care delivery. In their article, Richard Neilson and COL Denise Hopkins-Chadwick describe how it was used to develop

and refine approaches to instructional strategies in the US Army Practical Nurse Course, even as the career path of Army Practical Nurse has itself been evolving. Over a 6-year period, elements and phases of the program of instruction (POI) were examined and the latest thinking in educational concepts and design were researched to see which may be successfully incorporated within the course structure. In this case, researchers looked for evidence of statistically sound improvements in educational outcomes in situations of similar student demographics, course content, learning environments, etc, in evaluating an instructional technique's potential for use. Five new strategies were incorporated as the POI was redesigned to support the new military occupational specialty designation for the Army Practical Nurse, which provides a defined career track for advancement and expanded professional skills. This article joins others in this issue in demonstrating the professional acumen, dedication, and proactive energy of those charged with the education and training of the best our nation has to offer.

Another ongoing element of higher level professional education is the comparative evaluation of different techniques of presenting information and accomplishing learning by the students. In their article, Dr Don Johnson and Sabine Johnson describe a study performed within the US Army Graduate Program of Anesthesia Nursing to determine if there are any statistically significant differences between use of a human patient simulator and CD-ROM delivered training in the knowledge and skills obtained (and retained) by students. Interestingly, their preliminary research found no indication of any studies that investigated the relative effectiveness of a simulator against CD-ROM teaching strategies in care of trauma patients in terms of critical thinking and performance. The study they designed and conducted is intended to do exactly that within the context of nurse anesthetists training to contend with extensive, severe trauma injuries such as those incurred on the battlefield. Their article presents a carefully conceived, extensively researched, meticulously designed, and rigorously conducted scientific study, the data gathered, and the results developed from that data. Studies such as this are invaluable to decision makers who must look at cost-benefit tradeoffs while considering which choice will best serve the ultimate goal of saving Warriors' lives on the battlefield.

For many years, Army Nursing has been recognized for its leadership in setting standards for professional nursing in the United States. Those standards cover the range from the minimum requirements to enter the Army Nurse Corps to the qualifications and experience necessary to both teach and supervise the education of Army Nurses. The article contributed by COL Bruce Schoneboom and COL Denise Hopkins-Chadwick provides insight into the superb quality of Army Nursing's education and training structure by detailing the high educational standards required of the active duty faculty and supervisory positions. The article describes and enumerates the positions which are designated as requiring a terminal degree, and discusses how the Army builds and retains a cohort of nursing professionals with the necessary academic preparation. The reader cannot but be impressed by the high standards and levels of academic excellence integral to Army Nursing's educational system, which stands among the best in the world.

Over the last several years, MAJ Joseph Topinka has been instrumental in the publication of a number of articles in the *AMEDD Journal*, either authored by him or his JAG Corps colleagues, which have provided a wealth of information concerning the legal concerns, considerations, requirements, and risks inherent in the delivery and support of military healthcare. In this issue, he caps off that series by offering a plan by which he thinks the AMEDD education structure could better initially prepare its personnel for contending with those legal aspects during their early careers, and later providing more sophisticated training tailored to higher level responsibilities. His plan integrates 12 major areas of law into the Joint Medical Skills Institute's Competency Model by illustrating how one or more areas of law are inherent to each competency along with its other knowledge and skills components. He argues that healthcare professionals cannot achieve total skill competency without understanding the legal aspects of their jobs, and a lack of such understanding can have important ramifications, both to the individual and to the organization. Those ramifications can be both expensive and detrimental to a professional career. This article should be of great interest to those charged with planning the education and training requirements for military medical career tracks, from the perspective of future benefits gained by early investments of time and training resources.

Capt Benjamin Hazen and his colleagues have contributed an article which examines concerns facing the professional military education (PME) in the US Air Force. Currently, relatively few officers can be accommodated in the residence courses, so those not designated for such schools must obtain their PME education with correspondence versions (also called distance learning) which use different delivery methods. This situation is a product of necessity due to the realities of resource and time constraints, and is obviously not unique to the Air Force. It causes concern among the officers at those points in their careers where they are expected to complete PME, for a number of reasons. Capt Hazen et

al discuss these concerns using the term "intangibles," referring to certain aspects of attending residence PME which are not part of the curriculum, but still affect outcome from attendance. Some of those intangibles may be only perception rather than reality, but they are still matters of concern to the officer force. For example, those who do not attend residence PME often feel that they are at a competitive career disadvantage. On the other hand, some of those attending PME are concerned about the effect of extended absence on their proficiency in specialty skills (such as flying) and its effect on their career tracks. There is no record in the literature of a study examining the concerns of officers regarding residence PME (pro and con), so the authors designed and conducted such a study to identify the intangibles as the starting point to consider alternative approaches to the delivery of PME. The goal is to find a model that could allay the majority of the concerns, while still delivering the necessary level of PME to ensure the continuity of a well-trained, highly qualified, professional officer corps. The article describes the concept of a blended approach to all PME, a combination of both correspondence and residence learning experiences. The correspondence aspect could employ the latest in delivery methods (such as mobile technology, game-based learning, online collaboration) over a period of time. Completion of the correspondence phase of the course would be followed by a considerably shorter residence phase. In theory, a properly designed, blended model could provide the same PME experience to the majority of the Air Force's officers at the proper points in their careers. This is a carefully developed, thought-provoking article which should stimulate or reinforce ideas and concepts of military education planners of all the services.

All of us have experienced multiple choice examinations at some point in our academic endeavors. All of us have also experienced the anxiety concerning the first choice of an answer selection about which we are not 100% certain: "What are the odds that my first choice is indeed correct, even though I am not totally confident about it?" The question has probably existed as long as there have been multiple choice tests. Researchers have been formally investigating this conundrum since 1929, with consistent results. However, those studies have looked at a relatively small segment of academic disciplines, which did not include anesthesia nursing students. As part of the Army Graduate Program in Anesthesia Nursing process improvement program, it was decided to investigate whether their student population's attitudes toward answer changes were consistent with other studies, with the intent to provide information to the students based on the entire body of research before they began multiple choice tests. Dr Don Johnson and colleagues prepared an excellent article clearly describing the preparatory research, the careful planning and execution of the study, and details of the results. This is a very interesting and informative article with perhaps surprising results. This article is a fascinating discussion for all of us who have ever anguished over an answer choice, and a must-read for anyone anticipating a multiple choice examination in the future.

The *AMEDD Journal* is pleased to present CAPT (Ret) Bradley Poss' review of a recently released revision of a volume of the Borden Institute's Textbook of Military Medicine Series, *Pediatric Surgery and Medicine for Hostile Environments*. As CAPT (Ret) Poss so clearly explains, this book fills a urgent need by medical caregivers in the combat environment of today, where children make up a disproportionate share of victims and have a higher mortality rate than adults. Further, most military healthcare providers assigned to combat areas have limited pediatric training and experience. He provides a detailed, informative overview of the book. The value of this book is clearly evident in his descriptions and opinions. Based on his review, all military medical providers anticipating deployment, whether combat or to an austere environment, should investigate this book as a resource for helping the smallest and most tragic of casualties.

This issue of the AMEDD Journal closes with a collection of abstracts and the winning poster presented as part of the 3rd annual US Army Academy of Health Sciences Graduate School Research Day held at the AMEDD Center and School on December 11, 2013. Attendees at the Graduate School Research Day, as well as abstract and poster submissions, represent not only students in the various degree programs of the Graduate School, but also submissions from other military and nonmilitary academic institutions and medical centers. The professional collaboration and knowledge sharing afforded by the annual Research Day is another outstanding example of the wide variety and high caliber of academic and research opportunities available throughout a career in military medicine.

What is the Value of Graduate Education? An Economic Analysis of Army Medical Department Graduate Programs

LTC Lee W. Bewley, MS, USA
Kevin D. Broom, PhD
LTC Mark Bonica, MS, USA

ABSTRACT

Current and forward-looking resource constraints within the federal health system and general health market are generating questions of fiscal or economic viability of a number of programs including graduate education. This article establishes a framework for assessing economic value among graduate health-related programs within the Army Medical Department. The findings of this analysis indicated that the programs evaluated in the study generate positive economic value based on a market-based valuation of extrinsic benefits compared to extrinsic costs for conducting graduate education within each of the programs. Suggestions for future research and policy application are also discussed.

STATEMENT OF THE PROBLEM

The current social, political, and economic environment exists in a cacophony of competing perspectives of resource allocations, debt, obligations, investments, fiscal policy, monetary policy, and interest groups. Our society has experienced the effects of sequestration, continuing resolutions, government furloughs, and debt-ceiling legislation for nearly half a decade in what seems to be a new normal of federal resource formulation for providing services and meeting national obligations.

The field of medicine and health services seems to occupy a center of gravity in this national discussion of resource priorities as nearly 20% of economic activity is associated directly with the provision of health services in the United States.[1,2] Federal and state obligations in current and future budgets manifest in MEDICARE and MEDICAID programs coupled with provisions in the Affordable Care Act of 2010 yield substantial public obligations for resource allocations to health services that are judged by many prominent analysts of being unsustainable in current form.[3-5] The prevailing consensus among the community of health policy thinkers, exemplified recently by the documentary *Escape Fire*,[6] is that meaningful changes must occur within the healthcare marketplace to more effectively and efficiently use existing healthcare resources in a value-generating manner to meet societal needs.

The Army Medical Department Center and School (AMEDDC&S) and associated education and training programs have been directly affected by forward-looking assessments of resource constraints and potential contractions. In 2011, the AMEDDC&S conducted a multidimensional analysis of all courses conducted within the Academy of Health Sciences, dubbed the "1 to N List," to begin the process of prioritizing education and training requirements and resource utilization on a marginal basis to make adjustments in expanding, contracting, or eliminating programs of instruction as necessary.

In 2012, the US Army Medical Command, in conjunction with other military medical commands and the emergent Defense Health Agency at the Department of Defense (DoD) level, conducted similar studies focused on the costs inherent in the various education and training programs conducted across the military health system. Requests to the graduate programs for information focused solely on the actual incremental costs of conducting graduate education in current and forecasted postures, but did not address other dimensions of consideration for resource management.*

In the future, the DoD, Military Health System, and Army Medical Department (AMEDD) will likely be faced with continuing to meet respective missions with diminishing absolute and relative resources. In order to adjust to these emergent environment and market realties, a comprehensive review and adjustment of activities, processes, and outcomes matched with corresponding allocations of resources will become essential to ensure organizational viability and maintenance of educational and training programs that generate meaningful value.

Contemporary research to evaluate the generation of value in graduate education has included studies that compare starting salaries of graduates.[7,8] These studies indicate substantial variation in outcomes associated with

*Source: internal AMEDD and AMEDDC&S documents not readily accessible by the general public.

numerous confounding factors including backgrounds, attitudes, and varying curriculums. Other studies focused on the value-generating effects of graduate programs that conduct research. Buxton et al[9,10] analyzed more than 30 contemporary academic studies and found support for value generation in both extrinsic (cost savings) and intrinsic (knowledge development). Reviews of each of those articles found no consistent framework for assessing economic value generation.

A fundamental framework for assessing and developing the future organizational composition of services and activities could be a value perspective advocated by Michael Porter and other organizational economists.[11-13] The basis of the economic value perspective is that the combination of service and support activities within the organization can be expected to be matched with the resources voluntarily provided by customers, beneficiaries, and/or stakeholders in a marketplace. Simply put, the value of an organization is based on what resources (budget, revenue, donations, grants, sales, etc) others provide. In an increasingly resource constrained environment, elements within an organization will likely be required to demonstrate what value is generated in absolute and relative terms in order to survive or potentially thrive as a going concern.

The graduate programs of the AMEDD have a long tradition of quality education matched with deep ranks of distinguished alumni, numerous national awards and recognition, and a tremendous record of research and service.[14] Despite this standing, perpetual, recurring analyses of stakeholder perspectives seem to indicate both an incomplete understanding of the operational and resource bases of the various graduate programs and ideas that tremendous systemic cost-savings could be achieved by changing, diminishing, or possibly eliminating some or all of these programs. This article is intended to demonstrate the value of the AMEDD's graduate programs by applying a framework for economic value analysis, enhance the understanding of the cost and benefit bases of the programs, and examine pathways for future research that refines the process of evaluating value in graduate education.

BACKGROUND

The AMEDD has conducted graduate education continuously since 1951. In that year, a relatively new program of instruction in the Army Medical Field Services School (precursor to the Academy of Health Sciences and AMEDD Center and School), the Hospital Administration Course, initiated in 1947, developed and implemented a business plan to become affiliated through contract with Baylor University in order to be able to convey graduate degrees to graduates of the program.[14,15] Since then, the Army-Baylor University MHA-MBA program has served the Army, Navy, Air Force, Veterans Health Administration, and Department of Homeland Security, graduating more than 2,400 alumni since 1951 including many flag rank officers, federal senior executive service members, commanders, and national healthcare executives, while attaining a national ranking of 11 by *US News* in 2013 among all accredited healthcare management programs.[16]

Given the example and success of the first Army-Baylor graduate program, the Army continued to develop additional affiliation agreements in graduate education. The Army-Baylor Graduate Program in Physical Therapy was established in 1972 to enable awarding graduate degrees after decades of providing high quality education and training that yielded only a certificate rather than a degree. Similarly, graduate programs in physician assistant studies, nursing anesthesia, nutrition care, and social work were developed to meet ongoing human capital development requirements of the AMEDD and other military and federal health systems.

The prime basis of the affiliation contract is that the university provides all of the institution services associated with quality graduate education (accreditation to confer degrees, national standing and reputation, resources for research, student/alumni services, support for faculty, and admission/registrar services) and the government provides faculty, students, facilities, and conducts education. The mechanism of the contracting process is that academic institutions that meet government contracting requirements bid to provide services aligned with the provisions in a one-year contract with 4 renewal periods that generally results in the affiliation contract being bid and renegotiated every 5 years. The government only pays for those specific services and incremental costs provided and incurred by the affiliated university; consequently, the affiliated universities convey graduate degrees to students enrolled in AMEDD graduate programs at cost rate per degree that is substantially discounted from normal tuition costs at the affiliated university.

Currently, the AMEDD's graduate programs are organized within the Graduate School of the Academy of Health Sciences (AHS). The AHS Graduate School consists of 12 graduate programs and 13 degrees, including a doctoral program conferring a degree in clinical pastoral care to officers in the Chaplain Corps. The degree programs are conducted both within the AHS at Fort Sam Houston, Texas, and across the Army in hospital-based programs. Degrees conferred include Doctorate in Physical Therapy, Doctorate in Science, Doctorate in

Pastoral Care Ministry, Masters in Social Work, Masters in Health Administration (MHA), and Masters in Business Administration (MBA). Affiliated universities include Baylor University, Northeastern University, University of Nebraska (Medical Center), Fayetteville State University, and the Erskine Theological Seminary. In addition to the Army-Baylor MHA-MBA Program earning top-tier *US News* national rankings in 2013, the Interservice Physician Assistant Program affiliated with the University of Nebraska (Medical Center) is ranked 13, the Army-Baylor Doctoral Program in Physical Therapy is ranked 5, and the US Army Graduate Program in Anesthesia Nursing affiliated with Northeastern University is ranked 1 within their respective disciplines among accredited programs.[16]

METHODS

Michael Porter's research in value generation and development of the Value Chain framework for organizational analysis makes a case that the economic value of an organization is directly associated with the resources that are drawn to the activity through organizational service delivery and support activities. In practical terms, the value of an organization's products or services is directly related to the prices that consumers are willing to pay and the aggregate combination of sales to generate revenue and extrinsic benefit to the marketplace.[11,12]

The framework of this economic analysis to assess value will include a net estimation of extrinsic benefits and costs directly associated with the annual activities of the 6 AHS-based graduate programs providing education to commissioned officers in the AMEDD and other federal health services. Value will be expressed as the net difference of extrinsic benefits and costs. Additionally, a ratio of benefits to costs will be estimated to convey the nature and magnitude of the difference between costs and benefits.

Three dimensions of graduate education (teaching, service, and research) provide a basis to assess value generated. Each of these dimensions may have both extrinsic and intrinsic benefit and cost elements. For each element of analysis, extrinsic or incremental benefits and costs will be calculated. Meaningful intrinsic or indirect costs and benefits will be identified for future study and analysis.

One clear benefit derived from the activities of the AMEDD's graduate programs is the value of education received through the teaching provided by faculty and the degrees conferred from that education. The value of education provided by faculty was found by determining the market price of the aggregate credit hours within the curriculum of each program. The market price of education was determined by multiplying the credit hours in each curriculum and the public price per credit hour of the affiliated university for each of the contractual student starts. The public price per credit hour rate was found at each of affiliated universities' websites outlining costs of attendance. For example, the Army-Baylor MHA-MBA Program contract provides for 60 MHA annual student starts (66 hours), and 30 of these students may earn a joint MHA-MBA (87 credit hours). Baylor University graduate tuition costs per credit hour for students that would purchase equivalent graduate education on the open market is $1,357, which yields a value of $6,228,630 annually.

Service provided by the graduate programs ranges from service-learning opportunities that faculty pursue, such as short-term deployments, enterprise consulting, or patient care, and includes student graduate research projects and patient care in training. Other types of graduate program service encompass editorial review boards, accreditation fellowships, institutional review board membership, and external teaching or speaking engagements. Our review of the value of graduate service finds that most value generation, while substantial, is largely intrinsic and cannot be directly included in the initial framework of this analysis.

The 2013 AHS Graduate School Scholarly Activity Report outlined the research value generated by the nearly 100 faculty members serving the AMEDD's graduate school programs. Fiscal Year 2013 research efforts providing value included 259 publications, invited presentations, or technical papers. Additionally, more than $18.1 million of aggregate grant activity had been generated or managed during the fiscal year.*

Costs were determined for each of the AMEDD graduate programs based on the extrinsic contractual costs of affiliation, operating costs, and human resource costs. Operating costs, including supply, travel, and miscellaneous expenses, were based on fiscal year 2010 data as this fiscal year exists as the most recent stable budget with consistent cost systems. University affiliation costs from the most current (Fiscal Year 2013) cost data were used.* The cost analysis conducted by the US Army Medical Command in conjunction with the other military medical services and the Defense Health Agency established the cost per faculty or staff member at $88,000.* This figure was derived to account for a composite full-time equivalent DoD employee factoring time spent for readiness, training, and/or other required

*Source: internal AMEDDC&S documents not readily accessible by the general public.

activities that were not directly associated with the mission activities of assignment. Human resource costs were determined by multiplying this rate and the number of faculty, staff, and future faculty in doctoral studies assigned at the graduate program in fiscal year 2013.

FINDINGS

A summary economic analysis of the AMEDD's graduate program indicates that substantial net extrinsic value and intrinsic value are generated by these programs individually and in the aggregate. Table 1 presents the results of net extrinsic value accounting for the market value of educational degrees conferred compared to the extrinsic costs for affiliation contracts, operational budgets, and human resources (faculty, staff, and future faculty in doctoral studies). Table 2 provides summary economic value per graduate student by program given each program's annual contractual capacity. Table 3 depicts intrinsic benefits and costs of each program.

Table 1. Summary Economic Analysis of AMEDD Graduate Program Value.

Program	Extrinsic Benefits	Extrinsic Costs	Economic Value	Benefit-Cost Ratio
Army-Baylor MHA-MBA	$6,228,630	$2,008,472	$4,220,158	3.10
Army-Baylor DPT	$4,206,700	$1,396,613	$2,810,087	3.01
Army-Baylor GPN	$1,465,560	$1,260,978	$204,582	1.16
Northeastern USAGPAN	$9,595,300	$2,373,654	$7,221,646	4.04
Nebraska IPAP	$16,119,600	$2,999,293	$13,120,307	5.37
Army-FSU MSW	$1,376,160	$1,206,800	$169,360	1.14
Aggregate AHS Graduate School	$38,991,950	$11,245,810	$27,746,140	3.47

Glossary:
MHA - Masters in Health Administration
MBA - Masters in Business Administration
DPT - Doctorate in Physical Therapy
GPN - Graduate Program in Nutrition
USAGPAN - US Army Graduate Program in Anesthesia Nursing
IPAP - Interservice Physician Assistant Program
FSU - Fayetteville State University
MSW - Masters in Social Work

Clearly, the AMEDD graduate programs demonstrate compelling value relative to extrinsic benefits and costs. Each of the assessed graduate programs rates a benefit-to-cost ratio in excess of 1.0 indicating that benefits exceed costs in economic value terms. Furthermore, four of the graduate programs yield benefit-to-cost ratios that generate economic value in a range of 3 to 5 times benefits to costs. In aggregate, the 6 graduate programs in the AHS Graduate School generate economic benefits that society would normally expect to pay nearly $39 million to receive, balanced against extrinsic costs of only $11 million to provide this value.

Table 2. Summary Economic Value per Graduate Student by Program.

Program	Annual Student Contract Capacity	Average Economic Value per Graduate Student
Army-Baylor MHA-MBA	60	$70,336
Army-Baylor DPT	25	$112,403
Army-Baylor GPN	20	$10,229
Northeastern USAGPAN	65	$111,102
Nebraska IPAP	240	$54,668
Army-FSU MSW	40	$4,234
Aggregate AHS Graduate School	450	$61,658

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The intrinsic benefits generated by the AMEDD graduate programs are substantial and support strategic ends. The affiliation contracts with Baylor University, Northeastern University, and the University of Nebraska provide strategic alliances and access to academic and research resources that enable the AMEDD and the Military Health System to enrich strategic stakeholder networks. Additionally, earning peer-reviewed national rankings provides tremendous standing for Army Medicine and military services in terms of establishing and furthering a position of high level human capital development. Furthermore, the graduate programs' collective network of supporting organizations including each of the *US News* Top 5 Hospitals in America (Johns Hopkins, Massachusetts General, Mayo Clinic, Cleveland Clinic, and UCLA Hospital) provide a substantial basis for collaboration, benchmarking, and best practices exchange. Finally, the value of knowledge and grant activity provided by the graduate programs extends and enhances societal knowledge and healthcare organizations' ability to effectively and efficiently use scarce health resources to achieve higher quality healthcare.

Paired against the inherent value of intrinsic benefits is a portfolio of intrinsic costs, including opportunity costs,

Table 3. Summary of Intrinsic Benefits and Costs of AMEDD Graduate Programs.

Program	Intrinsic Benefits	Intrinsic and Opportunity Costs
Army-Baylor MHA-MBA	*US News* No. 11. 62-year strategic affiliation top-tier national university. Affiliation with each of the *US News* top 5 hospitals.	Faculty and future faculty could be diverted to practitioner assignments. Use of facilities and overhead support.
Army-Baylor DPT	*US News* No. 5. 42-year strategic affiliation top-tier national university. Combat Soldier oriented research.	Faculty and future faculty could be diverted to practitioner assignments. Use of facilities and overhead support.
Army-Baylor GPN	Combat Soldier oriented research. Graduates prime support Army Surgeon General Performance Triad.	Faculty and future faculty could be diverted to practitioner assignments. Use of facilities and overhead support.
Northeastern USAGPAN	*US News* No. 1. Graduates are filling critical gaps in hospitals and deployable units.	Faculty and future faculty could be diverted to practitioner assignments. Use of facilities and overhead support.
Nebraska IPAP	*US News* No. 13. Graduates are filling critical gaps in hospitals and deployable units.	Faculty and future faculty could be diverted to practitioner assignments. Use of facilities and overhead support.
Army-FSU MSW	Graduates are filling critical gaps in clinics and deployable units.	Faculty and future faculty could be diverted to practitioner assignments. Use of facilities and overhead support.
Aggregate AHS Graduate School	259 annual publications, presentations $18.1 million research grants. 50+ affiliations/MOUs with national institutions and organizations.	

Glossary:
MHA - Masters in Health Administration
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MSW - Masters in Social Work
MOUs - Memoranda of understanding

which provide insight on alternative uses of resources. Each of the graduate programs receive institutional support including offices, classrooms, parking, information technologies, human resources support, as well as general logistic and security support that generate expenses, but are usually cost allocated among activities as overhead or indirect costs. One prime opportunity cost that the AMEDD and other military health services that provide interservice faculty bear in the operation of graduate education programs is semiexclusive use of officers as professors rather than practitioners in the field. Many of the career groups of military medical officers moderate the problem of assignment opportunity cost by transferring faculty to practitioner assignments after 3 to 5 years service within a program, or by ad hoc, short-term (3 to 12 months) assignment in deployment and then return to the graduate program, which also effectively provides a service-learning opportunity for faculty members.

CONSIDERATIONS FOR FUTURE RESEARCH

Future research in development of a framework to assess economic value could incorporate more refined cost measures, particularly for human resources and overhead costs. By incorporating these costs, educational managers may be able to have even more complete information sets to evaluate costs, benefits, and opportunities to expand value. Potential problems likely to be encountered in the incorporation of these costs are primarily associated with apportionment. In the case of assigning precise human resource costs rather than a composite cost factor, portions of time dedicated exclusively to graduate education versus other activities may likely prove problematic. Similarly, allocations of overhead costs to operating units often attract questions of validity, depending upon bases of cost allocations.

Other potential opportunities to extend and refine analyses of AMEDD graduate education programs could seek to translate intrinsic benefits of research and service into extrinsic benefits. For instance, the Doctoral Program in Physical Therapy is often able to use resources derived from grant activity that enhance the quality of patient care and diminish care delivery costs. Similarly, the Administrative Residents in the MHA-MBA Program often develop graduate management research projects that yield substantial cost-savings to host organizations that might be included as extrinsic benefits.

CONSIDERATIONS FOR EDUCATIONAL POLICY

The AMEDD has developed successful business practices by developing affiliation agreements that leverage the market standing of nationally-renown education institutions to facilitate economic value generation manifest in the teaching, service, and research of AMEDD and other military health officers dedicated to service the federal health system. Maintenance of these affiliation agreements by the AMEDD and DoD may support the continued human capital development required to provide qualified officers in assignments in a manner that provides both direct and indirect net benefits. Key requirements to being able to continue generating high levels of economic value include awarding affiliation contracts to top-tier educational institutions with substantial market standing marked by the prevailing market tuition rate, investing graduate students to the

fullest educational capacity of the programs, and moderating intrinsic cost growth. A few specific applications of these guiding points, given the study findings, could include considering the economic value of changing the current institutional affiliation to an institution with advanced market standing during the normal contract solicitation, bidding, and evaluation process. Additionally, the Masters in Nutrition Care and Masters in Social Work Programs would likely benefit by having students attend from other military or federal services in order to attract more students which would yield more economic value and gain economies of scale. Finally, in the case of the Masters in Nutrition Care program, perhaps AMEDD strategic initiatives advocating nutrition care may generate additional force structure requirements for dieticians, for example, a dietician assigned to each Army brigade combat team or increased demand for graduate nutrition care education may emerge for other providers such as physicians, dentists, or nurses.

SUMMARY

This article seeks to establish a framework for evaluating the economic value of AMEDD graduate programs and to provide summary analyses of the extrinsic benefits and costs of conducting graduate education within the AHS Graduate School. Current findings indicate that the 6 graduate programs providing graduate education for AMEDD officers and other military or federal officers generate more benefits than costs and therefore provide economic value. Future studies may refine these processes to provide a richer understanding of the economic value of graduate programs. A number of policy considerations including maintaining, expanding, or contracting these graduate programs may be considered based on the findings of this research.

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AUTHORS

LTC Bewley is the Program Director and Associate Professor in the Army-Baylor MHA-MBA Program, US Army Medical Department Center and School, Fort Sam Houston, Texas.

Dr Broom is an Assistant Professor, Saint Louis University Masters in Health Administration Program, St Louis, Missouri.

LTC Bonica is the Deputy Program Director and Assistant Professor in the Army-Baylor MHA-MBA Program, US Army Medical Department Center and School, Fort Sam Houston, Texas.

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Incorporation of Learning Styles into the Graduate Program in Nutrition Curriculum

MAJ Renee E. Cole, SP USA
LTC Reva L. Rogers, SP, USA
Maj Heidi L. Clark, BSC, USAF
LTC (Ret) Lori D. Sigrist, SP, USA

Recent research advocates a "learner-centric" over a more traditional "teacher-centric" approach to enhance learning in formal education.[1-5] Teacher-centric learning, a passive one-way delivery of information from teacher to student, typically relies on the student's short-term memorization of course material while the teacher takes full responsibility to facilitate student learning. Conversely, in learner-centric teaching, the responsibility for learning is shifted to the student[4] as the instructor serves as a coach to provide education through a variety of learning methods/tools. Several investigators emphasize that learning is optimized when students are actively involved in applying course material, are required to reflect and critically think, and participate in collaborative efforts that expose them to people with divergent emotional, cultural, and personal experiences to stimulate self-awareness.[2-4] These concepts support Knowles' original work published in 1970 and still valid today. Knowles states that as individuals mature they become more self-directed, need to understand why information is important, and gradually shift from knowledge gathering to knowledge application.[6]

A key component in creating an environment that stimulates learning is the manner in which information is conveyed to students. The concept of learning styles has emerged to elucidate how students learn. A student's learning style is dictated by personal characteristics, including a combination of cognitive, affective, and physiological characteristics, that influence the ability to perceive and interact with educators and peers.[7,8] Although there are several learning style theories, the Grasha-Riechman, Kolb/McCarthy, and VARK (visual, auditory, read/write, kinesthetic) Learning Styles, described in Table 1, appear to be more thoroughly assessed in research. Each theory presents a different view of how individuals learn and drives the methodology for assessing and classifying learning styles. The Grasha-Riechman Learning Style is based upon student response to class activities, while the Kolb/McCarthy and VARK models assess students prior to the educational experience to increase awareness and identify study strategies that promote learner success.[9]

The progression from undergraduate to graduate education requires a more complex and thorough understanding of course material and some students may need to incorporate new or different study habits to facilitate critical thinking skills.[9] Consequently, institutions use a variety of surveys based upon learning theories to enhance learner success in a formal education environment. It is hypothesized that students will be more successful if a

Table 1. Learning Style Classifications by Learning Theory.

Learning Style	Grasha-Riechman	Kolb/McCarthy	VARK (Visual, Auditory, Read/Write, Kinesthetic)
Distinct cognitive, affective, and psychological characteristics of students addressed by each learning style.	Participant: Enjoys class interaction Avoidant: Unmotivated to attend class	Diverger/Reflector: Prefers discussion and group work	Aural: Prefers listening, interacting, and discussing
	Independent: Self-paced Dependent: Educator guided	Assimilator/Theorist: Prefers abstract concept, theory, and logical steps	Visual: Prefers graphics, pictures, and a variety of word colors and/or fonts
	Collaborative: Learning by sharing Competitive: Desire to perform better	Converger/Pragmatist: Prefers problem solving, case studies, applying theory Accommodator/Activist: Prefers hands-on activities	Reading-Writing: Prefers reading texts, word lists, articles and handouts Kinesthetic: Prefers to physically touch, do hands-on activities, and simulations

survey is used to assess and increase student awareness of individual learning styles and provide strategies to enhance study efforts.

GRADUATE PROGRAM IN NUTRITION

The US Military-Baylor University Graduate Program in Nutrition (GPN), established in 2006, is a master's degree and dietetic internship program for US Army and Air Force officers. Students who successfully complete the program obtain a master of science degree in nutrition and are eligible to take the national Registered Dietitian (RD) exam to earn the RD credential. Over the past 5 years, the GPN has a 96% first-time pass rate on the national exam; students rank between the 82nd and 94th percentile compared to approximately 3,500 students taking the exam annually. Although the GPN is a premier program for graduate dietetics education and selects high quality students, every year approximately 8% (1 in 12) of students fail to meet academic standards to complete the program. Thus in 2009, to improve student retention with an emphasis on effective learner-centric education, GPN faculty implemented the Saginaw Valley State University (SVSU) 45-item self-assessment learning style to increase student awareness of individual learning styles and provide effective study strategies. The SVSU Learning Style survey is an expansion of the VARK Learning Style survey that elaborates on auditory and visual learners, evaluates students' oral and written expressiveness and the preference for individual versus group learning activities.[10] The Interservice Physician Assistant Program at the Army Medical Department Center and School successfully used the SVSU learning style survey to assist student transition of learning at the graduate level.

A review of the GPN curriculum indicated that the majority of information provided to students during Phase 1 was teacher-centric, relying heavily on PowerPoint slides and one-way communication of knowledge from teacher to students. Phase 1 of the GPN consists of 45 credits of didactic coursework over a 9-month period (2 semesters) while Phase 2 is comprised of 1,338 hours of supervised practice to attain 38 competencies over a 12-month period as defined by the Accreditation Council for Education on Nutrition and Dietetics. Since Phase 2 focuses on application and practical experience of the information taught in Phase 1, faculty assessed each Phase 1 didactic course and incorporated a combination of learning style modes to accommodate all learning preferences. The remainder of this paper will discuss the transition to a learner-centric curriculum within Phase 1 of the GPN by incorporating learning style preferences as identified by the SVSU learning style survey.

GPN CURRICULUM LEARNING MODALITY INCORPORATION

This section provides a review of each learning style identified by SVSU with examples of how the GPN incorporated the learning modalities into the curriculum. Table 2 highlights the 15 Phase 1 didactic courses with the learning styles that were integrated into the curriculum. GPN students complete the SVSU survey before beginning coursework and faculty members review the results with each student to increase student awareness and motivation. The faculty also provides study strategies for each learning style (Table 3) and fosters student self-reflection during monthly academic counseling sessions throughout Phase 1.

Visual Language and Visual Numeric

Students with a visual learning style prefer to learn language and mathematical skills by sight (reading and writing). Activities that support the visual learner include:

- PowerPoint presentations and posters with a variety of colors, fonts, graphics, bulleted information, and calculations.
- Self-study material and assigned reading such as journal articles and textbook chapters.
- Graphics, such as charts, tables diagrams and figures.
- DVD and Internet videos to support both visual and auditory learners.
- Online calendar with courses visually represented as color-coded time blocks.
- Baylor Blackboard, an online application that allows visual organization of course materials and assignments into folders, and an online grade book.

Many GPN courses use visual means to display class materials with concurrent oral presentations. The Vitamins and Minerals course uses diagrammed pathways to visually display complex scientific information. In Medical Nutrition Therapy (MNT), students create a detailed patient-focused handout on dietary intake recommendations for disorders impacted by nutritional therapy and develop a poster to convey key information on a selected MNT topic. Nutrition for Physical Performance uses several short video clips on featured sports activities.

Auditory Language and Auditory Numeric

The auditory learning style students prefer to learn language and mathematical skills by listening and reflecting on the information. The learning mode activities to support the auditory learner include:

- Listening to lectures
- Class discussions of course material
- Small group discussions of case studies

- DVD and Internet videos to hear the information complemented by visual display
- Peer teaching of course material

Although all GPN courses incorporate auditory learning skills through instructor-taught lectures or facilitated dialogue, discussions among students are critical for the success of auditory learners. The MNT course uses case studies to discuss the nutrition care process for assessing nutrition and lifecycle patient examples and integrates relevant "You Tube" videos, as well as documentaries such as the HBO production *Thin* (Lauren Greenfield, Producer; 2006) to comprehend issues related to anorexia. The Advanced Nutrition and Critical Care course uses the American Society of Parenteral and Enteral Nutrition patient care guidelines as a platform to develop a nutrition support policy, and reinforces end-of-life care and ethical decision-making concepts with case study discussions. The Weight Management course features a variety of guest speakers, minimal PowerPoint presentations, and reliance on group discussion to facilitate assimilation of critical course information.

Kinesthetic and Tactile

Students with a kinesthetic learning style prefer to learn by doing and practicing. The learning mode activities to support the kinesthetic learner include:

- Hands-on activities
- Practical exercises/simulations
- Performing laboratory assessments
- Creating a video, poster, or other practical tool
- Role playing
- Game playing
- Field trips

The Advanced Nutrition Assessment Lab and Nutrition for Physical Performance courses use a variety of nutrition and physical assessment devices, such as: hemocue and glucometer for blood analyses; dual energy x-ray absorptiometry, bioelectrical impedance analysis, whole-body air-displacement plethysmography, and skin fold measurements for body composition assessments; and flexibility, aerobic capacity, and endurance testing for physical performance. Force Health Protection guides student development of a GPN marketing and/or nutrition education video. In the Research Methods II course, students conduct a research project to include recruiting and enrolling subjects, collecting and analyzing data, and presenting research findings. The MNT course uses a nutrition jeopardy game, similar to Boctor's "Nursopardy."[11] The Leadership Development and Food Service Management Theory course integrates field trips, such as visiting the military food service prime vendor to understand food vendor warehouse operations and a military dining facility to discuss food service operations with personnel. The Stability Operations course includes hands-on nutrition assessments with field tools such as a Shor-board to measure children's height in a remote humanitarian mission environment. In the Advanced Nutrition and Critical Care course, teams of students peer-teach several of the main nutrition concepts followed by group discussions.

Individual vs Group Learner

Individual learners prefer to learn in an environment conducive to learning alone, whereas group learners prefer to interact with others to assimilate information. Students may have a preference as individual or group learners, but all GPN students are expected to become proficient at learning independently as well as functioning successfully in a group environment. As future healthcare team members and effective military leaders,

Table 2. Incorporation of Learning Styles into Courses. The ✓symbols indicate level* of each learning style emphasis.

Course Title	Visual	Auditory	Kinesthetic	Oral and/or Written Expressive	Individual and/or Group
Advanced Anatomy and Physiology†	✓✓	✓✓			I
Advanced Nutrition Assessment Lab	✓✓	✓	✓✓✓	O/W	I/G
Advanced Nutrition and Critical Care	✓✓	✓✓✓		O/W	I/G
Biochemistry†	✓✓	✓✓			I
Current Issues in Nutrition	✓	✓✓	✓	O/W	G
Force Health Protection	✓	✓✓	✓✓✓	O/W	I/G
Leadership Development and Food Service Management Theory	✓	✓✓	✓	O/W	I
Medical Nutrition Therapy	✓✓	✓✓✓	✓	O/W	I
Nutrition for Physical Performance	✓✓	✓✓	✓✓✓	O/W	I
Nutrition in Stability Operations	✓✓	✓✓	✓✓	O/W	G
Protocol Development	✓	✓✓		O/W	I
Research Methods I	✓✓	✓✓	✓	W	I/G
Research Methods II	✓	✓✓	✓✓✓	O/W	I/G
Vitamin and Mineral Metabolism	✓✓	✓✓			I
Weight Management	✓	✓✓✓		W	I

*High ✓✓✓; Medium ✓✓; Low ✓; A blank cell indicates no emphasis.
†Course taught exclusively by outside faculty.

Table 3. Study Strategies for SVSU Learning Style Categories.

	Visual	Auditory	Kinesthetic
Study Environment	Minimize distractions and clutter in the studying environment	Study in a quiet place with minimal environmental distractions	Try to engage all senses and move when studying (chew gum, walk around, talk through information, draw a diagram, and/or squeeze a rubber ball)
During Lecture	Take notes during class and highlight important information	Consider taping the class if experiencing information overload	Take notes or do something physical (such as squeezing a stress ball) while listening
Cue Card Use	Use cue or flash cards with different colors, fonts, and illustrations	Review class notes with a peer to vocalize aloud	Lay out cue cards and move them around as information is recited
Exams	Recreate graphics used while studying to help answer difficult questions	Talk through each step or recite silently before attempting to answer	During exams, remember what you did physically while studying to help remember
Study Groups	Participation in study groups can be beneficial but is not essential	Participate in study groups	Study with other kinesthetic peers, use gestures, and manipulate items to help problem solve
General Tips	Use and/or create graphics to assimilate complex scientific information	Read materials or notes aloud, talk through diagrams/figures	Break up study time with breaks planned either by study time or page goals

it is essential that GPN students become adept at interacting in a group setting. To emphasize this aspect of dietetics, many courses incorporate group activities in addition to individual requirements.

Courses such as Biochemistry and Anatomy and Physiology require individual learning, whereas Current Issues in Nutrition primarily relies on group learning. In Current Issues in Nutrition, small groups read and critically assess 5 peer-reviewed research manuscripts, compare and contrast the quality of nutrition-based research, and present as a team the strength of scientific evidence, conclusion of the research assessed, and the implications for the RD.

Many courses employ a combination of individual and group activities. Although Protocol Development requires each student to individually write a research protocol for a master's level research project, students work in groups to discuss and understand the research process. Research Methods II requires individual assessment of the research protocol to be implemented, small teams to conduct several aspects of the study, large group discussion of statistical methods and analysis, and individual assignments involving creation of a research abstract and partial manuscript. Courses including both individual and group work often grade written assignments on individual effort but also grade each student's effectiveness with group discussions or combined efforts. This allows students to benefit from knowledge and experiences of others, gaining a broader comprehension and appreciation for the topic.

Some courses ask each student group member to rate their teammates on their contributions to the group at the end of the course or project. A final summative rating by classmates is included in the course as a project grade. Since it is unacceptable to allow team members to "cover for" or "carry" another student through the course, the expectation of effective group participation is highlighted at the beginning of the course to ensure students understand their role as a team member. Many times, this is the first situation in which students must rate/rank their classmates' participation in a formal manner and, although they are hesitant about the process, they understand that as a future supervisor, they will need the skills and confidence to rate their subordinates in an objective manner.

Oral Expressive vs Written Expressive

Expressiveness focuses on how the information is assimilated and disseminated. The oral expressive student is typically a skilled public speaker. The individual uses verbal skills to organize and assimilate knowledge and is effective at expressing knowledge through a discussion, simulation or practical exercise. This person often needs to talk through the process to strengthen their comprehension of the knowledge. The practice-based small group learning (PBSGL) activity is used in some classes to improve oral expressive skills. It is self-directed, identifies learning needs by discussing clinically relevant topics, and allows the student to reflect and share experiences with peers for more effective knowledge acquisition and critical skill development.[12]

The written expressive learner is typically a skilled writer. The individual uses written skills to organize information into manageable subcategories and is proficient at note-taking during class or as part of studying. The student finds it easier to express knowledge gained

by organizing thoughts on paper than expressing verbally. Practice oral exams are provided throughout the year in various courses to encourage verbal dissemination of material. This is especially helpful for those students who are written expressive learners.

COMMENT

Over the past 3 years, the GPN faculty integrated a variety of learning modes to support student learning style preferences. Since initiation of the SVSU learning style survey, the GPN assessed the learning styles of the past 3 classes, and formally started tracking progress over the past 2 classes. Figure 1 outlines the distribution of the students' major learning style preferences. Nearly half of students (48%) identified themselves as individual learners. This finding may have more to do with previous undergraduate studies group experiences than a true learning preference, as students commented anecdotally that undergraduate group projects were not necessarily team oriented and the work was typically completed by the most diligent students. Almost one-third (28%) of students were expressive oral and even fewer (16%) were expressive written, which may be related to de-emphasis of undergraduate curriculum writing opportunities due to often large class sizes. Since communication in the oral and written forms are key skills for effective registered dieticians, 67% of courses incorporate both written and oral expressive requirements, and 77% of courses taught primarily by GPN instructors integrating both elements.

The results of GPN students were similar to other healthcare students presented in the research examining the VARK learning style theory. The GPN students were all multimodal learners, similar to that of premed, nursing, and biomedical students (53% to 80%) reported in literature.[1,7,13-15] Interestingly Hsieh et al[16] found a unimodal learning preference (87%) in undergraduate biomedical students and Samarakoon et al[15] found the majority (52%) of their College of Medicine postgraduates were unimodal learners.[15,16] The GPN students' most common learning style was kinesthetic (32%) closely followed by visual language (24%), which was lower than research reported on premed, nursing and biomedical students (53%-69% kinesthetic).[1,7,9,13,14,16] Although 75% of GPN students were women, research suggests that there are minimal differences in learning preferences between men and women.[1,7,13]

Student age as a factor in learning style preference was identified in one study by James et al, who found there was no impact.[13] The GPN students typically range in age from 23-35 years (mean 26.4±3.3 years). Figure 2 depicts a potential difference in learning styles when the past 2 classes were categorized into 23-26 years and 27-32 years. The younger age category appears to be more kinesthetic and less visual; however the student sample size was not large enough to support statistical comparison. Eckleberry-Hunt and Tucciarone suggest that "Generation Y" (born from 1982 to 2005) students tend to prefer kinesthetic learning and desire a close relationship with their educators.[17,18] Only one GPN student fell outside of the Generation Y year group. The authors suggest that educators must be more flexible with Generation Y students and focus on increasing use of technology by minimizing traditional lectures, using multimedia, and using simulations, case studies, and group discussions; mentoring on professionalism by defining clear expectations, addressing inappropriate behaviors, and role-modeling desired behaviors; providing clear communication with regular meetings, personal attention, guidance on reflection and developing priorities; and providing oral and written feedback to build accountability, responsibility and independence.[17] The GPN program is dedicated to student mentoring through monthly academic counseling sessions, and an open-door policy encourages communication with faculty when students are faced with challenges requiring immediate attention. Some faculty adopted a unique approach to monthly student counseling sessions. Rather than a traditional sit-down, face-to-face session, the student and faculty member spend 20-30 minutes walking while talking; an approach that seems to encourage greater disclosure and particularly engages the kinesthetic learners.

To facilitate student growth in critical thinking skills and assimilation of information, it is important that faculty reflect on their own learning styles.[18,19] As a result, GPN faculty also completed the SVSU Learning Styles survey.

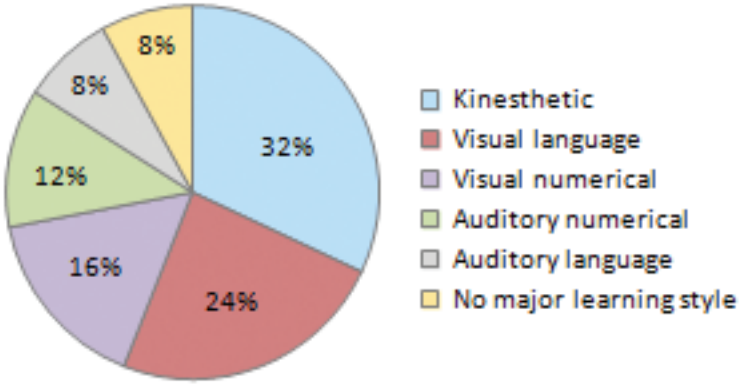

Figure 1. The distribution of student major learning style preferences aggregated from 3 classes.

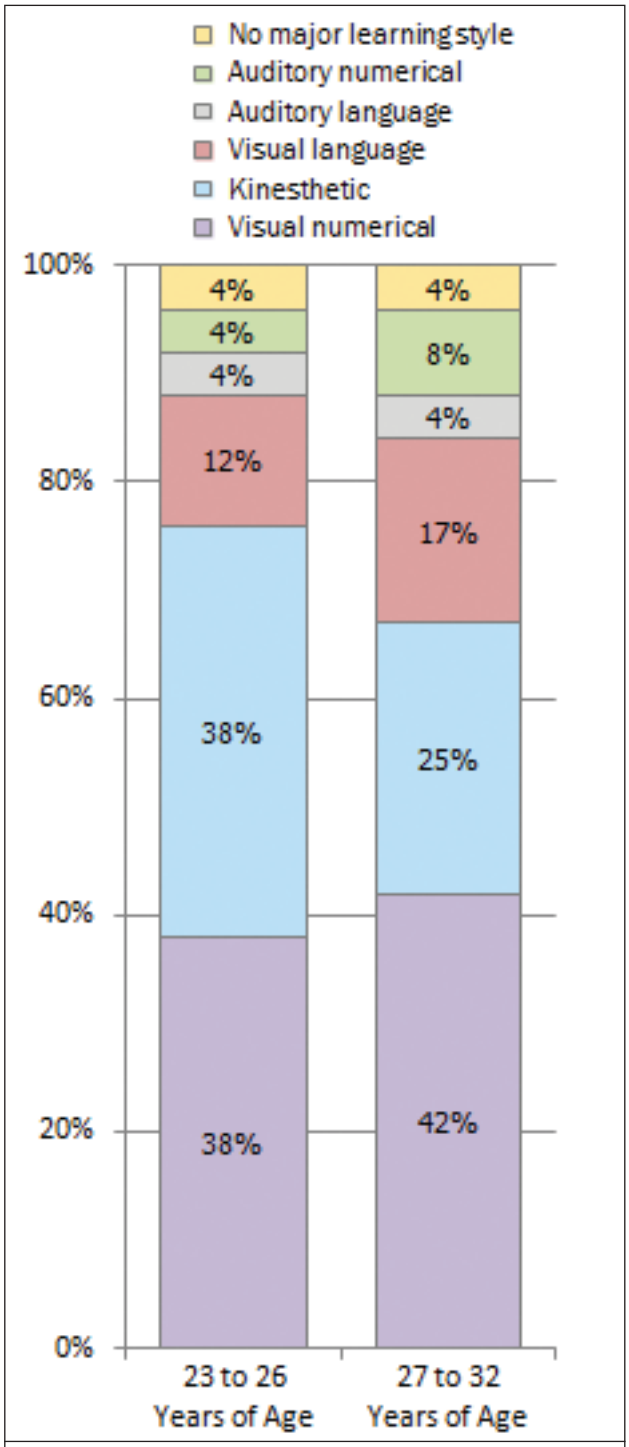

Figure 2. Students' major learning styles by age group.

Visual-numerical was the faculty's primary major learning style (100%) with kinesthetic (40%) identified as the secondary major learning style. The faculty is equally divided between preferences for oral versus written expressiveness. Learning styles within the faculty were similar, however, the faculty annually reevaluates each course through student and faculty feedback in an effort to continually stimulate learning through a variety of modalities. Incorporation of various learning modalities ensures that coursework remains relevant and challenging to students; encourages them to use their strengths and focus on areas for improvement; and prepares them to deal with the various challenges they will face as both military officers and members of the healthcare team. For the faculty, implementing various modalities into the curriculum creates an engaging work environment, promotes flexibility in teaching style, and encourages creative presentation of material.

It is also worth noting that there is skepticism within the scientific community as to the effectiveness of using learning style assessments to tailor course design. Although it is widely accepted that education should be tailored towards learning styles, Rohrer and Pashler state there is no clear evidence to support learning-style instruction.[20] They contend that tailoring is logistically demanding and effective only if all students fall within the same style, therefore, educators should focus on a combination of educational modalities that best present the specific topic. Furthermore, Hughes notes that out of the 71 different learning styles theories identified through a literature review, only 13 were noteworthy, and none have been adequately validated.[19] He supports that faculty must show how the course material is clinically relevant to the student in order to truly stimulate learning. The GPN staff agrees that course content must demonstrate clinical relevance. However, student awareness of learning styles may also help them understand their patient population, especially in an outpatient nutrition setting, and adapt their education and counseling skills as needed. These skills may also be beneficial for effective communication with peers and subordinates throughout their military and professional career.

CONCLUSIONS

The US Military-Baylor University Graduate Program in Nutrition transitioned from a teacher-centric to a learner-centric educational environment in 2009. The Saginaw Valley State University learning style survey was administered to students to assist them in their transition to graduate level education, which requires a collaborative, self-directed approach to knowledge assimilation and application. It is unknown if this program improvement impacted student success in their didactic coursework and dietetic internship. The GPN has many unanswered questions about predictors of success and will continue with annual program assessment and revision. A retrospective study identifying potential predictors of student success, including learning style

modality effectiveness, may add valuable information in the quest to meet and maintain educational goals and competencies, and produce highly qualified military registered dietitians.

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AUTHORS

MAJ Cole is Director, US Military Dietetic Internship Consortium and Assistant Dean for Research, Academy of Health Sciences, AMEDD Center and School, Fort Sam Houston, Texas.

LTC Rogers is Chief, Nutrition Care Division, William F. Beaumont Army Medical Center, Fort Bliss, Texas.

Maj Clark is a Lecturer/Instructor, US Military-Baylor Graduate Program in Nutrition, AMEDD Center and School, Fort Sam Houston, Texas.

When this article was written, LTC (Ret) Sigrist was Program Director, US Military-Baylor University Graduate Program in Nutrition, AMEDD Center and School, Fort Sam Houston, Texas.

An Active Learning Approach to Bloom's Taxonomy: 2 Games, 2 Classrooms, 2 Methods

MAJ Fred K. Weigel, MS, USA
LTC Mark Bonica, MS, USA

ABSTRACT

As educators strive toward improving student learning outcomes, many find it difficult to instill their students with a deep understanding of the material the instructors share. One challenge lies in how to provide the material with a meaningful and engaging method that maximizes student understanding and synthesis. By following a simple strategy involving Active Learning across the 3 primary domains of Bloom's Taxonomy (cognitive, affective, and psychomotor), instructors can dramatically improve the quality of the lesson and help students retain and understand the information. By applying our strategy, instructors can engage their students at a deeper level and may even find themselves enjoying the process more.

Learning is not a spectator sport.
Chickering and Gamson[1]

The traditional approach of teaching, with instructors standing at a podium in front of the class before the students, imparting the wisdom of the collective years of their education and experience, may not be the best method for all students to learn and retain material. Cognitive research supports that this derisively labeled "sage on the stage" lecturing approach to teaching does not work well for all students.[1,2] Some students learn better through varied pedagogical practices: "[the literature] suggests that students must do more than just listen: they must read, write, discuss, or be engaged in solving problems. To be actively involved, students must engage in such higher-order thinking tasks as analysis, synthesis, and evaluation."[2] It follows then, that instructors interested in engaging their students at a more thoughtful level should consider expanding their repertoires of educational methods beyond a "death by PowerPoint" approach to lecturing. In addition to students' increased longing for captivating educational environments, the competitive environment at universities places pressure on faculty to excel at teaching.[3]

What methods can we employ to engage our students better? How do we extend our reach beyond the lectern? How do we engage students across the domains of Bloom's Taxonomy? An answer may lie in an "Active Learning" approach to address the domains of Bloom's Taxonomy. In this article, we put this discussion on a firmer foundation. In the next section, we explain Active Learning and the 3 domains of Bloom's Taxonomy: cognitive, affective, and psychomotor.[4] We synthesize the role of Bloom's Taxonomy and Active Learning in developing 2 games: Trade or Raid, and Vote, Negotiate, and Retaliate (Method section). We developed one game, Trade or Raid, to be played over multiple class sessions and the other, Vote, Negotiate, and Retaliate, to be played during a single class session at a fast pace. In the Comment section, we provide a thorough comparison of the multiple versus single session games, elaborating on the Active Learning advantages and disadvantages through the lens of Bloom's Taxonomy. In the Future Directions section, we focus on continuous improvement and recommend study avenues in the realm of Active Learning across the Bloom domains.

BACKGROUND

We adopt the definition of Active Learning found in one of the seminal Active Learning manuscripts: Active Learning is any "instructional activities involving students in doing things and thinking about what they are doing."[2] As mentioned, the Bloom's Taxonomy domains are cognitive, affective, and psychomotor. In brief, Bloom's cognitive classification can be described as "thinking/head," meaning it involves activities that stimulate the mind. The affective domain can be thought of as the "feeling/heart," or activities that influence the emotions. Activities stimulating students physically fall in the psychomotor domain and can be described as "doing/hands."

In their discussion of developing affective methods to improve training for Airmen, Tharp et al recommend further research into affective learning to address "…questions regarding its use in and impact on Air Force education and training."[5] We feel the call from Tharp et al can be even broader. Their call for further investigation into affective learning can generalize beyond the

needs of the Air Force, and likewise, should expand to include the other 2 domains of Bloom's taxonomy: the cognitive domain and the physical domain. Tharp and his colleagues ask how "cognitive and affective-design methods [can] be combined to create a more effective overall curriculum-development process."[5] We suggest that the solution may be found in a strategy of Active Learning that targets all 3 learning domains of Bloom's Taxonomy.

BLOOM'S TAXONOMY

In developing principles to classify outcomes in education, Bloom and his colleagues generated their classification of learning objectives into what is now known as Bloom's Taxonomy of Learning. In the cognitive domain, thinking/head, the emphasis is on remembering or reproducing something which has presumably been learned, as well as objectives which involve the solving of some intellective task for which the individual has to determine the essential problem and then reorder given material or combine it with ideas, methods, or procedures previously learned.[4] Much effort has been focused on the cognitive domain in the past 2 decades.[6] Although a detailed discussion is beyond the scope of this article, it is worth mentioning that the cognitive domain is further subdivided into 6 detailed levels: knowledge, comprehension, application, analysis, synthesis, and evaluation.[7,8]

When reflecting on education, whether K-12 or higher, many consider learning as it relates to the cognitive domain. In contrast, the affective domain, feeling/heart, is focused on objectives "which emphasize a feeling tone, an emotion, or a degree of acceptance or rejection."[4] In this domain, the objective is to tune the teaching approach toward the learner's emotions, or to use the feeling/heart terminology: to touch the learner's heart to impact his or her learning. For a detailed discussion of the 5 subdivisions of the affective domain (receiving, responding, valuing, organization, and characterization by a value or value complex), refer to Bloom et al.[4] A detailed discussion of the levels of the affective domain is beyond the scope of our study.

In addressing outcomes focused on "objectives which emphasize some muscular or motor skill, some manipulation of material and objects, or some act which requires a neuromuscular coordination," Bloom et al[4] developed the psychomotor domain. Despite that few objectives in the literature focus on the psychomotor domain, it is important to consider the value of the psychomotor domain in healthcare education. For example, clinicians provide hands-on or manual care treatments; we should develop methods to tend to health education students.

In their research, Bloom et al[4] determined that most learning objectives fell into the cognitive domain, followed by the affective, and the fewest learning objectives fell into the psychomotor domain. In their vision, they hoped to develop a theory of learning that would cross all spectrums of education from those of the simplest learning to those of the most complex. It follows that if we approach the learner from more than one domain of the taxonomy, we should achieve stronger attention, comprehension, and retention.

ACTIVE LEARNING

As previously mentioned, Bonwell and Eison[2] provide our definition of Active Learning: "instructional activities involving students in doing things and thinking about what they are doing." Active learning can be looked at in contrast to the traditional classroom in which the instructor does most of the talking, moving, and doing, while the students sit and observe passively.[9] Two assumptions on which Active Learning is built, become apparent; "learning is by nature an active endeavor" and different students learn differently.[9] Active learning can be achieved through a variety of educational activities that focus on engaging students and rely less on instructor activity. These instructional activities can be "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"[9] (emphasis in the original). Active learning may involve using "structured exercises, challenging discussions, team products, and peer critiques."[1]

How then, do we incorporate Active Learning in our classrooms? We suggest the systematic approach to Active Learning that Auster and Wylie offer with 4 teaching dimensions: "context setting, class preparation, class delivery, and continuous improvement."[3] We set the context by developing a foundation of the skills needed to understand the games through traditional lecture methods, class discussions, and reading assignments. For our multiple session game, Trade or Raid, we introduce the game in its simplest form at the end of the first class. As a result, students begin to apply core macroeconomic concepts even before they receive a formal lecture on the topic. Thus, the Active Learning context is initiated in advance or concurrently, depending on the lecture flow. For our single session game, Vote, Negotiate, and Retaliate, we establish the context over the first few class sessions with a foundation of health policy lectures.

This leads to class preparation. For each of the 2 games, we developed instructions, gathered necessary materials, and designed the games to inspire the students to apply

the material developed in the foundation. Class delivery was different for each game. For our multisession game, Trade or Raid, the delivery was done in many short stages. At the beginning of the game, when the students had minimal foundation in economics, the instructions were simple with few variables. As the students gained more understanding of macroeconomic theory over the semester, we integrated more factors into the game. The challenge with the one session approach of Vote, Negotiate, and Retaliate was that we had to make the information thorough, yet concise enough to be consumed in one class period. We discuss our approach to Auster and Wylie's fourth dimension, continuous improvement, in detail in the future directions section.

Table 1. The distribution of chips among the teams at the beginning of the Trade or Raid game play. The chips represent the productive capacity of each nation (team) in play.

Team	Blue Chips	Red Chips	White Chips
1	3	1	0
2	1	3	0
3	0	0	4

METHOD: 2 GAMES, 2 CLASSROOMS, 2 METHODS

How do instructors engage students across the domains of Bloom's Taxonomy? To engage our students at the Army-Baylor Graduate Program in Health and Business Administration (part of the Academy of Health Science Graduate School in the Army Medical Department Center and School), we created 2 games. Trade or Raid is played in multiple sessions over the entire semester, building and evolving based on the material taught in the macroeconomics lectures. Vote, Negotiate, and Retaliate is played from start to finish in a single health policy class session and requires quick thinking, strategy, and action.

Game 1. The Macroeconomics Game: Trade or Raid

Trade or Raid is an interactive economics game designed to familiarize the students with the fundamentals of macroeconomics, development, and political economy. In Trade or Raid, we adopt an iterative approach to the game over multiple class sessions, with rule changes that increase the complexity of the game and reflect the additional material the students learn in the macroeconomics lectures. The initial session of Trade or Raid is played early in the semester and is designed to require only a minimal foundation in macroeconomics. By the end of the semester, Trade or Raid rule changes increase the complexity of the game to a degree that integrates a more thorough knowledge of macroeconomic concepts, principles, and theories.

Trade or Raid Game Play Explained

Each round of Trade or Raid may take from 10-15 minutes. Typically, we may play one round at the end of a class. In this game, we organize students into 3 teams, each representing a notional sovereign country. In actual play, each team chooses its own name to create a sense of belonging. For clarity in this article, we use Team 1, Team 2, and Team 3. During the game, the teams work independently to try to develop their respective nations' economies. To do so, each nation begins with a set of poker chips that represent the nation's capital stock—the productive capacity of the nation. The instructor provides the teams with the chips as shown in Table 1.

Each round is broken down into a series of phases. The first phase is production. With a productive capacity of 3 blue and one red, Team 1 receives 3 blue chips and one red chip at the beginning of each round. During the second phase, consumption, each team decides how much of their production they will consume. When the team consumes production, they turn in chips representing production to the instructor and receive gold coins that represent social utility (gold coins are not tradable; they represent the cumulative happiness of the residents of the Team's country). Following consumption, the teams can trade any remaining production with other teams. For example, Team 1 could trade excess blue chips with Team 3 for white chips, with the intent of consuming blue and white chip pairs in the next round. In the final phase, investment, teams can use any remaining chips to buy additional productive capacity. Additional productive capacity is priced differently for each team. Team 1 can buy additional blue chips for one chip each; additional red capacity for 3 chips each; and cannot buy white capacity. Team 2's costs are reversed, and Team 3 must pay 3 chips for any additional capacity, regardless of color. If the team chooses to invest, the productive capacity is greater in the next round, yielding more production for all future rounds, representing a wealthier country. In subsequent rounds of the game, we introduce other economic principles to increase complexity, such as capital depreciation, taxation, infrastructure investment, etc, coinciding with lessons taught in class lectures.

While the game seems stacked against Team 3 based on the initial rule set, we introduce the first rule change after the first 2 or 3 rounds, adding raiding to the trade phase. Now during the trade or raid phase, teams may either make a peaceful offer of trade with one of the other teams, or they may raid one of the other teams. Raiding consists of one of the team members from the raiding team taking as much (usually all) of the target team's production as they like. Under these rules, the target team has no defense. Order now becomes critical,

and gives Team 3 a powerful advantage. Since Team 3 always goes last, if Team 1 or Team 2 raid anyone, Team 3 can simply come through last and take all of the booty for itself. With the introduction of raiding, the game changes dramatically and provides an opportunity to discuss the impact of geography on economics. Table 2 demonstrates that the teams did eventually choose to specialize and engage in some level of trade. Looking at the red/blue/white columns for each team, one can see that each team ultimately only maintained productive capacity in its respective specialty.

The problem to be solved now for the 3 teams is how to take advantage of peaceful trade opportunities and increase investment so that production for all can increase. Gaining control over violence is a necessary condition for economic growth and is the central theme of the book *Violence and Social Orders*,[10] which is read toward the end of the course. When students finally arrive at the book, they have viscerally experienced and actively participated in the problem of violence and its utility-reducing effects for weeks as they have struggled to deal with game theoretic issues such as the inability to commit to promises.

In Table 2, we illustrate the Teams' results over multiple rounds and sessions of Trade or Raid (due to space constraints, only 2 teams are listed). Note the minimal amounts of investment that occur. An optimal strategy would be to invest heavily throughout the game to generate more production. The problem for Teams 1 and 2 is that if they save production with the goal of investing, it may be stolen from them during the trade or raid phase of each round. In the game documented in Table 2, Team 1 invests a total of only 10 chips, Team 2 a total of 15 chips, and Team 3 (not shown) a total of 33 chips, far less than optimal. This pattern has been consistent over all 3 iterations of the game, and reflects economic theory about development and violence (as modeled by Leeson[11]). Having experienced the difficulties of controlling violence, teams gain a deeper understanding as to why many parts of the world seem consigned to poverty

Game 2. The Health Policy Game: Vote, Negotiate, and Retaliate

We played Vote, Negotiate, and Retaliate in a single session (the fifth) of a health policy class, after establishing the students' foundation of health policy-making in the previous 4 lecture sessions. In this game, students are assigned roles as legislators or stakeholders, and their task is to "pass" a national health policy bill that best supports their respective constituents. Vote, Negotiate, and Retaliate integrates the health policy coursework from earlier in the semester to provide an Active Learning scenario of a health policy-making process in a democratic republic society. Drawing from previous class sessions, we expect students will recognize aspects of several frameworks, such as agenda-setting from the Stages Heuristic[12] or Longest's Framework,[12,13] and actors and context factors from Walt and Gilson's Policy Triangle.[12,14] Likewise, the national health policies that students propose during the game include aspects of both public interest theory and economic theory of government interventions. Before starting the game, we remind the students that they may generate policy items that run the gamut of government roles, including expenditures, taxation, and regulation.

Vote, Negotiate, and Retaliate Game Play Explained

The overall objective for all players is to diligently promote their group's ideologies to best support their constituents' desires. The students are separated into either one of 2 legislator groups or one of several stakeholder groups. The number of stakeholder groups is based on the number of students in the class, but at least 5 or 6 groups are necessary to generate enough complexity.

To understand the game play for Vote, Negotiate, and Retaliate, a few definitions are in order. A "policy item" is a specific healthcare action stakeholders try to promote to a political party's policy proposal. Students may generate positive promotion items: policy courses of action designed to benefit the owning group. For example, the American Hospital Association stakeholder group designs a policy item increasing Medicare/Medicaid reimbursement rates by 10%, thus increasing revenue to hospitals. Alternately, students may create negative blocking items: policy items that preserve benefits or prevent disadvantage to the owning group. For instance, the American Hospital Association designs an item, albeit an unrealistic one, that makes the development of provider-owned medical facilities illegal, thus blocking competition.

In addition to the overall objective listed above, each legislator group has as its objective passing their political party's national health policy proposal. Passing occurs when one legislator party collects more chips than the other by the end of the voting period and remains in good standing with constituents for reelection. In other words, the legislators want to pass their proposal, but they do not want to do so at the expense of their constituency. Therefore, the challenge for the legislator parties is to try to balance as many stakeholder groups' desires as possible.

While the legislator groups attempt to pass their proposals, each of the stakeholder groups have as their objective

Table 2. Trade or Raid Scoring by Each Round of a 13-Round Game Conducted Over an Entire Semester.

	Team 1											Team 2										
									Productive Capacity											Productive Capacity		
Round	Production	Consumption	Investment	Inventory	Gov't Spending	NX	GDP	Gold	Red	Blue	White	Production	Consumption	Investment	inventory	Gov't Spending	NX	GDP	Gold	Red	Blue	White
1	4	2	0	2	0	0	4	3	1	3	0	4	0	0	4	0	0	4	0	3	1	0
2	4	2	1	1	0	0	4	3	1	4	0	4	0	3	1	0	0	4	0	6	1	0
3	5	8	0	-3	0	0	5	12	1	4	0	7	6	6	-5	0	0	7	9	6	3	0
4	5	2	3	0	0	0	5	3	2	4	0	9	6	0	0	0	3	9	9	6	3	0
5	6	6	0	0	0	0	6	8	2	4	0	9	7	0	0	0	2	9	8	6	3	0
6	6	5	0	0	0	1	6	7	1	4	0	9	6	3	0	0	0	9	9	6	3	0
7	5	2	0	0	3	0	5	3	0	4	0	9	8	0	0	1	0	9	12	6	2	0
8	4	3	0	0	1	0	4	3	0	4	0	8	4	3	0	1	0	8	6	6	2	0
9	4	1	0	0	3	0	4	1	0	4	0	8	4	0	0	1	3	8	4	6	2	0
10	4	0	4	0	0	0	4	0	0	8	0	8	2	0	4	2	0	8	3	6	1	0
11	8	0	0	0	0	8	8	0	0	8	0	7	10	0	-4	1	0	7	15	6	0	0
12	8	4	2	4	4	-6	8	4	0	10	0	6	0	0	0	0	6	6	0	6	0	0
13	10	8	0	-4	6	0	10	12				6	6	0	0	0	0	6	6			
Final Totals	73	43	10	0	17	3	73	59				94	59	15	0	6	14	94	81			

Description of Game Play Activity and Resulting Scoring

The table captures the decisions and outcomes of each student team's actions.

Round 1 for Team 1: the students started with a productive capacity of 1 red and 3 blue. Thus, the first entry for production is 4. Team 1 consumed 2 units of production and saved 2 units as inventory for the following round. Total gross domestic product (GDP) for the "country" was therefore 4. This represents the concept of circular flow in macroeconomics, where production and consumption have to be equal.

Round 2: Team 1 produced 4 again, but this time consumed two units, invested one unit, and saved one unit. The gold earned was 3, representing the 3 for 2 reward the team earned by consuming a mixed pair of chips (1 red, 1 blue). This demonstrates a second principle of economics, that we prefer to consume a variety of goods, rather than just one type. The one unit of investment appears in the increased quantity of blue productive capacity, where the blue capacity went from 3 in round 1 to 4 in round 2.

Round 3: As a result of the investment in round 2, Team 1 now produces 5 units, 4 blue and 1 red. In round 3, Team 1 consumed all of their production from round 3 (5 units), plus the 3 units they had been holding in inventory, which results in inventory being measured as -3. Again, this represents changes in inventory, a key measure for Keynesian macroeconomic theory.

Round 6: Team 1 has a net export (NX) value of 1, which means they exported 1 more unit of goods than they imported. Since the game operates in a real (rather than money-based) economy, a positive NX tells us that Team 1 was raided in this round, and that 1 of their chips was taken. Losses to raiding are treated as exports.

The final totals row shows how much each team produced, consumed, invested, spent on building armies, exported, and finally how much gold was earned. The gold total represents the amount of utility the citizens of each country gained through the process of consumption. The final lesson of the game is the realization that it does not matter how much a country produces, all that matters is how much its citizens are able to enjoy life. This is the ultimate lesson of macroeconomics, and the point of the course to show that maximizing this value is not as easy as it sounds in a sometimes violent world.

to have more of their policy items on the National Health Policy Proposal that passes than any other stakeholder group. So, the stakeholder group has to decide which legislator party (or both) to support by contributing chips. For example, the American Association of Retired Persons (AARP) stakeholder group may want to have the following policy items included in the national health policy proposal: expanded Medicare benefits, ceilings on prescription drug pricing, restrictions on what hospitals are allowed to charge seniors for hospital stays, and other policy items. The AARP stakeholder group offers one of the legislator groups any number of poker chips representing the votes/influence/support of the AARP's constituents in an attempt to have the legislator group place the AARP policy items on the bill. Considering that the stakeholder groups in the game include groups

with incompatible goals, such as the American Hospital Association and PhRMA (the trade association for the pharmaceutical industry), it quickly becomes clear that the conflicting policy items from each of the stakeholder groups creates a layer of complexity and requires all the players to strategize. Additional complexity ensues from the right of the stakeholders to reclaim their chips at any time. Thus, if the legislator group adds or removes a policy item that offends a stakeholder group, the stakeholder group can take back their chips to keep or give to the other legislative body. Note: due to space constraints, detailed instructions for Vote, Negotiate, and Retaliate are not included here. However, that information is available upon request from the authors.

COMMENT

Comparison of the Multiple and Single Session Games

Each game had its advantages and disadvantages; some affected both games. For instance, we designed both games to relate to the concepts and theories of the corresponding coursework and from the inception of each game, we focused on stimulating learning across the 3 domains of Bloom's Taxonomy. Although playing the games took longer than if we had only presented lectures about the topics, we expect the games left a stronger impression of the concepts on the students. Individually, each game had its advantages and disadvantages as well.

For example, playing Trade or Raid, most students developed a better understanding of the game as they played multiple sessions. Correspondingly, their knowledge of the macroeconomic theories behind the game grew as the students related the game to the coursework and lectures that continued over the class sessions. On the other hand, some students found the game a little confusing initially and did not devote their full attention to subsequent game sessions. Because class sizes were normally 25 to 30 students, it was possible for some students to participate in a limited capacity. However, there was evidence, such as the following students' comments, indicating that most students were engaged in the game and associated it to the corresponding concepts:

> The game mimicked reality. As new concepts were brought into the reading and lectures, the rules of the game were changed so that those lessons would be particularly pertinent.

Trade or Raid incorporated concepts of consumption, production, investment, and trade. The game illustrated the concept of absolute and relative advantage clearly.

Whereas Trade or Raid required 10-15 minutes in multiple class sessions over the course of the entire semester, students played Vote, Negotiate, and Retaliate in a single class session, thus minimizing the class interruptions and time required for the game. Like Trade or Raid, Vote, Negotiate, and Retaliate is a complex game, but it has the added challenge of a frenzied pace of game play. Said pace may have led to the students relating fewer concepts and theory to the game than they did with Trade or Raid. However, we believe the "aha" moment for some students came after the game session ended as they contemplated the events of the game. This is evidenced in one player's suggestions for improving the game:

> I would recommend…ensuring a clear split between special interest groups that are likely to support republican and democratic sides…. To add a real complexity to it, it would be a good idea to give different special interest groups a different number of tokens to reflect their actual political interests. If this were done I think it would encourage a little more interorganizational collaboration because groups with less political influence would be encouraged to collaborate with one another on different causes/policies.

Active Learning Advantages and Disadvantages Through the Lens of Bloom's Taxonomy

As we observed the students' in-class actions and evaluated their feedback, we determined the Active Learning approach was successful in impacting the students across the cognitive, affective, and physical domains. By employing game play, we engaged the students' desire to win. Their desire translated into actions and behaviors affecting learning.

Cognitive Domain

In Trade or Raid, we added increasing complexity to the game over the course of the semester. The increasing complexity encouraged the students to keep their focus and wits sharp if they wanted to have a chance at winning. Their passion for winning engaged the students at the cognitive (thinking/head) level. By adding intricacies over the course of the game, aspects previously beneficial to a certain team became liabilities later. For example, in the beginning of the game, Team 3 felt they were at a disadvantage because they only had one production capability. However, when raiding was introduced, they discovered they had a critical advantage. Similarly, when depreciation was introduced, efforts at diversifying the production base became rapidly ineffective, and so teams were required to change strategies throughout the course of the game.

On the other hand, Vote, Negotiate, and Retaliate is a single session game, so we were limited to the extent we could increase the level of complexity. We were, however, able to create a few complexities. We told the students that the instructor may change aspects of the

economic or political environment, or any other externality. For example, 5 minutes before the vote (ie, chips) tally, we told the legislator stakeholder groups to reduce the number of policy items on their national health policy proposal to a level substantially lower than what they had on the board. By doing so, legislators had to reevaluate each policy item to determine which provided the most stakeholder support. Stakeholders had to determine which of their policy items were being cut and what actions they should take in retaliation (for example, demand the return of their chips).

Affective Domain

The passion elicited by the competition in each game affected the students at the affective level. To be accepted in the Army-Baylor Graduate Program in Health and Business Administration, students must compete against their peers for a limited number of slots in each cohort. Most of the students are very competitive and have a strong desire to succeed. By placing the students in a de facto competition, a game, we target the students' desire to win and focus on impacting the students' learning by getting them emotionally attached to winning. In Trade or Raid, the competition is on a game session by game session basis; each time the students play, they step through the phases of consuming, trading and raiding, and investing. To come out ahead, the students have to integrate what they have learned from the macroeconomics lectures, readings, and exercises. Dealing with intergroup behavior, problems of trust, negotiations, and broken promises, coupled with the inherent unfairness of the rules (order of play, absolute advantages) triggered surprisingly powerful affective responses to the game:

> It was certainly an emotional experience. Some members of losing nations resented perceived slights from richer nations that extended far beyond the game. Building allegiances and watching them be successful (at the expense of others) was the most memorable part of the game.
>
> Trade or Raid brought out the worst in people. Everyone wanted the gold coins and did whatever they could in the hypothetical situation to gain them. There were many tense moments when the personalities of leaders, even within the classroom, clashed.

In contrast, we developed Vote, Negotiate, and Retaliate with a compressed timeline to simulate an impulse buy experience. Students want to win; to do so they have to think and act quickly and strategically to have the most items on the passing bill (stakeholders) or to gain the most chips to have their bill pass (legislators). With an impulse buy, consumers are placed in situations in which they perceive they must buy items immediately or lose the opportunity to make the purchase in the future. In like manner, in our game, the stakeholders have to make immediate decisions on how many chips to offer for each policy item they want on the legislator group's bill. The legislators have to decide which policy items will garner the most chips. The impact to the students' affective domain can be recognized in how loud and frenzied the negotiations get, particularly as the time remaining in the game begins to dwindle.

Physical Domain

Each game had a similar but different impact on the students' physical domain. Both Trade or Raid and Vote, Negotiate, and Retaliate required students to get involved physically, but in slightly different ways. In Trade or Raid, the students used poker chips to signify their production capability and they collected/dispensed the chips in each phase of the game. As the game progressed, the students had more objects to work with, including toy soldiers, different color poker chips, and gold coins. They moved around the room when they were raiding, and flipped coins to simulate combat once armies were introduced. Their handling of the different objects exceeds the impact of solely reading information on a page or screen and makes the information more memorable. As one student commented:

> It places these lessons in a context that we can *see and touch* as opposed to viewing them in abstract through lectures (emphasis added).

The design of Vote, Negotiate, and Retaliate puts the legislator groups at separate dry erase boards in the room. Although the legislators do not have to remain at the boards and can pursue the stakeholder groups, generally, the stakeholders approach the legislator groups. Imagine a classroom filled with 25 students, with each student on a separate mission to win—whatever "win" means to him or her—moving around the classroom, fighting for the attention of his or her target person. The ensuing chaos ensures a lot of physical movement and involvement. Visions of the trading floor of the New York Stock Exchange on a volatile day may come to mind.

FUTURE DIRECTIONS

The direction we take our 2 games depends on what we have learned during the process of developing and employing the games in the classrooms. Changes we make are based on continuous improvement, an integral part of the Active Learning approach.

The Role of Continuous Learning in the Active Learning Process

We previously discussed 3 of the 4 dimensions to the Active Learning teaching approach: context setting, class preparation, and class delivery.[3] While each of those aspects is important, perhaps the most difficult dimension

to implement is that of continuous improvement. Continuous improvement requires taking the time to evaluate the work that has been done, make adjustments as necessary, and implement the changes the next time the games are employed. Although for Vote, Negotiate, and Retaliate we had to do the reflection after the game session, we were able to consider changes for Trade or Raid over the course of the semester.

Student feedback is an integral part of the continuous improvement process.[3] We gathered feedback about the learning experience from our students for each of the games. A few of the student comments and the impact of the comments on the games are included in the following paragraphs.

Regarding Vote, Negotiate, and Retaliate

The preponderance of the students' feedback for Vote, Negotiate, and Retaliate called for extending the game; as one student clearly stated:

> I think the game should be extended to either an entire class period or too [*sic*] 2 class periods. Essentially, it would have been nice to have a little more time with my special interest group to discuss our policy and initiative ideas. Some of this could have also been resolved if we knew our groups ahead of time and you could assign the blog the week before a specific focus area for each group that would get the creative juices rolling.

The comment above identified 2 weaknesses in the game, time and pedagogical strategy. Several students suggested that we provide them more time; some suggested playing the game over more than one session, but most suggested providing time before game day to prepare their policy items and plan of attack. The pedagogical strategy weakness lies in the compressed timeline designed to stress the negotiating process and incite emotions—hence, impacting the affective domain—so we want to be careful in increasing game play time. We intentionally withheld information until the day of the game in to make the game more challenging. However, doing so limited time available to determine policy items based on what they had learned in previous lecture sessions. For future renditions, we will provide students lead time and enough information for them to predetermine policy items.

> Another suggestion would be to weight the power of the stakeholders by dividing the tokens out proportionately…reflect[ing] reality rather than every group holding 11 tokens.

In our initial iteration of the game, we provided each stakeholder group the same number of tokens (11). In reality, health policy stakeholder groups have different levels of influence. For example, it is likely that the American Medical Association has more influence in health policy bills than does the People for the Ethical Treatment of Animals. In the future, we will distribute the tokens in accordance with the estimated influence weightings of each of the stakeholder groups.

> I also think that many of the groups that normally support the Democratic Party's policies were not included in the game (minority groups, poor, women, etc) and I think it would be interesting to include these groups.

It was too easy to talk with the congress and it actually didn't cost much money. I'm not sure how we could do that. I just know that you have to contribute a lot of money to gain the favor or vote of a legislator.

Concluding the discussion about Vote, Negotiate, and Retaliate with the 2 students' comments above, we provide the seemingly unrelated comments to illustrate how the sheer volume of feedback can stir our ideas for improving the games. In the case of the above comments, we derived an idea to add additional player positions in the game. We will add individual voters of various social economic status and ethnicities. These voters will have a designated time period in the game during which they will have the legislators' full attention and can confront the legislators on any policy items. Doing so will challenge the legislators to remove or add policy items to their bills to satisfy their voting constituents.

Regarding Trade or Raid

The feedback differed for Trade or Raid, due in large part to the maturity of the game. While this was the first year we played Vote, Negotiate, and Retaliate, Trade or Raid is in its third year. We have done much of the improvement and finessing of the game over its past few iterations. We make minor tweaks to the game as the game progresses over the semester, gauging the students' interest and needs. Despite the maturity of the game, we still find ways to improve it and student feedback is integral to the continuous improvement process.

Of the 2 games, Trade or Raid is the more intricate and complex. That complexity was not lost on the students, as expressed in these students' comments:

> The game objectives and the process were unclear in the beginning.

> Better explain the rules and potential stratagies [sic]. I felt like we were operating in the dark for much of the game.

Despite the refinements over the years, it is clear that the students could benefit from more instruction about game play and rules.

As with Vote, Negotiate, and Retaliate, time was an issue for some students. However, the time issue took a different form with Trade or Raid, as show in the following comments:

> The game play was too spread out. Each turn was too far removed from the last.
>
> Dedicate specific time each week for the game so students can know when to expect to play and be prepared.

Both comments indicate the need for more structure in the timing of the game. In the future, we will provide specific times for the game sessions and share the schedule with students.

CONCLUSIONS AND FUTURE RESEARCH

Our foray into gaming as a strategy to involve Active Learning across the cognitive, affective, and psychomotor domains of Bloom's Taxonomy has provided us with dramatic improvements in engaging the students and their information retention. We have shared what we gained from our experience in this article. We provided a clear explanation of Active Learning and the 3 domains of Bloom's Taxonomy.[4] In the explanations of our games, we integrated the role of Bloom's Taxonomy and Active Learning to provide an understanding of the relationship between them.

We focused the discussion of the advantages and disadvantages of each game through the lens of Bloom's Taxonomy to provide a clear understanding of how Active Learning impacts each of the learning domains. Practitioners can develop teaching games using our model as a template to maximize the impact of their games. Researchers can build on our model through an experimental or quasi-experimental study focused on empirically evaluating the affect of the games on each of the domains. Although the challenge of providing material in a meaningful and engaging way to maximize student synthesis exists, the quality of lessons and the students' retention of the information can be dramatically improved by following a simple strategy of Active Learning across the primary domains of Bloom's Taxonomy.

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AUTHORS

MAJ Weigl and LTC Bonica are Assistant Professors, Army-Baylor University Graduate Program in Health and Business Administration, JBSA Fort Sam Houston, Texas.

Impact of an Innovative Clinical Internship Model in the US Army-Baylor Doctoral Program in Physical Therapy

COL Josef H. Moore, SP, USA
CPT Kathleen T. Glenesk, SP, USA
CPT David K. Hulsizer, SP, USA
Capt Brittany E. McCright, BSC, USAF
CPT Chelsea Wrenn, SP, USA
CAPT Todd Sander, MSC, USN
MAJ Dan Fisher, SP, USA
Lt Col John D. Childs, BSC, USAF

ABSTRACT

Study Design: Retrospective case-control.

Background and Purpose: Physical therapy education has been characterized by positive reform including the transition to doctoral level education and the emergence of evidence-based practice as a standard part of the curricula. However, clinical education remains largely unaffected by these advancements and continues as a highly fragmented and ill-equipped model marked by an inefficient 1:1 student to faculty ratio. Current clinical educational models provide highly variable and suboptimal learning experiences for many students, which contribute to disjointed and noncollaborative learning. The purpose of this study is to examine the implications of a one-year collaborative internship model in the US Army-Baylor University Doctoral Program in Physical Therapy in which interns train in groups rather than 1:1 on productivity and efficiency of care.

Case Description: The Army-Baylor program culminates in a 12-month clinical internship conducted at 4 locations within south central Texas (3 military academic medical centers and one multisite outpatient privately-owned physical therapy practice). Each site can accommodate up to 8 (range=4 to 8) students who complete a standardized internship curricula across the full continuum of learning experiences. In this retrospective case-control design, productivity and staffing metrics were extracted for the 3 military sites using the Department of Defense M2 database during the period from 2006-2010. A separate analysis was conducted for each site with descriptive statistics used to assess clinic productivity and efficiency.

Outcomes: Data from all 3 sites indicate the presence of interns resulted in little variability in clinic productivity and efficiency. Decreased productivity and/or efficiency would bring into question the long term viability and sustainability of the collaborative internship model. Additionally, this model maximized the opportunity for highly engaged mentorship, individual attention, and quality instruction.

Comment: The findings suggest clinics can accommodate multiple interns and provide high quality education in a collaborative model without a decline in productivity or efficiency. In addition to the standardized curricula across sites, this model facilitates a highly collaborative and peer learning environment in which the intern class supports, challenges, and holds one another accountable to a more standardized and higher level of practice. Each site contributes 1-2 clinical faculty who no longer engage their own patient schedule but rather are able to serve in a full time clinical mentorship role with the interns. In return, the clinical site receives 3-4 full time equivalents of productivity delivered by closely supervised interns who are afforded sufficient time to conduct their examinations and treatments in collaboration with the clinical faculty. Finally, the collaborative internship model supports the mission of each internship site, providing them a critical mass of labor via economies of scale in exchange for an enriched investment into their clinical education.

In the past several years, physical therapy education has been characterized by positive reforms including the transition to a doctoral level education and the emergence of evidence-based practice as part of standard curricula. However, the clinical education system has been largely unaffected by these changes and remains a highly fragmented and ill-equipped system, marked by an inefficient 1:1 student to instructor format which leads to very disjointed, noncollaborative learning.[1] Regardless of the quality of didactic education, the variability across clinical education sites is profound, evidenced by the lack of systems to credential clinical education to ensure quality and consistency of training.[2-4] Furthermore, the current physical therapy clinical education system leans heavily on a "barter arrangement" dependent on the altruism of clinical practices and the potential to recruit and hire the students they educate upon graduation. The perceived lack of benefit for clinical practices may help explain the

difficulty that academic programs have in securing an adequate number of high quality clinical education experiences for their students.[2-4]

Although the physical therapy intern's labor is essentially free, the short duration and physical therapy interns' limited skill set in a 6-8 week clinical rotation diminishes their potential to become a productive, revenue generating member of the staff. While short term cash expenditures are low, resources are inefficiently expended when interns spend an inordinate amount of time learning administrative systems, documentation standards, billing procedures, etc, only to have the student move on to their next clinical affiliation once proficient and repeat this cycle at their next clinical experience. The indirect costs for clinical practices to provide clinical education under the current model are steep, yet often go unnoticed or written off as goodwill.

The medical model of clinical education has long proven useful and lasting in the training of qualified physicians, wherein residents receive a modest salary in exchange for receiving a high quality standardized training program delivered under the auspices of a credentialed graduate medical education system that adheres to rigorous accreditation and quality standards. Residents also train in a collaborative learning model as a member of a resident "class" or group compared to the 1:1 model historically used in the physical therapy profession. Recent evidence from the literature and anecdotal evidence have challenged the traditional model and suggested that there may be added benefits for a collaborative clinical education model in which students are formed into cohorts of students supervised by 2 to 3 clinical instructors, similar to the medical model of residency education.[3,5-7] With the emergence of the collaborative model, Ladyshewesky et al showed that both the traditional and collaborative model learning methods reduce clinical instructors' normal levels of productivity.[3] They defined normal levels of productivity as patient care time versus other nonincome generating activities.[3] The volume of care provided by students, however, compensated for this reduction in productivity.[3]

No studies to date have examined the implications of a collaborative clinical education model on a practice's productivity metrics. Therefore, the purpose of this study was to examine the implications of a one-year internship model in which physical therapy interns train in groups rather than 1:1 on productivity metrics such as visits, relative value units (RVU), and efficiency of care. We hypothesize that there will be increased productivity and efficiency during time periods with interns versus time periods without interns.

METHODS AND MATERIALS

Subjects

Participants in the study were interns from the Army-Baylor Doctoral Program in Physical Therapy, Class of 2010, and clinical faculty from 3 internship sites: Wilford Hall Medical Center (WHMC) and Brooke Army Medical Center (BAMC) in San Antonio, Texas; and Darnall Army Medical Center (DAMC), Killeen, Texas.

Procedures

We selected a retrospective case-control design using data extracted from the Department of Defense's Military Health System Management and Reporting Tool (M2) database. The M2 database is a powerful ad hoc query tool. The data set used for all 3 internship sites runs from October 2006 through September 2010. We were primarily interested in variables that represented productivity and efficiency metrics.

Data Analysis

We performed a separate analysis with descriptive statistics for each internship site. The raw dependent variables were full-time equivalents* (FTEs), relative value units† (RVUs), and patient encounters. These were combined into ratios for standardization. To assess productivity, or the amount of work performed, the ratios RVU/encounter and encounter/FTE were used. To assess efficiency, or the amount of work performed in a specified amount of time, we used the ratio of RVU/FTE/day. Each of these ratios was assessed during 3 conditions:

1. Months during which no interns were present.
2. Full period when interns were present (rotation 1, Aug 2007-Feb 2008; rotation 2, Aug-Mar 2009; rotation 3, Aug 2009-Jul 2010).
3. Period when interns were present and functioning optimally (rotation 1, Sep 2007-Jan 2008; rotation 2, Sep 2008-Feb 2009; rotation 3, Oct 2009-May 2010).

In the case of condition 3, optimal performance is defined as the period of time excluding times at the beginning of the internship when interns received instruction in administrative functions and at the end of internship when interns prepared for graduation and their next military transition.

*Defined by the Government Accountability Office as the number of total hours worked divided by the maximum number of compensable hours in a full-time schedule as defined by law.[8]

†Relative Value Units are a tool developed for Medicare which rank on a common scale the resources used to provide each service. The resources include the healthcare practitioner's work, the expenses of the practitioner's practice, and professional liability insurance.[9]

RESULTS

Since data are only available by month, the partial months at the beginning and the end of the intern rotations were excluded. These months were July 2007, March 2008, July 2008, April 2009, July 2009, and August 2010. In addition to the partial months excluded when analyzing the full period, additional months were excluded when analyzing the optimal period where it is hypothesized the interns were not functioning efficiently due to development learning early in the internship, and for periods of in- and out-processing. Since interns were not present at each internship site for every time period, each site has a different number of months in each condition, with WHMC having the nearest to equal distribution and DAMC having the least equal distribution. Therefore, only WHMC was assessed under all 3 conditions, BAMC was assessed under conditions 2 and 3, and DAMC was assessed only under condition 3.

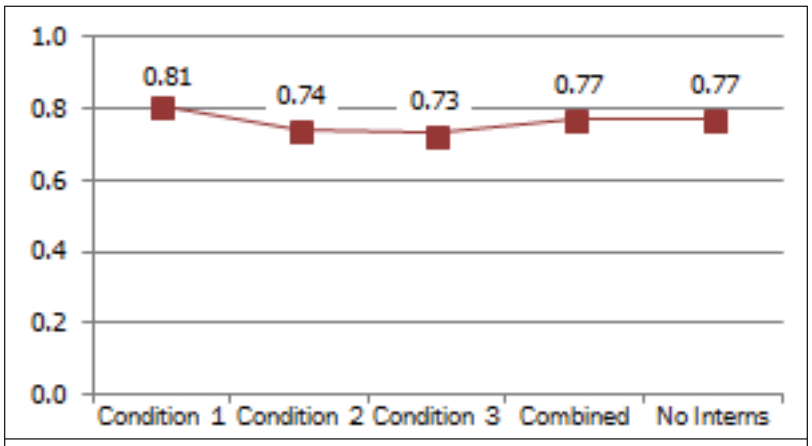

Figure 1. Productivity at WHMC indicated by the RVU/encounter ratio under all 3 conditions.

Productivity at all 3 internship sites for both RVU/encounter (Figures 1, 2, and 3) and encounter/FTE ratios (Figures 4, 5, and 6) revealed little variation during periods with and without interns. Efficiency (RVU/FTE/day) also produced little variation (Figures 7, 8, and 9) regardless of the presence of interns.

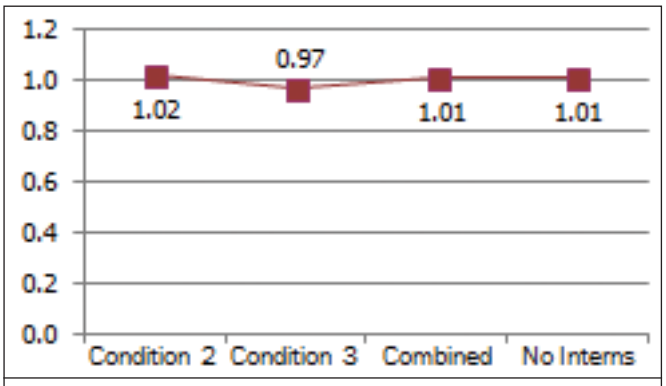

Figure 2. Productivity at BAMC indicated by the RVU/encounter ratio under conditions 2 and 3.

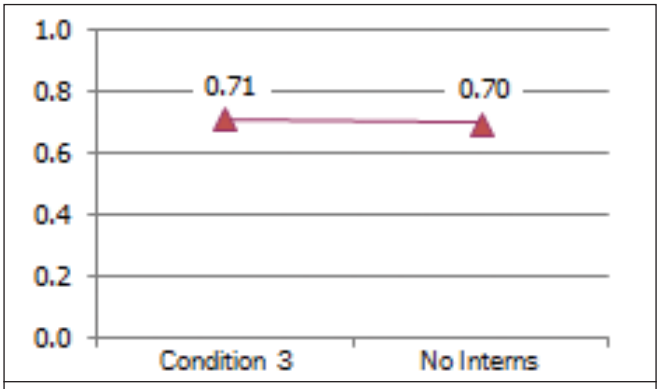

Figure 3. Productivity at DAMC indicated by the RVU/encounter ratio under condition 3.

COMMENT

Our results indicate that the presence of interns did not result in an increase in productivity and efficiency at the internship sites. However, the results support the notion that a clinic can provide clinical education without a decline in productivity and efficiency. Similar to a previous finding, it appears that interns compensate for the time a clinical instructor spends away from direct patient care with interns present.[10] Without question, a decrease in productivity and/or efficiency would bring into question the long term viability and sustainability of the collaborative internship model. We noted several potentially confounding factors that must be considered.

There are study limitations with a retrospective analysis, such as the inability to control for confounding factors. For example, there was variability in the reporting of FTEs at the 3 sites. Second, the patient referral volume also differed during the observed conditions at all 3 sites. Those 2 conditions resulted in a lack of ability to differentiate data. We also found that we are unable to generalize our findings because of differences in how input data are recorded within and between facilities. Despite the robust nature of the M2 database, it does not account for patients sent to civilian hospitals or clinics. Nor does it account for how patients accessed the internships sites or individual provider and intern productivity and efficiency. Given the retrospective nature of the study design, we also cannot be certain that any of the observed results are necessarily attributable to the presence or absence of interns.

The American Physical Therapy Association and the Commission on Accreditation in Physical Therapy

Education have little leverage or ability to lead necessary reform in physical therapy clinical education. Academic programs are in a negative incentive situation when it comes to reform. Currently, physical therapy students pay tuition to their academic institution while completing clinical internships or rotations, creating a veritable cash cow for the academic program, not the direct provider of the clinical education. However, those students have very few responsibilities during the clinical internships or rotations when compared to the effort expended in the classroom didactic environment. If reform is to occur in the area of physical therapy clinical education, this change will likely be mediated by the private sector in the form of for-profit entrepreneurial endeavors, one of which is the obvious financial benefit of a collaborative learning model that results in a net earnings increase for the clinical site in the form of longer term internship clinical experiences.

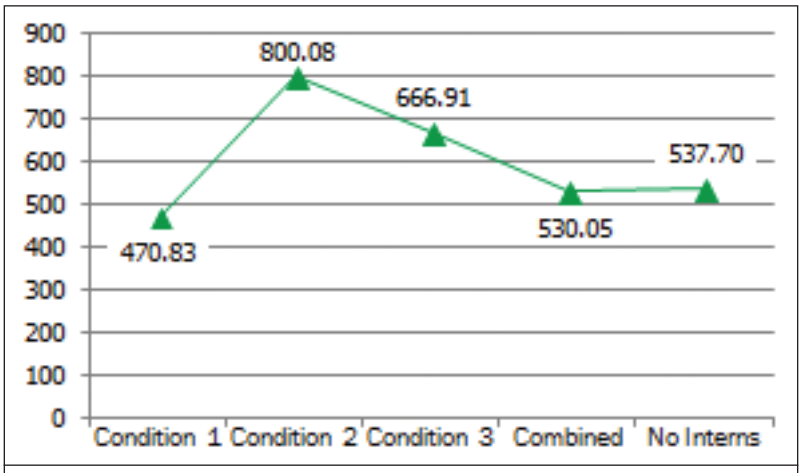

Figure 4. Productivity at WHMC indicated by the encounter/FTE ratio under all 3 conditions.

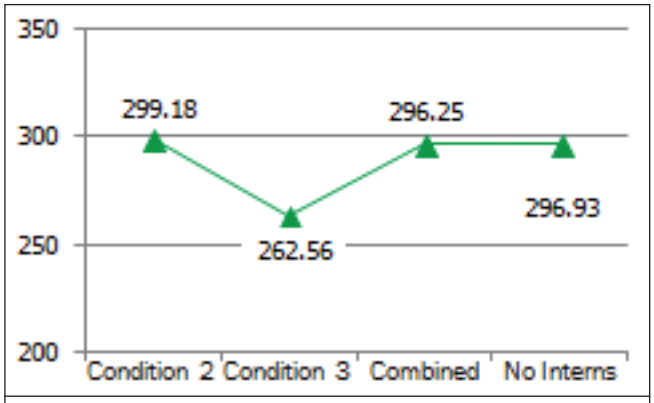

Figure 5. Productivity at BAMC indicated by the encounter/FTE ratio under conditions 2 and 3.

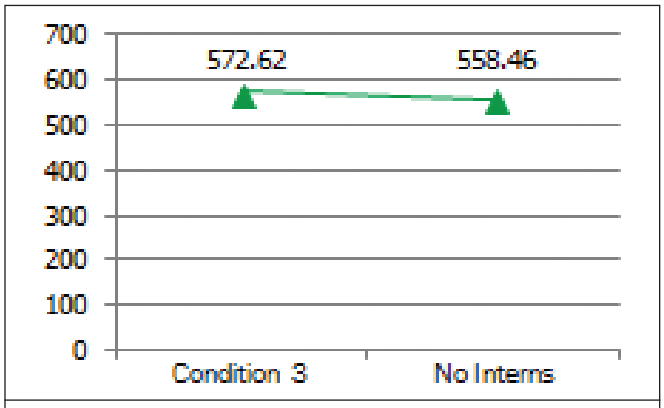

Figure 6. Productivity at DAMC indicated by the encounter/FTE ratio under condition 3.

Future Research

Attempts should be made to further examine the prospective implications of clinical education models on clinical productivity, efficiency of care, decreased cost for outside referrals, patient outcomes, and access to care.

CONCLUSIONS

This study suggests that internship sites can maintain productivity and efficiency while simultaneously delivering clinical education and mentorship to multiple interns at one time. As one looks into the future, it is realistic to envision the current model of PT clinical education moving even closer to the medical model.

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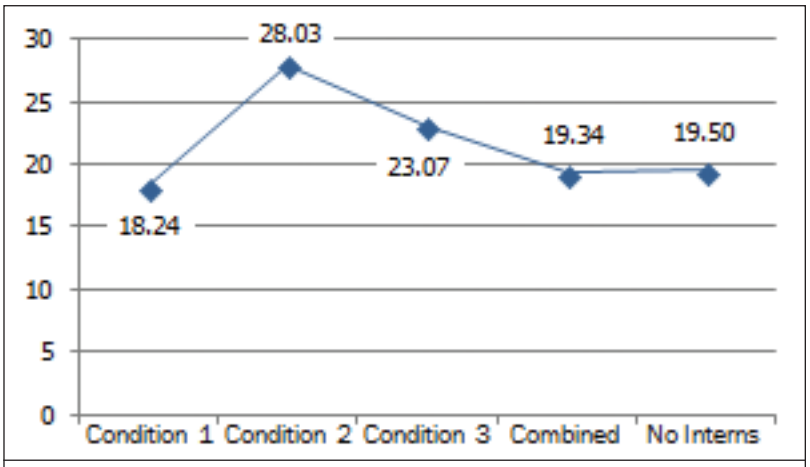

Figure 7. Efficiency at WHMC indicated by the RVU/FTE/day ratio under all 3 conditions.

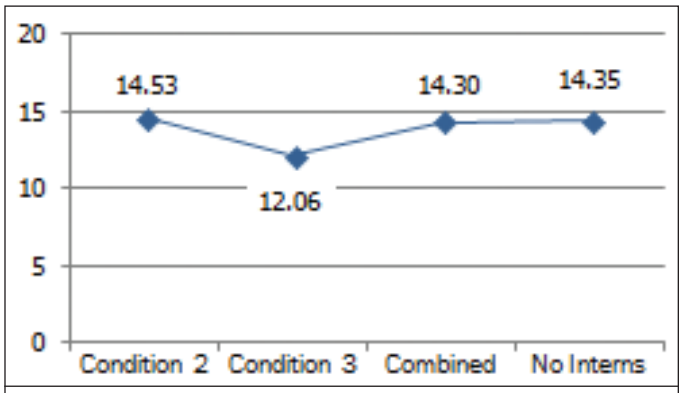

Figure 8. Efficiency at BAMC indicated by the RVU/FTE/day ratio under conditions 2 and 3.

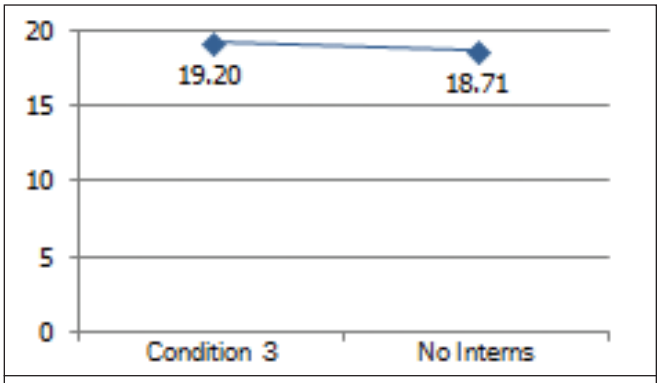

Figure 9. Efficiency at DAMC indicated by the RVU/FTE/day ratio under condition 3.

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AUTHORS

COL Moore is Dean, Graduate School, Army Medical Department Center and School, and Professor, US Army-Baylor University Doctoral Program in Physical Therapy, Joint Base San Antonio (JBSA) Fort Sam Houston, TX.

When this study was conducted, CPT Glenesk was a student in the US Army-Baylor University Doctoral Program in Physical Therapy. She is currently a staff PT at Keller Army Community Hospital (ACH), US Military Academy, West Point, NY.

When this study was conducted, CPT Hulsizer was a student in the US Army-Baylor University Doctoral Program in Physical Therapy. He is currently a staff PT at Blanchfield ACH, Fort Campbell, KY.

When this study was conducted, CPT McCright was a student in the US Army-Baylor University Doctoral Program in Physical Therapy. She is currently a staff PT at Wilford Hall Ambulatory and Surgical Center, JBSA Lackland, TX.

When this study was conducted, CPT Wrenn was a student in the US Army-Baylor University Doctoral Program in Physical Therapy. She is currently assigned to the 4th Brigade Combat Team, 82nd Airborne Division, Fort Bragg, NC.

CAPT Sander is an Associate Professor, US Army-Baylor University Doctoral Program in Physical Therapy, JBSA Fort Sam Houston, TX.

MAJ Fisher is Chief, Department of Rehabilitation, Winn ACH, Fort Stewart, GA.

Lt Col Childs is an Associate Professor, US Army-Baylor University Doctoral Program in Physical Therapy, JBSA Fort Sam Houston, TX.

The Army Social Work Internship Program: Training Today's Uniformed Social Worker

COL (Ret) Reginald W. Howard, MS, USA

ABSTRACT

Uniformed social workers are involved in ensuring the well-being of Soldiers and their Families during peace and war. The Army Medical Department Center and School is charged with the educational development of uniformed social workers. This article focuses on a relatively new approach to preparing social work officers for their dual role of providing garrison and operational behavioral health services to Soldiers and Families. In the 4 years since implementation, this 2-year training program has become the model for the professional development of new uniformed social work graduates.

Ongoing worldwide operations facing our armed forces today have created extreme emotional challenges for our Soldiers and Families. Data show one-third of the personnel returning from deployment will show signs of depression, anxiety, or posttraumatic stress disorder (PTSD).[1] Recruiting and retaining an adequately trained behavioral health force is a serious challenge today, given our deployment cycles in support of an ongoing war. The Army Medical Department (AMEDD) must ensure that the Army is always medically ready to deploy, while maintaining the capability to deliver healthcare to those forces anytime, anywhere, and under any conditions. The AMEDD behavioral health team consists of psychiatrists, psychologists, social workers, psychiatric nurse clinical specialists, and occupational therapists. Social workers represent the largest number of these behavioral professionals. Current Army doctrine assigns behavioral health providers to combat units on operational deployments to enhance mission readiness. Our ability to keep adequate numbers of highly trained behavioral health providers is key to the successful delivery of ready and relevant behavioral health services to Soldiers and Families.

Social workers have long been a part of American military history. The first social workers to support the American military were assigned to the American Red Cross in 1918. During World War I, the American Red Cross demonstrated the value of psychiatric social workers in a demonstration project conducted with the cooperation of the Division of Neurology and Psychiatry in the Office of The Army Surgeon General. Red Cross social workers continued to work in Army hospitals following the war and expanded their support to the military during World War II. Over the span of several decades, the role of military social workers grew from a small contingent to a recognized occupational specialty. In June 1945, Army social work became a fully recognized specialty in the Office of The Army Surgeon General.[2]

Recruiting, training, and retaining quality social work professionals is vital to the mission of the AMEDD. The process for independent social work licensure begins with an individual obtaining a master's degree from a university accredited by the Council on Social Work Education (CSWE). A uniformed social worker cannot deploy into a combat zone unless he or she is independently licensed. A candidate for independent social work licensure must participate in formal clinical supervision, ranging from 2000 to 4000 hours over a period of 2 to 3 years, depending on individual state requirements. The individual must satisfy the supervision requirement and pass the Association of Social Work Board's independent licensure exam to be recognized as a fully qualified social worker.[3]

Demand for social workers in this country has increased dramatically. The Department of Labor predicts 25% growth between the years 2010 and 2020.[4] While the Bureau of Labor Statistics projects that an additional 100,000 social workers will be needed by 2018, our country's accredited schools and programs of social work often struggle to recruit and graduate enough students to keep pace with the volume and complexity of social needs in our communities.[5]

The Army has used various methods for recruiting active duty social workers over the years. In 1998, the Army made the licensed independent social worker the standard for social work practice in the Army. This new professional standard increased the complexity of recruiting social workers for service in the active Army.

Shortly after the beginning of Operation Iraqi Freedom, the Army began to experience missed recruiting goals for social workers along with an increased demand for behavioral health services. The AMEDD embarked on a plan to focus internally and "grow its own." This process to develop from within began with the search for a university that could provide the Master of Social Work (MSW) graduate degree needed to begin the path to independent social work licensure.

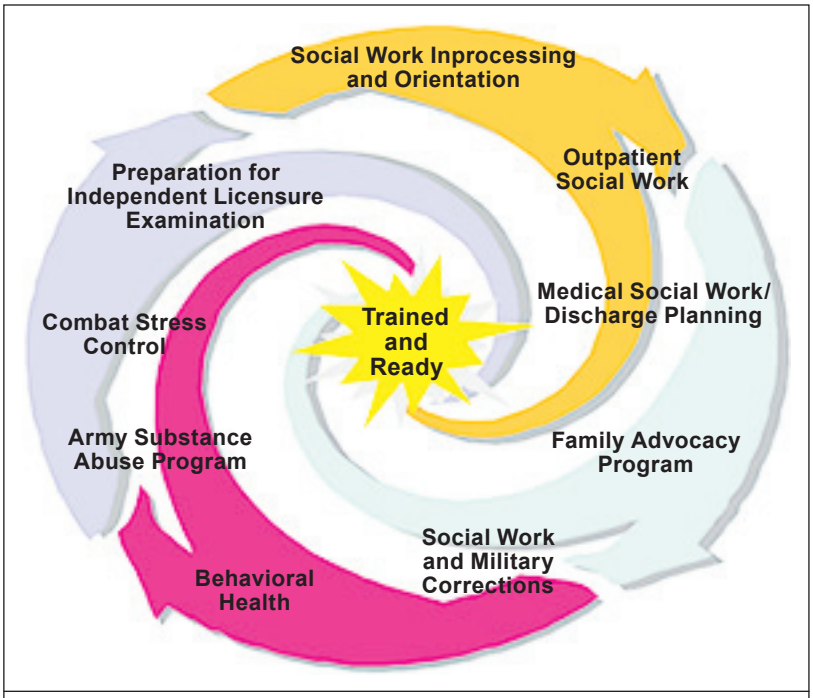
Through a competitive bidding process in 2008, the AMEDD selected and collaborated with Fayetteville State University in North Carolina and began training 15 Army officers in an accelerated 15 month MSW program at the Academy of Health Sciences, Fort Sam Houston, Texas. The first graduating class finished the Army's accelerated program eligible for clinical supervision to become independently licensed and fully qualified Army social workers.

Historical approaches to the process of moving recent social work graduates to independent licensure involved decentralization of the duty to our Army hospitals. The Army commissioned recent MSW graduates and assigned them to Army hospitals for clinical supervision in the Social Work Department. This decentralized approach lacked standardization, resulting in many officers experiencing significant delays in obtaining licensure. This process was met with numerous challenges including disruptions to clinical training due to unit exercises, permanent change of station moves, additional duties, changes in clinical supervisors, and a lack of attention or focus due to the informal nature of the process. This traditional decentralized process failed to evolve with the changing forward deployed Army. The wars in Iraq and Afghanistan revealed the need for a more forward presence of behavioral healthcare on operational deployments in the form of the Brigade Behavioral Health Officer. The historical model of social work clinical training and supervision lacked the focus needed to meet the Army's new doctrine. This reality necessitated rethinking the training of social workers in the Army.[3]

The Army's ultimate goal is for all social work graduates to achieve independent licensure in 2 years. The senior Army social work leadership called on the AMEDD Center and School (AMEDDC&S) to address what was a clear training need. That request resulted in the development of the Army Social Work Internship Program (SWIP). Today, all graduates of the US Army-Fayetteville State University Master of Social Work Program enter the SWIP immediately after graduation. The SWIP was established with a set of 4 critical goals:

1. Standardize intern training regardless of where the training takes place.

To support standardized training for all interns, the AMEDDC&S produced a training manual to standardize medical treatment facility SWIP training. The first SWIP training manual was developed by an 8-member work group formed in January 2009. The work group was comprised of Army uniformed social workers and civilian social workers representing various social work practice areas identified for inclusion in the SWIP. The completed SWIP training manual focused on 31 terminal learning objectives and over 100 enabling learning objectives across 5 military social work practice areas. The practice areas represented were Combat Stress Control, Army Substance Abuse, Army Behavioral Health, Family Advocacy, and Social Work Management. The conceptual model is illustrated in the Figure. Military corrections and medical social work are offered as elective experiences. The SWIP manual called for the use of clinical supervisors in all rotational areas with at least a 4-month rotation for each intern in each area. Plans were made for staff assistance visits to be conducted once every 2 years by a representative of the AMEDDC&S MSW Program to ensure compliance with training standards.



A conceptual model of the Army Social Work Internship Program.

2. Minimize administrative disruptions to training.

Historically, training and supervision of recent MSW graduates functioned as an informal program not officially recognized by the AMEDD for many years before SWIP. This informal status contributed to delays in licensure for many MSW graduates. New MSW graduates are commissioned in the Army Medical Service Corps (MSC). As members of the MSC, social workers are required to participate in most additional duties assigned to MSC officers. These duties include, but are not limited to Administrative Officer of the Day, Survivor Assistance Officer, 15-6 Investigation Officer, and field training and humanitarian missions. Time spent working in these additional duties was not countable toward social work licensure, and often resulted in significant licensure delays for new MSW graduates. The solution to the problem of supervision disruptions was developing and designating the SWIP as a 2-year assignment to a formal training program. Shortly after the SWIP manual was developed, AMEDD recognized the SWIP as a formal training program resulting in an Army Medical Command operations order calling for its implementation at 9 medical treatment facilities.

3. Develop a training program focused on military social work competencies.

Social work as a profession has well-established competencies. In 2009, possibly influenced by the global war on terror, an emergence of special military social work competencies was developing within the social work community. The CSWE released a set of educational standards in the form of military practice behaviors which highlight the knowledge and skills clinicians need to effectively serve the military community. Understanding military culture, community, programs, and policies are essential in providing services to military populations. Specialized education to prepare social work students and professional social workers to aid this population is clearly indicated. The provision of social work services to Soldiers and Families requires specialized training and development, as well as specific practice behaviors.[6] The 2009 SWIP work group considered all of the CSWE practice behaviors in its original manual, aligning SWIP with national best practices for social work services to military and veteran populations.

4. Focus on timely social work licensure.

Timely licensure supports mission readiness. Army policy prohibits providers who are not independently licensed from providing healthcare in a combat zone. The more rapidly our recent MSW graduates can achieve independent social work licensure, the sooner they can deploy in support of combat operations. The older, "informal" model of supervision resulted in many officers severely lagging behind the 2-year requirement to obtain independent social work licensure. In 2006, a total of 14 officers were ineligible to deploy because of delays in licensure. This represented 6% of the active duty social work career field. In a 4-year period, this rate has dropped to less than 1% as a result of the close monitoring of supervision hours and an emphasis on licensure preparation by the SWIP Directors of Training through the SWIP program.[3] Social Work Internship Programs are integral to preparation for the social work independent licensure examination

This standardization of training and its corresponding training manual allows the Army for the first time to identify a common skill set among its newly licensed social workers. It also allows for measurable standards across all training programs.

Since its formal beginning in 2008, 70 uniformed MSW graduates have enrolled on the Army SWIP. The program has shown extreme promise. A brief online survey of SWIP participants from 2010 to 2013 indicated that 75% of the program interns rated the overall supervision they received in the SWIP as above average or outstanding. In addition, SWIP interns currently have a first time pass rate on the Licensed Clinical Social Work exam of 94% compared to a national average of 76%.[3] The program looks forward to more critical review in the future.

CONCLUSIONS

The demand for skilled licensed social workers will continue to increase in both the civilian sector and the military. Enrollment in the US Army/Fayetteville State University MSW Program has increased 50% since 2008, requiring expansion of the SWIP program. In 2012, the SWIP expanded from 9 to 13 sites. In October 2012, a second work group met to update the SWIP training manual. The new manual supports recent changes in the social work licensure examination, places more focus on the role of a social work in a brigade combat team, mandates clinical supervisor training for all SWIP Directors of Training, mandates that interns participate in AMEDDC&S evidence-based practice courses for the treatment of PTSD, and includes a requirement for completion of select modules within the Joint Medical Executive Skills Institute distance learning program.

The Social Work Internship Program is currently the Army's model training program for recent MSW graduates. It supports the new Army Medicine Strategy and 2 of its key imperatives; create capacity and improve stamina. The SWIP creates capacity as a force multiplier which

has made a direct impact on filling uniformed social worker slots. Today, the uniformed social work career field has increased its fill rate by 10% over the past 5 years. This increase in Army uniformed social workers has improved mission readiness and the AMEDD's ability to meet the increasing challenges of providing care during peace and war. Building capacity is not simply doing more; it is about doing things better.[7] The SWIP immerses interns in a training environment best suited for learning about social work to Soldiers and Families. All interns are required to receive training in at least one evidence-based practice for treatment of PTSD. Interns are also allowed an opportunity to participate in electives in emerging treatment areas including telebehavioral health, traumatic brain injury, wounded warrior care, and embedded behavioral health. All training experiences are supervised by military and civilian employees who are experts in their areas. The AMEDD as a whole is committed to delivery and transformation of healthcare services for its beneficiaries. The SWIP operates in support of this commitment by providing timely, innovative, and evidence-based training for our newly acquired social work officers.

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AUTHOR

COL (Ret) Howard, a Licensed Clinical Social Worker, is a member of the faculty of the US Army-Fayetteville State University Master of Social Work Program at the AMEDDC&S, Fort Sam Houston, Texas.

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US Army Veterinary Corps First Year Graduate Veterinary Education Program

COL Erik H. Torring, VC, USA
LTC Wendy Mey, VC, USA

In 2009, the US Army Veterinary Corps initiated an effort to better prepare its junior Veterinary Corps officers (VCOs) for the rigors of military service. A program was created to provide exposure and reinforcement of those skills necessary for success in providing military veterinary medical services to the Department of Defense (DoD). The First Year Graduate Veterinary Education Program (FYGVE) was approved in 2009 by The Army Surgeon General for pilot implementation.

PURPOSE AND GOALS

The FYGVE Program is intended to better prepare newly commissioned VCOs for the wide variety of technical and leadership challenges that they will face upon arrival at their first military duty location. There are several key reasons why such a training program has become necessary at this time in the Veterinary Corps' history.

Many veterinary schools within the United States have changed their curriculum by shifting their focus from teaching core surgical skills by performing multiple common procedures towards the use of models or cadavers.[1] This practice has led to many graduates having limited experience in performing "real world" surgical procedures on live animals. This lack of hands-on experience may lead to a lack of confidence and potentially to the avoidance of such procedures, thus rendering these officers unprepared for providing comprehensive veterinary care to military working dogs either at their duty stations or in a deployed environment.

The unique missions of the US Army Veterinary Corps create another need for postdoctorate training. Protecting the food supply of Soldiers, Sailors, Airmen, Marines, their family members, and military retirees is a key mission of the Army Veterinary Service. However, only basic principles of food safety are covered in current curricula at most US veterinary schools. The FYGVE Program is designed to bridge this gap and address the lack of training in other subject areas unique to the military, such as leadership, the challenges of dealing with the military working dog, veterinary practice business and personnel management, zoonotic disease prevention and control, and stability operations in austere environments. Finally, the manner in which the Veterinary Corps has historically assigned newly commissioned VCOs was a factor in the development of the FYGVE program. Due to its DoD-wide mission and size, the Army assigns the majority of new VCOs to single veterinarian duty sites on Army, Navy, Air Force, and Marine Corps installations worldwide. A number of these duty locations are hundreds of miles from the VCO's higher headquarters and veterinary leadership. In contrast, few newly-graduated veterinarians in the civilian sector pursue positions in single veterinarian practices. Rather, many of them are electing postgraduate education programs.[1] A survey of 2011 graduates of US veterinary schools revealed that 52% of respondents pursed some type of postgraduate advanced education in order to further develop their technical skills.[2]

PROGRAM CURRICULUM

In keeping with the goals and objectives of the FYGVE program, the base curriculum provides FYGVE interns the opportunity to build upon their professional education and the Army Medical Department Basic Officer Leader Course, experiencing hands-on training in 3 broad-focus areas required of an entry-level VCO: veterinary public health, veterinary clinical medicine, and military leadership.

The mission of the US Army Veterinary Service is to execute veterinary service support essential for force health protection and to project and sustain a healthy and medically protected force; train, equip, and deploy the veterinary force; and promote the health of the military community.[3] Food protection activities are a cornerstone of the Veterinary Corps' contribution to force health protection. To accomplish this important mission, the Army requires veterinary personnel who are able to ensure food safety, wholesomeness, and related quality assurance standards; perform inspections of operational rations and other service-owned subsistence; perform sanitation audits of commercial facilities that produce food for DoD procurement and military food establishments; perform risk-based evaluations of food sources in a deployed or austere environment; and evaluate laboratory test results pertaining to submitted food samples.

Although veterinary school graduates are trained in microbiology, virology, and epidemiology, they receive little to no specific food safety training. The FYGVE Program curriculum provides both didactic and hands-on training to prepare entry level VCOs to be technically proficient and lead others in providing food protection support to the DoD. Prior to leading such audits and becoming certified to perform audits unsupervised, each FYGVE intern participates in a prescribed number of sanitation audits under the direction of Veterinary Corps Food Safety Warrant Officers. In addition to commercial audit certification, interns receive required training in operational food and water risk mitigation and installation food vulnerability assessments. The FYGVE interns also participate in installation-level food protection programs with other officers and enlisted personnel for a better understanding of the various programs for which they will be responsible at their first duty location.

United States veterinary school education provides graduates with the basic skills necessary to provide clinical veterinary medical care. As discussed earlier, the Army places many Veterinary Corps junior officers in single veterinarian duty locations, making these inexperienced veterinarians responsible for all aspects of medical and surgical care for military working dogs assigned to supported installations. The FYGVE Program provides the interns with course work and clinical cases to challenge their veterinary school education and to gain the proficiency and confidence necessary for success at independent duty sites. Evaluation of each intern results in credentialing to perform various tasks within the broad categories of general veterinary medicine: sedation, anesthesia, surgery, dentistry, and radiology. These clinical cases include military working dogs, other government-owned animals, and privately-owned animals presented to the veterinary facility for treatment.[4]

The FYGVE program curriculum also provides essential training in veterinary preventive medicine. Interns learn about zoonotic diseases of military importance such as rabies and avian influenza, how to establish animal disease prevention and control programs to protect human populations from zoonotic diseases, and the veterinarian's role in the One Medicine–One Health concept* linking animal and human health. The Army Medical Department embraces the One Medicine, One Health concept and the Veterinary Corps is a major partner in ensuring its propagation throughout the military. It is imperative that junior VCOs are aware of their role on military installations and in the operational environments they support.

*The One Health concept, first articulated by early scientists such as Rudolph Virchow, recognizes the intimate relationship between human health, animal health, and the environment, and calls for an integrative, synergistic approach to health by encouraging collaboration among experts of diverse fields of study.[5]

The diverse mission of a VCO presents challenges and rewards on a daily basis. Throughout the FYGVE course of instruction, interns are exposed to a mix of not only technical, but also nontechnical challenges that they will face as they proceed along their career path. By virtue of their rank and position, a newly assessed VCO is expected to have a certain level of competence as a leader. The FYGVE Program's leadership curriculum is designed to help the VCO mature as a leader and professional through a structured professional development program. Topics of instruction/discussion include interpersonal skills, team dynamics, cultural awareness, military and civilian human resource management, and resources available to assist the officer in handling a broad spectrum of leadership challenges.

PROGRAM DESIGN AND LOCATIONS

The US Army Veterinary Command (prior to its inactivation) and the Veterinary Corps developed a phased implementation plan to achieve the goals and objectives of the Veterinary Corps' FYGVE Program while ensuring veterinary mission accomplishment at duty sites across the United States. Initial planning resulted in the identification of 10 locations to host a FYGVE Program. After further analysis of manpower requirements, follow-on assignment potential for graduating interns, and site-specific government-owned animal, privately-owned animal, and food protection workload, the US Army Medical Command (MEDCOM) approved the final list of 8 FYGVE sites located at the installations listed in the Table.

First Year Graduate Veterinary Education Program Locations.

Location	Academic Year
Fort Belvoir, VA	2010-2011
Fort Bragg, NC	2011-2012
Joint Base Lewis-McChord, WA	2011-2012
Fort Hood, TX	2012-2013
Fort Carson, CO	2012-2013
Fort Benning, GA	2013-2014
Fort Campbell, KY	2013-2014
Camp Pendleton, CA	Site not fielded

Each of the locations is staffed with 2 instructors capable of providing mentored and hands-on training to 5-7 interns each year. These instructors include a Veterinary Preventive Medicine (Area of Concentration (AOC) 64B) officer and a Veterinary Clinical Medicine (AOC 64F) officer who have attended a long-term health education and training program within the respective specialty. In addition to the 2 permanent party instructors, many adjunct instructors are involved in the program to ensure a well-rounded educational experience. The adjunct instructors include assigned Army

Public Health Command (USAPHC) region and district commanders, senior noncommissioned officers, Food Safety Warrant Officers, and other locally assigned permanent parties who have expertise in conducting the installation level military veterinary mission. Finally, guest speakers from outside agencies such as the Joint Pathology Center, the DoD Military Working Dog Veterinary Service, the Armed Forces Health Surveillance Center, the USAPHC, the Army Training and Doctrine Command Culture Center, and collocated MTOE* veterinary units, provide outside instruction to the interns during the course of the year, either in person or via video teleconference.

Management and execution of the program are shared between 2 AMEDD organizations. A FYGVE Program Manager, under the direction of the Deputy Veterinary Corps Chief, is responsible for the program's operational oversight and administration, and curriculum analysis, design, development, implementation, evaluation, and modification. The Program Manager advises the Corps Chief on all aspects of the program, facilitates program development, and reviews plans, curriculum, policies, and procedures for the execution of the program to promote high quality training and ensure standardization across all locations. Execution and administrative support of the FYGVE Program rests within the USAPHC at the district level. Public Health Command instructors and personnel ensure all topics within the core curriculum are executed during the course of the academic year, provide leadership and supervision to the interns, as well as administrative support for the program.

CURRENT STATUS AND FUTURE

The FYGVE program is in its fourth year. Fort Belvoir was the beta site, graduating 5 interns in Fiscal Year (FY) 11. In FY12, Fort Bragg and Joint Base Lewis-McChord (JBLM) sites were added, and 15 interns graduated. This past June, 22 Veterinary Corps captains graduated from FYGVE internship programs at Fort Belvoir, Fort Bragg, Fort Carson, Fort Hood, and JBLM. During their internship training, FY13 interns performed an average of 9 commercial facility sanitation audits and 27 surgeries, as well as other curriculum items supporting the 151 critical tasks for VCOs. In FY14, 2 additional sites have opened at Fort Benning and Fort Campbell, and 25 interns have entered the FY14 FYGVE class. In FY15, a FYGVE class of 39 is expected, as all veterinary Health Professions Scholarship Program graduates are required to attend the program, and direct accession VCOs are encouraged to attend. The program is expected to reach full operational capacity with a FY16 class of 45-50, when all new VCO accessions attend the program after completing the Basic Officer Leadership Course.

The Veterinary Corps holds annual curriculum review committee meetings to ensure that the interns receive appropriate experience and training in areas required for their success and for Army Veterinary Service mission accomplishment. Participants include the FYGVE Program Manager and FYGVE cadre, in addition to representation from the Veterinary Corps, Army Public Health Command, the AMEDD Center and School, and US Army Human Resources Command.

To measure the effectiveness of the program, FYGVE cadre use after action reviews and one-on-one interviews during the course of the academic year, and the Public Health Command has developed pre- and post-course surveys. Those surveyed include interns who have completed the FYGVE program, FYGVE cadre, and commanders of units that have received officers who have completed a FYGVE program. The goal of these actions is constant program improvement to ensure that the DoD receives competent and confident Veterinary Corps officers capable of providing the highest quality of military veterinary support at installation level locations and in deployed environments worldwide.

*Modified Table of Organization and Equipment: Defines the structure and equipment for a military organization or unit.

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AUTHORS

COL Torring is Deputy Commander for Veterinary Services, US Army Public Health Command, Aberdeen Proving Ground, Maryland.

LTC Mey is Assistant to the Director for Healthcare Operations (MEDCOM), Office of The Surgeon General, Falls Church, Virginia.

Achieving Army Nursing Evidence-Based Practice Competencies Through a Civilian-Military Nurse Partnership

LTC Leilani A. Siaki, AN, USA
Debra D. Mark, PhD, RN
COL Denise L. Hopkins-Chadwick, AN, USA

ABSTRACT

Despite the Institute of Medicine's goal of 90% of all practice being evidence-based by 2020, educational and practice institutions are not on target to achieve this goal. Evidence-based practice is one of 5 core elements of the Army Nurse Corps' patient care delivery system and a key focus of the Hawaii State Center for Nursing. In order to increase evidence-based practice (EBP), a civilian-military partnership was formed to include healthcare organizations in the state, optimize resources, and share strategies for successful practice changes statewide. The partnership has been successful in meeting each of these goals using national EBP competencies and Bloom's taxonomy as a guide. The article presents a discussion regarding the history, processes, and outcomes of this partnership.

After 100 years, Florence Nightingale's philosophy "words ought to be distilled into action" remains relevant. With the Institute of Medicine[1] setting a 2020 goal of having 90% of all practice evidence-based and including evidence-based practice (EBP) in the core competencies for healthcare professionals, EBP has emerged as a strategic vehicle for distilling words or research into actions that produce optimal care. Despite a decades-old movement and support from entities such as the IOM and National Institutes of Nursing Research, a majority of universities continue to emphasize research over EBP, and practicing nurses continue to experience a lack of leadership support for EBP in their work settings.[2] However, use of EBP mentors has been identified as a means to improve nurses EBP knowledge and skills.[2]

Models and curriculum that are designed to increase knowledge with the help of mentors are more numerous in civilian than military settings. Searches in English databases such as CINAHL, OVID, and PubMed for civilian-military EBP training partnerships yielded few articles. However, one of those articles detailed historical background and establishment of a culture dedicated to EBP in a military organization in the Pacific.[3] The purpose of this article is to discuss a partnership between a group of local civilian hospitals and one military medical center formed under the auspices of the Hawaii State Center for Nursing (hereinafter referred to as "the Center") to develop EBP knowledge and skills in clinical staff nurses. Experienced EBP civilian and military mentors assisted with the training, resulting in an 18-month program which makes the recommendations of both Nightingale and the Institute of Medicine a reality.

FRAMEWORK FOR TEACHING EBP

The American Association of Colleges of Nursing identifies 6 competencies to direct nurse curriculum development. Through these competencies, nurses are expected to acquire the skills, knowledge, attitudes, and behaviors to deliver safe, optimum care and improve patient outcomes. These competencies, known as the Quality and Safety Education for Nurses (QSEN) program, are: (1) patient-centered care, (2) teamwork and collaboration, (3) evidence-based practice, (4) quality improvement, (5) safety, and (6) informatics. To meet the EBP competency, nurses must be able to critically read research and other evidence-based reports and integrate findings in ways that optimize patient outcomes, healthcare policies, and processes within healthcare systems.[4]

Bloom's taxonomy is a framework designed to assist faculty in developing common language and congruent curriculum objectives to achieve educational goals identified in national and local standards.[5] The intent of the taxonomy is to frame learning objectives in a way that encompasses educational levels, subject courses, and educators. The revised taxonomy focuses on learning objectives in 2 dimensions: knowledge and cognitive processes. There are 4 knowledge subdimensions: factual, conceptual, procedural, and metacognitive; and 6 cognitive process subdimensions: remember, analyze,

understand, apply, evaluate, and create.[5] For example, factual knowledge learning objectives for the cognitive process of remembering would focus on students' ability to recite facts and definitions. Under evaluation, students should be able to make judgments about a particular idea or event based on facts and apply these fact-based judgments to meet a specific learning objective or competency. Educators designing a curriculum to address the evidence-based QSEN competency might consider having students memorize steps in an EBP model (factual), describe how each step builds on and informs the process as a whole (analyze), and then demonstrate the application of one or more steps in the model (apply). Nurses who successfully achieve the learning objectives in each dimension are expected to possess the knowledge, skills, and behaviors necessary to competently engage in EBP. The QSEN competencies set within Bloom's taxonomy provided the framework used to guide this partnership as shown in Table 1.

CIVILIAN AND MILITARY ORGANIZATIONS INVOLVED IN THE EBP EDUCATION PARTNERSHIP

Army Nurse Corps

From the days of Florence Nightingale until now, education, practice, and training directed at improving patient care has been a consistent focus for civilian and military nurses alike. Early Army nursing leaders were neither nurses nor commissioned military officers or enlisted service members. The first superintendent of Army nurses, Dorthea Dix, and Clara Barton, founder of the American Red Cross, were teachers and strong patient advocates.[6,7] Today, the Chief of the Army Nurse Corps (ANC) is a major general, the current Army Surgeon General, a lieutenant general, is a nurse, and both of them have made education and evidence-based practice a priority.

The ANC philosophy regarding professional practice is a comprehensive approach to patient care. Designed to decrease practice variance and improve patient outcomes, the Patient CaringTouch System (PCTS) is comprised of 5 core elements: enhanced communication, capability building, evidence-based practices, healthy work environments, and patient advocacy.[8] LTG Horoho writes that evidence-based practice is one of the key elements in the PCTS. Under her direction, PhD-prepared nurse scientists along with clinical nurse specialists and healthcare systems analysts' have been embedded in centralized patient care settings for the express purpose of translating existing science into practice. The culture has been transformed from one where scientists only worked on single studies to generate new evidence to one where both original science and translation of evidence is common practice. While the ANC worked to develop the PCTS, nurse scientists at the Tripler Army Medical Center (TAMC) spearheaded efforts to create a robust EBP culture.[3] These same scientists also took the lead in forming the civilian-military partnership described in this article.

Tripler Army Medical Center

Established in 1907, TAMC is the largest US military hospital in the Asia Pacific rim, an area covering approximately 52% of the Earth's surface. It is home to the Pacific Regional Medical Command, one of 6 geographically-based regional medical commands in the US Army and the Center of Excellence in Disaster Management and Humanitarian Assistance. During World War II, TAMC had 1,000 beds. Currently, it has 231 beds, employs over 600 military and civilian licensed nurses, and serves almost 500,000 beneficiaries from within the Asia Pacific Rim, which includes Korea, Japan, Guam, American Samoa, and residents from the former US Trust Territories of the Pacific, the Federated States of Micronesia, and the Commonwealth of the Northern Marianas Islands. Over 2,000 patients a day receive care in the outpatient clinics, and over 200 babies are born at TAMC every month.[9,10]

Professional nursing practice at TAMC is guided by the PCTS. As noted, education and EBP are key elements of PCTS. Education regarding EBP begins with new employee orientation and continues at the unit level. Employees are encouraged to bring their ideas or questions to their unit-based practice councils (UPC). If those ideas or questions evolve into a project, the process generally follows the Iowa model.[11] Essentially, after receiving UPC approval, the project champion assembles a 2 or 3 person team. Each EBP project-specific team is allocated administrative time specifically to work on the project. Both unit-based and hospital-wide practice councils track projects and provide the hospital leadership/command team with regular updates. Librarians, nurse scientists, and clinical nurse specialists at TAMC support teams during all stages of the process, including selection of outcome measures and dissemination. Based on statewide participation, 2 or 3 TAMC teams a year are accepted into the Center 18-month EBP program.

Hawaii State Center for Nursing

The State of Hawaii is committed to improving patient safety and the quality and delivery of healthcare to the 1.2 million residents across urban and rural regions of this island-state. The Center was established by the state legislature in 2003 "to address nursing workforce issues."[12] In less than a decade, the Center has become the hub of professional nursing in Hawaii. Always with a focus on the nursing community as its constituent, the

Table 1. Bloom's Taxonomy knowledge and cognitive process dimensions mapped within the Quality and Safety Education for Nurses competencies.

		The 3 Quality and Safety Education for Nurses Evidence-Based Care and Quality improvement Practice Elements					
		Knowledge		Attitude		Skills/Behavior	
Bloom's 6 Cognitive Process Subdimensions		**Remember** Retrieve or recite relevant knowledge from long-term memory (facts definitions, lists).	**Analyze** Break into constituent parts and how r/t to each other & to overall structure or purpose.	**Understand** Construct meaning from instructional communications (oral, written, graphic).	**Apply** Carry out or use procedure (models, interviews, presentations, simulation).	**Evaluate** Make judgments based on criteria and standards: critiques, reports, guidelines.	**Create** Synthesize or reorganize elements to form a new, coherent, or functional whole.
Bloom's 4 Knowledge Subdimensions	**Factual** Knowledge of isolated content elements	Know EBP versus research language. Demonstrate knowledge of health research methods and processes.	Identify the components of research evidence, clinical expertise, and patient/family/community values.	Value all components of EBP.	Appreciate strengths and weaknesses of scientific bases for practice. Appreciate the strength of evidence on provision of care.	Employ efficient and effective search strategies to answer focused clinical or health system practices. Exhibit current knowledge of best evidence related to practice and healthcare systems.	Develop knowledge that can lead the translation of research into EBP. Implement care practices based on strength of available evidence.
	Conceptual More complex organized knowledge	Define EBP versus research. Identify principles that comprise the critical appraisal of research evidence.	Summarize current evidence regarding major diagnostic and treatment actions within the practice specialty and healthcare delivery system. Evaluate organizational cultures and structures that promote EBP.	Value cutting-edge knowledge of current practice.	Champion the changes required that support EBP.	Critically appraise original research and evidence summaries related to area of practice.	Build consensus among key stakeholders through the use of change theory to create EBP.
	Procedural "How To"	State 5 Steps of Iowa model of EBP. Identify efficient and effective search strategies to locate reliable sources of evidence.	Determine evidence gaps within the practice specialty and healthcare delivery system.	Value development of search skills for locating evidence for best practice.	Appreciate the gaps in evidence related to practice Value working in an interactive manner with the Institutional Review Board.	Lead and marshal the resources for change that supports evidence-based practice. Use coaching skills to engage nurses in evidence based practice and research.	Promote a research agenda for evidence that is needed in practice specialty and healthcare system. Actively engage with the Institutional Review Board to implement research strategies and protect human subjects.
	Metacognitive Cognition in general & awareness of one's own cognition	Awareness of personal level of knowledge/experience with EBP. Understand the need to define critical questions related to practice and healthcare system delivery.	Identify strategies to address gaps in evidence-based guidelines. Analyze how the strength of available evidence influences care (assessment, diagnosis, treatment, and evaluation).	Appreciate that organizational systems can significantly influence nursing's efforts in EBP. Appreciate that all nurses can participate in creating EBP.	Value knowing the evidence base for one's practice specialty area.	Role model clinical decision making based on evidence, clinical expertise, and patient/family/community preferences. Use quality improvement methods to address gaps in evidence based guidelines.	Use health research methods and processes, alone or in partnership with scientists, to generate new knowledge for practice. Participate in designing organizational systems that support EBP.

Center collaborates with nursing professionals, the community, and state in the spirit of consensus building and teamwork.

One of the Center's legislative mandates is to "conduct research on best practice and quality outcomes." This mandate, along with national and local trends and imperatives, created the stimulus for enhancing EBP capacity. As a result, an innovative statewide program was implemented to meet demands for quality nursing care and improvements in patient outcomes.

Civilian Partners

Over the past 5 years, the Center has engaged 15 different healthcare organizations, detailed in Table 2, in the EBP program: 7 acute care hospitals, one behavioral health facility, one critical access hospital, 2 long-term healthcare facilities, one women's and children hospital, and 2 rehabilitation hospitals. With the exception of 3 acute care hospitals and one team of nursing faculty, all facilities are located on the island of Oahu.

METHODOLOGY

Partnerships

Partnerships are defined as 2 or more entities agreeing to share the benefits and risks of achieving a mutual goal that neither partner can easily fulfill on their own. In healthcare, partnerships have the potential to bridge gaps that exist between science, policy, and practice[13-15] and ultimately improve care.[16-20] This exchange of ideas, resources, funding, and expertise serves to enhance capacity, resulting in the integration and translation of scientific findings to the bedside.[14,21]

The nature of partnerships vary and are dependent upon the period of time, local political conditions, the nature of the problem or goal, and the stage of development of the interventions.[22] Capitalizing on these conditions requires recognition that each partner is ready to share a common vision, similar interests, an understanding of each other, and a willingness to "move with optimistic uncertainty."[23(p72)]

Civilian-military partnerships described in the healthcare literature relate primarily to civilian trauma experts providing training to military healthcare providers for injured Soldier care or working with other nations to provide needed humanitarian assistance and disaster response.[24-26]

Table 2. Evidence-based practice projects in Hawaii, 2009-2012. The number of each type facility participating is in parentheses.

Type of Facility	EBP Topic
Acute Care Hospital (7)	Accidental extubation in pediatric critical care patients Advanced care planning based on cultural beliefs/ practices Alternative therapy pain management in postoperative joint patients Ambient noise levels Childbirth education Clinical simulation for medication errors in orthopedic/neuro/vascular units Conscious sedation safety Culture of transparency to support bedside patient safety Decompensation in heart failure patients Early sepsis screening in the ER and hospital Group therapy for adolescents in inpatient psychiatric setting Hospital discharge instructions for adults Hourly rounding for toileting Intraoperative skin preparation for adult hand surgical patients Length of stay, negative outcomes and costs for adults >18 years of age Management of sacral pressure ulcers Medication errors in adult surgical patients Nonpharmacological sleep for SICU patients Organizational change at the unit level Pain management for opioid-dependent orthopedic patients Patient choices for coping with labor Patient/staff communication Perioperative management of adult patients with sleep apnea x 2 Perioperative hyperglycemia management Pulmonary management of spinal cord patients Reduction in hospital-acquired pressure ulcers Restraint use reduction in medical/surgical andcritical care units Restraint use reduction in emergency department Shift report process for adult patients Simulation training for staff nurses Surgical site infections in antepartum/surgical ward Trauma informed care Vascular access device selection in long term intravenous patients
Behavioral Health Hospital (1)	Suicide reduction in inpatient settings Restraint use reduction in aggressive behavior children <8 years old Aggressive behavior in children <12 years old Fall prevention
Critical Access Hospital (1)	Hospital-acquired infections
Long Term Care Facility (2)	Pain management for residents with dementia Fall prevention x 2
Pediatric Hospital (1)	Ventilator weaning readiness
Rehabilitation Hospital (2)	Fall prevention Patency of peripheral intravenous lock in children Pediatric pin site care in pediatric population with external fixation Post surgery bowel function Surgical/pin wound dressing

Although military medical facilities are geographically located among their civilian counterparts across the nation, little is published about the linkages between and among military and civilian healthcare providers.

Bloom's Taxonomy and Quality and Safety Education for Nurses

Guided by Bloom's revised taxonomy, learning objectives directed at EBP competency applicable to both civilian and military environments were developed. These objectives focused on facilitating nurses' EBP skills, knowledge, attitudes, and behaviors. The learning objectives organized by the knowledge and cognitive process dimensions are listed in Table 1.

EBP Workshop and Internship Curriculum

The Center offers an annual 2½ half day workshop limited to 35 participants to ensure individualized attention and team support. The workshop covers each step of the Iowa Model[11]:

- Identify triggers.
- Form a team.
- Assemble and critique the literature.
- Synthesize the literature.
- Pilot the practice change.
- Implement the practice change.
- Evaluate the practice change.

The agenda consists of didactics followed by activities and exemplar presentations from previous team members, offering invaluable insight into the EBP process.

Prior to the workshop, teams submit a problem statement that serves as the foundation for workshop and internship activities. If possible, a team participating in the workshop consists of a staff nurse, an advanced practice registered nurse (APRN), and a nurse manager. Within this format, the staff nurse serves as a change champion; the APRN acts as an opinion leader, assisting with identifying and critiquing literature and developing implementation strategies; and the nurse manager provides administrative and logistical support. Teams from TAMC are encouraged to include both civilian and military registered or practical nurses or other interested staff. A contingency plan in the event of military deployment or change of assignment is included in the initial application. Due to competing demands, nurse managers at TAMC are not generally on the teams but have an open invitation to attend any of the internship program sessions described below.

While all facets of the Iowa Model are covered during the workshop, a thorough understanding of the model is difficult to convey within the time allotted, and a companion internship program deconstructs each phase into manageable steps and focuses on strategies for implementation of the project. The 18-month internship program is structured around bimonthly meetings that provide 4 hours of interactive didactic content which reinforces workshop material, followed by teams sharing status reports and actions to resolve barriers and restart stalled projects.

FINDINGS

Partnerships

Partnerships in nursing are common, especially those relating to academic-service partnerships. Naturally evolving from an applied science, nursing education necessarily involves clinical partnerships. A recent systematic review reported that nursing academic-service partnerships have 4 main stages: (1) mutual potential benefits, (2) moving from being competitors to collaborators, (3) joint practice, and (4) beneficial outcomes.[27] Although the intent of this review was to inform clinical nursing education reform efforts, it is consistent with what others describe as necessary elements of successful partnerships[13,15,28-30] and will be used as a blueprint to describe this civilian-military nursing partnership to enhance evidence-based practice capacity in Hawaii.

Partnership History and Foundations

The Army Nurse Corps recognized the importance of EBP and has emphasized and supported its implementation for the past decade. Support included training by Dr Marita Titler* to implement EBP programs, which resulted in an EBP pilot program at TAMC. Modeled after the Advanced Practice Institute at the University of Iowa and facilitated by Dr Titler, the pilot included an initial workshop, an 18-month internship program, facilitation by a nursing research office, and grant resources.[3]

The success of this TAMC-wide EBP program served as the basis for the Center's statewide initiative. Drivers for the statewide program were the Center's legislative mandate, the transition of facilitators of EBP at TAMC to the Center and a large civilian medical center, and an expressed community need for EBP competencies to meet magnet certification requirements and improve quality metrics. The first cohort entered the program in 2009.

Mutual Potential Benefits

There were 3 anticipated benefits of this civilian-military partnership: (1) increasing EBP capacity; (2) accessing and optimizing resources; and (3) sharing strategies for successful implementation of practice changes. All 3

*Professor and Chair, Division of Nursing Business and Health Systems, University of Michigan School of Nursing.

benefits were realized. Over the past 5 years, 150 registered nurses implementing approximately 50 different EBP projects from 15 different healthcare facilities across the state have developed competencies in EBP. Many of these nurses have gone on to lead other EBP projects, are functioning as EBP experts in their institutions, and/or have taken positions in quality management.

Resource access and optimization are afforded by the Center's central role in the community. It is in a position to not only lead this statewide initiative, but guide a cohesive effort, bringing together previously fragmented programs. This centralized approach provides a distinct advantage of shared resources in terms of education, expertise, and personnel. The Center provided a dedicated Project Coordinator for 10 hours each week; an Agency for Healthcare Research and Quality grant supported the annual EBP workshop the first 4 years; and affiliation with the University of Hawaii gives access to a nursing faculty member who directs the program, a statistician, and a medical librarian. Likewise, TAMC provides military and civilian nursing faculty and library support services.

The EBP workshop and internship program is a shared experience. Teams across institutions become familiar with their colleagues' projects and work environments over the 18 months. At each internship meeting, we ask the teams to provide an update on their project. This serves the purpose of assisting each other with strategies to overcome barriers and share successes for achieving milestones.

From Competition to Collaboration

Hawaii has an unusually collaborative spirit. This may be due to its geographic isolation, incomparable diversity, or great weather. Regardless, faculty were sensitive to the fact that discussing triggers for the various projects would expose nursing care problems. Every effort was made to focus on quality improvement, avoid any criticism, and create a safe environment for open discussion. Once the environment was perceived as safe, the teams from the 15 facilities had little hesitation to collaborate in this process and work together.

Joint Practice

Nursing care delivery issues are rarely unique and it was the hope of the Center that teams would work on similar practice changes across institutions. At one point, 4 facilities were addressing fall prevention: a rehabilitation hospital, a medical center, a long term care facility, and a mental health hospital. Another opportunity existed when 2 medical centers identified projects to prevent obstructive sleep apnea in the postoperative patient. Despite offers to provide additional facilitation, sharing of materials, etc, neither of these potential joint practices came to fruition. Anecdotally, logistics, time, and financial constraints were more of a barrier to these joint practices than a willingness to work together. Organizational cultural differences may have been another factor.

Beneficial Outcomes

Stakeholders benefitting from the Center's statewide EBP program include patients, nurses, and healthcare institutions. First and foremost, the patients at these 15 facilities were provided evidence-based care for a variety of patient care issues as shown in Table 2. TAMC participated in the program the first 4 years and its beneficiaries benefited from a variety of evidence-based practice projects across the continuum of care:

- Ambient noise levels
- Alternative therapy pain management in postoperative joint patients
- Childbirth education
- Clinical simulation for medication errors in orthopedic/neuro/vascular units
- Decreasing inpatient length of stay
- Intraoperative skin preparation for adult hand surgical patients
- Medication errors in adult surgical patients
- Perioperative management of adult patients with sleep apnea
- Reduction in hospital-acquired pressure ulcers
- Surgical site infections in antepartum/surgical ward

These projects spanned from pediatric populations to the elderly, from ambulatory to critical care settings, and from direct to indirect patient care delivery. Eight of the 11 TAMC projects have been institutionalized as new standards of care.

Nurses benefit from participating in EBP programs in several ways. Not only did participants develop EBP skills, they also enhanced their nursing professional and leadership acumen as well. Participants of the Center's EBP program obviously gained knowledge about and skills in EBP, but more importantly, learned firsthand how to implement and evaluate projects. Application and translation of this knowledge to the bedside is not only critical to changing to an evidence-based practice, but is undoubtedly the hardest part. Changing the behavior of others and permanently inculcating that change requires advanced communication skills, flexible leadership styles, commitment to the process and outcome, and a great deal of persistence.

The benefits of EBP capacity building to healthcare institutions are most obviously changes and improvements to patient care delivery and outcomes. Other benefits are not always readily tangible. For example, the maturation of professional and leadership skills among the nursing staff contribute to the organization by influencing the behavior of their colleagues, functioning as EBP faculty, disseminating results of EBP projects both locally and nationally, and identifying additional needs of the institution and implementing new projects.

COMMENT

Successes

Civilian-military partnerships can and do work. In this instance, the statewide EBP program met goals of multiple institutions simultaneously while filling gaps in resources that single institutions could not do on their own. The collaborative efforts of civilian and military nurse leaders, scientists, clinicians, and developing EBP experts effected practice changes that enhanced quality care, cost savings, and professional development.

Quality Improvement

The QSEN competencies focus on providing new graduates with tools necessary to improve patient safety and healthcare quality. Practicing nurses continually address safety and quality, yet may have graduated prior to the QSEN initiative and therefore possibly lack experience using evidence-based approaches. While this practice gap is only just now being addressed at the national level,[4] Hawaii's statewide civilian-military partnership has been successful at increasing EBP competency of staff and improving patient safety for over 5 years. Patient satisfaction, fall rates, and medication errors have improved. Additionally, TAMC nurses have had opportunities to disseminate their successes via podium and poster presentations at national and international conferences. Three manuscripts are in development and are scheduled for publication in September 2014. The professionalism and leadership demonstrated through the EBP projects have also led to increased interest in advanced education and new job opportunities for participants, many of whom have themselves become EBP mentors.

Cost Savings

A criticism of EBP is that the process is directed more at cost reduction rather than improving quality of care.[31] In Hawaii, costs for sending one individual off-island for expert training can exceed $2,200. In some instances, EBP does increase costs of care. For example, extra nursing care time and supplies were required to implement one practice change. However, the driving impetus behind acceleration of the EBP movement was the 1999 Institute of Medicine (IOM) report on quality care. According to a 2012 IOM report,[32] missed prevention opportunities, care fragmentation, and inefficiencies resulted in over $200 billion ($10^9$) in excess costs. Quality care itself can increase cost effectiveness by decreasing those missed opportunities through an EBP approach. For example, the childbirth education project at TAMC saved patients about $300 in out-of-pocket expenses. Streamlining discharge processes on one medical surgical floor at TAMC resulted in cutting associated costs almost in half.

Professional Development

When asked about their successes, most participants credited their organizational leadership with creating a culture of EBP and the initial workshop as most critical to their ability to complete and institutionalize their projects. Specific aspects of support participants found helpful were the onsite availability of PhD prepared nurses, librarians, digitally available toolkits/handouts from the workshop, and the ongoing mentorship support from both TAMC and the Center. One attendee remarked "The library support was also helpful because it was very intimidating trying to organize that amount of articles at first." Several participants spoke passionately regarding their sense of professional fulfillment in that they felt they were truly making a difference in patient outcomes: "I remember feeling alive during our project…. That period of time was a very emotional experience. It felt like we were doing what nurses are educated to do." Others talked about their ability to mentor others: "Even now at my new post, whenever a question pops up about EBP I feel more than comfortable answering it and it reminds me of how much I learned though the project." These personally communicated comments echo sentiments noted in the literature.[2,33,34]

Importance of Leadership

Leaders and their role in supporting EBP cannot be overstated. Balancing fiscal stewardship, personnel, and policy to deliver optimal care has been especially challenging these past few years. Leaders must be committed to the process as results may not be seen for more than a year despite the resources spent. Since inception, attendees of the partnership have consistently identified leadership support as critical to their success: "The leaders were all committed to change of culture from the research staff, the doctors, the medical library staff, and the nurses."

Internal Leadership

Evidence-based training and practice implementation uses considerable resources in terms of time, finances, clinical work schedules, and scholarly support. In

2011-2013 significant federal policy changes regarding legally allowable business practices, partnerships, affiliations, and declining fiscal resources directly affected the unique nature of this civilian-military partnership that had been in place. It is beyond the scope of this article to describe these changes, however, military attendance and participation in non-Department of Defense conferences and workshops, even for medical education, was severely curtailed. Extensive across-the-board budget cuts further limited the ability of TAMC's leadership to support liberal participation. During this timeframe, despite these restrictions, 9 more individuals were able to participate in the program due to the commitment of TAMC nursing leadership. Military attendees noticed: "the thing that was most helpful was the command support of what we were doing. Everyone was aware and supportive along the way. The command support created an atmosphere where our peers, subordinates and leaders were open to change." Future military participation will depend in part on ongoing regulations and the fiscal climate.

External Leadership

Leaders across the state facilitated the work of each participating institution and EBP team. The Center's EBP steering committee advised the program, provided oversight, and marketed the program within their institutions. Dr Titler's train-the-trainer model facilitated the development of EBP faculty. These faculty members develop their own EBP expertise by teaching content at each workshop and internship program. They also are available to their own institutions for individual consultation. Over time, EBP team members become leaders and experts concerning their topic.

Perceived Barriers

Key elements of a successful evidence based practice culture are EBP mentors, partnerships between academic and clinical settings, EBP champions, time, resources, and administrative support.[3,35-39] To overcome these barriers, multifaceted active dissemination strategies are needed to promote the use of research evidence in clinical and administrative healthcare decision-making. These strategies need to address both the individual practitioner and organizational perspective. This partnership and the corresponding educational program was designed to overcome as many of these barriers as possible.

Personnel Changes

Turnover in any organization can be cited as a major disruption to practice change and this is certainly true in healthcare delivery systems, including military facilities. Deployments and personnel transfers can unintentionally stall or derail EBP projects. This partnership provided the continuity needed to counteract effects of military operations. Rarely did all military EBP team members leave at the same time. New team members were quickly brought up-to-date by both remaining team members and Center faculty. Additionally, the PCTS goal of decreasing practice variance extended to military nurse scientists and clinical nurse specialists. Newly arriving military faculty were already familiar with the Iowa model of EBP and were able to quickly and almost seamlessly integrate into the partnership. The infrastructure provided by the Center combined with internal efforts at TAMC were effective in mitigating most effects from personnel changes.

SUMMARY

Evidence-based practice is a core element of the Army Nurse Corps' vision. Educating nurses about the EBP process facilitates the remaining PCTS elements designed to achieve the Corps' mission. The difficulty lies in implementation and enculturation. The mutual benefits of partnering with academic and healthcare organizations in surrounding communities facilitated and enhanced the abilities of nurses at both civilian and military treatment facilities to implement EBP into practice and "put words into action." Healthcare organizations facing comparable issues should consider a similar partnership as a vehicle for increasing EBP capacity, professional growth, and improved patient outcomes.

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AUTHORS

LTC Siaki is Deputy Chief, Center for Nursing Science and Clinical Inquiry, Madigan Army Medical Center, Tacoma, Washington.

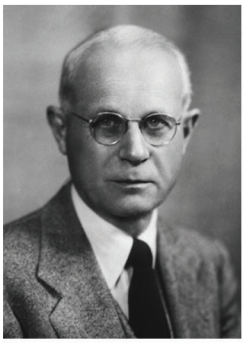
Dr Mark is Director, Doctor of Nursing Practice Program and Nurse Researcher, Hawaii State Center for Nursing, School of Nursing and Dental Hygiene, University of Hawaii at Manoa, Honolulu, Hawaii.

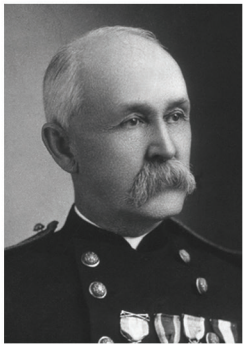
COL Hopkins-Chadwick is Dean, Academy of Health Sciences, Army Medical Department Center and School, Fort Sam Houston, Texas. She is also the Army Surgeon General Consultant for Nurse Education and Nurse Enlisted Training.

COMING SOON

"GOOD TUBERCULOSIS MEN"
THE ARMY MEDICAL DEPARTMENT'S STRUGGLE WITH TUBERCULOSIS

As the United States prepared for war in Europe, Army Medical Officer George E. Bushnell recognized the threat of *Mycobacterium tuberculosis* to American troops, and noted, what the Army needed was some "good tuberculosis men." Despite the efforts of the nation's best "tuberculosis men," the disease would become a leading cause of World War I disability discharges and veterans' benefits. This book tracks the impact of tuberculosis on the U.S. Army from the late 1890s, when it was a ubiquitous presence in society, to the 1960s when it became a curable and controllable disease.





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Infusing Evidence-Based Instructional Strategies to Prepare Today's Military Practical Nurses for Tomorrow's Practice

Richard A. Neilson, MHA, RN
COL Denise L. Hopkins-Chadwick, AN, USA

ABSTRACT

Is there one best method to provide instruction to today's nursing students? The evidence found in the current literature clearly states the answer is no. The student of today is technology oriented. But for them, it's not about technology, it's about the learning that technology provides. With this understanding, this article provides a review of the efforts by the staff of the US Army Practical Nurse Course (68WM6) to infuse evidence-based instructional strategies into curriculum. Five strategies that were integrated into the curriculum are presented: computer assisted learning, gaming software, classroom response system, human patient simulators, and video recordings. All of the initiatives discussed in this article were implemented into the program of instruction over a 6-year period in an attempt to incorporate the use of appropriate technology in the learning process. The results are a testimony to the necessity of using a combination of strategies for teaching today's nursing students. In doing so, the organization not only improved the learning process, but found significant financial savings.

There are instances in which the most efficient and effective way to teach selected topics is through expository teaching or teacher-directed, step-by-step learning. In such cases, unidirectional education and traditional presentations are relevant. However, understanding other topics often requires more interaction—experimentation, problem solving, collaboration, and manipulation of physical objects. Therefore, teachers must be able to present both types of instruction. This holistic teaching approach should include inquiry learning, cooperative learning, and concept attainment through class discussions and physical manipulation. While evidence indicates that there is not a single optimum teaching strategy, especially when the student population is diverse,[1] a combination of known strategies may produce a synergistic effect. This article presents the results of a focused review of the literature to identify a "bundle" of teaching strategies to be used in the Army Practical Nurse Course.

THE ARMY PRACTICAL NURSE COURSE

The US Army Practical Nurse Course ranks among the best nursing programs in the country. For over a decade, National Council Licensure Examination (NCLEX) pass rates have far exceeded the national average. It is the largest practical nursing school in the country, capable of producing over 600 graduates a year. Initially founded in 1950, the program has trained Soldiers, Airmen, and members of the Coast Guard. The success of our program is directly attributed to the motivation and dedication of the students themselves. Each of them is committed to becoming clinically competent, in addition to honoring his or her responsibilities as a member of the Armed Services. The faculty of this program consists of military members, both officer and enlisted, and experienced civilian nurses. All faculty members are highly dedicated to their profession and roles as educators. They bring diverse experiences and knowledge to the program. While it is often assumed that military staffing brings increased turbulence, such is not the case in this educational program. With each rotation of personnel, we gain new experiences and expertise. We also gain a fresh look at our curriculum driven by very recent clinical and combat experience. Unlike most nursing programs in which faculty teach only a particular subject matter, instructors in this program are required to teach across the curriculum. As a result, each new instructor is given a 90-day orientation period for required training to become familiar with the operations of the organization.

Even with its remarkable history, the US Army Practical Nurse Course (68WM6) is currently undergoing a transformation. The career path of the practical nurse in the Army is being significantly revised and is about to become a separate military occupational specialty (MOS). In the past, each student attending this course held current emergency medical technician (EMT) certification. With this MOS development, our practical nurse students will be less experienced since EMT

certification is no longer a requirement for course attendance. As a result of this change, the Academy of Health Sciences of the Army Medical Department Center and School (AMEDDC&S) has spent considerable time and resources revising techniques, curriculum, structure, and outcome measures.

The new program of instruction (POI) will incorporate evidence-based nursing practice and population-specific learning activities. The course is delivered in 2 phases. In Phase 1, all students and faculty are located at Fort Sam Houston, Texas. The students spend 11 consecutive weeks as a cohort. Phase 2 lasts an additional 44 weeks and is conducted at one of 5 Army medical treatment facilities across the United States. Upon completion of Phase 2, all students have completed the requirements to be eligible to take the licensure exam. The Texas State Board of Nurse Examiners is the approving authority.

COURSE FRAMEWORK

The Army Practical Nurse Course uses Bloom's taxonomy as a framework.[2] Bloom states there are different levels of cognitive skills or thinking. Lower level skills include knowledge (remembering facts and comprehension (ability to translate information from one form to another)). Higher level skills include application (ability to apply information in new situations), analysis (ability to break down the material into its component parts), synthesis (ability to use knowledge in a new way), and evaluation (ability to judge the meaningfulness of information). Each learning activity in the POI contains an action statement, condition, and standard which clearly identify the cognitive level of the skill to be achieved.

PREVIOUS RESEARCH

It is well documented that students have diverse learning styles.[3] Most people learn through a combination of 3 primary styles: auditory, visual, and kinesthetic. Now more than ever, students as a whole are not passive learners.[3] Students of today are mostly a combination of people from "Generation X" (30-34 years of age) and "Millennial" (18-29 years of age) generations. These students want and need to be actively involved in the learning process. Post "Baby Boomer" generations desire immediate feedback when attaining and applying knowledge and/or skills.[4] Practical Nurse Course serial student evaluation surveys support this finding. Students clearly state that they need interactive and hands-on learning activities. The challenge is to transform a previously static instructional framework in a systematic fashion based on evidence, thus avoiding the "next shiny object" syndrome. A common mistake is to simply add technology. Ferris states:

> The Net Generation learns by connectivity and discovery. They are plugged into technology, but learning is not about technology; it's about the learning that technology enables. We also know that much learning is inductive and nonlinear.[3]

Although they value education, Generation X and Millennials learn differently from their predecessors. The generations after the Baby Boomers are unique in that they are the first to have access early or grow up with digital and cyber technologies. Not only are they acculturated to the use of technology, they are saturated with it. According to Bonamici et al,[4] by the time he or she has reached 21 years of age, the average Millennial will have spent:

- 10,000 hours playing video games
- 200,000 hours on e-mail
- 20,000 hours watching television
- 10,000 hours on cell phones
- Less than 5,000 hours reading

Reading among young adults has declined at an unprecedented rate.[5] Media saturation and convenient access to digital technologies give the Millennials distinctive ways of thinking, communicating, and learning.[6-8]

USING EVIDENCE IN EDUCATION PRACTICE

Current research indicates that learning activities are most effective when matched to the correct cognitive skill level. A study by Johnson et al[9] found CD-ROM–based instruction to be effective in the lower cognitive skill domains of knowledge and comprehension, while the use of human patient simulators is highly effective in achieving higher skill cognitive domains. The goal of the Army Practical Nurse Course faculty is to incorporate the informed use of technology based on the Johnson et al[9] study and other similar studies.

EVIDENCE-BASED EDUCATION COURSE INITIATIVES

Computer Assisted Learning Programs

Each student workstation has a computer with web access. Instructors have the ability to display material such as videos, websites, animations, and research articles on each desktop, as well as monitor student activity on the web. Virtual learning environments, such as Blackboard, are used extensively to provide repositories for learning materials which are enhanced with interactive discussion. Blackboard is also used to provide a secure, web-based testing procedure. Bringing the internet into the classroom allows the student a more active role in learning. The use of computers directly supports the 3

primary learning styles. An early indication of the value of this program is that students who may not read a textbook assignment will eagerly read the same material presented in electronic format.

Incorporation of Gaming Software

Jeopardy gaming software has been used with all program content such as Anatomy and Physiology, Medical Terminology, and Math for Pharmacology, covering learning objectives in the knowledge and comprehension domain. The software has proven effective in increasing student classroom involvement. This is supported by instructor feedback and postexamination student surveys. The dominant benefits are the increase in active student participation, and the ability to identify topics requiring additional study by individual students.

Use of a Classroom Performance System

Classroom performance systems were introduced in 2006 to increase student interaction in the classroom. These hand-held units allow the student to respond to a question posed by the instructor during lecture by selecting the best answer from a series of plausible answers. These questions can be verbal or incorporated directly into presented material, such as PowerPoint presentations and/or graphics. The feedback is immediate. Even the most passive of students are encouraged to participate because the student can maintain a degree of anonymity. This system also provides feedback to the instructor as to the effectiveness of his/her presentation.

Human Patient Simulators

Human patient simulators (HPS) are technologically advanced mannequins integrated with computer software. Simulators come equipped with a number of different features that support a variety of learning experiences. The HPS can be programmed to speak and interact with the student like an actual patient. The simulators are projected to be used in both phases of the course and will form the cornerstone in achieving higher cognitive domains. With the use of HPS, scenario learning is not dependent on patient availability. Simulation provides every student the opportunity to practice and demonstrate skill competency. Additionally, patient safety concerns no longer restrict student learning opportunities. Simulation can meet the needs of today's students by complementing traditional teaching methods with technology. The use of simulators is not intended to replace classical education, but rather to enhance learning. Simulation will be used in line with what Gonzalez[10] reported in 2008: the process of learning through assessment, evaluation, decision making, and error correction is considered a stronger learning environment than passive instruction alone.

Video Recordings of All Lectures

The Army Practical Nurse Course has incorporated video recordings of all lectures into the program of instruction. In keeping with the Army Learning Concept for 2015,[11] this initiative seeks to improve our learning model by leveraging technology without sacrificing standards. The value of implementing this program cannot be overstated.

Research supporting the application of videos as a student study aid is abundant. Video as a tool for teaching and learning in higher education is a multimedia application with considerable promise. A review of current literature supports this point.

The idea of the instructor-led presentation is still a predominant method of lecturing in higher education because it is an efficient means of providing information to a large audience. However, it is possible to provide a medium students can revisit at a later date. Traditionally, learning revolves around lectures, tutorials, practical works, etc. In the current environment of omnipresent information technology, students are technically oriented. There is, therefore, a greater expectation for using technology for supporting learning.[12] Virtual learning environments, such as Blackboard, are used extensively to provide repositories for learning materials which may be enhanced by interactive discussion. Phelps suggests that recent fast changes in technologies, such as handheld computers, the internet and digital sound and imaging, have not been adopted by educationalists, despite the fact that the technologies such as video recording have become easier for nontechnical people to use.[13] Indeed, Lizewski[14] argues that the cultural environment of an organization affects the rate of adoption of learning technology.

Research suggests that learning requires both visual and auditory stimulus, particularly when technology is being used, in order to promote cognitive processing. Mayer[15] describes some principles of learning which are relevant to designing multimedia for learning, including:

Multimedia principle. Learning is improved using words and pictures in preference to words alone.

Contiguity principle. Learning is improved when pictures and related words are presented at the same time or next to each other on the screen.

Modality principle. Spoken words are better than printed text for explaining images.

Signaling principle. Learning material should be organized with clear outlines and headings.

Personalization principle. A conversational style is better than a formal style for learning.

Sorden[16] suggests that using a framework based on this type of theory is essential for producing effective multimedia teaching material. The old adage,"a picture is worth a thousand words," has proven to be true. Moving images, such as a video, can add authenticity to the portrayal of theoretical material. Similarly, video can improve communication of lecture material. According to the "cue-summation" theory of learning, increasing the number of stimuli makes learning more effective.[17] According to Mayer and Anderson, the use of visual information as an additional channel can aid the retention of verbal information.[18]

The video recordings can also be used as an instructional aid for another facility, a second benefit of developing these resources. The videos will be case studies that will address and amplify the importance of good practice and the value of the practical dimension of teaching as part of a teacher education program. By recruiting our best subject matter experts into this project as primary presenters, videos of exemplary practitioners will be used to assist in teacher education. Video enables an instructor to view the rich fabric of a classroom environment: the dialogue, actions, emotion, gestures, nuances, and body language.[19] In other words, the video case studies can be used for an analysis of classroom dynamics. Video case studies can be repeatedly viewed from various perspectives.[20] They can be slowed down or stopped so that discussion around an issue can be developed, and they can easily be deconstructed and analyzed. In short, case studies will present structured opportunities for new teachers to gain an understanding of what exemplary teaching should be, and to reflect on their own practices and beliefs about what they understand constitutes high quality educational practices. Each instructor will then be able to incorporate these best practices into their teaching style.

A third opportunity provided with this initiative is the availability of an exportable product. With the establishment of a secure web database, the videos can be exported to any computer. Web-based instruction is becoming a favored training option in industry, government, and higher education. Web-based instruction is a "hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported."[21] Web-based instruction is accessed via computer using the internet, making it available for instant updating, distribution, and sharing of information.[22]

The essence of this initiative is the adaptation of the research for the benefit of our students. It is not intended to replace in-residence instruction. It is intended to provide an additional tool in which the student may review lecture material in a web-based or CD-ROM–based environment. This allows the student to review the material at their own pace. This format is ideal for students who may have missed the actual presentation due to an appointment or illness. It also gives the student the ability to review a lecture in the instructor's own words. The resources for this initiative already exist within the AMEDDC&S. The cost is in the instructors' time for video recording of lessons and reproduction of a compact disk if used as a delivery format.

- The effectiveness of this effort will be evaluated with 4 different methods:
- Student grade-point averages will be monitored to measure the impact of lecture videos as study aids.
- Student attrition rates will provide an indication of the program's effectiveness.
- Student satisfaction surveys will provide feedback directly from the students as to the value of access to the lecture video.
- Satisfaction surveys will provide feedback from instructors as to the value of access to the lecture video as a training tool.

RESULTS AND OBSERVATIONS

As of this writing, all of the simulation lab/human patient simulator learning activities have been fully integrated into the course POI. Feedback from students has been positive thus far. When the initiatives began in 2005, 94% of our graduates obtained licensure with successful first-time completion of the NCLEX examination. Currently, 96.8% of graduates obtain licensure with successful first-time completion of the NCLEX examination, well above the national average of 88%. Even though no other factors (such as more rigorous criteria to enter the course) have changed, course attrition has been cut in half to an all-time low of 6%. The initiatives are already proving effective and will continue to place the Army Practical Nurse Course at the forefront of vocational education.

Computer-Assisted Learning

Instructors more comfortable with computer systems were eager to adopt their use. Others needed encouragement and training before becoming comfortable using them. Instructor hesitance is not the only factor that influences integration of computers into the POI. Server and network access was unpredictable at first, and computer security concerns prevent access to many

instructional resources and the installation of educational software. Computer maintenance was often delayed for extended periods. Organizational leadership continues to address these issues, and though the system continues to have intermittent disruptions it is now a more stable platform. The use of these computers has now expanded to include a web-based testing platform via Blackboard. The adoption of this testing format has significantly reduced test development and testing scoring time. On average, instructors would require 4 to 6 hours in the testing process, which has now been reduced to one hour. Faculty also reports a significant increase in time savings in the distribution and grading of student homework assignments as a result of the implementation of the web-based system. In fact, all student support material such as study guides and student handouts are now delivered in a web-based format. The organization has also noted a $35,000 annual savings resulting from the move to the paperless delivery method.

Computer Gaming Applications

The use of gaming software was a very desirable option because it placed no financial burden on the organization. The gaming software was developed using Microsoft PowerPoint, and the only cost was in development time. The gaming software was well received by the majority of faculty and students. The primary format is the use of Jeopardy as a review tool prior to exams. Although the results of its use were clearly positive, there were some adverse effects. A small number of students reported 3 basic concerns: the classroom environment became too competitive; increased anxiety related to fear of giving an incorrect answer; and they could not ask questions related to the material presented for fear of disrupting the flow of the game. It was also observed that not all instructors preferred using this software as a review process.

In response to these concerns, student feedback was reviewed for 5 consecutive classes. The results were extremely positive. Based on this finding, faculty elected to keep the gaming software as an instructor option in the curriculum. Its use was also modified for student participation to be voluntary. Surprisingly, this decision has led to the expanded use of different PowerPoint-based gaming software such as *Who Wants to be a Millionaire* and *Hollywood Squares* into individual classes and not just as a review methodology.

Classroom Performance System

The use of the classroom performance system (CPS) demonstrated initial success but had its challenges. Every lesson plan in the POI is timed, and the instructors are expected to cover the material in the time allocated. Each instructor adapted to the technology and CPS was actively incorporated into each lesson plan. The CPS system has proven itself to be valued by both faculty and students. Instructors used the immediate feedback provided by the students to reinforce their teaching. Observations in the classrooms showed students engaged and eager to engage in the next question. The primary problem occurred when the computers were upgraded to Windows 7. The CPS software was not compatible with this transition. It was quickly discovered that a CPS upgrade to a version compatible with Windows 7 was not possible. Ultimately, the decision was made to replace the CPS system with a system compatible with Windows 7. Unfortunately, the replacement process consumed 14 months.

Human Patient Simulators

The use of human patient simulators produced remarkable results. Each student could demonstrate his or her ability to accomplish a given task to the identified standard, without risk of harm to an actual patient. Each training scenario such as nasogastric intubation, intravenous therapy, and catheter insertion provided the student with a realistic training environment. However, over time the manikins increasingly needed repairs. The problems with the equipment prevented each student from adequately participating in the skills lab. The decreased functionality among the manikins made it challenging for the instructors to expose the students to the desired learning required in the training situation.

The manikin maintenance problems did ultimately result in a positive outcome. An extensive review of our training requirements was conducted. It was discovered that high fidelity manikins were not required for the Phase 1 student to meet 90% of the training requirements. All 8 Phase 1 human patient simulators are being replaced with the low-tech versions. High fidelity training manikins will be used for all of our Phase 2 sites which have more advanced skills training. This decision has saved the program more than $180,000.

Lecture Videos

The video recording process is complete and available in DVD format and web-based instruction using Blackboard. Every student now has access to a video presentation of all lecture material which provides them with the ability to study topics at their own pace. Students have provided extremely positive feedback on the availability of these presentations. Also, new faculty members describe it as a valuable resource in preparing for in class instruction.

CONCLUSIONS AND RECOMMENDATIONS

All of the initiatives discussed in this article were implemented into the POI as a result of a desire to incorporate appropriate technology capabilities into the learning process. Each initiative was supported by research.

Implementation of any technology must have leader, infrastructure, and faculty support. Instructor assignments should be based on skills, knowledge, and behaviors that support excellence in teaching, which evidence shows would include the use of technology. Computer support and repair must have high priority. It is impossible to maintain a standardized curriculum without this support. Long-term disruptions, an unavailable server, or unpredictable internet access to the media needed for instruction leads to frustration on the part of both faculty and students. Organizational leadership must be engaged in resolving information technology concerns. It is vital that an organization attempting to implement the use of any type of software be assured of its compatibility, not only with its current system, but also future technology upgrades. Based upon a review of student feedback and faculty observation, the use of gaming software in the classroom is a viable learning tool. Even with concerns identified by a few students, the implementation of the *Jeopardy* game was well received and significantly increased student involvement. The presentations should require only voluntary participation on the part of students. The human patient simulator is a valuable learning tool. Used properly, it allows students to participate in patient care procedures without concern for patient safety.

The simulators must be able to provide realistic training. Phase 1 has abandoned the use of high tech human patient simulators in favor of more basic models. These models will allow training of essential nursing skills without the added costs of the high fidelity version. The replacements will provide capabilities for attaining vital signs, as well as nasogastric and Foley placement. The phase 2 sites require more high-fidelity human patient simulators as skills training is more advanced. Training scenarios must be developed prior to purchasing any human patient simulators to ensure the equipment can accomplish the training objectives. Additionally, incorporation of this technology into the classroom requires completion of a time study prior to implementation to ensure the training objectives can be achieved in the allotted time.

These initiatives have provided an opportunity to gain lessons learned in the application of technology in the classroom environment. The data collected show both positive results and the need for changes in how the technology is applied. With this knowledge, the applications will be modified and adapted to ensure the Army remains at the forefront of nursing education.

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AUTHORS

Mr Neilson is an Instructor for the 68C Practical Nurse Course, Phase 1, US Army Medical Department Center and School, Fort Sam Houston, Texas.

COL Hopkins-Chadwick is Dean, Academy of Health Sciences, US Army Medical Department Center and School, Fort Sam Houston, Texas. She is also the Army Surgeon General Consultant for Nurse Education and Nurse Enlisted Training.

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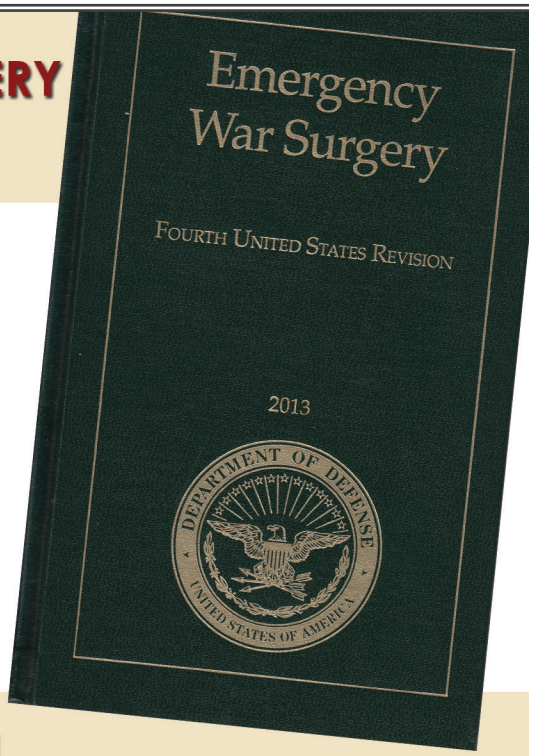

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The Effects of Using a Human Patient Simulator Compared to a CD-ROM in Teaching Critical Thinking and Performance

Don Johnson, PhD, RN
Sabine Johnson, MS

ABSTRACT

Background: Military healthcare personnel, including nurse anesthetists, must have the knowledge and skills to care for the extensive, severe injuries incurred on the battlefield. No studies have compared the 2 teaching strategies of using the human patient simulator (HPS) and a CD-ROM in caring for combat injuries relative to critical thinking and performance using nurse anesthesia participants.

Methods: A prospective, pretest-posttest experimental, mixed design (within and between) was used to determine if there were statistically significant differences in HPS and CD-ROM educational strategies relative to caring for patients who have trauma. Two instruments were used: critical thinking, which consisted of multiple-choice questions; and a combat performance instrument that measured ability to care for patients.

Results: A repeated analysis of variance and a least significant difference post-hoc test were used to analyze the data. The HPS group performed better than the CD-ROM and control groups relative to performance (P=.000) but not on critical thinking (P=.239). There was no difference between the CD-ROM and control group (P=.171) on the combat performance instrument.

Conclusion: In this study, the HPS method of instruction was a more effective method of teaching than the CD-ROM approach.

It is difficult to prepare healthcare practitioners for the extent and severity of injuries inflicted on personnel in the battlefield environment, as well as the conditions and situations under which such care must be rendered. All in-theater healthcare personnel are expected to expand their usual scope of practice in patient care, no matter the level at which they work in the evacuation and care chain. Nurse anesthesia is one of the specialties that is vital to surgical intervention and stabilization, and their training and preparation must be as extensive and effective as possible. However, the best methods of providing such instruction have not been studied. One method that may be effective is the use of simulation. Simulation is defined as a realistic representation (model) of the dynamics or processes with which the participant interacts with the environment, applies previously learned knowledge into the decision-making process, and responds with definitive decisions and actions to deal with a problem or situation.[1,2] The simulator is the tool used to produce the interactive clinical scenarios through the use of computer programs. Performance feedback can be provided without concern regarding real-life consequences.[3,4] Simulation as a teaching method allows an interactive experience to reflect or parallel patient scenarios. Leigh states that simulation is a method of translating didactic knowledge into a safe learning environment.[5] Further, Jeffries emphasizes that simulation is a teaching strategy that can be used to facilitate making connections between and among concepts through a process that actively engages students in learning. Such a strategy facilitates learning skills and knowledge.[3,6]

FRAMEWORK FOR STUDY

The framework for this study was the integration of situated psychology and critical thinking. The bases of situated cognition is that individuals best learn "what to do" and "how to do" in a real world environment which may be afforded by learning with a high fidelity simulator such as the Human Patient Simulator (HPS).[7] Situated cognition asserts that critical thinking has to occur within the context of the situation and is an essential component of critical thinking in the care of combat casualties. Critical thinking is process of seeking information, collecting data, discriminating between relevant and nonrelevant data, analysis of situations, applying standards of care, using logical reasoning, and performing the appropriate skills.[8] Appropriate care of patients on the battlefield requires all of these components.

OPERATIONAL DEFINITIONS

The investigators developed 2 instruments relative to caring for trauma patients. One was a cognitive instrument, critical thinking, which consisted of multiple-choice questions, and the other a combat performance

instrument that measured ability to care for patients. For the purposes of this study, these concepts were operationally defined as a score from 0% to 100% on each.

BACKGROUND OF SIMULATION

Very little prospective, randomized, experimental research exists on the use of simulation as a teaching method, and no studies have compared the use of the HPS and a CD-ROM relative to caring for combat casualties. In addition, no researchers have investigated the effects of simulation on critical thinking in caring for combat casualties. However, a wealth of literature addresses the value of using simulation as a teaching method but there is an absence of a rigorous research design.[9-18] McIndoe surveyed participants and found that the majority preferred problem-based simulation to lecture, rounds, or tutorial teaching formats, but he did not investigate the effectiveness of such an approach.[19] Korndorffer and colleagues found that simulation showed a significant improvement in overall scores from baseline for performing laparoscopic suturing, but they did not compare simulation to any other teaching method.[20] Rauen found that simulation as a method of teaching allows learners to apply theory to practice in an integrated manner. Furthermore, she found that a simulator has the capacity to demonstrate more than a single event or parameter at a time which allows participants to identify relationships both essential and common to clinical practice. She found that the evaluation of the simulation sessions were universally positive. As a result of the use of simulation, students became confident and were able to demonstrate skills learned.[14,15] However, Rauen did not compare the simulation approach to any other method or to a control group. One study compared the success rate of endotracheal intubation among paramedic students trained on a human patient simulator group or on human subjects in the operating room. The human patient simulator training was as effective as training on human subjects.[11] Steadman and colleagues investigated whether full-scale simulation was superior to interactive problem-based learning for teaching medical students acute care assessment and management skills. They used a pretest/posttest design and determined that simulation-based learning was superior to problem-based learning for the acquisition of critical assessment and management skills.[21] Wayne and colleagues conducted a retrospective study of cardiac arrest team responses and compared them to a simulator-trained group and a control group to determine if simulation would improve the quality of advanced cardiac life support (ACLS) care provided. They found that simulator trained residents showed significantly higher adherence to standards versus traditionally trained students.[22] Gordon and colleagues surveyed both students and educators concerning their opinions about simulation as a teaching tool. Both groups thought that the advantage of using the stimulator outweighed the disadvantage of its cost.[23] Eaves and Flagg created a 10-bed simulated medical unit as part of a new graduate nurse orientation. The program received outstanding evaluations from the new graduates, the educators, and preceptors in the clinical setting where the new graduates were oriented. However, the study did not compare the simulation with any other methods.[10] Cioffi and colleagues investigated the effectiveness of simulation on clinical decision making of midwifery students. However, the study used a posttest design with no mention of score reliability or instrument validity. Results showed that the students who received the simulation strategy collected more clinical information and had higher confidence levels, and reached a final decision more quickly than the lecture group.[24] Dieckmann introduced concepts into medical simulation that help clarify potential problems during simulation and foster its goal-oriented use. Their introduction of these concepts allowed improved matching of simulation realism with desired outcomes[25] Johnson and colleagues investigated the effectiveness of using the HPS compared to a CD-ROM group in teaching military nurses care of patients exposed to chemical warfare agents. They found that there were no significant differences in lower-level cognition between the 2 approaches, but the HPS was more effective relative to higher-level cognition and critical thinking. Steadman found that simulation-based training was superior to problem-based learning for the acquisition of critical assessment and management skills.[21] Hoadley compared results of 2 ACLS classes on measures of knowledge (content exam) and resuscitation skills (performance exam). Both the control and experimental groups consisted of physicians, nurses, emergency medical technicians, respiratory therapists, and advanced healthcare providers. The control group used low-fidelity simulation. The experimental group was exposed to enhanced realism via high-fidelity simulation (HFS). The HFS group did score higher on both cognitive and behavioral tests, but the difference was not statistically significant. The experimental group stated that learning using HFS was enjoyable, and adamantly recommended that ACLS should only be taught using HFS.[26]

Researchers stress that there are limited rigorously designed pretest/posttest studies of simulation and the need exists for investigations of simulation that compares the approach to other educational methods.[27] Rourke and colleagues reviewed the literature relative to simulation and found that high-fidelity simulations are used

extensively in nursing education, however, little research justifies their use.[28] Others support the use of simulation but struggle to substantiate their opinions.[26,29,30]

RESEARCH QUESTION

The following research question guided the study: Are there statistically significant differences in the HPS and CD-ROM educational strategies compared to a control group relative to the scores on the critical thinking (CT) and combat performance (CP) instruments?

METHODS

This study was a prospective, pretest-posttest experimental, mixed (within and between) design and was approved by the Institutional Review Committee at Brooke Army Medical Center, Fort Sam Houston, Texas. Potential participants were presented the purpose of the study and were assured that their participation was voluntary. Individuals who chose to participate in the study were evaluated relative to the scores on CT and CP instruments. After the initial evaluation, participants were randomly assigned to one of 3 groups: HPS, CD-ROM, or control group. The participants in the HPS and CD-ROM groups received instruction as described below. Two weeks after the pretest, data were collected and participants took part in one of 3 groups, they then returned and were evaluated using the same instruments. Participants in the control group received no instruction but were given the opportunity to complete the HPS or CD-ROM educational teaching strategy after all the data were collected. The study was conducted at a military anesthesia nursing simulation center configured to represent a typical facility located in Iraq or Afghanistan.

SAMPLE

A convenience sample consisting of 60 participants from the US Army Graduate Program in Anesthesia Nursing completed both the pretest and posttest instruments. One in the HPS, 6 in the CD-ROM, and 4 in the control group did not return to complete the posttests and were excluded from the study. The mean age was 29 and ranged from 24 to 47 years of age. There were 49 participants who completed the study: HPS, n=19; CD-ROM, n=14; and control group, n=16.

HUMAN PATIENT SIMULATION

A high-fidelity simulator, the Human Patient Simulator (Medical Education Technologies, Inc), was used as a teaching strategy and was programmed with 3 patient scenarios: hypovolemic shock, tension pneumothorax, and cardiac tamponade. Each scenario was 30 minutes in length for a total of 90 minutes. The rationale for using these scenarios was that they represent common occurrences on the battlefield. Also, these conditions lend themselves to the use of the HPS that allows participants to identify the problem, intervene, and evaluate care given. The HPS is a computerized full-body mannequin capable of providing real-time physiological and pharmacological responses to various health conditions and pharmacological interventions. The complete HPS system included the mannequin, computer software, monitors, and gases required to operate the system. A cordless microphone and speaker device located in the mannequin's head was used to simulate the "patient's voice." Participants were able to ask the mannequin questions, and the operator was able to respond by transmitting his voice through the mannequin.

The HPS was programmed to manifest signs and symptoms relative to combat casualties that included absent breath sounds, deviated trachea, tachycardia, hemodynamic changes, muffled heart sounds, and diaphoresis. The HPS was attached to a cardiac monitor so that blood pressure, pulse, and cardiac rhythms could be assessed by observing the monitor. In addition, participants were able to auscultate breath and heart sounds and palpate carotid, radial, and femoral pulses. In the hypovolemic scenario, the monitor demonstrated that the patient had hypotension with tachycardia. In this scenario, radial and brachial pulses were absent but carotid pulses were present. The HPS provided participants with the ability to assess, make an inference, intervene, and evaluate the intervention. Appropriate physiological responses to pharmacological interventions such as administration of fluids were immediately demonstrated by the HPS. For example, in the hypovolemic model, fluid administration resulted in a decrease in pulse and an increase in blood pressure. After an adequate amount of fluid was administered, radial and brachial pulses were palpable. The administration of oxygen resulted in an increased saturation as monitored by pulse oximetry.

COMBAT CASUALTY CARE CD-ROM

A CD-ROM was developed for this study that allowed participants to view PowerPoint slides that covered the pathophysiology of 3 types of combat injuries: cardiac tamponade, pneumothorax and hypovolemic shock, the same three scenarios developed for the HPS. After each set of slides addressing the pathophysiology of the combat injuries, the CD-ROM presented a patient portrayed by an actor with moulage to demonstrate the various signs and symptoms. The narrator asked rhetorical questions such as: What manifestations do you see? What other data would you collect? What do you want to do now? Each question was followed with an actor and monitor demonstrating appropriate data and a nurse administering an appropriate intervention. Once the intervention was complete, questions were asked, such

as: How would you evaluate the effectiveness of your intervention? This was followed by the nurse collecting appropriate information from the simulated patient and the monitor. Examples of the displayed parameters were vital signs, auscultation of the chest, breathing sounds, distended jugular veins, heart sounds, chest bruising, and bleeding abdominal wounds. Interventions included such items as administration of oxygen, intravenous fluids, cardiac and chest decompression, and other treatment modalities needed to stabilize the patient. Each scenario took 30 minutes to complete for a total of 90 minutes. The same content of training was presented by both the HPS and CD-ROM methods.

CRITICAL THINKING INSTRUMENT

The investigators developed objectives for 3 combat casualty scenarios: tension pneumothorax, cardiac tamponade, and hypovolemic shock. The objectives represented critical thinking skills (assessment, intervention, and evaluation) related to care of combat casualties. A test blueprint was developed to guide the item writers in the development of a total of 45 multiple-choice questions. The multiple-choice questions were written to represent the objectives. The items were given to an expert panel that consisted of 6 military registered nurses who had been deployed to either Iraq or Afghanistan. Three of the experts had a MSN, 2 had a PhD, and one had a BSN.

Content Validity

Investigators reviewed the literature on care of patients with battlefield injuries to determine content that should be taught and tested. The experts individually rated each question as very pertinent, pertinent, not pertinent, or not at all pertinent. Items rated as not or not at all pertinent were excluded from the instruments. Items were also excluded if the experts could not agree on the classification level or the correct answer. There were 35 questions that remained and represented 100% content validity.

Determination of Reliability

The questions were administered to 30 military nurses who were not participants in this study. A discrimination index was calculated for each question. The scores ranged from -0.23 to +0.78 with a mean of 0.37. Items that had a negative discrimination score were deleted except for 2 items which were judged by the experts as questions that reflected essential content. There were 33 remaining items. After two weeks, these nurses completed the same instruments. Test-retest reliability was calculated using Pearson's R and was 0.89 indicating the CT instrument was stable over time. The Kuder-Richardson formula indicated that the test dependability was 0.85, indicating an acceptable level.

COMBAT PERFORMANCE INSTRUMENT

Content Validity

After review of the literature, the investigators developed the CP instrument relative to the care of patients with battlefield injuries, specifically tension pneumothorax, cardiac tamponade, and hypovolemic shock. The CP measured the ability to assess, intervene, and evaluate care given to simulated patients using the HPS. The original instrument had 120 criteria, each anchored with met or not met. The instrument was given to the same 6 member expert panel described above and was reviewed for comprehensiveness, appropriateness, and accuracy. The experts individually rated each criterion as very pertinent, pertinent, not pertinent, or not at all pertinent. Items rated as not pertinent or not at all pertinent were excluded from the instruments leaving 107 criteria. The expert panel had a 100% agreement that all of these items were comprehensive and reflected essential content.

Reliability

Three investigators initially used the instrument to independently evaluate 30 participants to acquire psychometric data relative to the instrument. These individuals were not part of the study. A Pearson R test used to determine the correlation between the scores given by the investigators indicated good interrater reliability (r=0.96). Two weeks after the initial evaluation, the investigators evaluated the same participants using the same instruments. A Pearson R determined the correlation between the two scores to be r=0.94, indicating that the instrument was stable over time. The 2 faculty members who evaluated the performance of all participants independently evaluated 4 participants not enrolled in the study. A Pearson R determined the correlation between the evaluators to be r=0.90. After discussion, the same 2 faculty members independently evaluated the performance of 10 participants enrolled in the study. A Pearson R was again used to determine the correlation between the 2 evaluators, indicating excellent interrater reliability (r=0.97).

RESULTS

A multivariate analysis of variance indicated that there were no significant differences in the groups relative to pretest scores, age, number of years experience, or rank (P>.05) indicating that the groups were equivalent relative to these parameters. A repeated measures multivariate analysis of variance and least significant difference post hoc analysis were used to determine if there were significant differences between the groups over time on the CT and CP instruments. An alpha of 0.05 was used for all analyses. The Wilks' Lambda multivariate test indicated that there were significant differences in group

Summary of means ± standard deviations of results.

Outcome	Human Patient Simulator Group (n=19)	CD-ROM Group (n=14)	Control Group (n=16)	Post Hoc Analyses		
Critical thinking, pretest	66.28±12.0	66.10±12.06	64.65±11.33	HPS vs CD *P*=.239	HPS vs control *P*=.003*	CD vs control *P*=.077
Critical thinking, posttest	78.6±69.2	74.10±13.9	67.00±9.1			
Performance, pretest	49.47±13.4	43.73±13.2	46.13±12.2	HPS vs CD *P*=.000*	HPS vs control *P*=.000*	CD vs control *P*=.171
Performance, posttest	89.84±18.7	49.40±12.2	42.07±9.1			

*mean difference is significant at the 0.05 level

means by time (*P*=.000). The results are summarized in the Table.

COMMENT

Based on the results of this study, the choice of teaching strategies is the use of HPS. On the CT instrument there were no significant differences between the HPS compared to the CD-ROM, nor the CD-ROM compared to the control. There was a significant difference between the HPS compared to the control. Perhaps the CT instrument was not sensitive enough to capture the real critical thinking necessary for performance. Additionally, the reason that the CD-ROM was no more effective than the control relative to critical thinking may be that the approach did not lend itself to assessment, intervention, and evaluation. The reason that participants in the HPS group performed better on the CP may be the realism of the approach. It allowed realism and hands-on experience from which participants remembered facts and grasped the meaning of information such that they performed better than those using the CD-ROM. Teaching strategies using the HPS provide the opportunity for learners to apply principles, concepts, laws, and theory more than those using the CD-ROM. The HPS allowed participants to use the cognitive skills of evaluation and treatment in a realistic simulated environment. For example, in the tension pneumothorax scenario, participants were able to collect data such as absence of breath sounds and increased resonance on the affected side, cyanosis, deviated trachea, reduced pulse oximetry, etc. After collection of pertinent data, the participants were able to identify appropriate intervention and evaluate the effectiveness. In the tension pneumothorax scenario, evaluation of the effectiveness of needle decompression and chest tube placement was possible by observing changes in vital signs, normal breath sounds, trachea in midline, normal pulse oximetry, etc. Such skills represent the critical thinking skills of assessment, intervention, and evaluation that were demonstrated on the CP instrument. These processes were covered in the CD-ROM but may have lacked the realism provided by the HPS.

The most important finding of this study was that the HPS group was superior relative to performance as measured by the CP instrument. The effectiveness of such a strategy stems from the theory of situated cognition, which states that individuals best learn "what to do" and "how to do" in a real world environment.[7] Knowing what to do and knowing how to do it are essential components of critical thinking necessary for performance in the care of combat casualties. This concept has to be developed within specific subject matter and is optimally taught under realistic simulated conditions that best represent the desired patient care conditions. The use of the HPS is an effective method of translating didactic knowledge into a safe learning environment and can be used to facilitate making connections between and among concepts through a process that actively engages students in learning.

This is the first study that compares the effectiveness of HPS and CD-ROM teaching strategies in care of trauma patients in terms of critical thinking and performance. The major limitations of the study are that the findings may not be generalizable to other military healthcare providers, for example, the HPS may not be superior to the CD-ROM in learning other content and performance in other scenarios. Future studies should be implemented investigating additional types of content with different participants.

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AUTHORS

Dr Johnson is Professor and Director of Research, US Army Graduate Program in Anaesthesia Nursing, Fort Sam Houston, Texas.

Ms Johnson is a Research Associate with the Geneva Foundation

Raising the Educational Standard for Army Nursing Faculty

COL Bruce A. Schoneboom, AN, USA
COL Denise L. Hopkins-Chadwick, AN, USA

Army Nursing has long been a leader in the advancement of nursing standards in the United States. For example, in 1976, Army Nursing took the lead in establishing standards that make nursing one of the most trusted professions in our country when a baccalaureate college degree was set as the minimum standard for entry-level Army Nursing practice.[1] Today is no different as Army Nursing continues to raise the educational standard for its organic faculty, nurse scientists, and advanced practice nurses.

THE REQUIREMENT FOR DOCTORAL-LEVEL FACULTY

In 2008, the 23rd Chief of the Army Nurse Corp, MG Patricia Horoho, launched a campaign plan with a system for patient care delivery at its core.[2] The foundation of that plan, the Patient CaringTouch System, consists of 5 elements (patient advocacy, enhanced communication, capacity building , evidence-based practice, health work environments) and is designed to reduce patient care delivery variance though evidenced-based nursing care to achieve best patient outcomes. In support of building the capability to deliver evidence-based nursing care, the Army Nurse Corps (ANC) has a requirement for uniformed faculty to teach in several of its graduate programs as discussed below. In order to teach in Army programs, ANC officers must be certified or credentialed in the specialty in which they are seeking appointment and possess a terminal degree (PhD, DNP, DNSc).

The US Army Graduate Program in Anesthesia Nursing has a total requirement of 18: 4 at the Phase I site, and 2 at each of the 7 Phase II sites (Tripler Army Medical Center (AMC), Honolulu; Madigan AMC, Fort Lewis, WA; Womack AMC, Fort Bragg, NC; William Beaumont AMC, Fort Bliss, TX; Carl R. Darnell AMC, Fort Hood, TX; San Antonio Military Medical Center, TX; and Eisenhower AMC, Fort Gordon, GA.

The Graduate School of Nursing (GSN) at the Uniformed Services University of the Health Sciences has a total requirement of 6: one faculty member in each of the 5 programs within the GSN (PhD, Nurse Anesthesia, Family Nurse Practitioner, Behavioral Health Nurse Practitioner, Perioperative Clinical Nurse Specialist) and the Commandant of the GSN.

Army Nursing is building 4 Phase II sites to support the clinical and capstone requirements for DNP graduate students for the primary care programs associated with the GSN: Womack AMC, Beaumont AMC, Madigan AMC, and Darnell AMC. Each of these sites will require one doctoral level faculty member.

The Army Nurse Corps also has one faculty member at the Baylor Program in Healthcare Administration at the Army Medical Department Center and School (AMEDDC&S).

The total requirement for faculty with terminal degrees at all of the teaching venues is 29. However, there are other requirements in the ANC for terminal degrees, including the Corps Specific Branch Proponent Officer, the Chief of the Department of Nursing Science at the AMEDDC&S, and at each of the 5 Centers for Nursing Science and Clinical Inquiry located at the major Army medical centers. Although not in official faculty roles, many of these positions have adjunct faculty appointments and are expected to teach in a variety of programs. There are also several specialty producing programs located at the AMEDDCS that require graduate degrees. Although they do not currently require doctorate degrees, the ANC is tracking these programs as they may require a higher degree in the future. These programs include the Public Health Program (1 position), the Psychiatric Nurse Program (2 positions), the Perioperative Nurse Program (2 positions), the Leader Development Program (4 positions), the Center for Professional Education and Training (1 position), the Defense Medical Readiness Training Institute (2 positions), the Medical Simulation Training Center (1 position), the Flight Medic Program (1 position), the combined Intensive Care/ Emergency Room Nurse Program (7 positions), and a senior officer for curriculum development at AMEDDCS, for a total requirement of 22 officers.

STRATEGIES TO PROVIDE DOCTORAL-LEVEL FACULTY

In crafting the strategy to provide doctoral level faculty, the ANC has relied heavily upon established standards and best practice guidelines. In its position statement concerning academic preparation of nursing program

faculty,[3] the American Association of Colleges of Nursing (AACN) states that while institutional programs are culturally diverse, some standards are universal; a doctoral degree is required for faculty that have primary responsibility for overseeing all graduate and postgraduate education. Additionally, the AACN report *The Essentials of Doctoral Education for Advanced Nursing Practice*[4] outlines several desirable characteristics for advanced faculty, including diverse backgrounds and intellectual perspectives in the specialty areas of their students while providing a mix of practice and research experience.

The primary strategy to build a force structure with the required academic preparation for the ANC is the Long-term Health, Education and Training (LTHET) Program. For fiscal year 2013, the ANC has programmed a total of 85 officers into LTHET to work towards doctoral degrees. It should be noted that the vast majority of these starts will enter advanced practice programs and consequently will not be used as faculty for several years after graduation in 2015. It is expected that about only 6 of the graduates will be available for assignment to faculty positions after completion of the doctoral degrees. These include post-master's DNP completion candidates (3), PhD in neuroscience candidates (2), and PhD in nursing science candidates (1). Also, many officers are obtaining doctoral degrees on their own. This is particularly popular with our advanced practice providers who are obtaining DNP degrees at civilian universities across the country.

Although the difference between the requirements and the inventory is difficult to calculate due to the dynamic nature of managing personnel and talent, a significant shortage continues to exist with the ANC. With a minimum requirement of 29 doctoral-degree faculty positions within the ANC and a pipeline of 6 officers prepared for faculty roles per fiscal year, there continues to be a challenge in meeting force structure requirements. A variety of reasons exist for the persistent shortage of qualified faculty, including:

- Senior officers promoted to leadership and command positions outside the sphere of faculty positions.
- Officer retirements and other reasons for leaving the service.
- Deployments of officers with critical clinical specialties.
- The continued increase in the number of doctoral degrees for accredited graduate programs.

Currently, not all incumbents of the required positions are officers with doctoral degrees.

The ANC is considering several strategies to mitigate this deficit. These strategies include establishing a legitimate specialty known as an Area of Concentration for Nurse Researchers so that the inventory could be managed through Objective Force Modeling; establishing a career path to senior ranks within the ANC; and increasing the authorizations for PhD programs in the LTHET process in future years. This could also include civilian programs to further motivate officers to apply for PhD programs, expand the use of civilian nursing personnel prepared at the doctoral level for positions within our educational and training platforms, and encourage and expand on the BSN to PhD/DNP pathway for junior officers. The last listed strategy would build the needed force structure faster than the current pathway of bachelor, master, and then doctorate degree, and would have the added benefit of having doctoral-prepared nurses in the ANC at an early stage in their career, extending their utilization for those who stay for an entire career. This innovative model has been used successfully at major universities with top-ranked schools of nursing, such as the University of Michigan and Vanderbilt University.[5]

Army Nursing has embraced the position statement by AACN of faculty characteristics in our own programs and to those programs to which we send students through the LTHET program (PhD and research and DNP completion programs). This long-term strategy will insure that the ANC will have the appropriate faculty base to meet its needs in the future. It will also significantly advance the goal of Army Nursing's PatientCaring Touch System to achieve the best outcomes possible in the delivery of patient care.

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AUTHORS

COL Schoneboom is Commander, US Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, Maryland.

COL Hopkins-Chadwick is Dean, Academy of Health Sciences, Army Medical Department Center and School, Fort Sam Houston, Texas. She is also the Army Surgeon General Consultant for Nurse Education and Nurse Enlisted Training.

Legal Education for Army Medical Department Leaders and Soldiers

MAJ Joseph B. Topinka, JAGC, USA

A Proposal from a Lawyer Who Has Advised AMEDD Leaders and Soldiers for Nearly a Decade

I have been a legal advisor to Army Medical Department (AMEDD) commanders and staff at the levels of Army community hospital, ambulatory health clinic, medical center, regional medical command, and the Headquarters, US Army Medical Command (MEDCOM)/Office of The Surgeon General for over a decade. I have often been surprised at the inadequate knowledge and understanding of the law at each level, invariably due to a lack of experience and/or education about the legal obstacles, pitfalls, and "landmines" that AMEDD leaders and personnel face in today's highly complex federal healthcare environment.

Joint Medical Executive Skills Institute Competency Model
Military Medical Competencies
Medical Doctrine
Military Mission
Total Force Management
Medical Readiness Training
Emergency Management and Contingency Planning
Leadership and Organizational Management Competencies
Strategic Planning
Organizational Design
Decision Making
Change Management
Leadership
Health Law and Policy Competencies
Public Law
Medical Liability
Medical Staff By-Laws
Regulations
Accreditation and Inspections
Health Resources Allocation Competencies
Financial Management
Human Resource Management
Labor-Management Relations
Materiel Management
Facilities Management
Information Management and Technology
Ethics in the Health Care Environment Competencies
Personal and Professional Ethics
Bioethics
Organizational Ethics
Individual and Organizational Behavior Competencies
Personal and Professional Individual Behavior
Group Dynamics
Conflict Management
Interpersonal Communication
Public Speaking
Strategic Communication
Performance Measurement and Improvement Competencies
Population Health Improvement
Clinical Investigation
Integrated Health Care Delivery Systems
Quality Management and Performance Improvement
Patient Safety

Source: Joint Medical Executive Skills Institute website, https://jmesi.army.mil/documents.asp

As an assistant professor at the Academy of Health Sciences in the AMEDD Center and School (AMEDDC&S), I learned about the Joint Medical Executive Skills Institute's (https://jmesi.army.mil/) Executive Skills Program Competencies which are segregated into 7 major groups as shown in the Figure.

Some of the listed competencies have legal foundations or are specifically legally related. For example, by its title, the legal foundations within Emergency Management and Contingency Planning are not obvious, but public health law is an important, mandatory aspect of any such emergency planning effort. On the other hand, it is obvious that Public Law is specifically related to the study of law, whatever the area of concentration. In the final analysis, the law, or at least the application of law is fundamental to every medical competency and thus deserves to be thoroughly *taught* within the AMEDD, not only to leaders but to their supporting personnel as well.

THE PROPOSAL

Specifics

I propose a comprehensive plan and structure that focuses on 12 major areas of law:

- Discipline
- Standards of conduct (federal employee ethics)
- International law of armed conflict
- Health law
- Public health law
- Fiscal law
- Labor law
- Quality assurance
- Claims
- Contract law
- Administrative law
- Human subject research law

Each of the 12 areas would have more advanced and focused subparts that could be taught in courses either in the classroom setting or in the field by supporting legal

counsel. Foundation courses would be taught in each area for officers, noncommissioned officers, and Soldiers in advanced individual training, followed by more focused courses on the most current legal issues prior to the assumption of higher level leadership positions.

Areas of Law

Discipline

Discipline covers several competencies such as Total Force Management, Change Management, Leadership, Human Resource Management, Labor-Management Relations, Personnel and Professional Ethics, Personal and Professional Individual Behavior, Group Dynamics, and Conflict Management. I encourage students to separate the concept of discipline between military personnel and civilian personnel. Discipline issues regarding civilian personnel fall under labor law. Discipline pertaining to military personnel is found under the Uniform Code of Military Justice* (punitive actions), regulations in place to implement military justice, and the many regulations that deal with nonpunitive actions (administrative actions). Discipline in the military is a command-driven effort. Unlike the civilian world where lawyers make decisions to prosecute, in the military, lawyers advise and commanders make decisions. Commanders can determine to take no action, initiate administrative action, dispose of offenses with nonjudicial punishment (NJP),† or dispose of offenses by court-martial. Whatever the decision, advice of legal counsel is certainly key, but AMEDD commanders and leaders must be knowledgeable of the basic concepts; in other words, they cannot depend on legal counsel to teach them the basics each time a discipline issue emerges.

There is really no equivalent of NJP in the civilian sector. It is a critical process which allows a commander to handle discipline at the lowest level in the military environment. A commander who knows how to use NJP can dispose of misconduct quickly, and can also send a message to the unit that he or she is a person of integrity and fairness. That ability is an incredible influence on the competencies Conflict Management, Group Dynamics, and Personal and Professional Individual Behavior as Soldiers realize that they will be treated fairly at the lowest level possible, and that there is no need to refuse that low level procedure and demand a court-martial.

From my experience, I have come to believe that NJP is not well understood among many AMEDD midlevel leaders. For example, a year ago I was addressing NJP while teaching a class. One of my students, a field grade officer, was listening to my description of NJP and was surprised that a Soldier could refuse NJP and demand a court-martial. Either the student was never taught the concept or it was not effectively presented. I quickly incorporated NJP basics into that class instruction.

The experience discussed above is certainly not an indictment of our current teaching of discipline law within the AMEDD. For example, every Basic Officer Leadership Course (BOLC) and Captain's Career Course (CCC) contains a basic class on military justice in which we discuss such issues as NJP and the commander's role in discipline. In the last couple of years, the CCC has even conducted mock Article 15 hearings† in a small group setting wherein each student plays a role in the hearing. Most recently, the AMEDDC&S has initiated an Introduction to Basic Army Medicine (IBAM) course in which junior enlisted Soldiers are given classes on many issues including military justice. Additionally, I have both taught and supported pre-command courses where NJP has been reviewed. All told, these examples of efforts to teach military justice are noble and important as good order and discipline are critical in the operation of a military and fall squarely within the competencies of Military Mission and Leadership. However, the adequacy of this instruction should still be examined. For example, is sufficient time being allocated for teaching the subject within those venues? Also, are there other venues where the topic could be taught in more detail? When I asked the previously mentioned student about NJP and about instruction on the subject in a prior class, the student recounted a very short class on military justice years before in BOLC, but admitted no memory of anything from the class. But for that Military Medical Law elective course, the student may never have learned any details of the concept.

The above student example may be instructive regarding the direction the AMEDD should follow pertaining to teaching military justice. It is one thing to teach a military justice foundation course in BOLC, CCC, or IBAM. However, lesson planning and delivery for a class in a program for a particular department in the Academy of Health Sciences, or a noncommissioned officer professional development or officer professional development session at a military treatment facility or medical unit in the field should be from entirely different perspectives.

*The Uniform Code of Military Justice (UCMJ), a federal law (64 Stat. 109, 10 USC, chap 47), is the judicial code which pertains to members of the United States military. Under the UCMJ, military personnel can be charged, tried, and convicted of a range of crimes, including both common-law crimes (eg, arson) and military-specific crimes (eg, desertion).

†Nonjudicial punishment is outlined in Article 15 of the UCMJ. The legal process involving NJP is commonly referred to as simply "Article 15." The general rule is that Article 15s should be given for minor offenses under the UCMJ's punitive articles. Implementation of NJP in the Army is detailed in chapter 3 of *Army Regulation 27-10*.[1]

Creating a foundation in a class with students from all military occupational specialties is an absolute necessity, but what does a physician assistant, a social worker, a pathologist, a nutritionist, or an administrator need to know later in his or her specific occupational education?

Standards of Conduct

Within the AMEDD, frequent ethics issues face personnel in the form of gifts, conflicts of interest, use of government resources, postgovernment employment, unauthorized commitments, and political activity. From the perspective of almost 20 years teaching Standards of Conduct (SOC), I think we in the AMEDD do a good job training personnel on the basic rules. The SOC are implemented by *Department of Defense 5500.7-R: Joint Ethics Regulation*.[2] The SOC apply directly to the competencies of Personal and Professional Ethics and Personal and Professional Individual Behavior**.** The SOC also impact Financial Management and even Information Management and Technology, especially considering the use of information technology systems, such as electronic mail, social media, and internet access. As I inform my students, these rules exist as guidelines to assure that our conduct is that which taxpayers would expect of their government's employees. If we cannot live up to those standards, the taxpayers will not have trust in our conduct and our leadership. In addition, the rules can also have punitive or administrative repercussions, which are usually highly motivating personal considerations.

In addition to my work teaching SOC at the AMEDDC&S either as a primary subject in a defined course or as part of orientations and annual training, the AMEDD has a number of excellent, highly experienced ethics counselors at MEDCOM commands throughout the country. My concerns are two-fold. First, I think that we do not have enough time to teach in more detail and focus for such groups as resource management personnel, contract personnel, personnel holding government purchasing cards, and clinicians. I know clinicians who are so busy that they simply do not have sufficient time to attend a class, or who do not understand that SOC is different from the biomedical ethics that they may have been taught in the past. Second, we do not always teach SOC in an effective manner such that the subject matter is easily absorbed into people's minds. Throughout my career, I have often encountered a class of people who were in attendance only because the class was mandatory. Their thoughts and concerns were obviously on their other responsibilities, and interest in my class material was not a priority. Since my goal was to inspire and teach the rules that would empower them to act in an appropriate manner as executive branch employees within the Department of Defense (DoD), I would incorporate experiences, cases, examples, humor, or anything to engage their interest and, most importantly, impart to them the knowledge they needed.

Adherence to the SOC or executive branch ethics is ultimately a personal responsibility. Ethics counselors cannot monitor the activities of every executive branch employee. Ethics counselors also cannot be expected to teach a person to understand ethical conduct in a one-hour class at an orientation or mandatory annual training. It must be a way of life that is inspired by teachers, articles, and programs designed accordingly. The inspiration of even the best of instructors or counselors within an organization is just an example for a limited group of students. Our goal should be an inspirational program to teach and encourage employees to conduct themselves with only the highest ethical standards within the AMEDD's unique medical environment.

International Law of Armed Conflict

During the last decade, the subject of Law of War (also called International Law of Armed Conflict) has been increasingly important for personnel deploying to combat theatres. Over my many years of teaching this subject, invariably students have expressed the opinion that the term "Law of War" is seemingly contradictory in and of itself. My reaction has always been to address the importance of the subject and the true intent behind the training. It is a DoD requirement to train in the subject, but more importantly, I have always noted that an understanding of the Law of War is critical to the competencies of Medical Doctrine**,** Military Mission**,** Medical Readiness Training**,** Strategic Planning**,** Public Law**,** Personal and Professional Ethics, and even Bioethics. I am concerned when students indicate that they have gone through many Law of War classes but demonstrate little grasp of the concepts. Are we not teaching this subject correctly? Do we not have the right focus? Are we not conveying the basic concepts that will enable them to follow what is in fact either law or DoD policy?

I believe that many times we train to time and not to standard, and consequently we often do not focus on the issues that can really impact medical personnel in a combat environment. While I think our foundational classes at the BOLC and CCC levels are sufficient, they are only the basics. Future leaders and more experienced medical personnel really should explore the laws and policies that are in place and apply the lessons that have been learned over the years through our experiences with those laws and policies in an operational setting. For example, in my classes I often address examples from the Vietnam war era, or from Operations Enduring Freedom or Iraqi Freedom, but I can never go

into the detail that I feel is necessary; I simply do not have the time. With the right amount of time, the right mix of students with various experiences, and the right examples or case studies, students could explore many of the issues addressed by the Law of War and use their experiences and understanding to learn more about how they apply to the competencies noted above, competencies that must be used on the battlefield. During the last decade, AMEDD personnel have been in harm's way and have experienced a great deal. The legal medical aspects of those experiences should not be minimized. Our challenge will be to incorporate those lessons learned related to the Law of War and apply them to educational programs in the future.

Health Law

The Army has no formalized training in health law except advanced civil schooling every few years for one military lawyer to receive an advance law degree in health law. It is important to establish a more expansive form of training in health law within the AMEDD to prepare personnel in all the competencies of Health Law and Policy—Public Law, Medical Liability, Medical Staff By-Laws, Regulations, and Accreditation and Inspections. Although the area of Health Law and Policy is considered essential within the Joint Medical Executive Skills Program, in my opinion, we really do not have sufficient faculty to teach this area. Further, and perhaps more importantly, we may not have the sufficient legal counsel in the field trained in this area. In the civilian sector, health law is a topic that appears with regularity in the press and has become a growing practice over the last 10 years. Unfortunately, military health law advice and education, while valued, is in short supply.

After I arrived at the Academy of Health Sciences, I did not expect to be regularly invited to give a class on informed consent, the Health Insurance Portability and Accountability Act (HIPAA), advanced directives, and quality assurance, to name a few. Also unexpected was the small number of structured legal medical classes imbedded in many of the medical education programs. Recently, one of my former students asked why a course I taught did not have more classes on legal medical issues. He explained that my short block of instruction left him and other class members curious and feeling a bit unprepared. In response, I could only offer him some on-line resources and provide him with some articles I had collected that could be helpful. The health law industry in the civilian sector is expanding, health regulations are on the rise, and healthcare legal issues abound. I foresee that military medicine will not be immune to the coming tide of health law legal issues.

Public Health Law

In both military and civilian sectors, most people do not have a clear understanding of public health law, because they really do not have a clear understanding of public health. Public health has different concerns from medical care, encompassing the prevention of disease, prolonging life, and promoting health. It is preventive in nature and public health law is oriented to that perspective.

Fairly early in my experience with the AMEDD, I was requested by the installation medical and dental activity (MEDDAC) to provide legal advice on establishing and advising the new position of Public Health Emergency Officer (PHEO). Only later did I realize that I had begun my education in public health law. After a great deal of research, I understood the critical nature of a PHEO and the necessity for a PHEO to have legal counsel who understood all the federal and local state laws about such issues as quarantine, isolation, presidential declarations, and public health emergency declarations. Most PHEOs were leaders in preventive medicine so I began to spend more time dealing with preventive medicine personnel. Before long, I realized that public health and public health law went well beyond the competency of Emergency Management and Contingency Planning. It addressed issues such as chronic diseases, infectious diseases, safety, nutrition, food safety, healthcare-associated infections, human immunodeficiency virus (HIV), language and access to care, obesity, and prescription drug shortages, just to name a few. These issues affect the military and must be addressed. For example, I have been asked numerous times about HIV notification procedures under *Army Regulation 600-100*[3] which may involve the possibility of contacting local public health officials for notification and testing of contacts. This can be a very sensitive procedure not only involving DoD guidance pursuant to HIPAA and state or local laws or policies. Another example involved providing reasonable break time to allow a civilian employee to express breast milk after her return to work following the birth of a child. While some argued this fell under labor law, it also was an issue covered under public health law.

The subject of public health law extends beyond the scope of this article, but it cannot be denied that legal issues in the public health arena are ever increasing in the lexicon of today's society. We talk about energy drinks and how their ingredients could affect the health of young people, in and out of the military, beginning to show effects within the competency Medical Readiness Training. We talk about sugary sodas and their size restriction in places like New York City as a means to combat chronic diseases and obesity, a concern within

the competency Population Health Improvement. Childhood obesity and its impact on recruiting and chronic diseases affects Strategic Planning. Past experiences with public health emergencies always involve determination of who has jurisdiction over the matter—municipal, county, state, or federal, part of Emergency Management and Contingency Planning. We should ensure that AMEDD personnel are taught the basics of public health and public health law so that they are prepared to understand the issues facing the local communities near the military treatment facility (MTF) in which they work. Leaders should be conversant with laws governing federal, state, and local cooperation that is critical in dealing with any public health matter. Most importantly, legal aspects of the difference in perspectives of public health (the population) and medical care (the patient) must be clearly understood. In light of The Surgeon General's Performance Triad[4] (activity, nutrition, and sleep) initiative for a system for health, it appears that public health will become an even more prominent consideration for the AMEDD, and public health law will become a more important concern for its leaders and personnel.

Fiscal Law

Literally every unit or organization in the AMEDD is involved with the competency of Financial Management—the management of the obligation and expenditure of funds appropriated by Congress and allocated for AMEDD use. Money is the blood of the AMEDD body, having an effect on all the competencies of the Health Resource Allocation group of competencies as shown in the Figure.

Fiscal law is an area of the law that has no counterpart in the civilian sector, because it is founded ultimately on what Congress says we can and cannot do based on its constitutional power to fund the federal government. Government funds come in various "colors" and various periods of "availability" for new obligations based on the guidance given by Congress. Depending on the activity undertaken, the funds required to do so may vary depending on the nature and structure of the activity, the authority for the activity, the magnitude of the activity, the timing of the activity, and the actions previously taken by others with regard to the activity. Only one color can be correct by law. Some funding actions raise little or no issue, while color, timing, and availability of funds may make others problematic, which is when the understanding of fiscal law becomes important.

I have been queried for guidance on fiscal law issues many times. The basic rules of Purpose (funds may be obligated and expended only for the purposes authorized in an appropriation acts or law), Time (the period of time during which budgetary resources may be used to incur new obligations is different from the period of time during which the budgetary resources may be used to incur expenses), and Amount (obligations and expenditures may not exceed the amounts established by law) are straightforward. However, unlike other areas of the law where the absence of some prohibition is a potential gateway for action, fiscal law restricts the use of funds unless specifically authorized by Congress.

Issues under the subject of fiscal law continually appear within the AMEDD, such as purchasing from unauthorized sources, exceeding purchase thresholds, making split purchases, using government funds for personal expenses, using funds in the wrong fiscal year, purchasing more than needed, and using the wrong appropriation for a purchase. Such problems fall directly under the competencies of Financial Management and Personnel and Professional Ethics in that they are inappropriate actions on the part of employees and/or organizations in violation of law, policy, or rules. Such actions can also result in a violation of the Antideficiency Act (31 USC §1341-1342 and §1517) and require an investigation, with possible administrative or punitive sanctions, and may even require a report to Congress and the President resulting in embarrassment to the AMEDD.

Currently, we do not have any standard program to teach fiscal law within the AMEDD except those online resources that are used to help in certifying government purchase card holders and contracting officer's representatives, or the occasional ad hoc class that is taught only at the request of a local resource management office or a course manager. Understanding fiscal law is not just for comptrollers and their personnel, it is an important topic that could conceivably impact Decision Making, Leadership, and Strategic Planning, in addition to those competencies already mentioned.

Labor Law

One of my former Staff Judge Advocates would often tell me that his former installation legal office used to provide 10% to 20% of its legal resources to the local MTF although that MTF only represented a very small component on the military installation his office served. A great deal of that support was labor law related. As a former labor attorney, I can attest to the fact that labor law support addresses competencies such as Labor-Management Relations, Human Resource Management, Public Law, Regulations, Total Force Management, Leadership, Organizational Design, and several more. Dealing with a civilian workforce covers a large horizon

of legal areas including discrimination under the Equal Employment Opportunity program, harassment, civilian misconduct, Hatch Act (5 USC §7324) violations (unauthorized political activities), collective bargaining unit relations, and unfair labor practices, to name a few. While serving as a Command Judge Advocate at a major medical center, I became concerned that we had only a single supporting labor attorney, who also supported the entire installation at which the MTF was located. She was barely able to handle the workload, so I began to work some of the more rudimentary labor actions at the MTF in order to ease that workload. I was her "eyes and ears" in the MTF, but I also helped educate leaders and supervisors about the various aspects of dealing with civilian employees. I generally felt that with a little education, leaders and supervisory personnel could avoid the common pitfalls that were generating incredible legal workloads at other MTFs.

My opinion today regarding labor law has not changed. If anything, that opinion has become more established as the civilian labor population of the AMEDD has increased. We need more structured classes imbedded in courses for clinicians and nonclinicians alike who will have professional relationships, supervisory or otherwise, with civilian employees in the future. Reliance on that "one" supporting labor attorney, or the local Civilian Personnel Advisory Center, or the supporting human resource specialist(s) may not be enough to react to a crisis. More importantly, such a situation will not be conducive to the creation of an environment that is designed to prevent labor issues. My sense is that with the proper education, AMEDD leaders and/or managers can better understand the parameters of their authority. They can be empowered to take the necessary steps to create an employment environment where discrimination, inequity, and ignorance about civilian employee rights are absolutely minimal.

Quality Assurance

I generally try to address quality assurance (QA) in some of my classes because it is an important subject when dealing with documents and information produced by or pertaining to activities such as privileging, infection control, patient care assessment, medical records review, health resources management review, and identification and prevention of medical or dental incidents and risks (risk management, patient safety, and incident reports). Only The Surgeon General may authorize release of QA documents or information outside of DoD, so there is great sensitivity around these documents, the information generated in these documents, and the activities covered by the military quality assurance statute (10 USC §1102). From a legal standpoint, there is special sensitivity with regard to the procedures involving health provider misconduct and malpractice that affect the privileges of physicians, dentists, nurses, and other healthcare practitioners as this deals with the competencies Personal and Professional Individual Behavior, Patient Safety, and Quality Management and Performance Improvement.

When I address quality assurance in my classes, I try to always ask my students if they can tell me what QA really is and describe how *Army Regulation 40-68*[5] implements QA within the Army. Some respond with empty stares. Others confuse it with HIPAA. Still others, normally clinicians, understand the basic concept but do not understand QA's impact on privileging. I explain how substandard care, clinical performance, or nonclinical misconduct can start a whole adverse action process that could ultimately impact their clinical careers, including licensure termination or reports to the National Practitioner Data Bank and/or the Healthcare Integrity and Protection Data Bank. The students' reaction is often one of surprise and disbelief. The ignorance was normal from class to class. Unfortunately, it is not uncommon in the legal profession. Years ago when I was asked to advise on my first Credentials Committee review of a clinician's privileges, I realized how very little I knew. I had a steep, accelerated learning curve.

I believe that all AMEDD personnel need some sense of QA and the QA Program within the AMEDD. It covers such a wide variety of topics in its own right, and protects the subject matter of those topics in a way that is often unique to the outside viewer, whether within or outside of the military. However, the QA program also deals with some of the most sensitive issues in terms of clinical conduct and its impact on the overall quality of Army healthcare.

Claims

Based on my experience as a command judge advocate, a regional judge advocate, and the Deputy Staff Judge Advocate at MEDCOM, I think that most AMEDD personnel think about 2 things when they see the topic of claims. First, they think about a military move where their household goods have been stolen or damaged, and they make a claim under the Military Personnel and Civilian Employees' Claims Act (31 USC §3721) at the local "JAG office." Second, they think about some personal injury, death, or property damage caused by the negligence of military personnel acting in the scope of employment or occurring incident to noncombat operations where the patient files a claim under the Federal Tort Claims Act

(28 USC §§1346(b), 2671-2680). The subject of claims does indeed relate to both of these types of claims and the subject certainly falls under the competencies of Public Law and Medical Liability. But there are other types of claims worthy of note, especially those that affect Financial Management at all levels of the AMEDD.

Medical Affirmative Claims under the Federal Medical Care Recovery Act (42 USC §2651-2653) can be a significant source of revenue for a MEDDAC or MTF that has rendered care to a DoD beneficiary as a result of injury caused by a third party (such as a motor vehicular accident). The identification of a claim involves a great deal of coordination and integration between the supporting legal office and the MEDDAC or MTF personnel. This is so that a patient encounter is properly reported at the time of the visit and the legal office can then take action to put patients on notice of the rights of the MEDDAC or MTF to subrogate any damages received by the DoD beneficiary. My experience is that those MEDDACs or MTFs which have a strong Medical Affirmative Claim recovery program are those facilities that understand the value that can be generated by the program. They have the dedicated staff and focus from the leadership to ensure that medical care provided is ultimately paid for by the outside parties that caused the injuries. The money collected can then be used by the facility for patient care, training, and equipment.

The Third Party Collection Program (TPCP) is a congressionally mandated program that allows a MEDDAC or MTF to recoup expenses for medical care provided to nonactive duty beneficiaries when they have other health insurance. This is very different from the MAC program and often confused with the MAC program. This program is just as important to MEDDACs and MTFs in that they can legally generate additional revenue that can go to support the medical organization. But very often, the confusion over the 2 programs is part of the reason that the TPCP does not get the same visibility as the MAC program, yet it could also generate a great deal of revenue for a medical facility.

I do not propose that we make students and all AMEDD personnel experts in federal claims law, but I do think it is important that we teach people the clear differences among tort claims, personnel claims, MAC claims, and TPCP claims. Personnel claims support the morale of military members and tort claims are a reaction to negligent conduct and its resulting injury. Medical Affirmative Claims and TPCP are efforts to recoup expenses incurred in the provision of medical care. In all probability, such financial recovery could be increased if leadership clearly understood how useful and important these last 2 claims processes could be, especially in times of fiscal limitations.

Contract Law

Several years ago, I was asked, over the telephone, to interpret the ramifications of some action a department or clinic was planning in regard to an existing contract that provided support to the organization. I explained that I had to see the contract in order to provide an answer. The initial response was silence. The caller then indicated that he had never seen the contract. Indeed, he was clearly surprised in that he expected that I would be able to provide some general advice without the contract in hand. Contract law does not work that way.

There is no doubt that our dependency on contracts in the AMEDD has grown over the years which places emphasis on the competencies Financial Management, Material Management, Facilities Management, Information Management and Technology, and Human Resource Management as the AMEDD contracts for a great deal of personal services. When I arrived as the Deputy Staff Judge Advocate at MEDCOM in 2008, there were 2.5 contract attorneys on staff. When I left in 2012, I had helped in the hiring of over 8 attorneys in the Contract and Fiscal Law Division, and the hiring of an attorney in each region who had a responsibility in advising on acquisition matters. The need for contract law advice was considerable, but with that need existed the requirement for better understanding of contracts within the organization for which the contract was required.

Contracting by federal government entities is governed by a myriad of laws, regulations, rules, and guidelines, beginning with the Federal Acquisition Regulation, and percolating down through the separate departments to those that guide the individual contracting officer. I am certainly not advocating that AMEDD personnel in general be schooled in the provisions and details of this regulatory matrix, but I do strongly support providing AMEDD personnel with knowledge of the basics of the acquisition process to cover certain concepts:

- There must be an understanding of the role of the contracting officer whose authority to legally bind the Army is distinct and unique. Such authority is limited to that designated person, but all too often commanders and leaders think that their leadership position gives them the inherent authority to enter into contracts. Such a misinformed notion could easily result in an unauthorized commitment, which is definitely not a good outcome.
- There must be an understanding of the foundational principles of contracting. There are 2 parties to a

contract; one the legal buyer, the other the legal seller. The legal buyer must have the authority to enter into the contract.

- Federal contracting laws are different from those that pertain in the civilian sector.
- The acquisition process is not just about contracts but also the process that results in the contract, including acquisition planning, contract solicitation and award, and then contract administration. Bad acquisition planning results if the customer does not know what it wants but then realizes last minute that it needs something tomorrow. If the customer does not have its requirements defined, those requirements cannot be properly researched and addressed through solicitation. If the customer has no idea of how the contract is managed, the result is almost invariably bad contract administration.

Whatever the approach, the teaching of contract law should be in conjunction with the Health Care Acquisition Activity and its supporting legal counsel so that the students of today can be the sophisticated contract officers, contract officer's representatives, and contract customers of the future.

Administrative Law

Before my initial assignment into the AMEDD, I was already heavily involved in administrative law. Administrative law covers many of the areas we have already addressed such as contract law, labor law, standards of conduct, and fiscal law, but I have added it as one of the 12 areas of law that should be taught because it also covers other subtopics such as the Privacy Act (5 USC §552a), the Freedom of Information Act (FOIA) (5 USC §552), environment law, administrative investigations, installation management, and intellectual property, to name just a few. Each of these areas is important and is seen as issues at MEDDACs and MTFs around the Army. They are directly relevant to the competencies of Public Law, Regulations, Military Mission, and Leadership. Outsiders who want copies of internal, clinical procedures make requests under FOIA. A person who wants a copy of his nonmedical personnel records requests those records under the Privacy Act. There are environmental considerations pertaining to the disposal of hazardous substances or whether a new MTF building can be built on a particular piece of ground. Upon receipt of a complaint, a commander or supervisor normally investigates in order to determine the facts at hand before any decision is made.

Administrative law matters are simply not just the purview of the installation where the MTF is located. Military treatment facilities and MEDDACs are often virtually installations unto themselves with a wide variety of issues similar to those found at the installation level. They contain retail exchange facilities, work with outside agencies for space requirements, investigate nonpeer issues such as misconduct, and manage the flow of nonpersonal health information everyday. They deal with a host of legal subjects that do not fall within a particular class of law, but that does not detract from the fact that administrative law topics need to be taught; whether as a special study elective or a block of instruction as part of an overall course.

Human Subject Research

Human subject research law is a very specialized area of law. It deals with bioethics and clinical investigations and is highly regulated, therefore requiring a solid understanding of governing regulations**.** Legal issues abound at local institutional review boards which oversee research projects within regional medical commands and at medical centers. I am concerned about rights and consent forms that are difficult to understand by participants, and protocols which could possibly violate bioethical standards within the AMEDD. Further, I think that there may be an insufficient number of legal counsel experienced in this practice across MEDCOM facilities and medical centers. Much of the considerable knowledge and experience in this area is found at the US Army's Medical Research and Material Command (MRMC). Except for a solid class taught in the Army-Baylor Graduate Program in Health and Business Administration and some ad hoc classes taught by seasoned command judge advocates or MRMC legal counsel, there really is not a structured class or course on medical research within the AMEDD or the Army. The Army-Baylor class is a model that could be emulated and expanded, not only at the Academy of Health Sciences but throughout the AMEDD.

THE RESULTS

While there is no way to predict the result of a more comprehensive, coordinated, and nested approach to legal education for AMEDD personnel, the results would be an improvement over an assortment of classes that are merely reused from course to course and from basic to advance levels. There is no clear plan in effect to teach legal subject matter to prepare personnel based on the Joint Medical Executive Skill Institute's list of required competencies. Army medicine's personnel are facing ever increasing legal issues due to the nature of military healthcare, the increased civilian employee workforce, and the greater need for contracting within the military heath system. Such a plan is long overdue, and its supporting rationale, while mostly anecdotal, is based on the reality of experiences from practice. There

is a finite level of legal support in the field. At the very least, AMEDD personnel should be able to identify potential legal issues early and not find it necessary to react to such issues only after they reach crisis proportions.

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The proposal in this paper was represented in a poster presentation displayed at the 3rd Annual Academy of Health Sciences Graduate School Research Day on December 11, 2013. Electronic copies of the poster are available from the author upon request.

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AUTHOR

MAJ Topinka is an Assistant Professor in the US Military-Baylor University Graduate Program in Health and Business Administration, and is the Legal Instructor at the Army Medical Department Center and School Leader Training Center, JBSA Fort Sam Houston, Texas.

The coin depicted here is symbolic of the team-centric theme addressed in this article. The AMEDD|JAG Corps partnership has been the driving force shaping legal guidance of seasoned health law advisors within the Army for many years. The coin was designed by the author in 2009 with the inspiration of the employees and staff at the Office of the Staff Judge Advocate at the US Army MEDCOM and all the members of the AMEDD legal family.

Innovating to Integrate the Intangibles into the Learning Air Force

Capt Benjamin T. Hazen, USAF
MAJ Fred K. Weigel, MS, USA
Maj Robert E. Overstreet, USAF

ABSTRACT

United States federal law and other regulations require the US military services to provide professional military education to their forces. Meeting that requirement will become increasingly difficult with the absence of a federal government budget, significant cuts to defense spending, and expected future cuts to both defense spending and manpower. Additionally, the operations tempo remains high despite the withdrawal of troops from Iraq and the planned withdrawal from Afghanistan. The resulting time and budget constraints will likely make it more difficult for the services to provide every member with the opportunity to compete for positions in coveted in-residence professional military education programs. Thus, the Air Force is considering a new lifetime learning approach to professional military education. As the Air Force seeks to develop its new paradigm, we must understand what benefits of the current system should be retained and what drawbacks should be allayed. Unfortunately, there is little research in this area. We content analyze data collected from Air Force officers attending in-residence professional military education, synthesize our findings with education and technology literature, and suggest innovative technologies that can maximize the intangible benefits and minimize the drawbacks of professional military education. The blended approach we present can create a richer, more meaningful learning experience for the service member, while simultaneously lowering the cost per member and providing greater opportunity to attend in-residence professional military education.

Military services are required by the Goldwater-Nichols Act of 1986[1] and *Chairman of the Joint Chiefs of Staff Instruction 1800.01D*[2] to provide professional military education (PME) to their members. The US Air Force implements this guidance through *Air Force Instruction 36-2301*.[3] While operating the Department of Defense (DoD) on continuing budget resolutions for the last 4 years may have been challenging for the services, the recently enacted budgetary sequestration requirements have dealt a severe blow to DoD and service expenditures. The reduction in available budget and the coincident personnel cuts threaten to strain the in-resident PME system. The Air Force sees these challenges as an opportunity to evaluate their current PME approach and consider alternatives.

PME is the foundation upon which the Air Force develops competent leaders. It is a critical tool, as is the military leadership education of the other services, in the development of officers capable of executing the country's National Defense Strategy. In Air Force PME, students learn tenets of leadership, strategy, international policy, and other topics germane to the military profession. Although the content has evolved, the PME model for Air Force officers, a tiered education approach based on rank, has remained relatively unchanged since the birth of the US Air Force from its Army Air Corps origin in 1947.[4] To this end, the Air Force is currently considering a Learning Air Force approach to PME.[5] The Learning Air Force approach adopts a blended learning method, which consists of both correspondence and in-residence learning events. For instance, some courses would be delivered at various times throughout an officer's career via correspondence methods. Then, officers would attend revised and considerably shorter in-residence courses at specified intervals throughout their careers. Although Air Force leaders are considering the Learning Air Force approach, this blended learning method raises new questions and potential challenges about how changes to the current PME system might impact both the Air Force and its officers.

OVERVIEW

This article offers an initial investigation into the potential effects of transitioning to a blended learning approach by uncovering the intangible benefits and drawbacks of in-residence PME, and then examining ways by which to retain benefits and limit drawbacks when designing a blended learning system. The Background section provides a precise examination of correspondence and blended learning techniques in the context of the Learning Air Force approach. We then provide a detailed qualitative content analytic examination of the

intangible benefits and drawbacks of in-residence PME in the Method section. Surprisingly, this has not been done previously. In the Discussion section, we integrate the research results with a review of extant literature to suggest the adoption of innovative technologies that might help to enable the Learning Air Force concept or enhance the current PME experience via retaining benefits and minimizing drawbacks. Regardless of whether the Air Force retains the existing PME system or adopts the proposed Learning Air Force PME approach, the suggestions we present in this article can be incorporated to provide substantial benefit. Likewise, our recommendations can apply to and be integrated into sister service PME programs.

BACKGROUND

Although the specifics of the Learning Air Force approach are still being developed by senior leaders,[5] there is an emphasis on correspondence learning. As technology continues to evolve and the Air Force becomes more dependent upon its information infrastructure, this emphasis is not only prudent, but perhaps essential. Additionally, problems with replicating education, the number of service members served, and the distance to the education training site diminish with correspondence methods. However, when examining what course content should be delivered to students via a correspondence method, some intangibles associated with attending PME in a strictly in-residence fashion may be lost. In the context of this study, "intangibles" refer to those aspects of attending in-residence PME that are not explicitly incorporated into curriculum, but still affect outcomes from attendance. Examples of such intangibles include expanding one's professional network or, conversely, losing currency/proficiency in flying or other job functions while attending PME in-residence.

CORRESPONDENCE AND BLENDED LEARNING WITHIN THE LEARNING AIR FORCE

The Air Force transition to a correspondence or blended learning platform offers an opportunity to mitigate current shortcomings of in-residence PME; however, intangible benefits and drawbacks of attending PME in-residence should be considered when designing a correspondence or blended learning PME curriculum. We identify some intangible benefits and drawbacks of the current in-residence and correspondence PME models using analytical methods. Then we posit several suggestions to retain the benefits and minimize the negatives via adoption of innovative technologies.

There are 3 Air Force PME levels for officers: basic developmental education, intermediate developmental education, and senior developmental education. Squadron Officer School is the basic developmental education program that is attended by captains with approximately 6 years of commissioned service. Air Command and Staff College is the intermediate developmental education program that is attended by majors with approximately 12 years of commissioned service. Air War College is the senior developmental education program that is attended by lieutenant colonels and colonels with approximately 18 years of commissioned service. With minor differences at the company grade officer level, Air Force PME roughly equates to the Army, Navy, and Marine Corps programs.

Currently, 2 methods exist for completing Air Force PME. The preferred method is selection to attend PME in-residence, however, there are a limited number of positions for Air Command and Staff College and Air War College. Officers not selected to attend in-residence PME will have to complete the correspondence (known synonymously as distance learning) version of the program. Professional military education by correspondence is accomplished outside of a traditional classroom setting using a variety of different delivery models at the student's own pace.

The Learning Air Force concept presents an alternative to the current paradigm, the blended learning approach.[5] A course or curriculum is considered blended if 30% to 79% of the work is accomplished in a distance learning format.[6] The Learning Air Force concept proposes that PME should be spread throughout the officer's career.[5] Before departing the commissioning source, an officer would begin PME distance learning. At certain times in their career, corresponding roughly with the current PME timeline, officers would have the opportunity to attend an abridged in-residence PME program. For example, if Squadron Officer School was accomplished in a blended format, Air Force captains would take courses every year via distance learning. These courses would be significant academic portions of the current Squadron Officer School curriculum. This approach would provide captains the opportunity to practice and hone the skills covered by the distance learning portion within a shortened in-residence program.

Though there were concerns about online, distance, and blended learning models when they initially became popular during the 1990s, research now suggests that the learning outcomes garnered from these sources and other correspondence methods of learning are comparable to traditional learning.[6-8] As Larson and Sung[7] of the University of Illinois at Springfield observed:

> Based on the research performed over the last several years, it has become a foregone conclusion that there is no significant difference in student learning outcomes between face-to-face versus online delivery modes.

Therefore, the Air Force could accomplish its academic objectives via distance learning, using the in-residence portion of the Learning Air Force to allow airmen to practice the skills they learned. However, some skeptics argue certain topics are better taught in traditional classroom settings.[9] These critics argue that those courses involving human interaction enhance learning (eg, leadership courses) may lose some of their effectiveness if taught in a distance or blended environment. For example, the Squadron Officer School in-residence program provides 8 weeks of cooperative learning, where students learn as a team, which is enhanced by the social structure of the flight (a group of approximately 14 students). Cooperative learning has been shown to be more effective than individualistic, competitive learning; students who are part of a team working towards a common goal typically achieve a higher level of learning than students working alone in competition with their colleagues.[10]

Cooperative learning results in a greater transfer of knowledge than is generally achieved with individualistic or competitive learning.[10] Squadron Officer School provides students with the opportunity to build a team among colleagues from different career fields across the Air Force. Squadron Officer School uses a format of guided discussion and analytical writing to allow students the opportunity to make their experiences relevant. Squadron Officer School is a nonretribution forum for the officer to converse with his/her colleagues in an engaging and analytical way. The current curriculum includes team-building and problem-solving activities, and team sports that keep students engaged in the learning process. Each team is challenged to set goals and overcome obstacles; the team is also encouraged to socialize together. The fact that the flights live together in the dorms, socialize together outside of work, and face both physical and mental challenges together solidifies the cooperative style of learning within the Squadron Officer School experience. Shortening the in-residence portion of Squadron Officer School in the Learning Air Force format could diminish this cooperative learning opportunity. It is not clear if such intangible benefits of in-residence attendance can be carried forward to a blended learning model.

While critics may argue that correspondence is the wrong forum for learning leadership, this view might be changing with technology. Roman argues that the US military remains rooted in an industrial-age paradigm, where control is emphasized over command.[11] To illustrate Roman's point, the internet and other advanced methods of communication increasingly allow followers to be geographically separated from their leaders. Leadership by walking around may soon be replaced with leadership by virtual presence (text messages, video teleconferencing, etc).

In summary, available technologies can supplement correspondence learning to ensure that most, perhaps even all, tangible benefits of in-residence learning are not lost. It follows that there are likely specific technologies that can facilitate the Learning Air Force concept to a degree that most, if not all, of the intangible benefits are retained. We investigate the intangible benefits in the first phase of our study because, unfortunately, such targeted discussion of intangibles as they relate to the Air Force is absent in the literature. Therefore, in the second phase of our study, we describe technologies that can be used to facilitate the Learning Air Force and other services' military leadership education programs via correspondence and blended learning methods. As stated, our first step was to uncover the intangibles of in-residence PME. We discuss our qualitative approach in the next section.

RESEARCH METHOD AND RESULTS

Because there are no established studies and, therefore, no established measurement instruments, we chose a qualitative content analytic, open-text response survey as our data collection instrument to provide respondents to identify relevant intangible benefits and drawbacks to attending PME in-residence without our biasing their responses.

Sample Frame and Data Collection

Our target population was captains in the Air Force. At the captain level, in-residence PME attendance approaches 100%. Additionally, many captains complete the correspondence version prior to attending in-residence. These captains are at the onset of their career and are likely to have the most to gain or lose over the course of their careers from any significant changes to the PME process. The research sample consisted of all individuals currently attending PME in-residence at Maxwell Air Force Base, Alabama, the primary in-residence location for all Air Force officer PME. We posit that this sample is representative of officers from the target population who would typically attend in-residence PME. We sent e-mail invitations for the on-line survey to all attendees of Squadron Officer School Class 13B. We also shared invitations by posting them to Squadron Officer School 13B's online learning platform. As part of the invitation process, we assured potential participants of anonymity

and that we would not release raw results or identifying information.

In total, the sample contained 725 potential participants. After 2 weeks of data collection, 132 questionnaires were returned; of these, 124 were complete and useable for the study, resulting in a response rate of 17.1%. The demographic breakdown resulted in 100 males and 24 females, and the majority of participants (n=106; 85.5%) were between 26 and 35 years of age. Three (2.5%) participants were younger than 26 years and 15 (12.1%), older than 36 years. On average, participants have 1.3 dependents (SD=1.2) and deploy 94.4 days per year (SD=75.8).

To collect the necessary data for analysis, we developed an open-text response survey consisting of 6 demographic questions and 2 open-ended questions. We compiled these questions and demographic items onto a web-based questionnaire for ease of distribution, ease of data collection, and for increased accuracy (that is, a single point of data entry: when the respondents entered the information). The open-ended questions were:

1. From a career development perspective, what are the advantages of an in-residence vs a correspondence PME course? What are the intangible benefits of in-residence PME attendance?
2. From a career development perspective, what are the disadvantages of an in-residence vs a correspondence PME course? What sacrifices might one make to attend in-residence PME?

Content Analysis and Results

Content analysis is one method used to derive various themes from a body of text to assess several forms of documentable communications.[12] It is "a research technique for reducing large quantities of text into a more manageable form for inference and analysis."[13] In this research effort, we adopted procedures for problem-driven content analysis, using steps outlined by Krippendorff.[14] For our qualitative analysis of the survey data, we used MAXQDA (VERBI GmbH, Berlin, Germany), a qualitative data analysis package, to organize, recall, and analyze the data. To begin, we uploaded all data to create a unique MAXQDA project and started the project by separating data into 2 categories, corresponding to the 2 open-ended questions posed to participants. The first category represented potential benefits, whereas the second category represented potential drawbacks.

The next step of content analysis calls for identifying themes in the data and counting the number of occurrences of each theme. Unfortunately, the literature did not yield a theoretical or practical framework with which to guide our search. Therefore, we chose a Grounded Theory approach to extracting relevant themes from the data. Grounded Theory takes into account pragmatic ideas proffered by participants to generate a theoretical framework from the collected data.[15-17] In other words, the theory is grounded in the data, as opposed to a theory chosen a priori. The Grounded Theory approach calls for identifying emerging themes from the qualitative data and categorizing responses according to these themes.

To begin, we identified units of analysis and categorized them into overarching themes. Our definition of the unit of analysis was any expression mentioned by a participant that noted an intangible consequence of in-residence PME. Each expression was represented in the data by an independent text segment—words, a sentence, or a paragraph—that describes the consequence. The new themes were self-defined from the respondents' input garnered during data collection, thus grounding the results from the data as opposed to researcher predetermined theoretical framework. The data suggest 6 primary themes regarding benefits and 4 primary themes regarding drawbacks of in-residence PME identified in the Table. In addition, secondary themes were identified under some of the primary themes. Although research team members analyzed the data together to reach 100% agreement, further examination was needed to confirm the reliability of the results. Using a random number generator, the research team generated a sample of 20% of the responses for an outside participant to independently analyze. The outside researcher was asked to independently match each text segment in the 20% sample to the appropriate themes from the Table. We calculated Krippendorff's alpha coefficient (α)—a statistic used to assess reliability of content analysis research—to be α=.88. As a heuristic comparison, coefficients above α=.80 suggest adequate reliability.[14]

INNOVATING TO RETAIN BENEFITS, MINIMIZE DRAWBACKS

The results suggest that networking, time for learning, practical application of materials, rich discussion, prestige, and use of facilities are important intangible benefits realized by in-residence PME attendees. Thus, we recommend that regardless of the format of future PME, senior leadership should ensure these benefits are retained. In addition, the results suggest that time away from primary duties and family, lost career opportunities, and a lack of specialized curriculum are currently viewed as chief drawbacks to the current in-residence PME model.

In the remainder of this article, we suggest several ways these benefits might be retained and drawbacks

Themes Identified in the Data.

	Theme (Percentage of respondents commenting (n=124))	Definition
Benefits		
1	Networking (95.2%)	Meeting and socializing with others
	a. Learning about other jobs/bases/experiences (45.1%)	Gaining first hand understanding of what peers do across the Air Force
	b. Professional networking (27.4%)	Meeting and socializing with others for the purpose of enhancing one's career
	c. Personal networking (22.6%)	Meeting and socializing with others for the purpose of friendship
2	Time for learning (57.2%)	Having ample time for learning
	a. Time away from other Air Force duties (40.3%)	Time for learning that does not interfere or compete with other Air Force obligations
	b. "Reblue"/reflect upon Air Force (8.9%)	Time available to reflect upon one's career in the Air Force
	c. Time for introspection (8.0%)	Time available to reflect upon oneself
3	Practical application of materials (42.7%)	The opportunity to practice the skills learned in the classroom in a real-world, hands-on environment without consequences of failure
	a. Leadership (16.1%)	The opportunity to apply leadership training in a hands-on leadership laboratory
	b. Group dynamics and teambuilding (12.9%)	The opportunity to be a member of a small team and work through/apply team building and group dynamic concepts
	c. Social skills (8.9%)	The opportunity to hone interpersonal and social skills amongst others (ie, feedback)
	d. Communication (4.8%)	The opportunity to speak in front of a live audience and obtain formal and informal feedback
4	Rich discussion (28.2%)	The enhanced quality of communications at in-residence PME
	a. Face to face discussion of topics (24.2%)	Communication quality directly attributed to the face-to-face communication medium
	b. Guarantee of nonattribution (4.0%)	The belief that thoughts and opinions will not be recorded or leave the classroom environment
5	Prestige associated with in-residence learning (6.5%)	Feeling that the Air Force uses in-residence PME as a discriminator for advancement and other opportunities
6	Facilities available to enhance education (2.4%)	The availability of tangible facilities, such as libraries, exercise facilities, and outdoor team building facilities (project x)
Drawbacks		
1	Time away from primary duties (77.4%)	Time spent away from home station and one's primary job responsibilities
	a. Increased workload for others in unit (41.1%)	The feeling that one is letting their home station team members down by being gone for an extended period
	b. Falling behind in regard to work-related duties (20.1%)	The feeling that one will return to a mounting workload and/or will have to catch up with work center happenings and job proficiencies
	c. Flying currency (16.1%)	The potential for a crew member to go noncurrent
2	Time away from family/home (51.6%)	Time spent away from one's loved ones and personal life at home station
3	Lost career/work opportunities (18.5%)	The perception that one might miss out on opportunities presented while they are absent and/or the opportunity cost of attending PME vice another career enhancement opportunity

minimized via innovative technologies. Recent research has suggested that image digitizing systems (eg, video, photography) and mobile computer devices such as smart phones and touch-screen tablets will be in greater use for education over the coming years.[18] We focus on 2 exceptional alternatives that can be employed to improve PME. Subsequently, we address how such technologies can be procured and sustained.

Mobile Technologies

The 2011 Horizon Report highlights 2 technologies that are already beginning to change the way complex subjects are taught in higher education: mobile technology and game-based learning.[19] According to Pew Internet and Mobile Life Project research, 66% of people between the ages of 18 and 29 own a smartphone, and the number continues to rise.[20] In the US, 55% of universities have activated mobile applications for students to use with functions that include providing school wide emergency alerts, making coursework accessible on-demand, and enabling collaboration for students on-the-go.[21] Apple demonstrates these capabilities in an application called iTunes University[22] which allows faculty to create courses and disseminate material using PDF documents, e-books, videos, and other media to provide cheap online courseware to students around the world.

Many highly regarded institutions (including Stanford and MIT) are currently using iTunes University to provide content to their students on both Windows and Macintosh operating systems. The use of mobile applications in PME would allow the Air Force to provide coursework to students on devices the students already own and use, which will likely help enhance the richness of discussion and courseware that was cited by 28.2% of the study's participants as being important (Benefits item 4 in the Table).

While mobile technologies present a tenable solution, one must also factor software and hardware costs into the decision-making process. For example, a mobile application can cost as much as $250,000 to develop.[23] Another consideration is the cost to secure such a network.[24] We believe a full cost-effectiveness business case is an essential element before determining how to implement Learning Air Force should leadership pursue that course of action.

Gaming Technologies

Mobile communications devices may be suitable to provide videos, readings, and other coursework to students, but advancements in gaming technology offer the Air Force an opportunity to create a virtual learning environment that can potentially meet many of the current PME objectives while retaining some of the intangibles previously mentioned. The current outdoor, hands-on leadership lessons create an environment designed to prompt students to apply effective problem-solving, teambuilding, leadership, and communication techniques. Our results suggest that such practical application of course material is an important benefit of in-residence PME attendance.

The US Army has already adapted virtual environments to training, working with the commercial gaming industry to produce complex environment simulators. In August of 2012, the Army unveiled the Dismounted Soldier Training System (Figure 1), designed to place soldiers in a virtual environment to explore terrain, interact with civilians and enemy combatants, coordinate tactics, and train similarly to how they fight in the real world.[25] The Army Program Executive Office for Simulation, Training, and Instrumentation partnered with programmers from commercial software developers to use the CryEngine 3 graphics engine to create a realistic virtual environment, which may be useable to supplant or supplement the learning facilities cited by the study's participants as important (Benefits item 6 in the Table). CryEngine 3 is the latest version of the graphics engine used to develop the popular Crysis video game series. Indeed, this framework could be used in the development of Air Force PME software focusing on retaining intangible benefits of in-residence PME, such as networking, rich discussion, and practical application of course material, while executing learning from a distance.

Many new games require players to use the same principles in order to be successful. As Gee[26] argues:

> Digital games are, at their heart, problem solving spaces that use continual learning and provide pathways to mastery through entertainment and pleasure. Not surprisingly, there has been a growing interest recently in so-called serious games that involve learning the sorts of domains, skills, or content that we associate with school, work, health, citizenship, knowledge, construction, or community building, and not limited to pure popular form of entertainment…

In the past, computer games were designed for entertainment purposes. However, new games have become complex enough to fuse education and entertainment. Game developer Valve demonstrated this new fusion when it released Portal 2 in 2011. The game, which features a cooperative mode, puts multiple geographically separated players in a 3D environment and requires them to think critically to solve puzzles of increasing complexity. The Associated Press named Portal 2 the game of the year in 2011 and more than 3 million copies of the game have sold.[27] Valve has even released an educational tool based on the game called *Teach with Portals*, a classroom version of the game that allows teachers to build lesson plans around concepts found within the game.[28]

Software Collaboration Tools

Many sophisticated collaboration tools are now available for small scale electronic platforms. The Air Force could easily use existing packages augmented with commonly used communications methods to achieve a robust

Figure 1. Soldiers training with the Dismounted Soldier Training System.

collaboration environment through the use of personal electronic devices. The easiest and most cost-effective solution would likely be to use the Air Force's Blackboard and DoD's Defense Connect Online software solutions. Blackboard could be used to deliver academic content similar to how it is used with the in-residence portion of PME. Students could access Blackboard on their personal computers or personal electronic devices. Defense Connect Online could then be used to deliver real-time or recorded seminars to students and afford them a place to meet in a virtual environment, which would help to carry forward the intangible benefits of rich discussion and communication feedback. The Connect mobile application provides the capability of video conferencing from a phone. For familiarity purposes, students could choose to use other video technologies, such as Skype, provided they record and save conferences for instructor review. Indeed, there is a variety of commercial off-the-shelf video teleconferencing platforms that could be used by the Air Force and other services.

Software Support Considerations

To properly implement these and other education-based technology, it is essential the infrastructure is both available and capable of supporting the systems. We provide several approaches to address this concern.

Legacy and Aging Technology Support

Support for aging infrastructure and hardware is a key consideration when deciding on the appropriate platform for a given software solution. Software requirements do not often change after an initial release. What must be examined is the level of sophistication for which the Air Force or other services can effectively plan during its initial course software deployment. This limitation will determine number of concurrent users, the visual complexity, and overall processing capabilities for the generation of technology being studied. Air Force communication squadrons typically anticipate and budget to replace user workstations every 2 to 3 years, which approximately agrees with Moore's law* for expected hardware growth. In 2010, the average American upgraded their mobile device every 21.7 months.[30] By tailoring a software solution to accommodate personal electronic devices and to more specifically target a smaller subset of Android and Apple iOS devices, the Air Force can effectively obviate a communications squadron update for educational devices cycle.

In the event that the Air Force must maintain a small collection of tablets or small media devices at education offices, it must be noted that these devices are cheaper than workstations and typically have a longer usable lifetime. The update time frame, which is consistent between the government and the commercial market, would be the approximate amount of time Air Force education software should reasonably be required to support older hardware. This is typically 5 to 7 years. Air Force control over education software will drive device replacement and update. If major versions and updates to the curriculum can be planned for approximately every 3 years, then such updates will be able to take advantage of hardware modernization. Software, on the other hand, will not require as frequent updating. For comparison, the simulation software used for war gaming at Squadron Officer School could be used as an example. This software is relevant both educationally and visually, and is almost a decade old. Another example can be found in America's Army 3, a free game released by the US Army in 2009 (Figure 2). It is a technologically advanced game that is still relatively popular on the internet. These 2 examples demonstrate that strong applications can be created for platforms well within the anticipated hardware cycle limits. By catering to personal electronic devices, the requirement to support legacy or very old equipment is reduced to supporting equipment only a few years old.

Rapid Procurement and Curriculum Updates

Speed and agility are keys in the cyber domain. These keys translate to any technological capability, including education. However, there are many barriers to the adoption and use of educational innovations.[31] A computer-based course affords the Air Force rapid updating if control is appropriately managed at the correct level. The idea of rapid updates or acquisitions is familiar to the Air Force community at large as Big Safari. The Big

Figure 2. America's Army 3 video game opening screen.

*Gordon E. Moore, cofounder of Intel Corporation, stated that the number of transistors placed on integrated circuit chips doubles every 24 months. His observation has proven fairly accurate, in part, as a self-fulfilling prophecy: circuit manufacturers use Moore's law in their strategic planning.[29]

Safari concept "is used to accomplish special projects on a quick-reaction basis" to deliver time-sensitive capabilities in an expedited fashion.[32] The positive lessons learned from the Big Safari program could be applied to the PME environment as a means to keep up with the evolving curriculum and the continuous updating of technology to support it. The presentation of updated and approved course material should not be stifled by a cumbersome technological solution. An agile technological solution would provide an environment to allow for a rapid update of the accredited material.

CONCLUSION

As the Air Force continues to evolve in order to sustain its position as the most powerful air, space, and cyber force in the world, the way it conducts its PME must also evolve. As General Welsh states in his Vision for the United States Air Force:

> Education and training are the foundation of our airpower advantage. To maintain this advantage in the future, we must safeguard and reinforce that foundation. All Airmen, whether teacher or student, have a role in ensuring that we remain the most technically proficient, best-educated, and best-trained air force in the world. We will maximize our Airmen's potential by refining our development programs to move beyond classroom-based instruction and incorporating leading-edge educational concepts. Through a personalized, career-long building block approach, we will eliminate duplicative and extraneous training, returning valuable time to our Airmen.[33]

The Learning Air Force approach might offer a viable roadmap for such change. Regardless of the specific way forward, the intangible benefits of today's PME must be retained and the existing drawbacks diminished. Focusing on the Air Force's program, we provided a qualitative content analytic examination of the intangible benefits and drawbacks of in-residence PME; we provided prospective methods to retain the benefits and minimize the disadvantages; and we synthesized our research with the literature to propose the adoption of innovative technologies that can enhance the PME experience. Following our suggestions can reduce costs, improve the quality of education, expand the scope of the education experience, and potentially increase student enjoyment. Further research in this area should extend the analysis to the other services and synthesize the findings with the current study to strengthen the results. Other research opportunities exist as well. An experiment or quasi-experiment, designed to empirically evaluate the affect of the intangibles on PME outcomes is an obvious next step. Indeed, while the unit of analysis in our study is the Air Force company grade officer, the net benefits of a robust PME system are not individual-level outcomes; they are organizational-level outcomes and can be applied across all services. It is, in part, through a well-educated officer corps that the US military services will continue to meet their commitments and execute their roles in the National Security Strategy.

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AUTHORS

Capt Hazen is the Maintenance Operations Officer of the 911th Air Refueling Squadron, Seymour Johnson Air Force Base, North Carolina.

MAJ Weigel is an Assistant Professor, Army-Baylor Graduate Program in Health and Business Administration, US Army Medical Department Center and School, JBSA Fort Sam Houston, Texas.

Maj Overstreet is an Assistant Professor, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio.

To Change or Not to Change a Multiple Choice Answer

Don Johnson, PhD, RN
Susan Anderson, MSN, RN
Sabine Johnson, MS

ABSTRACT

It is a common belief that changing answers on multiple-choice examinations is detrimental, and such action usually results in changing from right to wrong. Over the past 60 years, studies have shown that changing answers on multiple-choice examinations is generally beneficial. The misconception regarding answer changing behavior may be perpetuated by faculty despite evidence to the contrary. As a part of the US Army Graduate Program in Anesthesia Nursing process improvement program, the investigators examined answer changing behaviors of nursing anesthesia students. The results of this evaluation supported conclusions from previous studies in that the odds of students changing from wrong to right was 72% and from right to wrong was 20%. Students should be informed about the benefits of changing answers on multiple-choice examinations.

THE PROBLEM

There is a widespread belief among educators and students that changing answers on a multiple choice test is detrimental. The common thought is that most students change their answers from right to wrong. This belief has been perpetuated by some faculty despite evidence to the contrary. Students are also affected by memories of past exam performances. Memories of changing answers from right to wrong have more emotional impact than wrong to right and, therefore, tend to remain much more a part of acute awareness. Since 1929, there have been over 30 studies investigating issues related to answer changing behavior on objective tests. The consistent finding of these studies was that changing answers was indeed beneficial to the student's performance on objective tests. As a part of the US Army Graduate Program in Anesthesia Nursing (USAGPAN) process improvement program, the faculty queried USAGPAN students and found that the vast majority believed that if they changed their answers, they changed them from right to wrong.

Research studies concerning answer changing behaviors have been conducted on education majors, psychology majors, math majors, and medical students. However, there are no investigations of anesthesia nursing students relative to changing their answers on multiple-choice exams. The purpose of this project was to determine if anesthesia nursing students are more likely to change their answers from wrong to right, right to wrong, or wrong to wrong.

BACKGROUND AND LITERATURE REVIEW

As early as 1929, Mathews[1] investigated answer changing behaviors on objective or multiple choice tests in college students. He found that 24 of 28 representative students believed that when they changed their answers, it resulted in a change from right to wrong. An analysis of 22,000 multiple choice items on tests taken by these students revealed that there were 555 changes, and of these, 53% actually resulted in higher scores.

Geiger[2] investigated the benefits of changing multiple choice test answers in upper level college accounting courses. Of the 279 students studied, only 34 believed that changing answers would result in gaining points while 192 believed that changing answers would result in losing points. Fifty-three students believed that changing answers would have no impact on their score. Of those 279 students, 265 or 95% changed at least one answer on their tests, and 78% gained points attributed to changing answers.

Harvill and Davis[3] examined answer changing behaviors in 64 first year and 66 second year medical school students. They found that in multiple choice tests administered in 6 courses (biochemistry, gross anatomy, pathology, psychiatry, immunology, microbiology), students changed answers from wrong to right from 61% to 75.8% of the time. They also found that students made more changes on more difficult items. Harvill and Davis also investigated the reasons for changing answers. They asked students to select from a list of reasons why they changed their answers which included the following:

1. Reread and better understood the test item.
2. Rethought and conceptualized a better answer.
3. Gained information from another test item.
4. Gained information from the instructor.

5. Remembered more information.
6. Used a clue or cue within the test item.
7. Made a clerical correction.
8. Corrected a mathematics error.
9. "Gut Feeling" that the new response was a better response.
10. Replaced one guess with another.
11. Other.

The two reasons for changing answers most often selected were rethought and conceptualized a better answer (accounting for 34.8%), and reread and better understood the item (accounting for 23.2%). Interestingly, these students changed from wrong to right 66.3% of the time which was consistent with other findings in the literature. Answers changed because of clerical or mathematical correction accounted for only 5% of the reasons selected but were associated with an 87.5% incidence of changing from wrong to right.[3]

Kruger et al[4] investigated the reasons for the belief in the test taking strategy of sticking with the first answer/first instinct. They conducted studies on 1,561 students who completed a multiple choice midterm exam in psychology. They found in 3,291 changed answers, 51% changed from wrong to right and 25% changed from right to wrong. They compared the actual results with the student predicted results and found that students predicted that they would change from wrong to right 33% of the time and from right to wrong 42% of the time. The investigators investigated why the students overestimated the effectiveness of staying with their first instinct and underestimated the effectiveness of changing an answer. They found that changing an answer produced more regret and frustration even though the end product was no different than sticking with an answer when it was wrong. This lead to more self-recrimination and the experience was then more engrained in the students' memory. The investigators postulated that memories caused by action (changing an answer) are stronger than those caused by inaction (staying with same answer), which serves to perpetuate the belief of sticking with the first instinct.

Bauer et al[5] examined the answer changing behaviors of 79 third-year medical students. They found that 72 of 79 students changed at least one answer on a general medicine exam, and of those students, 48.2% changed from wrong to right while 21.6% changed from right to wrong. They also found that students who changed their answers improved their test scores by an average of 1.4 points. Additionally, these researchers investigated the effects of informing one group of students of the benefits of changing answers. Those students who received information about the benefits of changing answers changed more answers than those who had not received such information. They also subsequently scored higher on their exams, although the difference was not significant.

Di Milia[6] examined the tendency of students at both the graduate and undergraduate level to change answers. Di Milia found that although the overall percentage of answers changed was low (1% to 2% of all answers reviewed), over half the students changed at least one answer, and the scores were improved for those who did.

PROBLEM STATEMENT

There have been no investigations examining the answer changing behaviors of nursing anesthesia students.

METHODS

This process improvement project used a retrospective descriptive evaluation method. The sample consisted of 34 students enrolled in the US Army Graduate Program in Anesthesia Nursing. Twenty-seven were Army Nurse Corps officers, 3 were in the US Air Force, and 4 were from the Veterans' Administration. Eleven of the 27 Army students were direct accession. The age ranged from 28 to 53 years. The rank ranged from second lieutenant to lieutenant colonel.

The investigators reviewed 9 multiple choice exams completed during Clinical Anatomy & Physiology 1 and Clinical Anatomy & Physiology 2. These courses have been taught by the same instructor for at least 15 years and the exam questions have established repeat reliability and validity.

All of the students' answer sheets from the 9 tests, consisting of 531 multiple-choice questions, were reviewed for erasures. There were 18,054 answers reviewed as determined by the calculation of 34 students times 531 questions.

A second reviewer provided feedback to confirm the interpretation for any marks about which the first reviewer was uncertain. There was no discrimination made in determining the specific reasons for answer changes. Erasures were counted as a change regardless of the reason, including clerical changes.

The total number of changes was calculated as follows: wrong to right (W-R); right to wrong (R-W); and wrong to wrong (W-W). If an individual changed an answer

multiple times on the same question, the final answer marked was the answer counted and the multiple erasures were counted as one change (whether it be from W-R, R-W, or W-W). An odds ratio of changing from each of the 3 possibilities was calculated. Seventy-five percent of the sampled students believed that they should not change an answer and that they should go with their first impression, although they did change.

RESULTS AND IMPLICATIONS

The results of this project were consistent with previous studies. The odds of changing from wrong to right was 72%; the odds of changing from right to wrong was 20%; and the odds of changing from wrong to wrong was 6.8%. There was a 3.6 times greater chance of changing from wrong to right compared to changing from right to wrong. There was a 10 times greater chance of changing from wrong to right compared to changing from wrong to wrong.

As a process improvement project, the investigators believe that students should be informed about the benefits of changing answers on a multiple choice exam. The results of this project as well as the findings from review of the literature are now incorporated into the curriculum of the test-taking strategies class presented at the beginning of each class year.

Sound decision making principles should be used in changing answers. Changing answers on a whim is not advocated. In an attempt to dispel some of the long-held myths regarding the results of changing answers on multiple choice tests, students should be informed of findings from this project and previous studies including the following:

- Students may gain information for one test item from other test items.
- Students reviewing their answers often discover they have misread or misunderstood the question and make changes accordingly.
- Students who change answers usually change from wrong to right.
- Reviewing an exam can have positive results as it is in review that students often discover they have made any mistakes and can make appropriate corrections.

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AUTHORS

Dr Johnson is a Professor and Director of Research, US Army Graduate Program in Anesthesia Nursing, US Army Medical Department Center and School, JBSA Fort Sam Houston, Texas.

Ms Anderson is the Senior Quality Assurance Specialist, US Army Graduate Program in Anesthesia Nursing, US Army Medical Department Center and School, JBSA Fort Sam Houston, Texas.

Ms Johnson is a Research Associate with the Geneva Foundation.

A New Volume in the Borden Institute Textbooks of Military Medicine Series

Pediatric Surgery and Medicine for Hostile Environments

Editors
COL Michael M. Fuenfer, MC, USA
COL Kevin M. Creamer, MC, USA

CAPT (Ret) Bradley Poss, USN

Military medicine has faced a steadily increasing challenge of providing care for critically ill and injured children in a variety of operational and humanitarian missions. Civilian populations have accounted for a growing percentage of combat casualties due to the evolving nature of war. This increase is demonstrated by the comparison of civilian casualties during World War I, which totaled less than 20% of all deaths, to recent conflicts in which that total has been as much as 80%. Children, due to their innate physiological and developmental vulnerabilities, often make up a disproportionate share of victims and have been shown to have higher mortality rates than adults in combat surgical hospital emergency admissions. Complicating this increasing prevalence of critically ill and injured children is the fact that healthcare providers, outside of pediatric and pediatric surgical subspecialty trained individuals, have limited training and experience in this area. Although several pediatric critical care and pediatric surgical textbooks have been written, many are voluminous books with extensive physiological and research focus, and, more importantly, are not focused on the unique challenges faced by the military.

Thankfully, the Office of The Surgeon General of the Army and the Borden Institute have recently released a revised volume of the Textbook of Military Medicine series that addresses this gap. *Pediatric Surgery and Medicine for Hostile Environments* is edited by COL Michael M. Fuenfer (Senior Surgical) and COL Kevin M. Creamer (Senior Medical and Critical Care). Both editors have extensive experience in the care of critically ill and injured pediatric patients in academic and operational situations. In addition, they recruited numerous subject matter experts to contribute to individual chapters.

The book is logically organized with 3 sections encompassing resuscitation and critical care, surgery, and medicine topics. The resuscitation section begins with an excellent overview of the approach to the pediatric trauma patient and advances to topics such as anesthesia, vascular access, mechanical ventilation, and others. This first section concludes with a chapter on aeromedical transports in a hostile environment which covers unique pediatric physiological and logistical issues.

The surgical and medical sections are each laid out by systems. Together they cover a wide spectrum of diseases that a practitioner might face, including common and uncommon conditions. Chapters are well organized and cover presenting symptoms, diagnosis, and recommended treatment for each disorder. Surgical chapters cover the full range of pediatric surgical subspecialties including burns, orthopedics, ophthalmology, and otolaryngology as well as less commonly covered subjects such as urology and dental. The medicine section begins with chapters on fluid and electrolytes and general nursing care, then covers a variety of diseases organized by systems before concluding with chapters on unique pediatric aspects of heat and cold injuries; chemical, biological, radiological, nuclear, and explosive injures; and pharmacotherapeutics.

All chapters are primarily written in a bulleted format with useful tables throughout, thus providing a large amount of information in a concise format. Chapters

vary in their use of figures, but those that are included are of high quality and complement the information within the text. The majority of chapters have very limited physiology and epidemiology discussions, but that is not the purpose of this book since larger reference books are available for those so inclined. It should also be noted that this book is not intended to be a reference for planning and responding to environmentally caused humanitarian disasters where public health resources would be more warranted. This book is perfectly tailored to its intent as stated in the title, *Pediatric Surgery and Medicine for Hostile Environments*.

I highly recommend this book to every deploying medical provider who might be faced with the unique challenges of providing pediatric critical and surgical care in a combat and/or austere environment. Further, it should be a standard reference at military treatment facilities located in combat and/or austere environments. Active duty military medical personnel may obtain one complimentary book directly from the Borden Institute using an online order form (http://www.cs.amedd.army.mil/borden/BordenOrder.aspx). The book may be purchased either through the Borden Institute (202-512-1800) or the Government Printing Office (http://bookstore.gpo.gov/).

AUTHOR

CAPT (Ret) Poss is the former Director of Graduate Medical Education and Chairman of Pediatrics at the Naval Medical Center San Diego as well as a former amphibious task force surgeon and 3rd Fleet Surgeon. He is currently a Professor of Pediatrics at the University of Utah and Medical Director of the Pediatric Intensive Care Unit at the Primary Children's Hospital in Salt Lake City.

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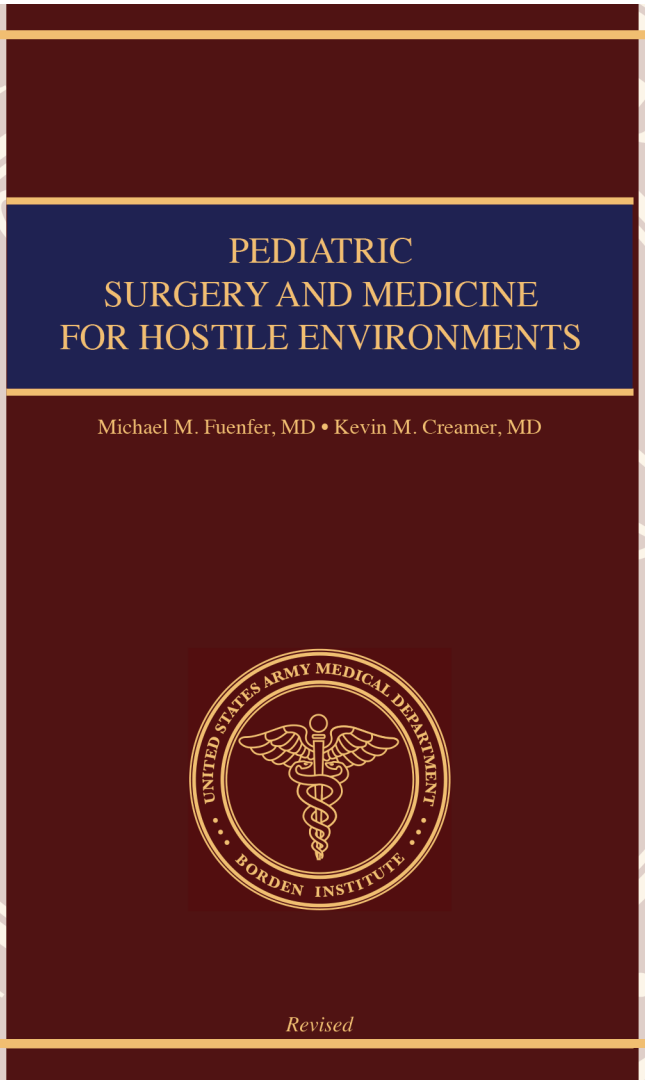

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Abstracts of Podium Presentations from the 3rd Annual Academy of Health Sciences Graduate School Research Day

The following research abstracts were presented on December 11, 2013, as part of the 3rd Annual US Army Academy of Health Sciences Graduate School Research Day at JBSA Fort Sam Houston, Texas.

Development of a Traumatic Brain Injury Assessment Score Using Novel Biomarkers Discovered Through Autoimmune Profiling

Buonora JE, Mousseau M, Latour L, Diaz-Arrastia R, Pollard H, Rizoli S, Baker A, Rhind S, Mueller G
Uniformed Services University of the Health Sciences Program in Neuroscience

Purpose/Hypothesis: At present, there is no effective method to objectively assess mild traumatic brain injury (mTBI). The underlying hypothesis for this investigation was that brain-specific autoantibodies can be used to identify proteins that will serve as circulating biomarkers for the assessment of mTBI. The goals of this research were to identify novel brain proteins targeted by TBI-induced autoantibodies and to determine if these proteins contribute to a circulating biomarker signature useful in the diagnosis and assessment of mTBI.

Participants: A tissue-sharing agreement was established with 2 separate ongoing clinical TBI studies (Cohort 1: mild to moderate; Cohort 2: moderate to severe). Patients recruited for both studies were adults admitted to an emergency room with a diagnosis of head injury. Admission plasma samples were obtained from Cohort 1 (n=154) and 2 to 7 days post-injury. Cohort 1 was evaluated against commercially purchased controls. Cohort 2 (n=106+44 controls) had plasma samples obtained at admission, 6, 12, and 24 hours post-injury.

Design/Methods/Materials: Autoimmune profiling for TBI-induced autoantibodies was carried out by immunoblotting in rodents and protein microarray in humans. Serum from control and brain-injured rats was used to interrogate immunoblots of the entire rat brain proteome fractionated on large 2-dimensional gels. Proteins revealed by autoreactive immunoglobulins were then mapped to corresponding protein gels and identified proteomically by peptide mass fingerprinting. A related analysis of the human autoimmune response to TBI was performed using a protein microarray platform containing over 9,000 human proteins. Within-subject comparisons were made between samples that were collected immediately following TBI and 30 days post-injury, times that would reveal the full expression of a TBI-induced autoimmune response. Findings from the 2 autoimmune profiling approaches were used to create a list of 12 proteins considered to be the best candidates for having roles as novel TBI biomarkers. Immunosorbent electrochemiluminescent assays were developed for two of the novel biomarker proteins (peroxiredoxin 6, cyclin-dependent kinase 5) and 6 established neuropathology biomarkers. Study samples were interrogated against the newly established panel of biomarkers.

Findings/Results: The mean plasma values of 5 of the candidate TBI biomarker proteins in Cohort 1 (mild/moderate) were significantly ($P \leq .03$ to $P < .0001$) elevated at both admission and 2 to 7 days post-injury compared to controls. The mean plasma values of 5 of the candidate TBI biomarker proteins in Cohort 2 (moderate/severe) were significantly ($P \leq .01$ to $P < .001$) elevated at admission, 6, and 12 hours post-injury compared to controls. The summation of the fold-changes observed in the plasma levels of 5 biomarkers differentiated control samples from both the mild to moderate cohort and the moderate to severe, with scores of 5, 17, 32 respectively.

Conclusions: The findings demonstrated how fold changes in plasma levels of a panel of biomarker proteins could be formulated to produce a TBI Assessment Score that identifies mTBI in humans. This TBI Assessment Score is based upon definitive measures of circulating biomarkers.

Value/Relevance: This research has 2 major outcomes which are medically relevant in the mTBI research. First, it demonstrates that autoimmune profiling can be used to identify novel biomarkers for TBI. Second, this investigation demonstrates for the first time that a profile of biomarker responses can form the basis for a diagnostic assessment score that is sensitive for the detection of mTBI and can be standardized across clinical settings.

Effects of Trigger Point Dry Needling on Pain and Disability in Individuals With Patellofemoral Pain Syndrome

Sutlive TG, Golden A, Harm K, Morris W, Morrison J, Moore JH, Koppenhaver S
US Army-Baylor University Doctoral Program in Physical Therapy

Purpose/Hypothesis: Patellofemoral pain syndrome (PFPS) is a prevalent knee disorder in military populations. A novel yet increasingly popular treatment for PFPS is trigger point dry needling (TDN). The purpose of this study was to determine if TDN is more effective at reducing pain and disability than a sham treatment in individuals with PFPS.

Participants: 40 military health care beneficiaries (24 male) with a clinical diagnosis of PFPS and no competing knee pathologies. The participants' mean age was 30.8±5.4 years, and a mean body mass index of 26.8±3.8.

Design/Methods: Participants underwent a standardized clinical examination and were randomized into a TDN treatment group or a sham treatment group. The TDN group received treatment that consisted of insertion of an acupuncture-like needle into the most painful 6 sites of the quadriceps femoris muscles of the symptomatic lower extremity based on a palpation examination. The sham grouped received a simulated treatment with a sharp object and guide tube without puncturing the skin. The same investigator performed all TDN and sham treatments. Participants and data collectors were blinded to treatment group. Outcome measures of pain, disability, and overall status were self-reported by participants on a Lower Extremity Functional Scale, Kujala Anterior Knee Pain Scale, and Global Rating of Change Questionnaire. Participants also performed 3 functional activities (squat, step-up, and step-down) and rated their knee pain during each activity on a numeric pain rating scale (NPRS). Outcome measures were collected before treatment and were reassessed immediately after treatment and again at a 72-hour follow-up appointment. The data were analyzed with a mixed-model 2×3 repeated measures analysis of variance, with independent variables being Group (TDN treatment and sham control) and Time (pretreatment, immediately posttreatment, and 72 hours posttreatment). The hypothesis of interest was the Group|Time interaction. The alpha-level was set a priori to .05 using a 2-tailed test.

Results: There were no statistically significant differences in baseline characteristics between the 2 groups. Both groups exhibited a clinically meaningful reduction in pain and disability based on the composite NPRS score at 72 hours posttreatment, but there was no significant difference between the groups (P=.608). Neither group demonstrated a statistically significant nor clinically meaningful difference in any other outcome measure from baseline to 72 hours posttreatment.

Conclusion: These data suggest that TDN treatment is not more effective than a sham TDN treatment at reducing short-term pain and disability in individuals with PFPS when used as an isolated treatment approach.

Value/Relevance: Though not statistically significant, the greater point estimates of clinical improvement in the TDN group suggest the need for further investigation. Future studies should include multiple sessions of TDN, longer follow-up times, alternate needling sites (eg, hip muscles) and TDN treatment in conjunction with therapeutic exercise.

Assessing Motivation for Eating and Intuitive Eating in Military Service Members

Cole RE, Clark HL, Heileson J, DeMay J, Smith M
US Military-Baylor University Graduate Program in Nutrition

Purpose/Hypothesis: To assess the motivations of normal weight versus overweight service members for eating in order to tailor future nutrition intervention programs. Research suggests there are 3 motivations for eating: environmental and social triggers, emotional influences, and intuitive (physiological hunger/satiety). The objective of this study is to determine if individuals with a normal body mass index (BMI) are intuitive eaters (motivated to eat for physical reasons), while overweight individuals are motivated by other factors.

Subjects: Of the 295 participants, the majority were male (71%), Caucasian (56%), Army (91%), enlisted (71%), a mean age of 30.1±8.6 yr, and BMI of 27.0±4.2 kg/m^2. The majority of participants had more than 2 years of college education (53%), never smoked (67%), performed aerobic activity at least 3 times per week (76%), and were physically active greater than 30 minutes per session (57%).

Methods: Cross-sectional, descriptive study in which participants were recruited from fitness centers, hospitals, and training environments at Joint Base San Antonio Fort Sam Houston (70%) and Joint Base Lewis-McChord. Height (cm) and weight (kg) were measured in duplicate and averaged. BMI was calculated as m/kg^2 and dichotomized as normal (18.5 to 24.9 kg/m^2) or overweight (≥25 kg/m^2). Two validated surveys were administered: Motivation for Eating Score (MFES; 43-item 5-point Likert scale) and Intuitive Eating Score (IES; 21-item 5-point Likert scale). Descriptive data were reported as frequency and mean±SD. Mann Whitney T-test and nonparametric correlation analyses were conducted for BMI category with MFES, IES, and subscores. Statistical significance was set at α=0.05 with an 80% power.

Results: When subjects were dichotomized by BMI status, 64% were overweight (n=190). About 74% of normal BMI subjects accurately perceived themselves to be at the right weight whereas 35% of overweight subjects incorrectly perceived themselves to be at the right weight. Of the high BMI group, 65% were attempting to lose weight, compared to the 27% of the normal BMI group. There was a significant difference in MFE subscales between normal and overweight subjects, such that normal weight were more likely to be physical eaters (P=.001; r=-0.165) and less likely to be environmental/social eaters (P=.016; r=-0.117). There was no significance found between BMI groups and emotional eating and total IES; however, normal weight subjects tended to rely on hunger and satiety cues (P=.023; r=-0.112) more than overweight subjects.

Conclusions: Normal weight participants were more likely to eat for physical/intuitive reasons compared to overweight participants. There is a disparity between actual BMI status and perceived weight, especially in overweight subjects, which potentially disrupts the ability to eat intuitively and propagates dieting behaviors. Increasing the awareness of nonintuitive eating influences and providing targeted strategies to increase intuitive eating may improve eating behaviors, self-perception, and, ultimately, BMI status.

Relevance: The DoD spent approximately $1.9 billion in healthcare costs associated with obesity in 2009, adversely affecting military readiness. In 2010, the DoD lost approx $60 million in training costs and discharges associated with approximately 1,200 initial enlistees failing to meet the height and weight standards within their first year of service. Current models of weight management education focus on providing nutrition information rather than behavior change. These results may support transitioning away from a dieting model for weight management to one of following internal physiological cues to achieve a normal BMI.

Shaping Student Attitudes Towards Healthcare Teams Through a Hybrid and an Online Interprofessional Education Course: Results From a Pilot Study

Sanchez-Diaz PC, Parker RA, Valdes MS, Ramirez MN, Narayanan S, Dominguez DG, Jones ME
University of the Incarnate Word

Purpose/Hypothesis: Patient safety and issues of quality health care are driving forces in the transformation of health professions education and highlight the need for redesigned systems of care. In 2011, the Interprofessional Education Collaborative Expert Panel developed a set of core competencies considered essential for preparing healthcare professionals and to address policy and accreditation issues. Interprofessional education (IPE) occurs when students from 2 or more professions learn about, from, and with each other in a collaborative environment. Creating an IPE calendar that accommodates student schedules from different healthcare programs is difficult, especially if the involved professional programs are located on different campuses. Little is known about the effectiveness of online education in meeting the goal of preparing students in the interprofessional competencies. The purpose of this study was to compare the effects of a hybrid and an online IPE course on student attitudes toward healthcare teams.

Participants: All 20 students participating in the hybrid IPE activities completed the pre- and postparticipation measurements. Thirty-one students volunteered for the online IPE activities and 14 completed pre- and postparticipation measurements (40% return rate).

Design/Methods: Both hybrid and online courses were completed within a minisemester (8-week period) and both combined teacher-centered and student-centered approaches. We used the Attitudes Towards Health Care Teams (ATHCT) Scale survey as pre- and posttest measurement to assess the impact of a hybrid and an online IPE course in the attitudes of healthcare professional students. All statistical analyses were performed with SPSS Statistics software (IBM). Results were considered statistically significant when the *P* value was less than or equal to .05.

Findings/Results:

1. Baseline attitudes in hybrid and online cohorts: There were no statistically significant predidactic differences between groups in any of the 3 survey subscales "team value" ($F=0.845$, $P=.365$), "team efficiency" ($F=0.451$, $P=.507$) and "shared leadership" ($F=0.240$, $P=.627$). There were no significant differences between professions in baseline ATHCTS total scores ($F(4,29)=1.899$, $P=.137$) or posttest scores ($F(4,29)=0.373$, $P=.826$).
2. Effect of hybrid versus online IPE course on student attitudes toward health care teams: Students in the online course had significantly higher scores on the team efficiency subscale than students in the hybrid course ($F(1,32)=6.135$, $P=.019$).
3. Within group differences for hybrid and online IPE course on student attitudes: Students in the hybrid course had significantly higher "shared leadership" postdidactic subscale scores ($t_{19}=-3.209$, $P=.05$) while students participating in the online course showed an increase on "team efficiency" score at the end of the program ($t_{13}=-2.801$, $P=.015$).

Conclusions: Comparable attitude changes were observed in participants after completion of the hybrid and online courses with statistically significant improvements in "shared leadership" and "team efficiency" attitudes in the hybrid and online cohorts respectively. The findings of this pilot study suggest that online education may be a valid approach to the didactic component of IPE as it can ease scheduling conflicts, a significant challenge in interprofessional education.

Value/Relevance: To our knowledge, this is the first study that compares the effects of hybrid and online IPE courses on attitudes towards health care teams that involves health administration, nursing, pharmacy, physical therapy and optometry students. Future work including a larger number of subjects along with non-IPE professional students as control will enable us to more fully determine the effects of online and hybrid interprofessional education courses on student attitudes towards healthcare teams.

The Effect of Patient-Centered Medical Home Implementation on Cervical Cancer Screening Compliance Rates at the Screaming Eagle Medical Home

Harasimowitz E, Hawkins M, Jeremy T, Cuyler M, Mangelsdorff AD, Kim F
US Army-Baylor University Graduate Program in Health and Business Administration

Purpose/Hypothesis: To analyze the change in cervical cancer screening compliance rates in accordance with Healthcare Effectiveness Data and Information Set (HEDIS) metrics to determine the effect of patient-centered medical home (PCMH) implementation on preventive care at Fort Campbell, Kentucky. The PCMH is a primary care model that focuses on preventive services and provider continuity. Cervical cancer screening is a vital preventive screening procedure that, according to literature, will increase under the PCMH model.

Subjects: Women aged 24 to 64 enrolled in the Fort Campbell Parent DMIS ID from January 2011 to December 2012 (n=155,924) were examined for compliance with the HEDIS metric for cervical cancer screening. This metric requires women to receive a pap smear every 3 years starting at age 21 in order to meet compliance standards. Patients were included in this study if they had 3 months of enrollment and at least one primary care encounter between January 2011 and December 2012. Patients were categorized as PCMH if the patient was enrolled in the Screaming Eagle Medical Home or non-PCMH if the patient was enrolled at Blanchfield Army Community Hospital.

Materials/Methods: We conducted a logistic regression to predict the effect of PCMH implementation on cervical cancer screening. This study further controls for age, marital status, health status (measured by number of patient visits), beneficiary category, and socioeconomic status (determined by sponsor rank) and time.

Results: From January 2011 to December 2012, 19.9% of the total patient months were enrolled at the PCMH location. Compliance with cervical cancer screening was 80.3% at the PCMH location, and 75.8% at the non-PCMH location. Patients enrolled at the PCMH location were significantly more likely to be compliant with cervical cancer screening than those at the non-PCMH location (AOR=1.161; 95% CI, 1.123-1.200). Each control variable included in the model demonstrated significance ($P<.05$) in all categories.

Conclusions: The PCMH approach to primary care demonstrated improved cervical cancer screening compliance within the constraints of this study. Each independent variable included in this study significantly influenced the likelihood of enrollees' screening compliance. Further studies are needed to study the effect of PCMH on additional preventive measures.

Relevance: Within the last 3 years, the Military Healthcare System (MHS) has begun implementing the PCMH model as a way to curb rising healthcare costs and improve the overall patient population health status. This study is one of the first to examine the impact of this model on quality. Results could help inform policy makers both within and outside the MHS on the efficacy of PCMH towards improving healthcare quality as measured by compliance with preventive services.

Effect of Dry Needling on Infraspinatus Muscle Function, Shoulder Mobility, and Pain Sensitivity in Patients with Shoulder Pain

Koppenhaver S, Croy T, Trachtenberg R, Ciccarello J, Waltrip J, Pike R, Walker M, Flynn T
US Army-Baylor University Doctoral Program in Physical Therapy

Purpose/Hypothesis: It is postulated that dry needling enhances function and decreases pain in people with subacromial impingement syndrome (SIS). However, only a single case study to date supports this claim. Therefore, the purpose of this study was to investigate the effect of dry needling on shoulder muscle function, mobility, and pain sensitivity in subjects with SIS.

Subjects: Fifty-six volunteers with clinical symptoms of unilateral SIS (36 men, 20 women; aged 44.1±10.1 years; body mass index=28.4±4.6 kg/m^2; median months since initial SIS onset=11.23 (IQR 4.3, 36.9)) were recruited and completed the study.

Materials/Methods: Participants completed a standard history and physical examination including the Penn Shoulder Score (PSS) questionnaire, shoulder range of motion (ROM), pain pressure threshold (PPT), and ultrasound imaging (USI) of their infraspinatus muscles bilaterally during a submaximal isometric contraction. ROM measurement was performed supine for bilateral shoulder flexion, abduction, external rotation, internal rotation, horizontal adduction using a standard goniometer. PPT measurements were taken in 3 tender locations of each infraspinatus muscle with a digital pressure algometer. Percentage change in USI measured infraspinatus muscle thickness was from rest to contraction. Treatment consisted of dry needling to trigger points at 3 locations in each infraspinatus muscle. ROM, PPT, and USI measurements were repeated immediately after treatment and again 3 to 4 days later. After follow-up, participants were dichotomized into "clinical improvement" or "no clinical improvement" based on whether they surpassed the minimal detectible change of the PSS (≥11.4 points). Separate 2×3×2 repeated measures analysis of variance was conducted on ROM, PPT, and USI measures for shoulder (symptomatic vs asymptomatic), time (pretreatment, posttreatment, and 3 to 4 day follow-up), and clinical improvement (improved vs not improved).

Results: Initial PPT was statistically more pain sensitive in the symptomatic shoulder than on the asymptomatic shoulder (P=.003 to P=.023), and improved significantly after dry needling (P=.010 to P=.025). Significant interactions in PPT indicated that the decrease in pain sensitivity after dry needling was largest in the symptomatic shoulders (P=.034) of participants that improved clinically (P=.035). Similarly, ROM in each direction was initially statistically less in the symptomatic shoulder than in the asymptomatic shoulder (P<.001 to P=.012), and improved (increased) significantly after dry needling (P<.001 to P=.023). Improved flexion, abduction, and internal rotation ROM was greatest in the symptomatic shoulders (P=.001 to P=.038), while the improvements in external rotation and horizontal adduction was greatest in participants that improved clinically (P=.003 to P=.044). No significant changes in infraspinatus muscle contraction were found after dry needling in either shoulder regardless of clinical outcome.

Conclusions: Dry needling to the infraspinatus muscle increases shoulder mobility and pain pressure thresholds of symptomatic shoulders in subjects with SIS.

Relevance: Service members who experience shoulder pain due to SIS could possibly benefit from a single dry needling treatment, potentially decreasing lost duty time due to shoulder pain.

Mentors Offering Maternal Support (M.O.M.S.): A Military Intervention Program for Decreasing Prenatal Maternal Anxiety and Depression and Building Resilience

Weis KL, Walker KC, Lederman RP
US Military Education & Training Campus

Purpose: Explore the effectiveness of a mentored program to decrease prenatal maternal anxiety and depression while building resilience and coping.

Participants: Consented n=278; 50 Control and 48 Treatment have completed all elements of the program. The majority of the sample were wives of military service members. Twenty-eight participants were active duty.

Method: 278 pregnant women in their first trimester were consented and randomized to either a stress-intervention treatment (M.O.M.S.) arm or a standard prenatal care control arm. Self-report questionnaires included: sociodemographic information, pregnancy-specific anxiety, depression, family functioning, coping, and resilience. Mixed models were used to determine differences in the slopes across pregnancy between the treatment and control groups for each measure.

Results: The M.O.M.S. intervention group versus the control had statistically significant decreases in prenatal anxiety related to maternal identity formation (β=-0.85, $P \leq .02$); preparation for labor (β=-2.04, $P \leq .001$) and depression (β=-0.94, $P \leq .007$) over the course of treatment. They also had statistically significant increases for resilience (β=0.41, $P \leq .05$).

Conclusions: The M.O.M.S. program, a one-hour intervention every-other week during the first and second trimester of pregnancy, was shown to decrease prenatal anxiety and depression and increase resilience. Prenatal anxiety related to maternal identity formation and preparation for labor are predictive of preterm birth and low birth weight.

Relevance: The Surgeon General of the United States has urged the development of psychosocial interventions focused on decreasing maternal anxiety and depression. Military mothers and families are at an increased risk of maternal anxiety and depression and have requested unique military support groups led by peers.

The Effects of Epinephrine and Vasopressin on Survival from Cardiac Arrest Following Desipramine Overdose in a Porcine Model

MAJ Ken Gore, CPT Brian Gallahan, CPT Tammy King, CPT Heather Leal, CPT Brian Lowery, CPT Kyle Stevens,
1LT Allen Bolido, 1LT Jennifer Brady, Don Johnson, RN, PhD

US Army Graduate Program in Anesthesia Nursing

Significance

- In 2012 more Soldiers committed suicide than those who lost their lives in combat.
  - ✓ 349 Military Suicides
  - ✓ 313 Combat Deaths
- Every 80 minutes a veteran commits suicide.
- At least 20% combat veterans suffer from post traumatic stress syndrome (PTSD).
- Over 80% of PTSD patients suffer from another psychiatric disorder, commonly alcohol abuse or dependence.
- PTSD accounted for 52% of mental health diagnoses treated at Department of Veterans Affairs facilities.
- Patients with PTSD and alcohol co-dependence are at an increased risk for suicide.
- Data strongly suggest that there is a correlation between increased suicides and PTSD.
- Because of PTSD and other psychiatric conditions, health care providers have prescribed antidepressants at an all time high.
- Approximately 17% of deployed Soldiers were on at least one form of an antidepressant.
- Desipramine, an antidepressant, is one of the preferred medications for treating depression, alcohol abuse, and PTSD.
- An overdose of Desipramine may lead to cardiac arrest.
- According to the Advanced Cardiopulmonary Life Support (ACLS) guidelines, Epinephrine and/or Vasopressin may be used in conjunction with cardiopulmonary resuscitation (CPR).
- Based on limited evidence-based data, the American Heart Association (AHA) recommends 1 mg of Epinephrine or 40 units of Vasopressin (one time dose) be administered intravenous (IV) for patients in arrest
- No studies have investigated the most effective treatment (Epinephrine or Vasopressin) of cardiac arrest from an overdose of Desipramine.

Problem Statement

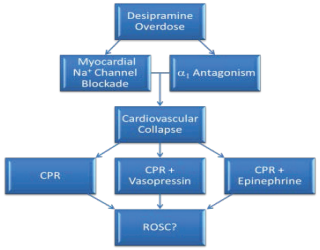
It is not known the most effective treatment of cardiac arrest for patients who have an overdose of Desipramine.

Research Question

The following research question guided the study:

Is there a statistically significant difference in survival between the use of CPR + Epinephrine; CPR + Vasopressin; and CPR only groups in the treatment of subjects in cardiac arrest from Desipramine?

Theoretical Framework



Methods

- The study was a prospective, between subjects design using 21 Yorkshire, adult male swine.
- Pigs were randomly assigned to one of three groups: CPR + Epinephrine (n = 7); CPR + Vasopressin (n = 7); or CPR only (n = 7) .
- Swine were acclimated for 4 days.
- Telazol® 5mg/kg and Glycopyrrolate 0.2mg were administered 10 minutes prior to general anesthesia.
- Isoflurane was used for anesthesia.
- An ear vein and the right carotid artery were cannulated for monitoring and for drug administration.
- Monitors were applied.
- Swine were allowed to stabilize for 10 minutes.
- A toxic dose of Desipramine (8 mg/Kg) was administered until there was a non-perfusing rhythm.
- Anesthesia was discontinued; after 30 seconds of a continuous nonperfusing arrhythmia, CPR was started using a mechanical device, the "Thumper."
- The Thumper was used to automatically compress the sternum at a predetermined depth of 1 1/2 inches at a rate of 100 beats per minute.
- Compressions were continued with ventilations with 100% oxygen at a ratio of 30:2 (compressions to ventilations).
- After two minutes of CPR, 1 mg of Epinephrine was administered to that group and continued every 3 minutes; 40 units of Vasopressin was administered one time to that group; or CPR only was used for that group without any medications.
- Every 2 minutes CPR paused. Pulse and rhythm were assessed.

TRISERVICE NURSING RESEARCH PROGRAM
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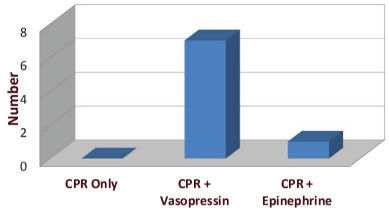
Methods Continued

- When the pigs in all groups were found to have either ventricular fibrillation or ventricular tachycardia, the investigators defibrillated them beginning with 200J and subsequently increased to 360J.
- If the treatment resulted in a return of spontaneous circulation (ROSC) defined as a sustainable rhythm that maintains a systolic blood pressure ≥ 60 mm Hg for 10 minutes, treatment was considered successful.
- The pigs were monitored for a total of 40 minutes if successful; otherwise the treatment was discontinued after 30 minutes. If the treatment did not result in ROSC, CPR was discontinued and documented as unsuccessful.

Success of Treatment by Group



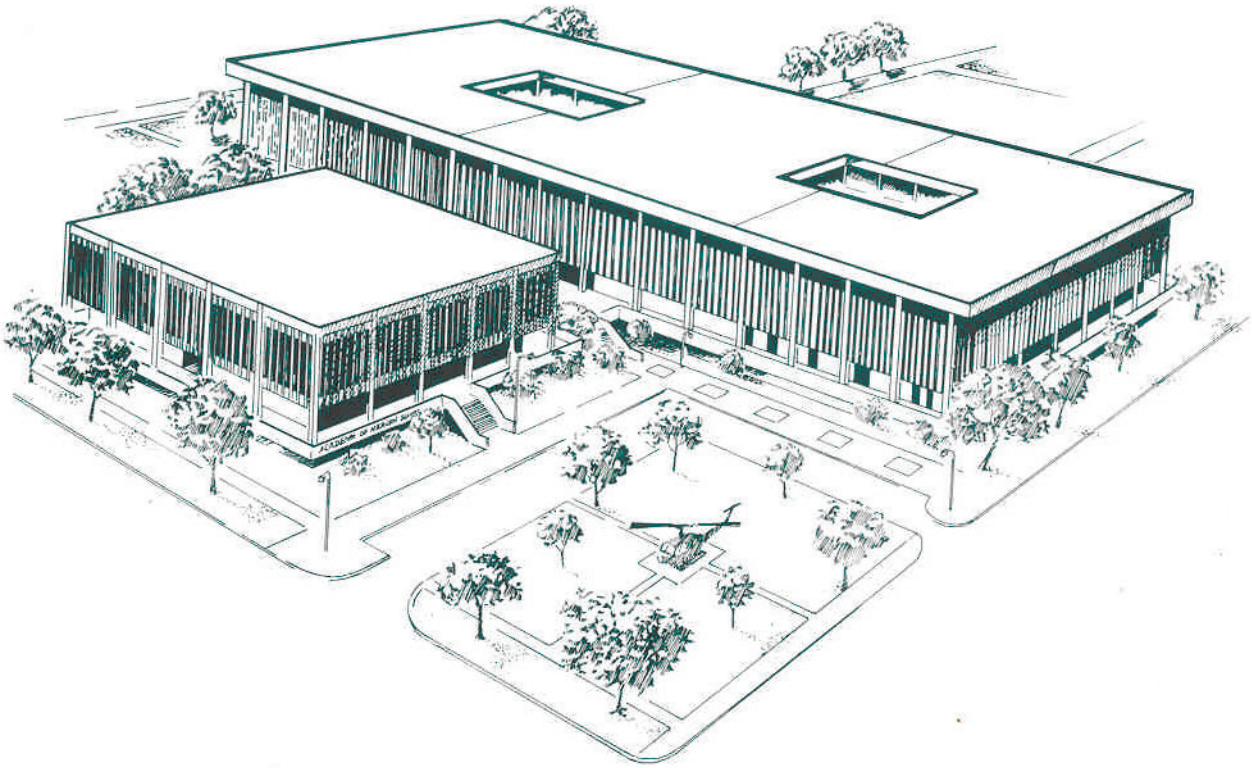
Results

- None of the pigs in the CPR only group and 1 in the Epinephrine + CPR group survived; all 7 of the pigs in the Vasopressin + CPR group survived. (See chart above)
- A multivariate analyses of variance (MANOVA) was performed on the pretest data that included weight, temperature, blood pressure, and pulse. There were no significant differences between the groups indicating that they were equivalent on those parameters ($p > 0.05$).
- The Fisher's Exact Test indicated that there was no significant difference between the CPR only and the Epinephrine + CPR groups ($p = 1.00$); a significant difference between CPR only and the Vasopressin + CPR groups ($p = .001$); and a significant difference between Epinephrine + CPR only and Vasopressin + CPR groups ($p = .005$).
- The odds of survival in the Vasopressin + CPR group was 225 times greater than CPR only ($p = 0.008$) and 65 times greater than Epinephrine + CPR group ($p = 0.015$).

Conclusions

- The results strongly suggest that Vasopressin + CPR is much more effective than CPR only or Epinephrine + CPR.
- Future studies should be implemented using humans.
- The results of this study has the potential of saving lives of patients who have an overdose of Desipramine.

The poster selected best of the presentations as part of the 3rd Annual Research Day held December 11, 2013, at the Graduate School, Academy of Health Sciences, AMEDD Center & School, Fort Sam Houston, Texas.



The headquarters and primary instructional facility of the Army Medical Department Center and School, Joint Base San Antonio Fort Sam Houston, Texas.

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SUBMISSION OF MANUSCRIPTS TO THE *ARMY MEDICAL DEPARTMENT JOURNAL*

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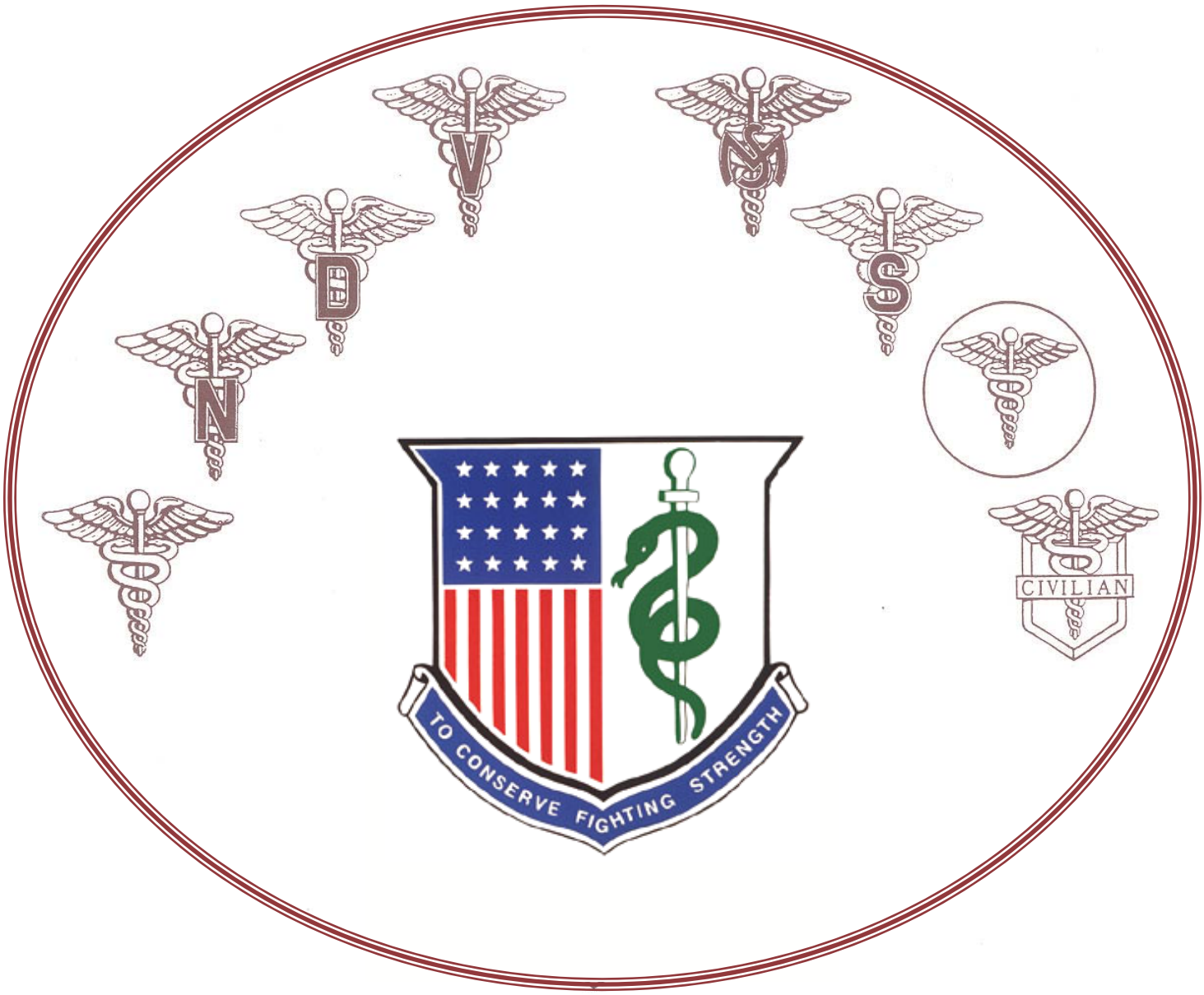

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