

JOURNAL OF HEALTHCARE, SCIENCE AND THE HUMANITIES





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Contributing Authors

Shaun Baker, PhD is Assistant Director of the VADM Stockdale Center for Ethical Leadership at the United States Naval Academy in Annapolis, Maryland. Dr. Baker is nationally regarded as a winning coach for the USNA Ethics Debate Team. He teaches both introductory philosophy and film in philosophy courses. His creativity is evidenced as the innovative webmaster of the Stockdale Center site.

Gary Barron, BA, BSc is currently completing the requirements for a master's degree in Sociology at the University of Calgary, and has been accepted at the University of Alberta to undertake a PhD. He holds a Canadian Institutes of Health Research award for his master's research, and has received a number of other awards for outstanding academic performance. He has worked for the Alberta Government on a number of health-related and knowledge translation projects.

Paula Chidwick, PhD is the Director Clinical & Corporate Ethics and Ethicist at William Osler Health System in Brampton, Ontario, Canada. She specialized in Bioethics at the University of Guelph and did a Fellowship at the University of Toronto Joint Centre for Bioethics. Dr. Chidwick has served on the Canadian Bioethics Society Executive, Health Canada's Scientific and Expert Advisory Panels. She currently serves on the Ministry of Health Critical Care Coaching Team.

Rose Ciccarelli, MA is the writer and editor for the VADM Stockdale Center for Ethical Leadership at the United States Naval Academy in Annapolis, Maryland. Her instructional design background has enhanced her numerous academic achievements, which includes work on films, plays, books, newsletters, and journal publications.

Nancy Crum-Cianflone, MD, MPH is an Infectious Disease Physician at the Naval Medical Center San Diego. Dr. Crum-Cianflone had a distinguished research career in the field of infectious disease. Her recent work has focused on understanding the human immunodeficiency virus (HIV) and the complications of this disease, including cancers. She is an adjunct Professor at San Diego State University and a Voluntary Associate Professor of Medicine at the University of California San Diego.

Christopher Culp, MD, FACP is Deputy Chief of the Navy Medical Corps. Dr. Culp is an Internal Medicine physician whose Navy career has included clinical, teaching, afloat and deployment assignments. He most recently served as deputy Commander for clinical services at Tripler Army Medical Center.

Patrick H. DeLeon, PhD, MPH, JD is Chief of Staff to U.S. Senator Daniel K. Inouye. He has served on Capitol Hill for nearly four decades. He is a former President and Fellow of the American Psychological Association and a member of the Institute of Medicine. Adjunct Professor of Doctoral Programs at USUHS, he was elected an Honorary Fellow of the American Academy of Nursing. He received the Order of Military Medical Merit in 1999.

Karen Faith BSW, MEd, MSc, RSW is a clinical ethicist, consultant and educator. Prior to studying bioethics at the University of Toronto, Karen had over 20 years experience in the fields of social work and adult education. Following the completion of a yearlong fellowship in clinical ethics, Karen later served as Director of the Ethics Centre at Sunnybrook Health Science Centre in Toronto. A noted speaker both nationally and internationally, Karen is an adjunct lecturer at the Factor-Inwentash Faculty of Social Work at the University of Toronto.

In This Edition

Joshua Fouts is Executive Director of Science House Foundation, a 501(c)(3) non-profit dedicated to inspiring the imaginations of students worldwide to pursue careers in science. He is a Senior Fellow for Digital Media and Public Policy at the Center for the Study of the Presidency and Congress.

Dianne Godkin, RN, PhD is Senior Ethicist with Trillium Health Centre, Mississauga, Ontario, Canada. Her education includes a Post Graduate Clinical Ethics Fellowship (University of Toronto), Doctoral and Master's Degrees in Nursing (University of Alberta) and a Baccalaureate Degree in Nursing (University of Western Ontario). She has extensive teaching, research, and clinical experience. Her publications include the book, *Living Will, Living Well: Reflections on Preparing an Advance Directive*, published in 2008.

Jenny Godley, PhD is an Assistant Professor in the Department of Sociology at the University of Calgary. Her broad research interests include the social determinants of health and the effects of social networks on health behaviors and outcomes. She has studied the impact of social class on obesity and disordered eating behaviors in adolescents and adults. Her current research uses social network analysis to examine interdisciplinary research collaborations and interprofessional relationships in health services.

Jason Guzman, MSN, CRNA is currently staff at National Naval Medical Center Bethesda, MD. Jason has recently graduated from the Uniformed Services University of the Health Sciences Nurse Anesthesia Program. He was a student in the program at the time this research study was completed.

Laurie Hardingham, BN, MA is recently retired from the position of Clinical Ethicist at St. Joseph's Health Care, London, Ontario, and as Assistant Professor in the Department of Physical Medicine and Rehabilitation, Schulich School of Medicine and Dentistry, University of Western Ontario. She is a member of the Organizing Board and Faculty of the Clinical Ethics Summer Institute (CESI). She completed Fellowships in Clinical Ethics at the University of Toronto Joint Centre for Bioethics.

Elizabeth Holmes, PhD is Director of Assessment at the VADM Stockdale Center for Ethical Leadership, at the United States Naval Academy (USNA) in Annapolis, Maryland. At USNA, she has also been Professor of Psychology, Leadership and Ethics. Dr. Holmes has led a distinguished career of teaching and research in psychology, health promotion, and ethical leadership. She serves the ethics center as its liaison to USNA's Academy Effectiveness Board.

Corry Jeb Kucik, MD, DMCC, FCCP teaches at the Navy Trauma Training Center and is an Assistant Professor of Anesthesiology and Critical Care at the University of Southern California. He is a graduate of the United States Naval Academy, Uniformed Services University, Marine Command and Staff College, Naval War College, National Capital Consortium Anesthesiology Residency, and Harvard Critical Care Fellowship. He serves on the American Society of Anesthesiologists Board of Directors.

John Maye, PhD, CRNA is an Associate Professor at the Uniformed Services University of the Health Sciences. He is currently serving as the Director of Research for the Nurse Anesthesia Program.

Joseph D. McBeain, MSN, CRNA is currently staff at Naval Medical Center San Diego, CA. Joseph has recently graduated from the Uniformed Services University of the Health Sciences Nurse Anesthesia Program. He was a student in the program at the time this research study was completed.

Keshav Nayak, MD is Director of the Cardiac Catheterization Laboratory, and Chairman of the Executive Committee of Medical Staff at Naval Medical Center San Diego. A graduate of Haverford College, and Pennsylvania State University School of Medicine, Dr. Nayak has a keen interest in ethical decision making as it pertains to the practice of medicine.

Guillermo Navarro, MD is a fourth year Emergency Medicine Resident at the Department of Emergency Medicine at Naval Medical Center Portsmouth in Virginia. He authored and headed the development of a comprehensive trauma curriculum presented in the Dominican Republic as a bi-annual course over the last three years. The course is now a required certification for emergency providers treating trauma patients in that country.

Michael Owens, MD, FACEP, FAAEM is an Emergency Physician and Director of International Medicine at the Naval Medical Center Portsmouth. Dr. Owens holds an academic appointment as an Assistant Professor of Emergency/Military Medicine, Uniformed Services University of Health Sciences.

Todd A. Parker, MD, MS is the Assistant Department Head for the Department of Emergency Medicine at Naval Medical Center, Portsmouth, Virginia. He is also an Assistant Professor of Military and Emergency Medicine at the Uniformed Services University of the Health Sciences. He was the Chief Resident of the Emergency Medicine Residency Program when conducting this research.

Robert H Riffenburgh, PhD, FASA is Chief of Biostatistics at Naval Medical Center San Diego, occasional Professor of Statistics at San Diego State University, and Lecturer at Rady Children's Hospital. He has had a long career as professor at various universities, scientist for the U.S. Navy, officer at NATO, and CEO of his own consulting firm. He has published over 150 scientific articles and is currently writing the 3rd edition of his book "Statistics in Medicine" (Elsevier).

Veronica C. Rios, MD is an Emergency Medicine physician at Naval Hospital Jacksonville, Florida. At Naval Hospital Jacksonville, she is the emergency medicine department coordinator for the Independent Duty Corpsman Center of Excellence and clinical supervisor of the department physician assistants. Dr. Rios is actively involved in teaching residents and physician assistants.

Elizabeth Roucek, MSN is currently staff at Naval Medical Center San Diego, CA. Elizabeth has recently graduated from the Uniformed Services University of the Health Sciences Nurse Anesthesia Program. She was a student in the program at the time this research study was completed.

Jacqueline Rychnovsky, PhD, RN, CPNP is currently stationed at the Bureau of Medicine and Surgery in the office of Nurse Corps Policy and Practice. Captain Rychnovsky is a Nurse Researcher and Pediatric Nurse Practitioner who has served in a variety of clinical, administrative, and policy positions. She recently completed a Capitol Hill fellowship in the office of Senator Daniel K. Inouye (D-HI).

Arya M. Sharma, MD, PhD, FRCPC is Professor of Medicine & Chair in Obesity Research and Management at the University of Alberta. He is also the Medical Director of Alberta Health Services Edmonton Region's interdisciplinary Weight Wise Program. Dr. Sharma is also the Scientific Director of the Canadian Obesity Network, funded through the federal National Centres of Excellence program. His research focuses on the evidence-based prevention and management of obesity and its complications.

Dennis Spence, PhD, CRNA is the Phase II Clinical Research Director for the Uniformed Services University of the Health Sciences (USUHS) Nurse Anesthesia Program at Naval Medical Center San Diego. Dennis is also an Adjunct Assistant Professor at USUHS.

Franklin Eric Wester is a colonel and chaplain in the US Army Reserve assigned as Senior Military Fellow at the Institute for National Security Ethics and Leadership, National Defense University, Washington DC. He is an ordained Lutheran clergyman and currently teaches graduate courses in ethics, strategy, religion, and security. His research and publications address applied military ethics and just war thinking. He was senior command chaplain for the US Army Reserve during Operation Iraqi Freedom.





FROM THE
EDITOR'S DESK



From the Editor's Desk

Dr. Edward F. Gabriele

Editor, Journal of Healthcare, Science and the Humanities
Deputy Vice Chancellor, Navy Medicine Institute
for the Medical Humanities & Research Leadership
USN Bureau of Medicine and Surgery
Washington, DC 20352
Tel: (202) 762-3600
Email: edward.gabriele@med.navy.mil

On May 25, 1961, President John F. Kennedy addressed Congress and laid out his vision for a wide variety of needs and opportunities for the nation. Early in his address to Congress he remarked, “These are extraordinary times. And we face an extraordinary challenge. Our strength as well as our convictions have imposed upon this nation the role of leader in freedom’s cause.” One of the considerations in his panorama was the launch of the space program with the goal of American astronauts landing on the moon and successfully returning home by the end of the decade. The President was adamant that America not fall behind the accomplishments of other nations. He was firm that the American nation needed to maintain world leadership. It was clear from his address that he tied American success in the exploration of space to our continued role as the world’s leader in the defense of peace and the progress of peoples. World peace and the defense of liberty tied to successful leadership in discovery, innovation, and development. An interesting equation.

Today, a half century later, this equation continues to be far more than interesting. In fact, it is at the very core of life in a post-industrial and post-modern world. Upon reflection, it seems that human beings explore for at least two fundamental reasons. First, we want to meet needs and guarantee security. In other words, we explore out of necessity. Secondly, however, human beings always want to become more than what we are. We are ever on the road to self-transcendence. We look for a future that is ever more expansive than our present. We desire to grow, to become, to make a quantum leap into something or somewhere “more.” In many ways, fifty years ago President Kennedy inadvertently spoke out of these dual needs to a nation that had entered into a decade that would be a time of upheaval. Yet one constant question that seemed to underlie the upheaval of the 60’s for this nation and the world was: “What is our ‘more’?”

The Journal of Healthcare, Science and the Humanities is dedicated to this same question as central to our academic and professional considerations: “What is our ‘more’?” The *Journal* explores, from the strength of interdisciplinarity, the widest possible vistas of subjects and issues concerning patient-centered care, the arts, the sciences, the humanities, social concerns, research and development, medical technologies, and the intense concerns of women and men who are searching to know more, to do more, to be more. The *Journal* is designed specifically to invite readers into the mystery and panorama of “health” as an endless human frontier. This edition of the *Journal* continues to capture that vision and in a special way highlights what is the core of its quest and commitment. This edition features

Introduction

a very privileged Prelude by the Surgeon General of the United States Navy, Vice Admiral Adam M. Robinson, Jr. The Admiral's opening reflections on the commitment to patient-centered care as the core of medicine itself is a critically important springboard from which this edition's articles and reviews flow. His Prelude is a fitting and powerful testimony to the richness that Vice Admiral Robinson has created during his tenure as the Navy Surgeon General. Part of that richness has been his founding and service as the first Chancellor of the Navy Medicine Institute for the Medical Humanities and Research Leadership. Within the Institute, Vice Admiral Robinson likewise directed the publication of the Journal itself. We are therefore deeply grateful for his catapulting us so successfully into vistas of success previously never dreamed possible.

After the Surgeon General's Prelude, this edition proceeds to a wide variety of in-depth academic and professional considerations of patient-care issues involving specific healthcare technologies, ethics, humanitarian assistance, pastoral care, and other areas. The edition includes informative reviews and reports and then concludes with a celebrated consideration of the future of healthcare itself in our time.

Indeed, this edition of the *Journal* captures in a special way how these are extraordinary times. In a Dickensian mode, some might see these as the best of times; others, the worst. I would suggest neither. Rather they are extraordinary times because they are times of quintessential opportunity. President Kennedy launched America into the wide and explored vistas of outer space. Perhaps these are times, and the *Journal* captures this well, where we are called to explore the even wider vistas of "the space within" that is the human mind, the human imagination, the human heart, the human capacity to care for others more than the self.

Enjoy the journey within – indeed, The Endless Frontier.

PRELUDE





Vice Admiral Adam M. Robinson, Jr.
36th Surgeon General of the United States Navy

The Patient and Family-Centered Care Philosophy: First Principles and Core Values

Adam M. Robinson, Jr., MD
VADM, MC, USN

Surgeon General of the United States Navy
Chief, USN Bureau of Medicine and Surgery
Chancellor, Navy Medicine Institute for the Medical Humanities
and Research Leadership
Washington, DC
Tel: (202) 762-3701
Email: nmi@med.navy.mil

Author Note

The opinions in this article are those of the author and do not represent the views of the Department of the Navy, the Department of Defense, or the United States Government.

Introduction

On behalf of the 63,000 Navy Medicine personnel under my command, and the millions who benefit from our care, I am pleased to provide this Prelude for the second edition of *The Journal of Healthcare, Science and the Humanities*. It is my sincere hope that this Prelude will enlighten and inspire, and provide a glimpse into what truly defines who we are as care providers. This is not about serving in the Navy. This is about earning the public trust, and it must be earned in new and fresh ways. We must engage the public. Forums like this enable us to get outside of ourselves. I consider it an honor and privilege to share my thoughts on how we as healthcare providers, scientists, and humanists, can fundamentally change the way we provide care to our beneficiaries and positively impact global health.

The First Principle of Patient and Family-Centered Care

The reason that we live on this earth, the reason that God has given us the ability to be here and to be sentient beings, is to make sure that we help one another. It may sound simplistic, but our responsibilities as human beings, as citizens, and in my profession, as care providers, starts with a commitment to helping one another, our fellow men and women, in the communities and networks in which we live. That is what healthcare, the sciences and humanities are all about.

What we do does not have to be complex or complicated. Whether you are in the field of healthcare, or a teacher, scientist, or humanitarian, you simply need to step forward and do what is right. You do not ever have to ask permission to do what is right. I was asked recently what the two most important things were that I learned from my decades of military service and medical practice. I was instantly able to say, I learned from the military

Prelude

the concept and ethos of service: the ethos of honor, courage, and commitment that defines naval service; and as physicians the love of humanity that we as care givers provide to every man and woman under our care.

The extension and the contribution we make to this world is not a contribution that we make in any isolated sort of way. God has a way of putting us where we are meant to be, whether we want to be there or not. There is no one among us that does not stand on the shoulders of giants who have come before us and lit a path for us to follow. Regardless of the myriad paths we are on, it is our job as thought leaders and executives to carry the torch.

Navy Medicine is unique in that we can go out and reach people that no one else can reach. We can deploy expeditionary medical forces around the world to provide care for people in need that no one else can do. We are able to protect and save lives on land and at sea, as well as in the air; on every ocean and in every continent in the world. Whether we are treating a relatively minor injury, illness, or traumatic injury resulting from war, *our patient and family-centered philosophy* and approach is not only our mission; it is the bedrock of our medical system – it is our bottom line. This is not only our duty; it is our honor and privilege.

The 63,000 personnel under my care provide force health protection in a patient and family-centered way, both at home and abroad. This mission spans the globe, from U.S. hospitals within the TRICARE network, to the operational fleet and fleet Marine forces, overseas hospitals and military treatment facilities, medical battalions, research units, and hospital ships. This global footprint ensures that we maintain a razor sharp focus on the dual mission of supporting readiness of the force, as well as the health benefit mission of patients and their families. They are both equally important and mutually supportive.

I speak quite often to internal and external audiences alike of the collective need to return to First Principles. The patient and family-centered care model is my First Principle. We can pass all the healthcare reform in the world with the greatest access and quality, but if the patient service we receive from healthcare providers is bad, if people do not like who we are or how we treat them, it is all for naught. We can go to the best doctor in the world but if the treatment is not patient-centered, we will not return to that healthcare provider, even if they are the best. We have to make sure that we put patients and their families' needs above our own. We must treat them with the ultimate respect, attention, and care to provide the comprehensive care they truly need and deserve. Patient and family-centered care is my way of letting my providers know, and those who may glimpse into the portal of Navy Medicine know, that no matter where we are, whether we are in uniform or not, we must always focus on the needs of our patients and their families.

One of the things I have strived to instill in my organization during my tenure is to ensure we manage every aspect of care. We make sure we bring the medicine to the patient; we do not make the patient find the medicine. The difference between the military and civilian side is that we do case management for our patients and their families. Healthcare is not just about getting to the right doctor, but getting the right access in a timely fashion. And *we cannot make it difficult*. Access to care is part of the issue, but also making sure you get the right care, at the right time, in the right proportion, for the right reasons. If people

actually get to experience that care, it has to be managed. Some people say “well, we will get there.” It is not about getting there. It is about being there, *every day, all day*; otherwise patients lose out.

In many ways, this model is a paragon for what an effective and efficient healthcare system can and should be, regardless of location or size. Not only does it serve personnel throughout their treatment lifecycle. It manages every aspect of medicine in the continuum of care to provide a seamless transition between levels and types of care, be it physical or mental health treatment. We emphasize preventative health rather than disease prevention. Prevention programs cost more up front, but by emphasizing health, wellness, and prevention up front, we as health providers will not only save money, we will save lives and improve the quality of life of our beneficiaries. We must move beyond the reactive nature of medical care that only intervenes once a patient is sick. A more proactive approach focused on preventative care will better serve the patients and the providers in the long run.

Navy Medicine, as a member of the Military Health System along with our sister services Army and Air Force, are the organizations leading the way in innovation in the larger healthcare community. Our nation can look at how we treat the whole patient, both physically, psychologically, and spiritually throughout the continuum of care, as a model for what a truly 21st Century healthcare model can and should be.

Healthcare is More Than a Business

Healthcare is not only a business, it is a covenant relationship. It is a philosophy of care that puts the patient and their families’ needs above our own. We serve them. This starts with looking inward before we can look outward. As Shakespeare says in *Hamlet*, “This above all: to thine own self be true.” Through that tragedy, we learned what a leader must be and do. It starts with self-awareness, understanding who you are, and being comfortable in your own skin, so you can project the best of your goals, desires, and interests. Only after we have become self-aware can we truly connect with the people we have the honor of leading. This is the essence of the covenant leader and what we must do to ensure that we are effective and that our people prosper and grow under our leadership.

Leadership is sacred. Leadership is challenging. Leadership is a contact sport, but as we define and decipher who we are, we can also begin the arduous and very fulfilling job of connecting with people and leveraging their talents, their gifts, and understanding their foibles. None of us is perfect. But we can arrive at a closer level of perfection when we synthesize the talents of those around us rather than only relying on ourselves for thoughts and insights.

When we learn to mix our talents and blend them with the people we lead, this is the beginning of a true covenant leadership experience. For those who like etymology, you may know that “covenant” comes from the Latin meaning “to come together.” The ecclesiastical interpretation originally meant an agreement between God and the ancient Israelites, in which God promised to protect them if they kept His law and were faithful to Him.

My only point is that when we all entered into the professions of healthcare, the sciences, or the humanities, and especially the field of medicine, we, in essence, made a solemn and, dare I say, sacred agreement between our fellow care providers and those for whom we provide care. That solemn and sacred agreement is also to lead each other so that people are nurtured and transformed under our leadership. We should take this responsibility — covenant leadership — seriously.

Patient and family-centered care does not mean we cannot or should not apply the latest business practices to increase efficiency and effectiveness. We should, but patients are not clients. For me, they are my Sailors, Marines, and their families who selflessly serve and sacrifice around the world, oftentimes in harm's way. They deserve to be treated as we would our own family members. We treat people in body, mind, and spirit so that they are healed physically, emotionally, and spiritually. That is the essence of patient and family-centered care and the covenant relationship which unites providers with their patients.

Healing Wounded Warriors and their Families in Body, Mind, and Spirit

Whenever I speak on the issue of wounded warrior care, I emphasize that we need to focus on how we heal wounded warriors not just in body, but in mind and spirit. So many of the injuries we see today are unseen. The invisible wounds of war have become just as devastating and damaging on our force as losing limbs. We need to remember that men and women have emotional and spiritual lives. They also have families who serve their loved ones, and often become victims of fatigue, stress and mental trauma as well. Families are an integral part of a comprehensive treatment program, and of healing

There are so many reasons to be hopeful, despite the challenges of war. When Sailors and Marines in the fight are hurt, we apply all of our training and resources to provide rapid care, and this is done in partnership with our sister services. A wounded warrior's chance of survival if they can get to a surgical unit is now about 97%. *This is the lowest mortality rate amongst trauma victims coming out of any war.* If a warrior can arrive with life in him or her, there is a good chance we can keep them alive.

Last winter I had the pleasure of visiting Afghanistan with my Air Force and Army counterparts and their senior enlisted members, the Joint Surgeon, and the Central Command surgeon. We were able to look at several of our Role 3 hospitals and military treatment facilities that provide care for wounded warriors that include Army, Navy, Air Force, Marine Corps, and Coast Guardsmen that are in theater. We looked at all phases of systems currently in place. We also looked at the development of the Afghan medical system specifically from a military and police system perspective so that medical forces are built up organically once our military transitions out of theater.

We wanted to make sure we understood what the challenges were. We went to listen and to learn. We did not do a lot of talking. We went to be informed. We left with a much better sense of the challenges and what the military health system can do to improve in theater care. We also saw mental health professionals embedded with teams on the front

lines. That is really the best way to stem some of the consequences of stress and mental health issues. If we can treat our patients in real time in the field, we can get an individual back to duty faster and probably cut off the necessity for any long term treatment or long term disability from illness.

Every day there is a success story that I hear about. The number of cases of women and children that I saw in operating rooms that were being cared for by a variety of military medical professionals across Afghanistan was impressive. It was amazing to see men and women in conditions who would not normally survive even in this country, but who do survive their injuries. The best care in the world from a trauma surgery perspective is in Afghanistan right now.

Transition and Reintegration: Medical Home Port

Once wounded warriors return from battle and begin the transition and reintegration process, they will need to count on more reliable and accessible care for themselves and their families. That is where the Medical Home model comes into play. *Medical Home Port* is Navy Medicine's patient and family-centered Medical Home mode that provides a more comprehensive, team-based system of healthcare delivery. This model drives out variability by implementing standards for all aspects of primary care services. It ensures that care is all-inclusive and integrated with all other care provided within the healthcare system. This care includes but is not limited to readiness, prevention, wellness, behavioral health and disease management.

Medical Home Port is a game changer in how care is provided to beneficiaries and their families. It is not about brick and mortar. Again, it is a change in philosophy in how to treat our patients and their families. In the coming years, full implementation at Military Treatment Facilities worldwide will reduce overall costs in the long term and also improve population health, patient satisfaction, and readiness across the board.

The key challenge we as health providers are faced with is that the provider-centric model does not leverage the entire healthcare team in patient care. This decreases the ability for providers to see the right amount of patients, enhance success, and spend time doing the tasks which are appropriate for the provider's level of certification and education. *Medical Home Port* will require a culture of change and leadership to ensure success. This is a 'game changer' in how we have done business in the past, but I am very confident that it is the right thing to do, is achievable, and is fully consistent with First Principles.

Medical Home Port is simply a further manifestation of the patient and family-centered care philosophy. We ensure Sailors, Marines, and their families get the right care, when and where they need it. If that means we need to be open 24/7 and on holidays, then so be it. The benefits of full implementation will be profound. Each patient will be part of a team that includes a primary care provider, a nurse educator, a care coordinator, and other support staff. This model will better utilize personnel by leveraging support staff, increase the ability to diagnose and treat patients, and keep them in hospitals instead of the "network" of providers outside our reach. Lastly, *Medical Home Port* increases access to provider and team to allow them to better manage the health of their population.

Supporting Readiness

In the military, we talk a lot about readiness. The readiness mission is all about the ability to train, educate, and retain a fully ready force in order to deliver healthcare, anytime, anywhere, in support of the full range of military operations, from the health benefit mission, to the translational research and development that saves lives, to the combat casualty care we provide from the battlefield to the bedside.

The Military Health System places readiness at the core of what we do for our beneficiaries. In order to be an agile, flexible, fit, fighting force, we must strengthen delivery of primary care and adapt to the changing environmental healthcare needs in order to fully support current and future operations.

Integral to accomplishing these objectives are having a highly skilled and diverse people that have the right education and training to provide cutting edge care to war fighters and their families. Readiness is important because care comes first, but in order to provide that care, the management side of the mission has to work efficiently and effectively. It is our collective responsibility and duty to ensure we are wise stewards of taxpayer dollars. This means investments focused on people working in areas with the most direct and immediate impact on the most pressing challenges and needs.

This philosophy ties into another concept called the *360 Degree Enterprise Concept* which states that we as healthcare providers need to take a more holistic and comprehensive look at our programs, processes, and people, and how they can be structured to best support the mission and the greater cause of serving humanity. In order to deal with enterprise-wide issues, we need to take an enterprise-wide view of how we provide care. To achieve better functionality across the enterprise, the individual pieces of the mosaic need to consistently perform well.

But we cannot make these decisions in a vacuum. We must measure. We must know how to best allocate limited resources and the diversity of talent across the enterprise. That is why, over a year ago, we began an enterprise-wide assessment of the size, specialty levels, and distribution of total force billet requirements and personnel inventories.

Excellence in Education and Training

Education is crucial to the quality of healthcare. The Military Education and Training Campus (METC) in San Antonio is using a similar approach of consolidation and standardization in how we educate our people. METC prepares Sailors, Soldiers and Airmen to save lives on the battlefield. This is the largest consolidation of service training in defense history as the 2005 *Base Realignment and Closure Commission* required the majority of existing enlisted medical education to move to co-locate.

While the Navy is the present service lead on campus, METC is a fully integrated inter-service education and training system that leverages the assets of all defense healthcare practitioners. The low mortality rate on the battlefield is due in large part to the training corpsmen receive. That is why places like METC are so important and should be replicated. Because the quality of care we provide from the battlefield starts with training in

the classroom. The average daily student load is about 9,000 Sailors, Soldiers and Airmen making METC the world's largest military medical education and training institution.

The job of educating medical professionals is growing ever larger. That is because the challenges our country faces are so unpredictable and diverse. We need to be ready to confront a range of challenges, whenever and wherever they happen. The Medical Education & Training Campus is but one example of how exceptional education of our young people translates into cutting edge care to patients.

Importance of Translational Research and Development

Excellence in education translates into advancements in the research labs as well. I cannot overemphasize the importance of research and development, especially with respect to advancements in wounded warrior care. It is not about grant money. It is because medical advancements start with an idea or experiment in a lab. Researchers and scientists epitomize the spirit of interdisciplinary scholarship, innovation, and entrepreneurship. Science and technology, research and development are the bases from which most of innovations originate.

Navy Medicine would not be able to accomplish its mission without a vibrant research and development community. The work that researchers do is having a direct impact on the treatment we are able to provide, from the battlefield to the bedside. Many wounded warriors are walking, talking, and leading productive lives today because of research and medical advancements. R&D programs are truly force multipliers.

Today, we have 10 medical research laboratories at home and overseas, focusing on programs as wide ranging as population based medicine and epidemiology, aviation, submarine, directed energy, toxicology, emerging infectious disease evaluations, combat casualty care, diving medicine and many more.

The Navy and Marine Corps team have unique operational needs including expeditionary medicine, undersea medicine, and hypobaric and hyperbaric issues. Due to the nature of wounds we are seeing from Iraq and Afghanistan, our focus remains on five priority areas that include: 1) Traumatic Brain Injury and psychological health treatment and support for both operational forces and home-based families; 2) Medical systems support for maritime and expeditionary operations; 3) Wound management throughout the continuum of care; 4) Hearing restoration and protection for maritime, surface and air support personnel; and 5) Undersea medicine, diving, and submarine.

This focused research has yielded tremendous results in combat casualty care including mild to severe traumatic brain injury and post traumatic stress, wound management, wound repair and reconstruction, as well as extremity and internal hemorrhage control and phantom limb pain in amputees.

We need to make sure that we include basic sciences in everything that we do, with special focus on young people. Typically, young people make more innovative scientific discoveries than older people do because young people don't know that they are

not supposed to do it that way. As John Stuart Mill, the famous utilitarian philosopher, once said, “Listen to even the humblest of the individuals in the world, for they too have a contribution to make.”

Our Role in Humanitarian Assistance/Disaster Response as a Global Force for Good

After responding to two tsunamis in six years, two earthquakes in Pakistan and Haiti, and a hurricane in the Gulf Coast, we have proven the necessity of a robust expeditionary military medical force to bring hope and stability to places and people in dire need.

Japan is but the latest reminder of the importance of medical surge capabilities. Our nation’s response to the Japanese people after a devastating earthquake, tsunami, and nuclear fallout, shows the selfless character of our nation, and shows our shared values of caring for others in need. By doing so, whether in Japan, Haiti, Indonesia, or New Orleans, we help save lives in the short term, but we also provide the conditions for greater security and stability in the long term.

Navy Medicine is not just part of our military response in the Diplomacy-Military-Economic (DIME) model; we are also part of the diplomacy mission as well. We are providing the soft power mission of military medical providers, and in doing so, we are really practicing what many of us call “smart power.”

Medicine is a common language that all countries understand. Wherever we can provide hope and comfort and care to others in need, and wherever we can partner with other allied nations through military medical partnerships, it behooves us to do so; to build trust and cooperation, and strengthen our relationships with a broader coalition of countries for our mutual benefit, and simply put, it is the right thing to do.

These partnerships can translate into a host of new medical advancements in areas like disease prevention, wounded warrior care, and TBI treatment as well, and especially the care we are providing our warriors directly on the battlefield.

If you read the latest *National Military Strategy*, you will see very clearly that it is “whole-of-government” solutions that we must embrace if we are to solve our nation’s and the world’s greatest challenges. That is especially true when we talk about global health. Embracing joint, interagency, multi-national, and whole-of-government(s) approaches is where we must go if we are to truly have a positive impact on global health issues.

One example of this is our hospital ships, USNS *Mercy* and USNS *Comfort*. USNS *Comfort* is currently on a 5 month deployment to South America, Central America and the Caribbean in support of *Operation Continuing Promise 2011* and USNS *Mercy* returned from *Pacific Partnership* last August. These are proactive humanitarian civic assistance missions that include combined assets from partnering nations, and a variety of non-governmental and intergovernmental agencies (NGOs/IGOs) that work with host nations to assist in civil-military operations in response to future crises. These missions are not only great examples of how we as a nation are creating “whole of government” solutions by enlarging our

engagement with others around the world. They are also a key component of our maritime strategy. (See www.navy.mil/maritime)

I have visited the crews of these deployments in theater in the past and I can tell you first hand, these humanitarian assistance missions bring to others a sense of enrichment and hope that touches individuals, their families, their communities, and their nations, and in doing so, benefits the global community. They not only strengthen relationships with host countries, they provide much needed medical care for thousands of civilians who would otherwise not receive it. *Continuing Promise* will provide dental care including surgical services, public health training, engineering support, veterinary services, as well as provide sharing best practices with partnering nations. This knowledge sharing is akin to “teaching a man to fish” in that the information exchange is integral to building host nations’ organic medical support, disaster relief preparedness, and maritime security capabilities. The trust and cooperation we help build and sustain with multinational partners greatly enhances our ability to work together should a disaster strike the region in the future.

A Return to Core Values

I began by talking about the First Principle of patient and family-centered care. That is my First Principle but it will not necessarily be yours. Whatever your First Principle may be, I challenge you to look deep within to discover it, and then live it with passion and determination.

To understand more deeply the implication of my First Principle, I am guided by very important core values in my professional and personal life that I would like to share. First, we have to be professionally competent in what we do. Our education and commitment to professional competence must be life-long and enduring. None of us ever fully masters the art and science of our craft. Our pursuit of quality in every patient encounter, and every teaching encounter, must be unrelenting. We must be prepared at all times for whatever challenge lies ahead. Let us commit ourselves now to a lifetime of learning, education, and professional competence.

My second core value is that we have to be personally ready. Personal readiness means we need to make sure that the people important to us, in our professional and personal lives, remain priorities. If we neglect them or take them for granted, we will lose them. If we lose them, we will lose a good portion of who we are. My third core value is the spiritual side of what we do. The spiritual side simply means this. There is something in this world that is larger than any one of us individually. We better connect with and understand that, and give ourselves over to it, so it becomes an important part of who we are and what we do.

My fourth core value that is central to my life is that there is nothing in this world that is worthwhile and valuable that can be accomplished without personal sacrifice. Sacrifice is the price that we pay to purchase accomplishment. Sacrifice is the currency which must be paid in order to fulfill the missions of duty and honor. Sacrifice is the toll demanded when our country calls us to lift its burdens. Sacrifice involves a spiritual connection between the one (person) doing the act and the people/person receiving the benefit. The loss or deprivation incurred by the sacrifice simultaneously becomes the blessing received by those benefitting.

The truth is this: It is more blessed to give than to receive. The man or woman sacrificing receives a double portion for his or her effort, and this may be one of the paradoxes of life. To achieve a full state of spiritual affirmation, we must wholly and completely sacrifice ourselves to God. In doing this, we are yet more fully made aware of our duty – to help one another and our ultimate commandment: to love God above all else and completely.

Conclusion: Toward An Ethos of Service

The Ethos of Service is a foundation cornerstone of my life. The ultimate obligation that we have to others is to serve them. Service is a choice and it often inconvenient. Leaders are servants to the servants. It is that simple and it is that difficult. Service makes us uncomfortable as we proceed to look squarely in the face of the human condition as depicted by the ones we serve. Service requires temperance, modesty, humility, and courage, both moral and physical. All of these attributes, these personal and professional core values and principles, must be inculcated in us in order to care for our people. Service is what separates us from most Americans. Service defines our commitment to one another. This is who we are. This is what we do.

Service is something you do not have to give wearing a uniform. Certainly if you wear the uniform you are giving service, but you can give service by involving yourself in your community, neighborhood clubs, churches, in your spiritual sanctuaries whatever they may be; making sure you insert yourselves in the lives of the people around you and the people with whom you live. That is the reason why the patient and family-centered philosophy of healthcare is so important. It is another way to insert ourselves as human beings in the lives of people who need our help. It is a way of connecting with people and making sure that our ethos of service never falters and that we learn how to pass it on to the next person. That is the legacy that means something. That is why the heroes and leaders of the past are talked about today. They left a legacy that was larger than their own selves because they connected with people. They made a difference in the world in which they lived.

As leaders in our chosen fields, we have to lead and be effective managers. You have to do both, but leadership has nothing to do with managing the office. It is about helping your people progress. I am a student of theologian Howard Thurman. He wrote an essay on leadership which taught me four things. First, a leader must be absolutely truthful and a truth seeker in everything that he or she does. Integrity is paramount. Nothing else matters if your word is not your bond. Second, a leader needs to know him or herself. You have to be truthful first to yourself. I am who I am. Third, you have to take responsibility for your actions. Things that occur are not someone else's fault. Do not make excuses. Lastly, you have to be responsible for your reactions. What we react to is often not what we caused. This is the difference between bitterness and hubris, and grace and acquiescence.

As one professor I know is often heard to say, "The day you stop serving others, is the day the pilgrimage comes to an end." I find that an important sentiment. This is what we at Navy Medicine have done for generations. What will you do? What can we do together to advance the cause of healthcare and global health?

I pledge to you that, with your help, we will we never stop striving to ensure that our nation will always have a medically ready, mentally and physically fit fighting force; and that those who have served our nation along with their families can always count on us to provide quality and compassionate patient and family-centered healthcare.

You are all answering the call to service in a multitude of ways. Whether your work is in the sciences, humanities, or the field of healthcare, the work you do is of great value and service of the highest order to our nation and is very much appreciated and valued. The true measure of success is to give of yourself to a cause larger than you. We do that by committing ourselves to a lifetime of giving, of caring, of mentoring, of teaching, and making a difference in the lives of others. If you commit to that unbroken tradition of service, you will be at peace with yourself. The only way is to have peace in your own heart from being honest, truthful, and taking responsibility for those things that you must. If you do, you will become a role model that your colleagues, subordinates, and superiors will want to emulate.

Never diminish, never think poorly; never denigrate what you can give as a human being, when it is given with sincerity, clarity, and absolute love in your heart. Never think that it is not going to be meaningful to someone you touch. Make sure that you make a difference in whatever you do.

Biography

Vice Admiral Adam M. Robinson, Jr. Surgeon General of the Navy

Vice Admiral Robinson is the 36th surgeon general of the Navy and chief of the Navy's Bureau of Medicine and Surgery. He is a native of Louisville, KY. He entered the naval service in 1977 and holds a Doctor of Medicine degree from the Indiana University School of Medicine, Indianapolis, through the Armed Forces Health Professions Scholarship Program. Following completion of his surgical internship at Southern Illinois University School of Medicine, Springfield, he was commissioned.

His first assignment was as a general medical officer, Branch Medical Clinic, Fort Allen, Puerto Rico, before reporting to the National Naval Medical Center, Bethesda, MD, in 1978 to complete a residency in general surgery. His subsequent duty assignments included: staff surgeon, U.S. Naval Hospital, Yokosuka, Japan, and ship's surgeon, USS *Midway* (CV 41).

After completing a fellowship in colon and rectal surgery at Carle Foundation Hospital, University of Illinois School of Medicine Affiliated, Champaign-Urbana (1984–85), Vice Admiral Robinson reported to the National Naval Medical Center, Bethesda, as the head of the Colon and Rectal Surgery Division. While there, he was called to temporary duty in 1987 as ship's surgeon in USS *John F. Kennedy* (CV 67) and in 1988 as ship's surgeon in USS *Coral Sea* (CV 43).

Vice Admiral Robinson reported to Naval Medical Center Portsmouth, VA, in 1990 as the head of the General Surgery Department and director of General Surgery

Prelude

Residency Program. He was appointed acting medical director for the facility in 1994. While at Naval Medical Center Portsmouth, Robinson earned a Master's degree in Business Administration from the University of South Florida. In 1995, Vice Admiral Robinson reported to the commander, Naval Surface Force, U.S. Atlantic Fleet, as the force medical officer serving in that capacity for two years. Following that assignment, he reported to Naval Hospital Jacksonville in 1997 as the executive officer. In January 1999, as Fleet Hospital Jacksonville commanding officer, Vice Admiral Robinson commanded a detachment of the fleet hospital as a medical contingent to Joint Task Force Haiti (Operation *New Horizon/Uphold Democracy*).

In August 1999, Vice Admiral Robinson reported to the Bureau of Medicine and Surgery (BUMED) as the director of Readiness and was selected as the principal director, Clinical and Program Policy in the Office of the Assistant Secretary of Defense for Health Affairs in September 2000, where he also served as the acting deputy assistant secretary of Defense for Health Affairs, Clinical and Program Policy. Vice Admiral Robinson was assigned as commanding officer U.S. Naval Hospital Yokosuka from September 2001 to January 2004, after which he received assignment back to BUMED as deputy chief of BUMED for Medical Support Operations with additional duty as acting chief of the Medical Corps. In July 2004, he reported as commander, National Naval Medical Center, Bethesda, MD. He assumed the duties as commander, Navy Medicine National Capital Area Region in October 2005.

The author of numerous presentations and publications, Vice Admiral Robinson holds fellowships in the American College of Surgeons and the American Society of Colon and Rectal Surgery. He is a member of the Le Societe Internationale de Chirurgie, the Society of Black Academic Surgeons, and the National Business School Scholastic Society, Beta Gamma Sigma.

He holds certification as a certified physician executive from the American College of Physician Executives. In December 2010, he was awarded the honorary degree of Doctor of Humane Letters by his alma mater, Indiana University.

Vice Admiral Robinson's personal decorations include the Distinguished Service Medal (two awards), Legion of Merit (two awards), Defense Meritorious Service Medal (two awards), Meritorious Service Medal (three awards), Navy Commendation Medal, Joint Service Achievement Medal, Navy Achievement Medal and various service and campaign awards.





The image is a composite graphic. The background is a historical map of Africa, showing the continent in a light tan color with various geographical features and a compass rose. Overlaid on this is a modern map of Africa, with countries colored in shades of yellow and green. A blue diagonal shape cuts across the top right, containing the word 'ARTICLES' in white, sans-serif capital letters. The overall aesthetic is that of a historical document or a travel-themed publication.

ARTICLES



A Case Study for Ethical Decision Making: Disabling the Defibrillator

Elizabeth K. Holmes, PhD

Director of Assessment
VADM Stockdale Center for Ethical Leadership
United States Naval Academy,
112 Cooper Road
Annapolis, MD, 21402
Tel: (410) 293-6088
Fax: (410) 293-6081
Email: ekholmes@usna.edu

Shaun Baker, PhD

Assistant Director
VADM Stockdale Center for Ethical Leadership
United States Naval Academy,
112 Cooper Road
Annapolis, MD, 21402
Tel: (410) 293-6078
Fax: (410) 293-6081
Email: sbaker@usna.edu

Rose Ciccarelli, MA

Writer/Editor
VADM Stockdale Center for Ethical Leadership
United States Naval Academy,
112 Cooper Road
Annapolis, MD, 21402
Tel: (571) 264-3713
Fax: (410) 293-6081
Email: ciccarel@usna.edu

Keshav R. Nayak, MD

Department of Cardiology
Naval Medical Center San Diego, California
34800 Bob Wilson Drive
San Diego, CA 92134
Tel: (619) 532-7400
Fax: (619) 532-9863
Email: Keshav.Nayak@med.navy.mil

Author Note

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Abstract

Individuals engage in a four-step process when making ethical decisions. Using a model to understand that process — and the moral intensity factors influencing it — can allow physicians to practice making sound ethical decisions in a rational, pragmatic way. In this case study, a decision-making model is applied to explore the process of making decisions about care for an end-of-life cardiac patient with a defibrillator.

Keywords: Ethical decision making, defibrillator, medical ethics

Introduction

Retired Captain Dave Brunning is your patient. Now 79 years old, he has been under your care for some time, and both of you have grown quite close. You admire him. His quick and sometimes wicked wit allows him to cope better with his situation than most patients. A volatile combination of active tobacco use, diabetes, and high cholesterol caused his heart attack at 60. His worsening cardiomyopathy and valvular heart disease resulted in prosthetic mitral and aortic valve surgeries, and most recently, an automated implantable cardioverter-defibrillator (AICD).

However, after getting the AICD, his condition has progressively worsened. He now suffers with severe shortness of breath at rest (New York Heart Associated Class IV status), permanent atrial fibrillation, and a low platelet count. You are his primary cardiologist and have been steadfast at his side through all of this. With much cajoling, you convinced Captain Brunning that, at this juncture, hospice care is best for him. He does not want to lose his independence, but also does not want to burden his family. In making the decision about hospice, he needed brutal honesty from you, and you delivered.

Today he wants to talk again. You are visiting him in hospice, overlooking a splendid view of a sunny Maryland day.

“Doc, I realize I’m getting to the end of my life,” he says, looking out the window. “We’re just waiting for the hardware to break down. But I’m in no hurry to die—I’d like to squeeze out as many days as possible. The grim reaper can wait.”

He looks directly at you. “On the other hand, I’m not interested in hanging on in a vegetative state. That does me no good. It does my wife no good. It’s not good for the

great-grandkids. Part of me wants heroic measures taken if my ticker stops suddenly or I can't breathe anymore. Then again, if those measures save me, but I wind up as a vegetable, I'm not interested. What the hell do I do? Am I contradicting myself?"

"Maybe," you answer. "I'm not going to lie. The chances are significant that heroic measures could be futile. If heroic measures take a long time to bring you back, especially with a prolonged period of not having a pulse, it could end up leaving you in a vegetative state. It is very difficult for me to say what could happen."

"What if we turned off the defibrillator?" he asks. "Would that make a difference?"

"If your goal is to live longer, the defibrillator would definitely save your life if you have a malignant arrhythmia. However, you're pretty weak. It could prolong your suffering if it takes a lot of time and medications to resuscitate you. It is very tough for me to predict."

"But by the same token," he argues, "say my condition improves with the stronger medications and new technologies, wouldn't I be less likely to survive heroic measures later on without that thing alive in me? So I'd less likely end up a vegetable? By the way, when is that damn battery due for a replacement? I'm not looking forward to another procedure in my condition."

"Six months," you answer. You think for a moment and then continue. "Dave, have you really thought this through? Are you sure you want to take the immediate risk right now of ending your life to lower the risk of ending up in a vegetative state somewhere down the road? The grim reaper might like that proposition. He might take that bet."

The captain shrugs. You consider his argument. There is a moral distinction between letting Dave die and taking active steps to terminate his life. Would disabling Captain Brunning's defibrillator be a case of letting him die? Perhaps. But you have an almost visceral reaction when you consider replacing the defibrillator battery when you know it would prolong the terminal phase of his life and then realize you could avoid that and just let the battery die. Knowing the risk, either option seems like active euthanasia to you. You realize that this situation is like one of those ethics case studies you discussed in medical school. You would have his consent no matter what. You realize there is much more you have to think through, and you ask Captain Brunning to think more as well.

How would you make this decision?

Ethical Decision-Making Model

Research has shown that people move through different stages when processing an ethical decision. The stages begin with an initial recognition or awareness of the moral dimensions of a problem, progress to weighing possible courses of action and exploring the consequences of the proposed solutions, and end with a decision to act or refrain from acting. Studies indicate that ethical, social, and psychological factors affect the process at each one of these stages. Psychological and social factors can exert influence without our being aware of them. Sometimes these influences lead to ethical choices, sometimes they do not.

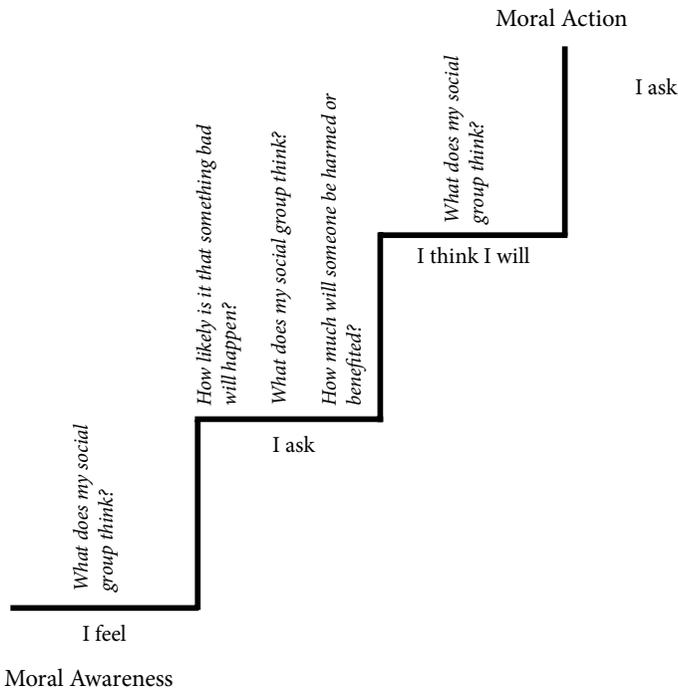


Figure 1. Ethical decision-making model.

Based on sound theory and validated by the research of Lincoln and Holmes (2010), the model shown above is one approach to making pragmatic decisions quickly, with conscious and deliberate awareness of these factors. Here, the likelihood of producing sound moral choices, even in difficult circumstances, is increased. This four-step approach is based on “James Rest’s Model” (1986), along with Thomas Jones’ (1991) idea that moral intensity factors influence each of those components. For example, the degree to which a person is harmed or benefited by the decision-maker’s actions may influence the decision as well as the degree to which the social group agrees that a given action is good or bad. How close the decision-maker feels to the people affected by the decision and the probability that something harmful will occur can also color decision making. By asking questions that probe those moral intensity factors, the decision-maker becomes aware of how he or she may be affecting the decision-making process.

To make an ethical decision, a person works through the stages, moving from moral awareness to moral action. In the first stage, there is gut-level recognition that the situation is morally charged. Anger, fear, anxiety, concern, and/or empathy are aroused. The decision-maker’s gut is answering the question: “Is there something wrong here?” Two moral intensity factors—proximity (how close the decision-maker feels to the people affected) and social consensus (whether a social group perceives a given action as right or wrong)—can influence whether the decision-maker identifies an ethical issue. Becoming aware of these influences can help one correct for oversensitivity or insensitivity to the moral dimensions in a problem.

Assuming that the decision-maker has identified an ethical issue, he or she begins to weigh various options in the second stage, which is moral judgment. The aim is to distinguish right from wrong, better from worse, and between competing obligations. The decision-maker is weighing possible actions. Moral intensity factors, such as magnitude of consequences (how much someone is harmed or benefited by the decision-maker's action), probability of effect (the likelihood that predicted circumstances and expected level of harm or benefit will occur), and social consensus, play roles in this stage of the process.

The third stage, where a person must decide what to do or not do, builds on the results of the last. Sometimes choosing not to act is a valid decision. Deciding what to do also means marshaling the courage to act or not act, sometimes in the face of great opposition. In deciding to act, research shows social consensus plays the biggest role.

Sometimes, people can recognize an ethical dilemma, decide the right thing to do, resolve to act, and yet, do not. The power of other people present is the most common explanation used for failing to act morally. In the last stage, a person carries out his or her decision, in spite of opposition or possible consequences, or chooses not to act.

The Model Applied to the Case Study

This model can be used to help reach a decision about the dilemma outlined in the case study. The first step is to decide if this situation presents an ethical problem. Here are some questions that could be used to reveal the ethical dimensions of the problem:

1. Have you been in similar situations?
2. Have you experienced a similar visceral reaction when contemplating yourself personally acting or refraining in some way that could cause an end-of-life patient to die?
3. Does the cardiologist's closeness with Captain Brunning make it more or less difficult to gauge responsibilities and assess risk?
4. What does the "do-no-harm" component of the Hippocratic oath tell us about this case?
5. If a patient is at end-of-life status, is there really any harm in acceding to such requests?
6. What if guidelines are provided in the professional literature in regard to disabling life-saving mechanical devices for palliative care patients?

The questions below could be used to identify any moral intensity factors that could influence the decision:

1. How close do I feel to Captain Brunning and his family—those most affected by this decision?
2. What would my peers think? Would other cardiologists perceive an ethical problem in this situation?

Moral Judgment

In the moral judgment step of the model, questions like the ones below can help the decision-maker to formulate and weigh various options:

1. All things considered, should this cardiologist recommend disabling the device or doing nothing?
2. Should the cardiologist suggest that Captain Brunning reconsider the request for heroic measures?
3. Who or what should the cardiologist refer to for guidance?
4. Suppose there is little professional guidance in the case. On what should the cardiologist primarily base a decision?
5. All things considered, which option best satisfies this cardiologist's professional obligation as a doctor, as well as the obligation to respect Captain Brunning's wishes?
6. What do you think is more important to Captain Brunning, his desire to live long or his desire to avoid a vegetative state?

The sample questions below can indicate how much moral intensity factors, such as magnitude of consequences, probability of effect, and social consensus, are affecting decision making:

1. If Captain Brunning were not retired, would this significantly change my reasoning in this case? Why or why not?
2. How much harm or benefit would come to Captain Brunning if I do nothing? What about if I disable the defibrillator?
3. How much harm or benefit would come to Captain Brunning if I had recommended rescinding the request for heroic measures? What about if I had not?
4. How likely is it that Captain Brunning will live longer if I disable the defibrillator? What if I do nothing?
5. How likely is it that Captain Brunning will end up in a vegetative state if I disable the defibrillator? What if I do nothing?
6. Would any of these actions be acceptable to those whom I respect? Would any of these actions be in line with the culture and traditions of Navy medicine?
7. What would other cardiologists think about the potential consequences? How would their opinions affect my judgment?

Moral Intention

The questions below can help clarify what the decision-maker intends to do:

1. What do I think I should do?
2. Do I really intend to act on that decision?

3. What emotional forces might hold me back from acting on that decision?

Other questions can highlight whether moral intensity factors such as social consensus are affecting one's judgment:

1. How would other cardiologists act in my place? How does my perception of their likely beliefs and actions influence my intention?
2. How does my perception of the standards, culture, and traditions of medicine affect my intention?

Moral Action

These questions assess how likely it is that the decision-maker will follow through on the intention to act:

1. What might inhibit this cardiologist from recommending that Captain Brunning retain the heroic-measures request? From recommending that he discard it? From disabling the defibrillator? From doing nothing?
2. Have you encountered situations where a patient has requested heroic measures at the end of life and has strong negative views about living in a vegetative state? What did you recommend and why?
3. In such cases, considering the multiple people involved, is there a path of least resistance? What would lead one to take that path over the more difficult paths?
4. Does the fact that a patient is elderly have any effect on decision making? If so, what sorts of effects might they be, and are they generally positive, negative, or neutral?

Again, social consensus has the most acute effect on decision making, so questions related to perceptions about what peers would do help to reveal any moral intensity factors.

What Happened

In this case, Captain Brunning was hospitalized for decompensated congestive heart failure exacerbation. His condition had progressively worsened for six months after the conversation. His defibrillator remained active. After hospitalization, his condition further deteriorated, and he expired after an unsuccessful resuscitation. He received numerous defibrillator shocks in his final moments.

Conclusion

This case is difficult because it asks when it is appropriate to disable or refrain from maintaining devices like pacemakers and defibrillators that have been placed in patients who are in palliative, end-of-life care. As with any elective procedure, a complex balance needs to be struck between the patient's wishes and the doctor's best judgment as to safety of any procedure. Also, the traditional ethos of the medical profession comes into play, and doctors must wrestle with the fact that any invasive procedure may exacerbate a patient's condition and can cause death.

Articles

When possible, it is useful to review professional literature for any objective guidance or criteria that can be used in end-of-life cases. However, in this case, little such guidance was available, and little research has been done on how often defibrillators are disabled.

Learning to apply an ethical decision-making model to case study dilemmas provides needed practice for problems encountered in real life. Walking the steps from moral awareness to moral action is an indispensable skill for every physician.

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A Pilot Investigation Evaluating Physiological and Psychological Stress Measurements in Patients Presenting for Elective Surgical Procedures

CDR Dennis Spence NC, USN, CRNA, PhD

Assistant Professor of Nursing
Uniformed Services University of the Health Sciences
Bethesda, MD
Phase II Clinical Research Director
Naval Medical Center
34800 Bob Wilson Drive
San Diego, CA 92134
Tel: 619-218-9676
Email: Dennis.spence@med.navy.mil
crnaden@yahoo.com

LT Joe McBeain NC, USN, CRNA, MSN

Staff Nurse Anesthetist
Naval Medical Center San Diego
San Diego, CA

LT Jason Guzman NC, USN, CRNA, MSN

Staff Nurse Anesthetist
National Naval Medical Center
Bethesda, MD

LT Elizabeth Roucek NC, USN, MSN

Graduate Registered Nurse Anesthetist
Naval Medical Center San Diego
San Diego, CA

CDR John Maye NC, USN, CRNA, PhD

Research Director and Associate Professor
Nurse Anesthesia Program
Graduate School of Nursing
Uniformed Services University of the Health Sciences
Bethesda, MD

Author Note

The views expressed in this article are those of the authors and do not reflect official policy or position of the U.S. Department of the Navy, the U.S. Uniformed Services University of the Health Sciences, the U.S. Department of Defense, or the United States Government.

Abstract

This prospective, descriptive, correlational pilot investigation evaluated preoperative stress in patients presenting for outpatient general surgery. A total of 29 patients completed measures of state affect (Multiple Affect Adjective Checklist (MAACL-R)), subjective stress (Visual Analogue Scales for stress (VAS-S)), thermal comfort (VAS-T), and salivary alpha amylase (SAA) to evaluate the sympathetic nervous system (SNS) stress response, on admission (T1), at arrival in preoperative area (T2), and prior to entering the operating room (T3). SAA was significantly higher at T2 as compared to T1 (220.36 ± 183.8 U/ml vs. 160.53 ± 120.92 U/ml, $P = .012$). VAS-S were significantly higher at T2 (VAS-S: 36.6 ± 25.19) and T3 (VAS-S 38.82 ± 26.28) as compared to T1 (27.06 ± 21.6) ($P < .05$). Lower positive affect was negatively correlated with SAA at T2 ($r = -.384$, $P = .04$). Subjects who reported feeling colder (VAS-T) in the preoperative area had significantly higher absolute increase in SAA ($r = -.413$, $P = .03$). This relationship was stronger in subjects with no past surgical history ($r = -.909$, $P < .0001$), however, this relationship was not present in subjects with previous PSH ($r = -.007$, $P = .98$). Results suggest the preoperative period is associated with increased physiological and psychological stress.

Keywords: salivary alpha amylase, MAACL-R, preoperative, stress, positive affect, anxiety

Introduction

Anticipation of surgery is a significant stressor for many patients that can trigger the physiological and psychological stress response (Everly & Lating, 2002). The initial stress response, called the flight or fight response, activates the autonomic nervous system and triggers the Sympathetic-Adrenal-Medullary axis (SAM) (Charmandari, Tsigos, & Chrousos, 2005). If stress is prolonged, glucocorticoids are released from the adrenal cortex under activation of the Hypothalamic-Pituitary-Adrenal axis. Inability to cope with this stressor can lead to abnormal or excessive activation of the stress response, which may be associated with increased heart rate, blood pressure, and psychological distress in the preoperative period, and may influence perioperative outcomes and delay recovery. For the purposes of this investigation, *stress* is considered a response or reaction to some stimuli or *stressor*; thus, the definition: "Stress is a physiologic response that serves as a mechanism of mediation linking any given stressor to its target-organ effect or arousal" (Everly & Lating, 2002, p.15). Within the context of this study, the term *preoperative stress* will be used to describe the response or reaction patients experience to the anticipation of anesthesia and surgery (the stressor) (Figure 1).

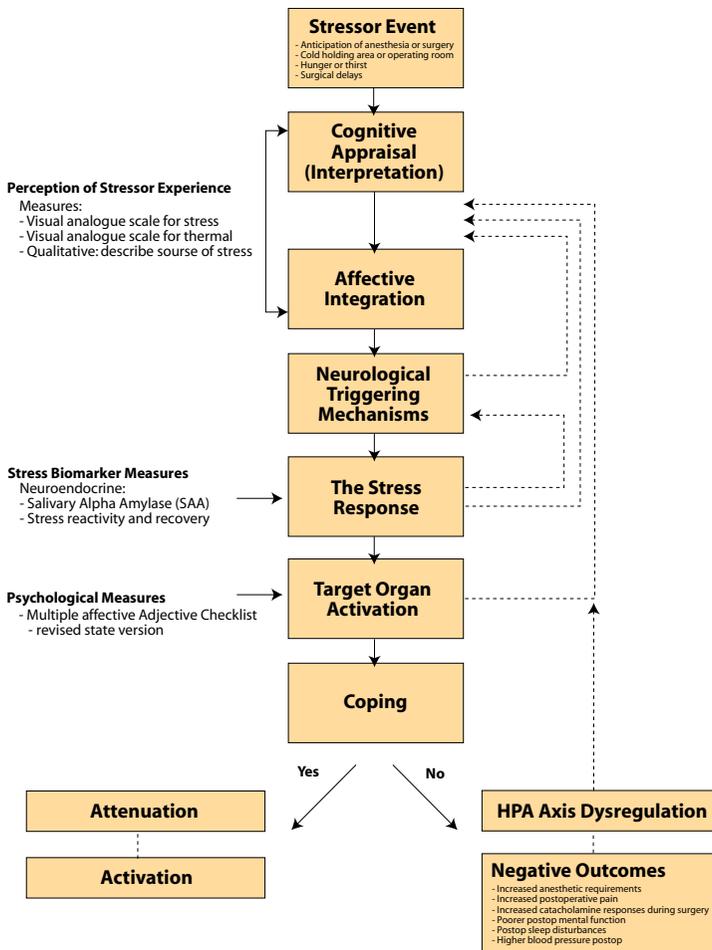


Figure 1. A systems model of the human stress response. Adapted from Everly and Lating, 2002.

Preoperative anxiety, a behavioral response to anesthesia or surgery, is common among patients waiting for surgery. It has been associated with increased anesthetic requirements (Hong et al., 2003; Maranets & Kain, 1999), increased postoperative pain and analgesic requirements (Kain et al., 2000; Kain, Sevarino, Alexander, Pincus, & Mayes, 2000), increased catecholamine responses during surgery (Manyande et al., 1992; Pearson, Maddern, & Fitridge, 2005), poorer mental functioning after surgery (Pearson et al., 2005), increased postoperative sleep disturbance (Kain & Caldwell-Andrews, 2003), and higher blood pressure postoperatively (Manyande et al., 1992).

However, anxiety is only one of several emotions that may manifest in the preoperative period. Other specific emotions such as hostility, depression and positive affect may also be experienced, and thus may increase or decrease the stress response (Lubin &

Zuckerman, 1999; Lubin, Fiedler, & Van Whitlock, 1999). For example, a male patient who has had multiple surgeries may not be anxious about the anesthesia or surgery, but may feel acutely depressed or have low state (situational; current) positive affect because he anticipates a prolonged recovery or complications after the surgery (e.g., chronic testicular pain after inguinal hernia repair). State positive affect is defined as feelings of happiness, joy, excitement, enthusiasm or contentment at a specific moment in time; thus, a patient with low positive affect would have less of these feelings (see Cohen and Pressman (2006) for an excellent review on positive affect and health). This situational depression or low positive affect may modify the stress response. However, if only state anxiety was measured, one might not be able to explain individual differences in the physiological or psychological stress response. Furthermore, events such as surgical delays, hunger or thirst, or feeling too hot or cold (thermal comfort) (Kimberger, Illievich, & Lenhardt, 2007) in the preoperative period may modify preoperative physiological and psychological stress responses prior to surgery. Given these potential negative outcomes, it is essential that anesthesia providers have an in-depth understanding of the physiological and psychological stress responses patients manifest in the preoperative period.

Advances in biopsychosocial research have dramatically increased our knowledge and understanding of individual differences in stress. Recently, salivary alpha amylase (SAA) and several psychological measures have been identified as possible variables (or markers) that may help explain differences in how people respond or react to stress (Chatterton, Vogelsong, Lu, & Hudgens, 1997; Kirschbaum et al., 1995; Lubin & Zuckerman, 1999; Rohleder, Nater, Wolf, Ehlert, & Kirschbaum, 2004). Salivary alpha amylase is an indirect measure of the SAM axis that has been found to be more sensitive to stress than salivary or intravenous catecholamines or traditional measures (i.e., heart rate and blood pressure). Psychological measures found to be sensitive to stress include the Multiple Affect Adjective Checklist (MAACL-R) and the Visual Analogue Scale for Stress (VAS-S) (Lubin & Zuckerman, 1999). These instruments have been used extensively by stress researchers and have been found to be reliable and valid measures of the psychological responses to stress (Fatkin, King, & Hudgens, 1990; Hudgens, Malkin, & Fatkin, 1992; Torre et al., 1991). Unfortunately, there are no investigations to date that have used SAA, MAACL-R or VAS-S together to study preoperative stress in patients undergoing elective surgery. Therefore, the purpose of this pilot investigation was to evaluate preoperative physiological and psychological stress and thermal comfort measures in patients presenting for elective surgical procedures upon admission (T1), on arrival to the preoperative area (T2), and prior to entering the operating room (T3). Our secondary aim was to determine the relationship between the physiological and psychological measures of stress and thermal comfort. Thermal comfort was included as an outcome as some patients complain of feeling cold when waiting to have surgery (Kimberger, Illievich, & Lenhardt, 2007).

Methods

Subsequent to Institutional Review Board approval, a prospective, descriptive, correlational pilot investigation was conducted at Naval Medical Center San Diego. A convenience sample of 30 American Society of Anesthesiologists Class (ASA) I & II patients aged 18–65 years presenting for elective general, non-cancer, surgical procedures (i.e., inguinal hernia repair, laparoscopic cholecystectomy) requiring general anesthesia were

recruited. Subjects were excluded if they were taking medications known to interfere with SAA analysis (e.g., beta blockers or albuterol), had diabetes or history of a psychiatric disorder, Sjogren's syndrome, autoimmune disorders, or a history of radiation to the head or neck.

Patients were approached on the day of surgery in our same day surgery unit shortly after checking in. Prospective subjects were provided information about the study by the investigators, and informed consent was obtained from those who wished to participate. Baseline demographics were collected in a quiet room. Demographic data included height, weight, ASA status, ethnicity, education, marital status, military rank, years of service, deployment history, past medical history, past surgical history, and medications. Additionally, subjects were asked to describe what they were most concerned about on the day of surgery and the stressful feelings they might be having at that time.

After initial measurements were obtained, subjects' state affect (MAACL-R), subjective stress (Visual Analogue Scales for stress (VAS-S)), and thermal comfort (VAS-T) were evaluated (T1). A saliva sample was then collected to analyze SAA. Saliva was collected using a Salimetrics Oral Swab (Salimetrics, State College, PA), which is a small, inert polymer cylindrical swab in a plastic tube. Subjects placed the swab in the upper right pocket of the mouth for two minutes, then placed the cotton swab in the plastic tube. The next data collection point occurred after subjects arrived in the preoperative holding area. Subjects called by operating room staff were escorted to the preoperative holding area, where they were placed supine in a gurney, and the VAS-S and VAS-T were administered. Additionally, subjects responded to an open-ended question in which they described any sources of stress or stressful feelings they were having at this time point (T2). After completion of these forms, a second saliva sample was collected for SAA. The final data collection point occurred immediately before subjects entered the operating room, but prior to administration of any sedatives or opioids (at this facility patients are typically not given any sedatives or hypnotics until they are ready to enter the operating room). Data collected at this point included the MAACL-R, VAS-S, VAS-T, and SAA, and subjects' responses to an open-ended question in which they described any sources of stress or stressful feelings there were having at this time point (T3). At least 20 minutes passed between the time the anesthesia provider started the subjects' intravenous line and the collection of the second or third SAA sample, respectively. All saliva samples were placed in a cooler after collection, subsequently transported to the laboratory, and placed in a -30° C freezer.

Instruments

MAACL-R. The Multiple Affect Adjective Checklist is a reliable and valid psychological measure of several positive and negative affect domains. It includes a general (trait) and today (state) version, and consists of five primary subscales (anxiety (A), hostility (H), depression (D), positive affect (PA), and sensation seeking (SS)) derived from a one-page list of 132 adjectives. The MAACL-R state form has been found to be particularly suitable for investigations that postulate changes in specific affects in response to stressful situations (Lubin et al., 1999). This is identical to the general form, except participants are instructed to answer according to how they "feel right now," "have felt since they last completed the form," or "felt since arriving in the preoperative holding area." Scores are presented as t-scores (based on a mean of 50 with a standard deviation of 10).

VAS-S and VAS-T Visual Analogue Scales for Stress (VAS-S) and Thermal Comfort (VAS-T). Visual analog scales (VAS) have been utilized to evaluate subjective experiences recorded in the perioperative period. A review of studies consistently demonstrates that VASs accurately measure (i.e., with high validity) the construct (e.g., stress, temperature, pain) they are designed to measure across a variety of settings and populations (Hudgens et al., 1992; Jensen, 2006; Kain et al., 2002; Kimberger et al., 2007; Wewers & Lowe, 1990). The VAS-T is a 0–100 mm scale, with a score of 0 mm indicating intense cold and 100 mm indicating intense heat; a score of 50 mm indicates thermal neutrality, neither too warm nor too cold (Kimberger et al., 2007). The VAS-S is used to measure how stressed the subject is feeling right now, with 0 mm indicating “not stressed” to 100 mm indicating “extremely stressed.”

SAA. Sympathetic, parasympathetic, and peptidergic nerves innervate the saliva glands (Arglebe, 1981). When beta-adrenergic receptors are stimulated by the sympathetic nervous system (SNS), there is an increase in the release of salivary proteins, including SAA (Huether, 2006; Speirs, Herring, Cooper, Hardy, & Hind, 1974). SAA levels have also been shown to increase during periods of physical and psychological stress (Chatterton, Vogelsong, Lu, Ellman, & Hudgens, 1996; Kirschbaum et al., 1995; Nater et al., 2005; Nater et al., 2006; Rohleder et al., 2004; Takai et al., 2004), and after exposure to aerobic exercise or hot and cold environments (Chatterton et al., 1996).

All saliva samples were sent frozen to Salimetrics, Inc. (Salimetrics, State College, PA). The SAA assay method utilizes a chromogenic substrate, 2-chloro-p-nitrophenol linked with maltotriose. The enzymatic action of α -amylase on this substrate yields 2-chloro-p-nitrophenol, which can be spectrophotometrically measured at 405 nm. The amount of α -amylase activity present in the sample is directly proportional to the increase in absorbance at 405 nm. For ease of use, the reaction is read in a 96-well microtiter plate with controls provided. The coefficient of variation was less than 5%.

Statistical Analysis

Descriptive and inferential statistics were used to analyze the results. Because SAA results are positively skewed, a log transformation was performed prior to analysis; however, untransformed results are presented (Rohleder et al., 2004; Rohleder & Nater, 2009). Next, the area under the curve (AUC), absolute increase (AINC), and mean increase (MnInc) were calculated for SAA; for the VAS-S and VAS-T, the MnInc was calculated (Edwards, Evans, Hucklebridge, & Clow, 2001; Nater & Rohleder, 2009). For each MAACL-R subscale, a change score was calculated. Demographic data were compared and analyzed with Chi-square or Fisher's Exact tests where appropriate. To analyze changes over time in SAA, VAS-S, and VAS-T, a one-way repeated measures ANOVA or Friedman Test was used where appropriate. Differences in MAACL-R scores at T1 and T3 were compared using a paired t-test or Wilcoxon Signed Rank Test was used where appropriate. Exploratory analysis of relationships between SAA and the psychological measurements and VAS-T were completed using Pearson Correlation or Spearman Rank Order Correlation Coefficients where appropriate. Results are presented as either the mean \pm SD, median (min, max). A *P* value $<.05$ was significant. Since this was a pilot study no sample size was calculated.

Results

Sample

The majority of subjects were active-duty (in the U.S. Military; n= 22, 75.9%) Caucasian (n= 19, 65.6%) males (n = 17, 58.6%), with n = 12 (41.4%) having no past surgical history (Table 1). The majority of the proposed surgical procedures were hernia repairs (n = 18, 62.2%).

Primary outcome

State affect scores on the MAACL-R at T1 and T3 were compared. The assumption of normality was not met for a paired t-test, so the Wilcoxon Signed Rank Test was used. No statistically significant difference was found for the anxiety, depression, or hostility scales ($P > .05$). For the positive affect scale, there was a median decrease of -2.0 (-18, 11) at T3 compared to T1 ($P = .085$; Table 2).

Differences in subjective stress ratings as measured by the VAS-S were compared at each time point. The assumption of normality was not met for a RMANOVA, so a Friedman Test was used. There was a significant difference over time in the scores ($P = .01$; Table 2). A Wilcoxon Ranked Signed Test results found a significant difference between T2 and T1 (mean difference = 9.28, 95% CI 2.7 to 15.87; $P = .009$) and T3 and T1 (mean difference = 11.5, 95% CI 2.5 to 20.47; $P = .014$), but similar between T2 and T3 (mean difference: 2.21, 95% CI 3.37 to 7.79; $P = .29$; Table

2). Differences in subjective temperature ratings as measured by the VAS-T were compared at each time point. The assumption of normality was not met for a RMANOVA, so a Friedman Test was used. There was no significant difference over time in the scores ($P = .67$; Table 2).

Table 1. Demographics

Age (y):	32.55 ±10.33
Gender	
Male	17 (58.6%)
Female	12 (41.4%)
ASA Status	
ASA I	15 (51.7%)
ASA II	14 (48.3%)
Ethnicity	
Caucasian	19 (65.5%)
African American	6 (20.7%)
Asian	1 (3.4%)
Hispanic	2 (6.9%)
Pacific islander	1 (3.4%)
PSH	
Yes :	17 (58.6%)
No :	12 (41.4%)
Surgical Procedure	
Hernia repair	18 (62.2%)
Laparoscopic cholecystectomy	8 (27.6%)
Pilonidal cystectomy	1 (3.4%)
Lymph node dissection	1 (3.4%)
Laparoscopic gastric banding	1 (3.4%)

Note. Data are presented as mean ± SD or number of cases (%).

Table 2. Psychological and Thermal Comfort Measures

Variable	T1	T2	T3	P
MAACL A	45 (44, 110)		45 (43, 84)	.79
MAACL D	46 (40, 84)		46 (44,81)	.94
MAACL H	46 (39, 71)		46 (43, 65)	.94
MAACL PA	49 (42, 63)		47 (42, 62)	.085
VAS-S	27 ± 21.6	36 ± 25.2*	38 ± 26.2**	.01
VAS-T	51 ± 10.4	49 ± 14.6	49 ± 12.9	.67

Note. Data presented as mean ± SD or median (min, max). T1: arrival hospital; T2: arrival in preoperative holding area; T3: prior to entering operating room. MAACL-R results are t-scores based on a mean of 50 ± 10. MAACL-R subscales: anxiety (A), depression (D), hostility (H), positive affect (PA); VAS-S (visual analog scale for stress), VAS-T (visual analog scale for thermal comfort)* $P = .009$ for T2 vs. T1 and ** $P = .014$ for T3 vs. T1.

Differences in mean SAA levels at each time point were compared using a RMANOVA. A significant difference over time was noted in SAA levels ($P = .01$); student t-test results found a significant difference between T2 and T1 (mean difference = 63.12 U/ml, 95% CI -0.94 to 127.18 U/ml; $P = .007$). No difference was noted between T3 and T1 (mean difference = 42.45 U/ml, 95% CI -6.3 to 91.28 U/ml; $P = .14$) and T2 and T3 (mean difference = 33.18 U/ml, 95% CI -6.47 to 72.83 U/ml, $P = .12$). Untransformed SAA levels are presented in Figure 2.

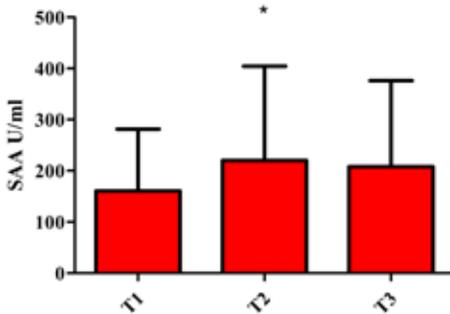


Figure 2. Salivary alpha amylase. Note: SAA samples collected on arrival to hospital (T1), on arrival to preoperative holding (T2), and prior to entering OR (T3). * $P = .007$ when compared to T1. Average time between T2 and T1 was 45 ± 42 minutes, and between T3 and T2 43 ± 24 minutes.

Secondary Outcomes

Exploratory analysis revealed no relationships between MAACL-R at T1 and T3 and SAA at T1-T3, or the AUC and AINC for SAA ($P > .05$). Examination of MAACL-R changes scores revealed a positive, though not statistically significant, correlation between anxiety change scores and AUC for SAA ($r = .358$, $P = .066$). There was a significant negative correlation between positive affect change scores and SAA levels at T2 ($r = -.384$, $P = .04$), indicating subjects who had lower positive affect had increased SAA after arriving in the preoperative holding area. While not statistically significant, examination of subjects with no PSH revealed a positive correlation between MAACL-R anxiety scores at T3 and SAA levels at T2 ($r = .503$, $P = .11$), suggesting that subjects with higher SAA levels after arriving in the preoperative holding area had higher anxiety prior to entering the operating room.

A positive correlation was found between MAACL-R anxiety scale at T3 and VAS-S at T2 ($r = .481$, $P = .009$) and T3 ($r = .688$, $P = .001$), respectively. This suggests that subjects who had higher subjective stress on arrival to the preoperative holding area and prior to entering the operating room had higher state anxiety prior to entering the operating room.

No relationship was found between VAS-S and VAS-T at any time point. No relationship was found between VAS-T and SAA ($P = .67$) at any time point. Subjects who reported feeling colder (MnInc in VAS-T) in the preoperative area had significantly higher absolute increase (AINC) in SAA levels ($r = -.413$, $P = .03$). This relationship was stronger in subjects with no PSH ($r = -.909$, $P < .0001$; Figure 3), however this relationship was not present in subjects with previous PSH ($r = -.007$, $P = .98$). Subjects with no PSH were approximately 7 years younger and had a lower ASA status (ASA I: 75%) compared those with previous PSH, though groups were not significantly different ($P > .05$).

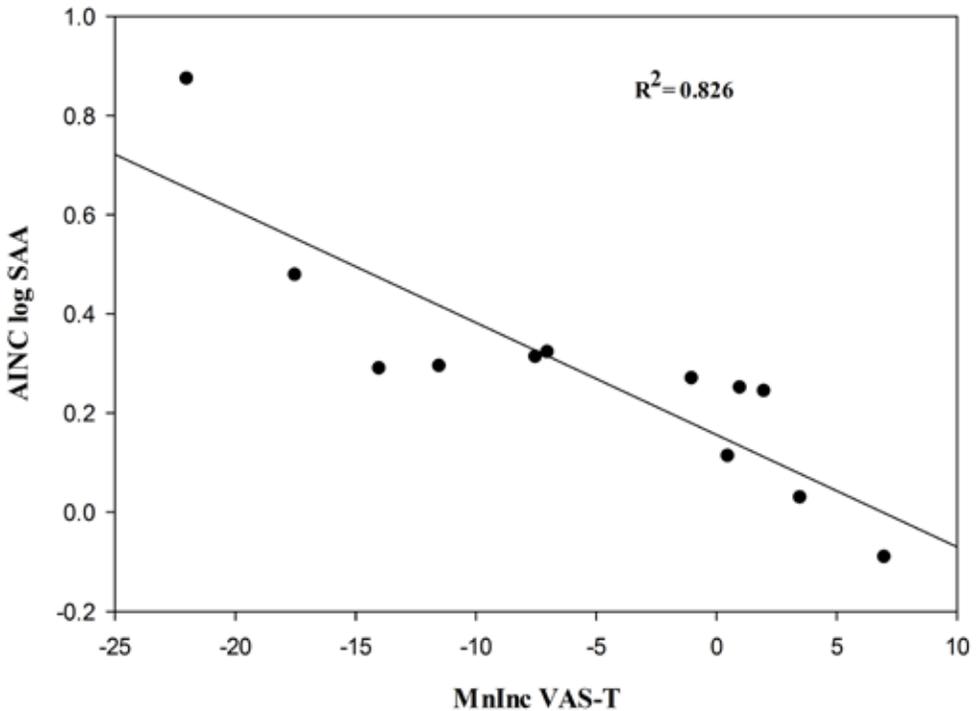


Figure 3. Correlation between thermal comfort and SAA. Note: Correlation between mean increase in VAS-T and absolute increase in SAA ($r = -.909$, $P < .0001$). Subjects with no PSH who reported feeling colder in the preoperative area had a significantly higher absolute increase in SAA.

Discussion

The primary purpose of this pilot investigation was to evaluate preoperative physiological and psychological stress as well as thermal comfort in patients presenting for elective surgery. The investigators gathered data on three occasions for each subject: after admission (T1), on arrival to the preoperative holding area (T2), and prior to entering the operating room (T3). The study's secondary aim was to determine the relationship between the physiological and psychological measures of stress and thermal comfort. The authors report that salivary alpha amylase and subjective stress as measured by visual analogue scale for stress and other instruments increase over time during the preoperative period. However, subjects' perceptions of their thermal comfort did not change over time (VAS-T). There was a trend towards subjects reporting lower "state positive affect" (feelings of happiness, joy, excitement, enthusiasm or contentment at a specific moment in time) prior to entering the operating room (T3) when compared to when they arrived at the hospital (T1); however this was not statistically significant. Overall, these results suggest that the preoperative period is associated with increased physiological and psychological stress responses. This is the first investigation to evaluate these stress measures in subjects preparing for elective outpatient surgery, and results suggest that these measures may be useful in future preoperative stress research in a similar surgical population.

In the secondary aim of determining the relationship between the physiological and psychological measures of stress and thermal comfort, the authors' findings suggest a relationship between some of the psychological (i.e., MAACL-R Positive Affect) and physiological measures (i.e., SAA), such that subjects who felt more negative (lower positive affect) prior to entering the operating room had a larger SNS response on arrival to the preoperative holding area (T2). This is the first investigation to evaluate these stress measures in subjects preparing for elective outpatient surgery, and results suggest that these measures may be useful in future preoperative stress research in a similar surgical population. Overall, these results lay the groundwork for future prospective studies in a larger sample of subjects, and possibly in a more diverse population.

Although causation cannot be determined, several explanations may apply to the relationship between lower positive affect and higher salivary alpha amylase levels. The time immediately prior to entering the operating room is a critical time that may be associated with decreased positive affect (i.e., more negative feelings), which may in turn be associated with an increase in SNS activation. In this current investigation this is the time that many subjects met with their surgeon and were interviewed by their anesthesia providers. In some cases the meeting with their anesthesia providers may have been very brief, and subjects may not have had enough time to have all their questions answered or fears allayed (Mitchell, 2008). In some cases the meeting with the anesthesia providers and surgeons may heighten subjects' stress responses. Mitchell (2010) conducted a survey of 460 patients undergoing general anesthesia for surgery to evaluate factors associated with preoperative anxiety. He determined that 30% of the variance in anxiety on the day of surgery was explained by the factors "preoperative anesthetic information," "anesthetic catastrophizing," (thinking how bad things will be), and "imminence of surgery," with "imminence of surgery" having the strongest correlation with preoperative anxiety ($r = .451$). Similarly, in an investigation of 214 patients waiting to undergo surgery with monitored anesthesia care (sedation provided by an anesthesia provider), the factors "intraoperative apprehension" (fear of something bad happening during surgery) and "anesthetic information provision" (receiving information on what to expect or feel) predicted 37% of the variance in anxiety on the day of surgery (Mitchell, 2008). Thus, it is possible in this current study that subjects may have been more apprehensive after receiving information about the proposed anesthetic and may have had some misconceptions about general anesthesia (e.g., might not wake up, fear of dying, surgical "recall"). Further, the imminence of surgery may help explain the relationship between lower positive affect and increased SAA.

In fact, statements made by several study subjects in this investigation support the factors described (Mitchell, 2008; Mitchell, 2010). For example, when asked to 'Describe any sources of stress or stressful feelings you are currently experiencing,' one subject wrote at T1, *"I am nervous about how everything will turn out. I am calm right now because my loved ones are here, but have those thought in the back of my mind."* At T2 this same subject wrote, *"Very nervous, anxious, and ready for this to be over. Butterflies in my stomach."* Prior to entering the operating room the subject wrote, *"Very stressful right now. Ready to have something to calm me down."* These quotes support the factors 'anesthetic catastrophizing' and 'imminence of surgery' (Mitchell, 2008). Sources of stress reported by other subjects at T3 included, *"Pre-op anesthesia," "having to go to sleep for the surgery," "anesthesia choices,"* and *"going under."* These quotes support the factors 'preoperative anesthetic information' and 'intraoperative apprehension' reported by Mitchell (2008).

The medical literature is replete with the correlation of anxiety and stress with SAA levels (Balodis, Wynne-Edwards, & Olmstead, 2010; Grillon, Duncko, Covington, Kopperman, & Kling, 2007; Noto, Sato, Kudo, Kurata, & Hirota, 2005; Takai et al., 2004). However, this is the first report on the correlation between affect, specifically positive affect (MAACL-PA), and SAA in the perioperative period in patients waiting to undergo elective outpatient surgery. Most previous research has focused on measuring state anxiety rather than state positive affect (Chatterton et al., 1997; Hong et al., 2003; Kain, Sevarino, Alexander et al., 2000; Manyande et al., 1992; Maranets & Kain, 1999; Pearson et al., 2005; Rohleder et al., 2004). The reason for this may be that there is a lack of consensus among researchers on what is meant by positive affect (Cohen & Pressman, 2006), or unfamiliarity with the concept or instruments (i.e., MAACL-R) designed to measure the concept. While a relationship was found with positive affect and SAA, no relationship was found between SAA and state anxiety. This was unexpected, as previous researchers using the anxiety scale on the MAACL-R have reported associations with SAA in settings outside the operating room (Chatterton et al., 1997; Fatkin et al., 1990). It may be that other external environmental factors (e.g., holding area room temperature, noise, baseline stress level of surrounding patients) may have masked this potential relationship. In this investigation, the strongest positive correlation was between SAA and thermal comfort (i.e., how hot or cold the subjects felt).

Preliminary results relating to thermal comfort indicate that subjects who never had surgery before described feeling colder in the holding area and had a significant SNS stress response (increase in SAA). It is unclear why these group differences exist; exploratory analysis suggests this relationship may be related to age and ASA status. It may be that subjects who had never had surgery before were unaware what they would experience upon arrival to the preoperative area. At the facility where the study was conducted, the preoperative holding area can be quite cold (approximately 72° F) at times, and it is possible that this triggered a SNS stress response. Further research is needed to confirm these results and to determine whether if providing patients with information about the entire perioperative experience (i.e., anesthetic, surgical, and environmental) would decrease physiological and psychological stress. This is especially important, given that most ambulatory surgery patients (with lower acuity or less medical problems) do not see an anesthesia provider—or are not provided with detailed information about the perioperative experience—until they arrive at the hospital on the day of surgery (Mitchell, 2008).

This investigation has several limitations. It was a pilot with a small sample size ($n = 29$) limited to ASA class I and II patients. The investigators chose to conduct a pilot study because this study design and instruments had never been used to evaluate preoperative stress, and thus no effect sizes were available to base a power analysis on. As the demographics demonstrated, the majority of the subjects were Caucasian males preparing to undergo hernia repair at a single institution, and thus the results may not apply to other surgical populations or facilities. A larger prospective investigation is needed to confirm that these stress measures and relationships are present in multiple surgical populations. Additionally, the check-in procedure for surgery at this facility obliges the patient to walk a distance from Same Day Surgery (T1) to the pre-operative hold area (T2). It is thus possible for this physical activity to have influenced the SAA results. Finally, it was very difficult to control environmental factors (i.e., temperature, noise, personnel, patient privacy) in the preoperative holding area. Though the investigators tried to minimize extraneous factors that could influence the stress patients experienced, it is still possible these factors may have influenced the results. The

investigators did try to minimize these factors by not recruiting subjects who were scheduled for the first case of the day, when the preoperative holding area is the busiest; however, in attempting to minimize the impact of one of the confounding stressors, the investigators had to assume negative impacts from the others, such as increased NPO times, longer wait times, and even inevitable delays for cancellations in the surgical schedule. Researchers should consider trying to control for some of these factors when designing future preoperative stress studies, and attempt to collect baseline measures of physiological and psychological stress prior to the day of surgery.

Conclusion

This pilot investigation demonstrated that the preoperative period is associated with significant increases in markers of physiological and psychological stress. This study demonstrated that SAA, the MAACL-R, VAS-S, and VAS-T are useful measures for evaluating preoperative stress. The clinical import of this finding is that clinicians may be able to use simple measures such as the VAS-S or VAS-T to evaluate subjective stress or thermal comfort. Further research is necessary to validate both the methodology and the instruments used to glean whether any interventions focused on decreasing preoperative stress beyond those already practiced might lead to improved perioperative outcomes. This is especially important, given that previous researchers have demonstrated a relationship between psychological stress (i.e., anxiety) and postoperative pain (Carr, Brockbank, Allen, & Strike, 2006; Kain, Sevarino, Alexander et al., 2000). The current study adds to the body of knowledge on stress in the preoperative period by demonstrating that low positive affect is associated with increased SNS responses. Additional research is needed to confirm this finding. Preoperative interventions, such as education and guided imagery, have been shown to decrease preoperative stress, postoperative anxiety, pain, and recovery room stays (Gonzales et al., 2010). Additionally, owing to the findings reported in previous research investigations on factors associated with anxiety on the day of surgery (Mitchell, 2008; Mitchell, 2010), further research will help determine whether providing information on the perioperative experience using alternative strategies (i.e, audio recordings, online videos) reduces preoperative stress, especially for patients presenting for ambulatory surgery who do not see an anesthesia provider until the day of surgery.

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Identifying Causes of Change in Cancer Trends Among HIV-Infected Patients

Robert H. Riffenburgh, PhD, MS

Biostatistician, Clinical Investigation Department
Naval Medical Center San Diego
34800 Bob Wilson Drive
San Diego, CA 92134
Tel.: (619) 532-9414
Fax: (619) 532-8137
Email: robert.riffenburgh@med.navy.mil.

Nancy F. Crum-Cianflone, MD, MPH

Physician, Infectious Diseases Department
Naval Medical Center San Diego
34800 Bob Wilson Drive
San Diego, CA 92138
Tel.: (619) 532-6189
Fax: (619) 532-8137

HIV Working Group
Infectious Diseases Clinical Research Program
Uniformed Services University of the Health Sciences, Bethesda, MD

Author Note

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Abstract

Cancers among HIV-infected patients continue to play a significant role in the morbidity and mortality of HIV-infected patients. In 1996, highly active antiretroviral therapy (HAART) was introduced and resulted in marked reductions in AIDS-defining cancers (ADCs). However, HAART may not have impacted non-AIDS-defining cancers (NADCs). Our goal was to statistically model the rates of ADCs and NADCs to explain observable trends. We obtained frequencies of incident cancer diagnoses ($n = 439$; 305 ADCs and 134

NADCs) among 4,498 HIV-infected patients who had open and free access to care (1986–2006). We used smoothing techniques to reduce random fluctuations and expose patterns suggestive of putative models. We then modeled frequencies of occurrence using well established biologic growth patterns. The data showed that the rate of ADCs increased prior to HAART in a pattern best represented by a biologic growth curve. After the introduction of HAART, ADCs exhibited a sudden negative (declining) growth curve. Despite the HAART era, NADCs have demonstrated a linear rising pattern throughout the study period. In summary, the implementation of HAART was the major—and the only identified—cause of change in ADC cancer rates in our study cohort. A projection of this curve predicts a continued negligible incidence of ADCs among HIV patients with access to care. NADCs in our study cohort were unaffected by HAART and showed a steady growth of incidence over two decades.

Keywords: Survival, cancer, HIV, AIDS, AIDS-defining cancer (ADC), Non-AIDS-defining cancer (NADC), HAART, growth curve, death rates, Gompertz curve, modeling, model evaluation, smoothing, coefficient of determination, Akaike information criterion.

Introduction

Information about natural processes arising from sources beset by many influences is often buried in highly variable data, its pattern not immediately perceptible to a viewer. Yet the perception of such patterns is requisite for understanding and addressing these processes. Such a phenomenon occurs frequently in medicine, one example being an ongoing controversy over the effectiveness of HIV treatment influencing the rate of incident cancer cases among HIV patients. Some answers may be found by bridging scientific fields; in this case, introducing recently developed statistical methods into medical research. The current study is the first to use statistical methods and modeling techniques to examine the rates of cancers among HIV patients and the impact of highly active antiretroviral therapy (HAART) on these cancer occurrences.

Cancers among HIV-infected patients were an early hallmark of the disease. In fact, Kaposi's sarcoma (KS) was one of the first clinical diseases which led to the recognition of the HIV epidemic in the early 1980s (CDC, 1981). During the first 15 years of the epidemic, medical therapy of HIV disease was limited, and cancers continued to play a significant role in the morbidity and mortality of HIV-infected patients. As such, the Centers for Disease Control and Prevention classified three cancers as AIDS-defining cancers (ADCs), including KS, non-Hodgkin's lymphoma, and invasive cervical cancer (CDC 1992). In 1996, combination therapy with three or more HIV medications, termed highly active antiretroviral therapy or HAART, was introduced. This therapy resulted in significant immune reconstitution among HIV patients with marked reductions in opportunistic infection and death rates (Detels, 2001; Mocroft, 1998). In addition, the incidence rates of ADCs closely linked to the immunosuppressed state, such as KS, also significantly decreased after the introduction HAART (Engels, 2006; International Collaboration on HIV and Cancer, 2000; Jones, 2000).

Although HAART had a significant impact on cancer trends, cancer rates have fluctuated over the course of the HIV epidemic in ways that may not be solely explained by the commencement of HAART. For example, some studies showed that the incidence of KS

as well as other cancer types may have decreased before the introduction of HAART (Engels, 2006; Jones, 2000; Buchbinder, 1999; Grulich 2001); the reasons for these changes remain unclear as studies have not found a link between the use of mono- or dual-antiretroviral therapies as an explanation for the decline pre-HAART ADC rates (Jones, 2000). Furthermore, although ADC rates have diminished, other types of cancers, especially non-AIDS-defining cancers (NADCs), remain important causes of morbidity and mortality (Patel, 2008). To our knowledge, there have been no publications with the sole purpose to model cancer trends over the 20+ year HIV epidemic in an attempt to explain the variations in cancer rates using population-based modeling among HIV-infected patients. Our goal was to statistically model the rates of ADCs and NADCs over time, and to justify or to rule unlikely putative causes for observable trends. Specifically, our goal was to use time series methods to reduce variability and allow observable trends to appear, then to fit these trends to well-established biologic growth curves and other commonly used potentially explanatory patterns.

Methods

We obtained frequencies of incident cancer diagnoses ($n = 439$) among HIV-infected patients from data collected as part of a prospective, observational HIV Natural History Study (NHS) which enrolled 4,498 evaluable patients from 1986–2006. Participants were U.S. military beneficiaries who were evaluated on a biannual basis utilizing standardized data collection procedures. Our study cohort consisted of participants diagnosed early in the HIV disease course and with free access to medical care, including antiretroviral medications. Details of the NHS cohort and the identification of cancer cases within the database have been published elsewhere (Crum-Cianflone, 2009). Cancers were divided into ADCs (KS, non-Hodgkin lymphoma, and invasive cervical cancer) and NADCs (all other cancers). The first cancer event in each participant was used in this analysis and the subject censored during subsequent follow-up to avoid oversampling of participants with recurrences of the initial cancer or multiple cancer events. For those without cancer, the censoring date was the last study visit or the date of death. Follow-up for this report ended 31 December 2006.

Our general approach was to use time series methods to smooth the cancer incidence rates and identify the best fitting models to the smoothed data. We smoothed the data with moving averages so that a discernible pattern emerged, regressing the smoothed data on the raw data, and choosing the interval length for the moving averages by the regression's coefficient of determination R^2 , by the relative model evaluation based on Akaike's information criterion (AIC) (Burnham, 2004), and by the residual mean square. Then we postulated models, consistent with our understanding of the disease patterns, that appeared appropriate to the smoothed data and fit the data to the models by nonlinear (and in one case linear) regression methods, assessing the quality of the fit by the regression's R^2 . The rate of cancers rose in the early pre-HAART period, then decreased, but increased again over time. We suspected that the second rise was due to an increasing incidence of cancers unrelated to AIDS, so we separated the rate data into ADCs and NADCs. Due to the powerful impact of HAART noted in other studies (Engels, 2006; International Collaboration on HIV and Cancer, 2000), we examined the pre-HAART and HAART periods separately. Fits for growth curve models were carried out using SPSS software (SPSS Inc., Chicago IL). All other computations were carried out using Stata software (Stata Corp., College Station TX).

Results

Study Population Characteristics and Cancer Rates

The overall study population had a median age at HIV diagnosis of 28 [interquartile range (IQR) 24–33] years; 91% were male; and ethnicity was self-reported as African American among 45%, Caucasian among 44%, and other in 11%. The median CD4 count at HIV diagnosis was 510 (IQR 353–680) cells/mm³. Overall, cancers in this analysis included 305 ADCs and 134 NADCs as shown in Figure 1.

Frequencies and rates of ADC and NADC occurrences by year were tallied and appear as Table 1 and Figures 2 and 3; the vertical line at 1996 represents the implementation of the HAART among HIV-infected patients. We noted multiple jagged and irregular patterns in the rate data, unrelated as far as we could discern to any known causes of cancer; hence, the data were smoothed using forms of moving averages to better perceive the underlying shape of cancer rates over time. For short data sets with both occasional extreme values and irregular-but-not-extreme values, the goal of the smoothing process is to soften extreme values with a moving median and then reduce remaining irregularities with a moving mean (Tukey JW, personal communication, 1965).

To determine the length of a smoothing interval, we evaluated intervals of 2, 3, 4, and 5 years. For the limited number of years in our study, we believed that smoothing intervals greater than 5 years would reduce sample size unacceptably and obscure the pattern. We calculated the ratio to the maximum smoothing interval of 5 of R^2 , Akaike's model likelihood, and residual mean square for each smoothing interval in order to select the minimally adequate interval. [If n is sample size (number of years) and k is number of parameters (5: coefficients b_1, b_2, b_3 , and intercept and variance), then

$$AIC_c = n \times \ln(MSR) + 2k + \frac{2k(k + 1)}{n - k - 1} .]$$

Pre-HAART Era ADC Rates

Examination of the pre-HAART ADC raw data (Figure 3) showed an initial increase that then reached a plateau. On logical grounds, this pattern could be fit as a straight line or as a sigmoid curve (increasing rate to an inflection point, then decreasing rate). The most general sigmoid curve is a classical biological growth curve (Gompertz, 1825). (This curve does not require symmetry, as does a cubic curve.) After smoothing, we noted that the resulting curve accelerated, reached an inflection point, and then decelerated, typical of the

TOTAL CANCERS: 439

AIDS-Defining: 305	
Kaposi's Sarcoma	221
Non-Hodgkin's	82
Invasive Cervical	2
Non-AIDS-Defining: 134	
Skin (non-melanoma)	54
Anal	16
Hodgkin's	14
Melanoma	10
Prostate	8
Renal	7
Gastrointestinal	5
Testicular	4
Lung	3
Brain (non-lymphoma)	3
Head/Neck	2
Breast	2
Thyroid	2
Liver	1
Sarcoma	1
Pancreatic	1
Parotid	1

Figure 1. Types of cancers classified as AIDS-defining and non-AIDS-defining among HIV-infected patients.

Table 1. Number of cancer cases and rates per 1000 per person-years among HIV-infected patients.

Year	# HIV-Infected Patients	# Cancer Cases	# ADCs	# NADCs	Cancer Rate	ADC Rate	NADC Rate
1986	1220	7	4	3	5.74	3.28	2.46
1987	1658	11	7	4	6.63	4.22	2.41
1988	1870	9	8	1	4.81	4.28	0.53
1989	2117	26	17	9	12.28	8.03	4.25
1990	2283	26	20	6	11.39	8.76	2.63
1991	2468	27	20	7	10.94	8.10	2.84
1992	2505	61	49	12	24.35	19.56	4.79
1993	2403	40	31	9	16.65	12.90	3.75
1994	2289	52	49	3	22.72	21.41	1.31
1995	2155	36	31	5	16.71	14.39	2.32
1996	1998	32	27	5	16.02	13.51	2.50
1997	1851	19	11	8	10.26	5.94	4.32
1998	1757	10	5	5	5.69	2.85	2.85
1999	1647	11	4	7	6.68	2.43	4.25
2000	1533	6	3	3	3.91	1.96	1.96
2001	1515	8	3	5	5.28	1.98	3.30
2002	1516	18	4	14	11.87	2.64	9.23
2003	1474	9	5	4	6.11	3.39	2.71
2004	1356	16	5	11	11.80	3.69	8.11
2005	1207	11	2	9	9.11	1.66	7.46
2006	905	4	0	4	4.42	0.00	4.42

traditional biological growth process. A straight line pattern was therefore unsupportable. We postulated a Gompertz growth curve (Gompertz, 1825), used successfully to model cancer growth in a number of papers (Riffenburgh, 2001; Johnstone, 2007; Solum, 2004), given by Eq (1) for the pre-HAART period,

$$y = baseline + b_1 e^{-b_2 e^{-b_3(year-1988)}} \tag{1}$$

where b_1 , b_2 and b_3 are constants to be estimated.

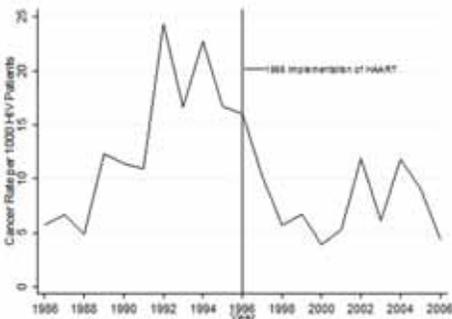


Figure 2. Incidence rate of cancer per 1000 person years among HIV-infected patients.

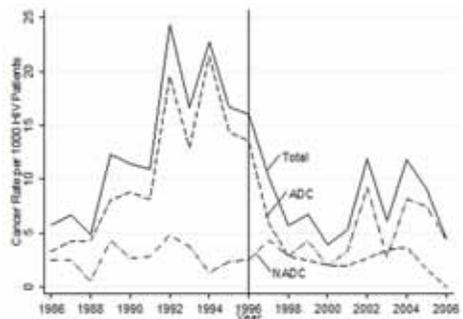


Figure 3. Incidence rates of cancer per 1000 HIV-Infected patients for all cancers (Total), ADCs, and NADCs. The vertical line at 1996 indicates the implementation of HAART.

We smoothed the data by a moving median followed by a moving mean of interval lengths 2, 3, 4, and 5. Figure 4 shows the original data and the four smoothed curves and Table 2a shows the smoothing evaluation criteria. Clearly, the fits for raw data and intervals 2 and 3 are inadequate. The fit for the 4 interval is only slightly inferior to that for the 5 interval for two measures and the same for R^2 , rendering it fairly competitive. We judge that the small gain in quality measures due to moving from a 4 interval to a 5 interval is outweighed by the loss in data and therefore we accept the fit from an interval of 4 data. The smoothed data for the 4 interval can be seen in smoothed data yielded Eq. (2).

$$y = 3.3 + 14.0e^{-6.5e^{-0.05(\text{Year}-1988)}} \quad (2)$$

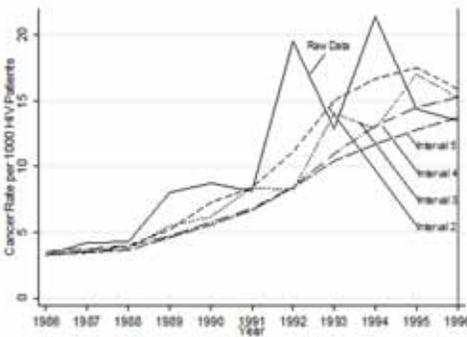


Figure 4. Incidence rates of pre-HAART ADCs per 1000 HIV-Infected patients as raw data and smoothed data for smoothing intervals of 2, 3, 4, and 5. The vertical line at 1996 indicates the implementation of HAART.

Table 2a. Smoothing interval evaluation criteria for pre-HAART ADC data

Data Form	R^2	AIC _c	MSR/1000	R^2 Ratio	Evidence Ratio	MSR Ratio
Raw Rates	0.747	101.94	132.45	0.758	< 0.001	56.69
Interval = 2	0.979	74.38	8.42	0.993	0.001	3.79
Interval = 3	0.953	79.65	14.25	0.967	< 0.001	6.42
Interval = 4	0.987	63.44	2.82	1.001	0.303	1.27
Interval = 5	0.986	61.05	2.22	1.000	1.000	1.00

A graph of the smoothed data and fit will be shown in a later figure (6). The fit for pre-HAART data provide $R^2 = 0.99$ with the small root mean square error 0.43. The growth curve fit is quite adequate. The parameters should not be taken as exact, inasmuch as other fitting efforts could yield slightly different parameters. The important issue is that a traditional biological growth curve fits the data quite well, indicating that the suspected reduction in incidence prior to HAART appears due partly to the slowing rate of change in a post-inflection-point growth curve and partly to vagaries in data unrelated to biologic causes.

HAART Era ADC Rates

After HAART was implemented, the data showed a decreasing rate (concave upward), approaching the horizontal axis (Figure 3). There appeared to be a slight initial concave downward portion, so we postulated a negative growth curve, the reverse pattern of the pre-HAART model, which is given by Eq. (3),

$$y = \text{startpoint} - b_1 e^{-b_2 e^{-b_3(\text{year}-1995)}} \quad (3)$$

For the HAART data, we followed a procedure similar to that for pre-HAART data, using a decreasing rate of growth from a startpoint of $y = 15.7$ (value of y at 1995). Figure 5 shows that original data and the smoothed curves for smoothing intervals 2, 3, 4, and 5, and Table 2b shows the evaluation criteria for the five curves. While not as clear-cut as in the pre-HAART data, we still judge that the 4 interval is the best choice. The fit relative to others can be seen in Figure 5. Fitting it to Eq. (3) yielded the form:

$$y = 15.7 - 14.0e^{-6.5e^{0.63(\text{year}-1995)}} \quad (4)$$

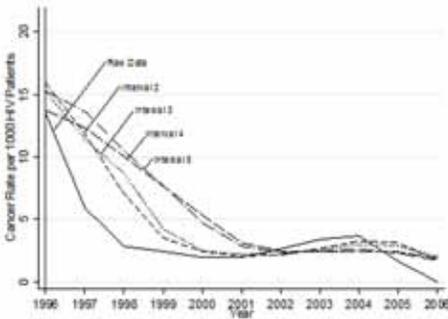


Figure 5. Incidence rates of post-HAART ADCs per 1000 HIV-Infected patients as raw data and smoothed data for smoothing intervals of 2, 3, 4, and 5. The vertical line at 1996 indicates the implementation of HAART.

Table 2b. Smoothing interval evaluation criteria for post-HAART ADC data

Data Form	R^2	AIC _c	MSR/1000	R^2 Ratio	Evidence Ratio	MSR Ratio
Raw Rates	0.832	141.96	43.78	0.885	< 0.002	2.73
Interval = 2	0.920	138.23	32.08	0.979	0.015	2.00
Interval = 3	0.935	134.89	24.29	0.995	0.082	1.52
Interval = 4	0.940	133.15	21.01	1.000	0.196	1.31
Interval = 5	0.940	129.89	16.02	1.000	1.000	1.00

The smoothed data for all ADC data with the pre- and post-HAART fits superposed is shown in Figure 6. The fit for post-HAART data also provide $R^2 = 0.99$ with root mean square error 0.42. Again, a declining growth curve pattern appears to explain the data quite well until about 2002, at which time the smoothed curve increases slightly for three years and then begins to decrease again. The explanation for this phenomenon is unknown.

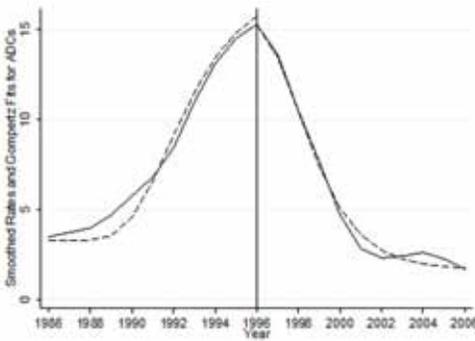


Figure 6. Smoothed rates of ADCs per 1000 HIV-Infected patients with Gompertz growth curve fit pre-1996 (implementation of HAART) and inverse Gompertz curve fit post-HAART.

NADC Rates

These data do not show a pattern assignable to putative causes and demonstrate no visual impact at the time of HAART introduction. An overall increase over time was observed, mandating at minimum a linear pattern (Figure 3). The data seem to increase slightly, plateau, and increase again, suggesting a cubic pattern, but we cannot postulate any biological or medical causes for a cubic pattern. Furthermore, a cubic curve fitting the data would imply an unsustainable continued accelerating growth rate extrapolated forward. We proceeded with the straight line model, prepared to sophisticate the postulate if the fit proved to be inadequate.

The NADC rate data in Figure 3 show no discernible influence from the advent of HAART, so we endeavored to fit the entire period. We followed the same smoothing methods as with the ADC data. Figure 7 shows the raw data with smoothing for the several intervals and Table 2c shows the smoothing interval criteria similar to those in Tables 2a and 2b.

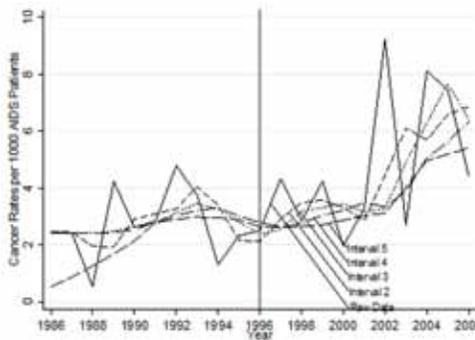


Figure 7. Incidence rates of NADCs per 1000 HIV-Infected patients with smoothed data curves using smoothing intervals of 2, 3, 4, and 5.

Again we chose the data from a smoothing interval of 4, the curve of which can be seen in Figure 7. There is no obvious biological pattern. Geometrically there appear to be a slightly increasing rate until about 2003, after which a sharp acceleration can be seen. We evaluated a linear and exponential fits R^2 for the linear fit was 0.64 and for the exponential, 0.88, so we chose the latter as our model. The fit that emerged is given as Eq. (5).

$$y = 2.174 + 0.0854 (year - 1985) + 0.0000000209 \log (year - 1985) \quad (5)$$

Table 2c. Smoothing interval evaluation criteria for NADC data

Data Form	R^2	AIC _c	MSR/1000	R^2 Ratio	Evidence Ratio	MSR Ratio
Raw Rates	0.313	112.04	186.26	0.397	< 0.001	3.12
Interval = 2	0.627	98.50	94.63	0.796	0.010	1.58
Interval = 3	0.585	99.37	98.83	0.742	0.006	1.66
Interval = 4	0.363	91.51	66.71	0.807	0.330	1.12
Interval = 5	0.788	89.29	59.71	1.000	1.000	1.00

Raw data ($i = 1$) and smoothing intervals of width $i = 2, 3, 4,$ and 5 . R^2 is coefficient of determination, AIC_c is Akaike information criterion corrected (for small samples), and MSR is mean square residual. R^2 Ratio is R^2_i/R^2_5 , Evidence Ratio is $e^{-0.5\Delta(i)}/e^{-0.5\Delta(5)}$, where $\Delta(i)$ is the deviation of AIC_c for interval i from that for interval 5, and MSR Ratio is MSR_i/MSR₅.

Figure 8 shows the data for the smoothing interval of 4 with the exponential fit superposed. The fit yielded $R^2 = 0.880$ and root mean square error = 0.39. R^2 is slightly smaller than for the ADC fits and the error term is similar. The implication is that the number of NADC occurrences has increased an every year with the increase sharply accelerating after 2003. Projection indicates that this acceleration will continue. The average annual increase from 2004 to 2006 was 1.28 per 1000 per year.

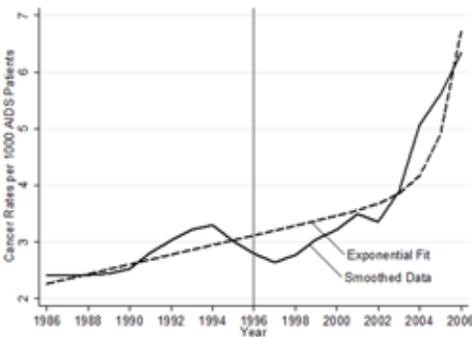


Figure 8. Smoothed rates of NADCs per 1000 HIV-Infected patients with best exponential fit superposed.

Discussion

ADC and NADC rates follow different time-dependent patterns. ADC rate patterns before versus after the introduction of HAART are dramatically different. Before HAART, ADC rates were increasing according to a classic biological growth curve. With the introduction of HAART, the ADC rate pattern changed abruptly, becoming a negative growth curve, declining to negligible in our study cohort. We conclude that the introduction of HAART was the major discernible cause of change in ADC cancer rate incidence. A projection of this curve would predict a continued negligible incidence of ADCs among HIV patients. Of note, our study was conducted in the setting of early diagnosed and treated HIV-infected patients consisting of U.S. military beneficiaries with free access to care (Crum-Cianflone, 2009).

The goal of the modeling demonstrated in this paper was to examine the potential declining rates of ADCs before the advent of HAART. Since prior studies have suggested that single- or dual-antiretroviral medications had little impact on ADC rates in the pre-HAART era (Jones, 2000), the cause of these trends remain unknown. In our study cohort, we also visually observed decreasing ADC rates prior to HAART availability. However, whether this was due to fluctuations in the data and occurrence of study visits, or represented a true decline in the rate was unclear. Hence we utilized mathematical smoothing techniques and modeling to reduce the vagaries of the data and demonstrate a clearer pattern in the data. With these techniques, the reduction of ADC rates appeared to directly coincide with the introduction of HAART in our cohort, rather than before its availability. Our data suggest that HAART was the major—and the only identified—cause of reduction in ADCs over the HIV epidemic. We advocate that similar modeling techniques are applied to other cohort data to confirm our findings regarding ADC trends in the pre-HAART era.

Unlike ADCs in our study, rates of NADCs were largely unaffected by the availability of HAART, similar to other studies (Herida, 2003). ADCs occur primarily in patients with severely impaired immune systems, supporting their definition. HAART has markedly reduced immunosuppression and as such has subsequently allowed for a fuller spectrum of cancers (i.e. NADCs) to be seen among HIV-infected patients.

In our study, NADC rates showed a steadily increasing incidence through 2003, and an acceleration of this increase after this time. The trends of the rapid increase in NADCs require further follow-up and confirmation by other study groups given the overall small number of cases. While our study was not designed to determine the cause of the rising rates of NADCs, prior studies have suggested that it may be linked to the aging of the HIV population (Long, 2008; Crum-Cianflone, 2009). Furthermore, increasing risk of cancer has also been associated with longer duration of low level immunosuppression (Kiely, 2010), which may be playing an important role in cancer pathogenesis now that HIV patients are experiencing longer life expectancies (Antiretroviral Therapy Cohort Collaboration, 2008).

Regarding the patterns of cancer growth over time, ADCs exhibited a biologic growth curve pre-HAART, but NADCs did not. The rising rates of ADCs in the early epidemic were likely due to a progressive immunosuppressed state of HIV patients over time in the absence of effective therapy. On the other hand NADCs appear less associated with the level of immunosuppression (Stebbing, 2009; Crum-Cianflone, 2009). Furthermore, patients often died of ADCs or opportunistic infections before developing a NADC in the early HIV epidemic. As noted above, the linear rising occurrence of NADCs post-HAART is likely a result, at least in part, to the aging of the HIV population.

Our study had potential limitations. First, although we evaluated a large cohort of HIV patients over the course of the HIV epidemic, the number of cancer cases was limited. Furthermore, both ADCs and NADCs represent a diverse collection of various cancers. However, due to the limited number of individual cancers (e.g. anal cancer, lung cancer), we were unable to model trends for each cancer type.

Strengths of the study include the novel approach utilized with statistical modeling to describe cancer trends over the HIV epidemic. Our models help define true patterns of cancers

over time by reducing vagaries of the data. Additionally, our cohort captured cancer data over a >20 year time span and provides valuable data on changes of cancer rates over time.

In conclusion, using cancer modeling strategies, we show evidence that the implementation of HAART reversed the rising rate of ADCs during the HIV epidemic. A projection of this curve would predict a continued negligible incidence of ADCs among HIV patients with access to care. However, rates of NADCs in our study cohort were largely unaffected by the introduction of HAART and demonstrated increasing rates over time. These data highlight the importance of strategies for the prevention and early detection of NADCs among HIV infected patients. Finally, our study exemplifies the usefulness of statistical methods and modeling techniques in establishing patterns from highly variable data—methodology applicable to multiple biological, social, and economic processes—and contributing valuable insights in the field of medicine.

The IDCRP HIV Working Group is comprised of: Brian Agan MD, Susan Banks, Mary Bavaro MD, Helen Chun MD, Cathy Decker MD, Lynn Eberly PhD, Conner Eggleston, Anuradha Ganesan MD, Heather Hairston, Cliff Hawkes MD, Kathy Huppler Hullsiek PhD, Arthur Johnson MD, Michael Landrum MD, Alan Lifson MD MPH, Grace Macalino PhD, Jason Maguire MD, Scott Merritt, Robert O'Connell MD, Jason Okulicz MD, Sheila Peel PhD, Michael Polis MD, John Powers MD, Roseanne Ressler MD, Edmund Tramont MD, Mark Wallace MD, Amy Weintrob MD, Timothy Whitman MD, Glenn Wortmann MD, and Michael Zapor MD.

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Soldier Spirituality in a Combat Zone and Preliminary Findings about Correlations with Ethics and Resilience

COL Franklin Eric Wester

Chaplain, U.S. Army Reserve
Institute for National Security Ethics and Leadership
National Defense University
300 5th Avenue, SW
Ft. Lesley J. McNair
Washington, DC 20319
Tel: (202) 685-3903
Email: WesterF@ndu.edu

Author Note

This paper is based on original research. The protocol was reviewed by the Brooke Army Medical Center Institutional Review Board and granted exempt research status based on the determination of minimal risk (I.2009.089et). Findings have been and will be presented at a series of professional conferences for military leaders, academics, civilian clergy, and military chaplains. This report could not have been possible without the visionary leadership of Colonel Sean Hannah, director of the Center for the Army Professional Ethic. He opened the proverbial door to investigating spirituality as one of the relevant variables in the moral life of Soldiers. Thanks to Colonel Hannah and his capable team of military, civilian, and academic partners. In particular, Dr. John Schaubroeck and his students made the analytic work possible. Further, the Office of the Army Chief of Chaplains and US Army Reserve provided capable assistance in sending the following chaplain candidates who performed invaluable research assistance: 1LTs David Pyle, Joel Giese, Stacy Fairley, and James Fowler. Mr. Adam Jungdahl of National Defense University deserves appreciation for his dedicated work on refining the statistical reports. Finally, the generous support of Dr. Albert C. Pierce, Director, Institute for National Security Ethics and Leadership, National Defense University, and the university leadership all enabled these efforts to move forward. The views expressed in this research paper are those of the author and do not reflect the official policy or position of the U.S. Government, the Department of Defense, the U.S. Army, National Defense University, or the U.S. Army Chaplains Corps.

Abstract

This paper examines results of a survey of U.S. Soldiers in the combat zone of Iraq collected in the summer 2009. Named the Army's Excellence in Character, Ethics, and Leadership (EXCEL) survey, it measured spirituality as one variable as a dimension of character among Soldiers. Spirituality is expressed using composite score and three discrete, correlated factors. The paper analyzes statistically significant correlations between higher scores of spirituality with measures of ethics and the resilience of Soldiers. Further inquiry would examine how factors of spirituality interact with ethical attitudes and behaviors for strengthening morality in Soldiers and benefits of spirituality for physical and emotional resilience.

Keywords: Spirituality, ethics, resilience, character development, religion in the military

Introduction

“It is in the national interest that personnel serving in the Armed Forces be protected in the realization and development of moral, spiritual, and religious values consistent with the religious beliefs of the individuals concerned. To this end, it is the duty of commanding officers in every echelon to develop to the highest degree the conditions and influences calculated to promote health, morals, and spiritual values of the personnel under their command.”

– General George C. Marshall
(Husted, 2006)

“Leadership is a potent combination of strategy and character. But if you must be without one, be without the strategy.”

– General Norman Schwartzkopf
(Epstein, 2006)

Spirituality is an inherent dimension of individual and social life. Many times, it is identified with religious expression, belief, and/or affiliation. For those with a religious belief system or affiliation, these combined elements of experience provide a deep framework and wider nexus of meaning. For those without a particular affiliation, spirituality is still a human experience. Likewise for those without a religious affiliation or belief system, religion strongly influences culture in many ways—language, community life, and tribal or national myth. In many ways, religion and spirituality give vitality to ritual and perspective on transitions in life such as birth, puberty, marriage, vocation, sickness, tragedy, violence and death. For individuals, religion and/or spirituality strongly influence values and inform moral decision-making. Also, spirituality and internalized religious ideas can foster endurance, hope, and resilience in the face of life’s challenges.

This paper aims to peer into dimensions of spirituality among a group of people facing moral dilemmas, physical and emotional stress, all in an environment which poses life and death questions—soldiers in a combat zone. Even though the subjects of this investigation are soldiers, the implications of their responses about spirituality, ethics, and resilience are not inherently limited to military personnel. By taking a look at how these constructs emerge from this specific population in the crucible of life in a combat zone, it may be possible to gain understanding informing wider angles of inquiry.

There is growing conceptual agreement for Soldiers in the U.S. Army recognizing and seeking to engage spirituality as an element of character. For example, spirituality, or the domain of the human spirit, is one of the three elements of the character development model for cadets at the U.S. Military Academy—along with the ethical and social domains (Snider, 2008). The holistic fitness programs in the Army (Comprehensive Soldier Fitness) and the Department of Defense (DoD) model of Total Force Fitness include spiritual fitness as a specific domain. And in the areas of training, education, and development, leaders aspire to inculcate character development, including spirituality, to complement teaching Soldiers competence in their military tasks (Doty & Sowden, 2009; TRADOC, 2008).

In the military leadership, spirituality and cognate constructs such as morals and values, as noted by Marshall above, have long been viewed as integral aspects of command responsibility. Character development is understood as a facet of leading Soldiers — including character development that addresses spirituality. A strong spirit in Soldiers may be viewed as instrumental in fostering ethical conduct and personal resilience. This paper aims to examine spirituality along three factors and identify correlations between spirituality and constructs expressing moral attitudes, behavior, and emotional and physical resilience.

From a wider perspective, military service has traditionally been viewed as offering positive potential in building character (Shaw, 2008). The services established Junior Reserve Officers Training Corps (JROTC) programs which have character-building as a central tenant. In decades past, particularly when conscripted service was used, one popular idea presented the “option” of military service in lieu of short jail time for petty crime. This was understood as a way to give offenders a chance to “grow up” and benefit from the discipline of military life. In today’s era of an all-volunteer (recruited) force, the military life is still viewed as fostering personal maturity.

The EXCEL survey assesses multiple facets of character among a unique population—Soldiers in a combat zone. The original aim of the EXCEL study was to analyze “the variables involved in building strong moral individuals and teams” (Army Center of Excellence for the Professional Military Ethic [ACPME], 2009). Items on the survey address ethical attitudes, values and behavior, leadership, physical and emotional health, and spirituality. This paper examines results of the Army’s Excellence in Character, Ethics and Leadership (EXCEL) survey focused on spirituality and how it interacts with ethics and the resilience of Soldiers. Rightly, and by design, individual religious beliefs and practices have been protected in the military with attention to the twin principles of avoiding the “establishment” of religion for Soldiers and urging “free exercise” through a pluralistic military chaplaincy. These findings are based on a large and well-defined sample of more than 1,250 Soldiers in a combat zone. Survey data about spirituality and correlations with physical and psychological well-being and resilience are widely published, but most often using medical patients (Koenig, Pargament, & Nielsen, 1998; Koenig, McCullough, & Larson, 2001). This EXCEL study is notable, in part, due to the population sampled.

This paper discusses preliminary findings about spirituality using a three-factor construct of spirituality. The three-factor model emerged from the survey data by calculating fit indices of scores on fifteen items. The items addressing spirituality were included within the larger, interdisciplinary research instrument assessing more than twenty constructs, including ethics, and resiliency. Higher mean scores of spirituality are examined in light of demographic variables. Correlations between spirituality, ethics, and resilience are reported, showing how spirituality interacts with measurements of ethics and resilience.

Many of the constructs relate to enduring aspects of human character. This paper examines preliminary findings about correlations of spirituality with ethics, and resiliency. These factors converge to give some contours of the interactions of these constructs as elements of character in Soldiers. The findings also point to areas for further research.

Background of the ARMY EXCEL Study

In 2008, the U.S. Army initiated designs and plans for the Multi-National Forces-Iraq (MNFI) Survey-2009. The study was requested by General Petraeus as he relinquished command of the Multi-National Forces in Iraq in September of 2008. The study had the backing of the Chief of Staff of the Army and was implemented by the Center for the Army Profession and Ethic (CAPE) with collaboration by the Institute for National Security Ethics and Leadership at National Defense University, the U.S. Army Chaplains Corps, and a wide range of military and civilian academic partners. The study tests a wide range of constructs about the ethical attitudes and behavior of U.S. Land Forces. The intent of this study was to aid Army leaders in self-assessment, reflection, and continuous learning.

It was hoped findings from the survey might shed light on earlier findings by the Mental Health Assessment Team (MHAT IV and V) reports. These reports indicated significant percentages of military personnel who stated they would not report a fellow member of the military for “killing or wounding an innocent non-combatant” (MHAT IV Report, 2006). The Army has set a high priority on ethics and ethical decision-making in the face of sustained operational demands. Given this reality, ethical dilemmas abound, and Soldiers are constantly faced with demanding challenges. Lapses like Abu Ghraib and other severe ethical failures make it evident that ethics training is an ongoing necessity (Dunlap, 2008). Survey results reveal correlations between an individual’s level of spirituality and two other constructs: ethics and resilience. Specifically, spirituality correlates positively with five factors of ethics, such as moral courage and moral confidence, as well as increased psychological and physical resilience.

Spirituality Defined for this Study

Definitions of spirituality have evolved over the past decades, to say nothing of the various expressions of spiritually-oriented practices across a wide range of faith groups and cultures. The form of the word suggests a journey or process tied to spirit defined here as a multi-dimensional, cohesive core of the individual expressed in beliefs, ideas, practices, and connections. (Pargament and Sweeney, 2011; Sweeney et al., 2007; Teasdale, 1999). Going into this survey of Soldiers, the working hypothesis was that spirituality could be assessed using three subscales. The stated Hypothesis (which included three additional statements) was: “Spirituality incorporates the three elements of a spiritual worldview, personal piety, and connection to a faith community.” These are relevant, even if not sufficient factors, of spirituality.

The three subscales in the design did not achieve acceptable levels calculating from fit indices using five items per subscale. What emerged from calculating fit indices of spirituality items confirmed that spirituality is indeed multidimensional, but along different subscales. Items clustered around three factors, but in a different combination: connection to others, religious identification, and hopeful outlook. These three factors do not account for all elements of spirituality. By analyzing data from the survey questions, a unifying construct of spirituality emerged along three subscales. With the exception of four questions, all of the spirituality questions on the survey fell under one of these three categories. Four questions were removed from the analysis in order to identify items which formed the strongest constructs. Three items removed seem too vague and did not align with the three factors; one item mixed two concerns in one question. Thus, using the eleven items which provided

strong statistical fits with three factors, the EXCEL study does describe reliable aspects of spirituality for the Soldiers surveyed.

Using this alternative model, a three-factor sub-structure provides good fit indices. Furthermore, the fit of the three-factor model is much better than a one-factor model. Table 2 presents the fit indices of this revised structure. A fit index above .90 is considered extremely strong. Fit indices at .75 are acceptable.

Table 1. Fit Indices

Factor Structure	χ^2	NFI	NNFI	CFI	GFI	SRMR	RMSEA	AIC
3 Factors	335.12	.952	.943	.958	.952	.040	.077	253.12
1 Factor	1662.12	.759	.705	.764	.767	.102	.173	1574.12

χ^2 – Chi-square, also called the discrepancy function, expresses the likelihood or goodness of fit. The lower the number the closer the fit.

NFI – Normed Fit Indices. Expresses the covariance among items. Zero indicates no covariance and 1.0 is exact covariance. This provides an adjustment to the non-normed index for sample size and degrees of freedom to explain the relation between this new fit measure and the other ones

NNFI – Non-Normed Fit Indices.

CFI – Comparative Fit Indices. CFI expresses the fit of items to form a factor and is used to avoid underestimation of fit noted in small samples. This is a rather large sample so the fit index here is strong.

SRMR – Standardized Root Mean Square Residual. This represents the square root of the average or means of the covariance residuals—the differences between corresponding elements of the observed and predicted covariance. Zero represents a perfect fit, but the maximum is unlimited.

RMSEA – Root Mean Square Error of Approximation. Used to express a measure of approximate fit rather than perfect fit. Less than .10 indicates a strong fit.

AIC – Akaike Information Criterion. Like the chi square index, the AIC also reflects the extent to which the observed and predicted covariance matrices differ from each other.

U.S. Army Chaplaincy and DoD Terms of Reference on Spirituality

The three-factor construct of spirituality above parallels and complements the definition for spirituality which the Army Chief of Chaplains Army employs, “a process transcending self and society that empowers the human spirit with purpose, identity, and meaning” (Center for Spiritual Leadership staff, personal communication, 14 May 2010). The three factors of the EXCEL model of spirituality connect to the three functions in the chaplaincy definition—empowering people with purpose, identity, and meaning. The chaplaincy definition also incorporates awareness of that which transcends self and society. Linking the EXCEL model of spirituality to the Army chaplaincy definition, connection to others relates to identity, religious identification relates to both identity and meaning, and hopeful outlook relates to purpose.

Another relevant definition comes from the *Chairman of the Joint Chiefs of Staff Instruction* (CJCSI) on the Total Force Fitness (TFF) framework (2010). TFF addresses spirituality, defining it as “the expression of the human spirit in thoughts, practices, and relationships of connection to self, and connections outside the self, such as other people, groups, nature, and concepts of a higher order.”

Although these definitions overlap and incorporate various elements, the three factors which fit the data from the EXCEL survey cluster along three similar constructs: connection to others, religious identification, and hopeful outlook. These factors, when present, correlate in the lives of Soldiers to positive attributes and may act as a buffer against some psychological and physical risk factors. Each of the three factors is considered further and then examined in light of correlations between spirituality and subscales addressing ethics and resilience.

Methods in the EXCEL Study

Survey Design

The EXCEL survey is a paper-and-pencil instrument survey which collects demographic and survey data primarily using Likert-scales. EXCEL addresses topics ranging from ethical attitudes, actions, and observed behaviors in others to leadership, attitudes about the Army, general physical concerns, attitudes, and well-being. The survey was designed in four versions: version A (which featured just the core questions), version B (which featured core questions plus spirituality questions), version A Leader (which featured core questions and was given to leaders), and version B Leader (which featured core questions plus spirituality questions and was given to leaders). Surveys were collected from 2,572 Soldiers deployed in Iraq between June 20, 2009 and July 24, 2009 (Hannah et al., 2010). To protect the anonymity of participants, data was collected from randomly selected units. Though this total number of 2,572 Soldiers fell short of the targeted sample of 6,000, the large sample size increases the reliability of the results and decreases sampling bias. Details on the data collection are presented in the section on procedures below.

Survey Participants

This paper focuses on data from version B and version B Leader. Of the 2,572 Soldiers surveyed, 1,366 completed version B and version B Leader, which included the spirituality items). The Appendix lists the fifteen spirituality questions and details on their sources. Of 1,366 version B surveys, there were 1,263 valid responses, meaning surveys were sufficiently complete to be tabulated and analyzed. Table 2 presents a summary of demographics of version respondents. Note that 61 percent of respondents were under age 27, and 76 percent were grade E5 (sergeant) and below. As would be expected from such a large group, the demographics of the sample population generally mirror those of the Army as a whole. The sample is slightly more male, and slightly younger than rest of the Army. Education levels, the number of married soldiers, and the number of soldiers with children are slightly lower than the average. All these factors can be attributed to the overrepresentation of enlisted personnel in the sample. The greater representation of males and enlisted is expected given the survey was implemented primarily in combat maneuver units.

From a review of relevant literature, surveys addressing spirituality and well-being most often sample populations in hospitals or other treatment facilities, college students, or congregational members. Some articles rely on larger social science data collection such as the General Social Survey (GSS) of the National Opinion Research Center at the University of Chicago. No comparable data was previously available about Soldiers in a combat zone.

Table 2. Demographics of Version Respondents

Gender	Male	Female	Unknown
	1123	130	13
Age	Number	Percentage	
18–22	378	27.7%	
23–27	457	33.5%	
28–32	219	16%	
33–37	130	9.5%	
38–42	77	5.6%	
43–47	43	3.1%	
48+	13	1%	
Unknown	49	3.6%	
Marital Status	Unmarried	Married	Unknown
	736	611	19
Army Component	Active Component	Reserve Component	Unknown
	909	428	29

Survey Items

Fifteen items (see Appendix) relating to spirituality were included at the request of the Institute for National Security, Ethics and Leadership (INSEL) at National Defense University and the United States Army Chaplain Corps. Items were selected from established surveys. All items were formatted using a five-point Likert-scale in line with the layout of the larger survey.

Thirteen of the fifteen items included in EXCEL were used based on previous validated studies. They were based on the “Dimensions of Religion/Spirituality and Relevance to Health Research” from the VA Palo Alto Health Care System. The purpose of the study was to “identify unique religion/spirituality (R/S) factors that account for variation in R/S measures of interest to health research” (Haber, Jacob, & Spangler, 2007). Their research focus was identifying religious and spiritual items relevant in health through meta-analysis of personality and medical instruments. Haber and associates took many of their questions from other well-established studies. These include the *Brief Multidimensional Measure of Religion and Spirituality*, by Fetzer Institute/National Institution of Aging, and R. L. Piedmont’s *Development and Validation of the Spiritual Transcendence Scale: A Measure of Spiritual Experience*. In addition, Haber *et al* used what they called two “classic measures with exceptional histories of use” (Haber, Jacob, & Spangler, 2007). The first is the *Spiritual Well-Being Scale*, by C. W. Ellison, which measures well-being associated with God and existentialism. The second is “The Age-Universal” version of Allport and Ross’s *Religious Orientation Scale*.

Articles

These well-known sources combined with one of Haber's "Religion/Spirituality Motivation, Devotion, & Coping" questions in conjunction with two MNFI-specific questions make up the fifteen items. The Appendix provides a complete list of the fifteen items and their sources. The items which form the three-factor model of spirituality are shown in Table 3 below.

In the design, the fifteen spirituality items were to measure three dimensions of spirituality in individuals: spiritual worldview, prayer/personal piety, and connection to a faith community. These address private and personal spirituality, as well as the public aspects of spirituality, paralleling the approach in another recent study (Greenfield, Gaillant, & Marks, 2009). Also, by matching leader scores with scores of followers in their units, future analysis can examine spirituality within units and interactions between leaders and followers in multi-factorial analysis.

Table 3. Items and factors for spirituality

<i>Connection to Others:</i>
Q.151 I feel that on a higher level all of us share a common bond.
Q.152 Although there is good and bad in people, I believe that humanity as a whole is basically good.
Q.154 Although individual people may be difficult, I feel a bond with all of humanity.
<i>Religious Identification:</i>
Q.155 My spiritual life is an important part of who I am as a person.
Q.159 I go to my place of worship (Chapel, Church, Synagogue, Temple) because it helps me connect with friends.
Q.160 I believe my personal prayers help me during this deployment.
Q.161 I believe the prayers of my family and friends back home help me.
Q.162 I believe the presence and ministry of my unit chaplain brings value to the unit.
<i>Hopeful Outlook:</i>
Q.157 I feel a sense of well-being about the direction in which my life is heading.
Q.163 I feel good about my future.
Q.164 I have forgiven myself for things that I have done wrong.

Procedures

To obtain a representative sample, the MNFI Inspector General (MNFI-IG) randomly selected two-brigade sized units from each of the four Army divisions then serving in Iraq. Two battalions were randomly selected within those brigades, from each of those battalions, three companies were randomly selected, and from each of the companies, three platoons were randomly selected. In addition to these troops, key leadership at the platoon, company, and battalion levels also participated in the survey, thus allowing the survey to assess the culture/climate developed by individual leaders in their areas of responsibility. Battalion chaplains and chaplain assistants implemented survey administration protocols, distributing and collecting surveys in platoon-sized elements (20 – 40 individuals).

All leaders surveyed were asked as well to rate certain effects of leadership at platoon, company, and battalion level. Further, leaders were asked to evaluate the leadership and unit performance of subordinate leaders—at the next level down from them. All Soldiers completing the survey reported on their individual ethical behavior and beliefs, rated their immediate leaders and the ethical behavior of their peers, and evaluated the culture and climate in their respective units and their psychological and somatic conditions. Respondents receiving version B rated themselves on three factors of spirituality.

Of the original 2,572 Soldiers, 1,366 completed version B and version B Leader of the survey which included fifteen items assessing spirituality. (The Appendix lists the fifteen spirituality questions and details about their sources.) Of the 1,366 surveys returned, 1,263 were valid responses. Based on a literature review, this is the largest sample of Soldiers assessing spirituality in a combat zone. The Army does collect annual data on religious preference for Soldiers, but not qualitative survey data. The closest comparable sample probing aspects of spirituality numbered 800 in an unpublished thesis from World War II probing the effect of combat on religious belief and personal morality. Pomeroy and a colleague collected data about the meaning and importance of faith in God and attitudes about prayer from 800 Soldiers on hospital wards at Camp Kilmer, NJ, during January of 1946. He reported that 65,000 Soldiers passed through Camp Kilmer some weeks. His major findings were that “men felt their religion meant more to them now than before the war,” that “God evidently seemed more personal to the men now,” and “34% indicate that they pray more now than before the war, and only 9% pray less” (Pomeroy, unpublished, 1946).

To protect privacy and insure anonymity, respondents filled out the survey and returned it to the unit chaplains who served as survey administrators. Data collectors placed surveys in sealed folders immediately upon collecting them from participants. Chaplains used a coding scheme with each unit. This scheme randomly assigned a code to each unit and the code was written on the outside of each sealed envelope. Using these precautions, it was not possible to associate an individual’s recorded data with that individual or their military unit, unless the individual failed to follow instructions and put his or her name on the survey. The Chaplains will thus be the only party to have access to both the unit designation and their data, and each chaplain will only have access to approximately 1/20 of the full sample’s data. The paper surveys were transported from chaplains to the MNFI staff and shipped to CAPE at West Point, NY. From the time the chaplain turns in the sealed envelopes for shipping, neither the staff nor the CAPE knew the unit designations and thus were unable to determine the unit from which any survey set came. Data was entered, analyzed, and reported by code only.

The data was provided to the following individuals for statistical analysis: Colonel Sean T. Hannah, PhD, CAPE director, in conjunction with several leading university researchers, including (alphabetically) Dr. Bruce Avolio (University of Washington); Dr. Steve Kozlowski (Michigan State University); Dr. Robert Lord (University of Akron); Dr. John Schaubroeck (Michigan State University); and Dr. Linda Trevino (Pennsylvania State University). The draft Technical Report of the data was prepared by Colonel Hannah and Dr. John Schaubroeck with assistance from doctoral students at Michigan State University: Nikolaos Dimotakis, Katherine Guica, Megan Huth, and Chunyan Peng (Hannah et al, 2010).

Three Factors of Spirituality *Connection to Others*

McMillan and Chavis defined sense of community as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together” (1986). Soldiers report a connection to others as a dimension of spirituality. This factor correlates with intentions for ethical actions, moral attitudes, and a general increased ability to withstand the rigors of combat. Members of the military are familiar with feeling a common bond with each other, just as Shakespeare coined the famous phrase, “we happy few, we band of brothers.” But this sense of connection to others goes far beyond camaraderie or *esprit de corps*.

While *esprit de corps* is important, it is vital for a Soldier to not just feel both like she or he belongs to the unit but also belongs to the rest of the human race. Beyond a connection to others, even a generalized bond to humanity, spirituality regularly finds expression in religious activities, as in the items measured for religious identification. Soldiers who integrate connection to others at a deep level of their humanity recognize even their enemies are still part of humanity deserving certain rights and protections. A connection to others may mitigate enemy abuses, POW mistreatment, and civilian casualties. Three items comprise the subscale for the factor connection to others.

Religious Identification

Spirituality is not experienced in a vacuum. Soldiers who recorded a higher level of spirituality tended to connect that spirituality to some level of participation in recognized religious activity—prayer, prayer by others, and worship. Though definitions of spirituality are sometimes vague, real Soldiers are not vague at all. For Soldiers, practice is important, and practice is a prominent factor in their expression of spirituality.

The EXCEL study data indicates when Soldiers were surveyed concerning spirituality, their spirituality was most typically described with recognizable religious identifiers such as prayer, chapel attendance, and corporate worship, which are common to organized religion. In addition to the two items about prayer, this factor was measured by five items. In correlating scores for Total Spirituality, the two items most closely related to this score are those that express beliefs about prayer:

Q.160 I believe my personal prayers help me during this deployment. (.794)

Q.161 I believe the prayers of my family and friends back home help me. (.786)

Religion and spirituality are sometimes complicated to discuss. As the Instruction issued by the Chairman of the Joint Chiefs of Staff points out, “Defining ‘spirituality’ in the Armed Forces is difficult because of: the diversity of service members and their preferred spiritual practices; and, the confusion, ambiguity, and blurred lines that exist between understanding and defining ‘spirituality’ and religion” (CJCSI, 2010). The EXCEL study shows Spirituality is experienced through religious identification. This underscores the need to ensure that individual Soldiers have the opportunity to practice their respective beliefs with freedom and respect. Soldiers who make use of these opportunities have a higher level of spirituality and, as considered below, this translates into increased resiliency and a strengthened personal ethic.

Hopeful Outlook

A third factor of spirituality emerged called hopeful outlook. Hope, optimism, and positive outlook are notable given the conditions under which these surveys were collected—living in a combat zone. This hopeful outlook was revealed through Soldiers’ responses to the three items. One item in this factor addressed the issue of guilt, which combat veterans sometimes face. Guilt can often become a debilitating symptom if not properly processed and dealt with. This will be discussed as an aspect of resilience.

Frequency Distributions on Spirituality Items

Responses of Soldiers in the survey indicate a wide range of scores about spirituality. Roughly one-third of respondents indicated they were not in agreement with these items about spirituality, one-third of respondents were neutral, and one-third of respondents were in agreement. Two frequency distributions graphs are included that illustrate the lowest and highest response patterns for spirituality graphs. In both graphs, responses are grouped into three categories: Strongly Disagree/Disagree; Neutral; Agree/Strongly Agree. Also, each graph depicts the distribution from Version B and Version B Leader surveys. Leaders tended to agree or strongly agree more with items measuring spirituality compared to the larger sample of respondents.

Figure 1 shows the distribution of the highest scores on one of the spirituality items: Q164 I feel good about my future. In this distribution, 156 total respondents marked Strongly Disagree/Disagree, 352 Neutral, and 755 Agree/Strongly Agree.

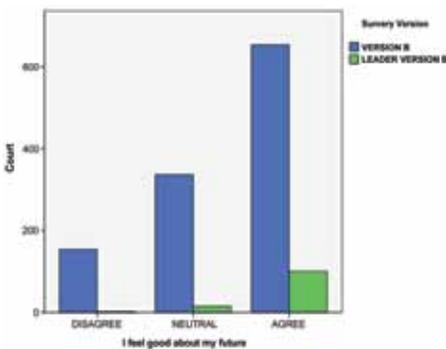


Figure 1. Distribution of highest scores on Q164.

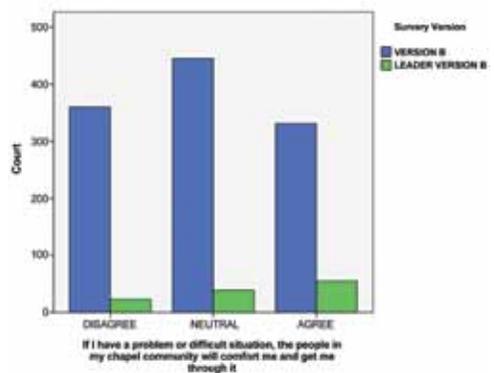


Figure 2. Distribution of lowest scores on Q159.

Figure 2 shows the distribution of the lowest scores on one of the spirituality items: Q159 If I have a problem or difficult situation, the people in my chapel community will comfort me and get me through it. In this distribution, 383 total respondents marked Strongly Disagree/Disagree, 484 Neutral, and 386 Agree/Strongly Agree.

Correlations of Spirituality to Age, Rank, and other Variables

Regarding spirituality, a literature review identified no longitudinal studies that span the adult life-cycle from early adulthood to senior adulthood which could provide conceptual descriptions of spiritual development. Most evidence of spiritual development comes from the study of individual lives (Bianchi, 1987; Tornstam, 1999) or is generalized from other fields such as analytic psychology (Jung, 1964), moral development (Kohlberg, 1981) or faith development tied to a quest for meaning without regard to transcendence (Fowler, 1981).

In Table 3, the three factors using subscales for spirituality and the Spirituality Total scores are listed with means from the Likert-scale. The strongest correlations (at the 0.01 level, 2-tailed) indicate:

- Higher spirituality scores correlated modestly with older respondents (.268)
- Higher spirituality scores correlated modestly with increased rank (.213)
- Higher spirituality scores correlated slightly with women (.121)
- Higher spirituality scores correlated slightly with higher education (.168)
- Higher spirituality scores correlated slightly with marriage (.073)
- Higher spirituality scores correlated slightly with having children (.145)

The significance of correlations is characterized as follows:

- Strong > .350
- Moderate .300 to .349
- Modest .200 to .299
- Slight .100 to .199

Table 4. Factors and Means

Factor/ Demographics	Connection to Others	Religious Identification	Hopeful Outlook	Total Spirituality Score
Mean (R=1-5)	3.0347	3.0343	3.4717	3.1517
Gender	.114**	.100**	.088**	.121**
Age	.242**	.232**	.181**	.268**
Education	.155**	.127**	.128**	.162**
Component	-.079**	-.054	-.023	-.064*
Married	.026	.063*	.093**	.073**
Children	.090**	.137**	.118**	.145**
Rank	.205**	.161**	.179**	.213**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Notes: Range of Likert-scale = 1-5 and N=1,223 to 1,263

The cross-sectional data in this study indicate variables of age and rank produce the strongest statistically significant differences in all measures of spirituality, but leaves open the reasons for these differences.

In the EXCEL data, there are two additional items of note in the correlations. First, there was no statistically significant correlation between the number of deployments and any reported higher or lower Total Spirituality scores or scores on any of the three sub-scales. Second, an interesting and very strong correlation emerged in using single items about spirituality and the Total Spirituality score. The item which best correlates (.794) with the Total Spirituality score is belief in the benefits of personal prayers. This is nearly identical and closely followed (.786) by the item regarding belief in the benefits of prayers by family members and friends. The convergence of belief *about* prayer and the practice of prayer may be of particular interest. These responses on the belief in the effectiveness of prayer provide justification for chaplains and leaders to encourage soldiers' spiritual practice and growth.

Five Factors of Ethics Correlating with Spirituality

In addition to describing spirituality, this paper examines correlations between spirituality and two constructs: ethics and resiliency. Correlations between spirituality and five factors of ethics will be reported. Further below, resiliency will be analyzed describing correlations between spirituality and two factors, emotional and physical resiliency. In ethics, measuring individual responses indicated a positive correlation between spirituality and the following factors of ethics: Moral Courage/Ownership (.408, Strong), Moral Efficacy (.391, Strong), Embracing Army Values (.387, Strong), Intent to Report Unethical Conduct (.335, Moderate), and Soldier Identification (.295, Modest).

These five factors taken together could frame a useful approach to the ethical dimension of character. Using these to further specify the ethical dimension of character with Soldiers may fit alongside the three-factor model for examining the domain of the human spirit or spirituality. The third major element of character (using the U.S. Military Academy model) is the social dimension. Character is an overarching construct that incorporates the spiritual, ethical, and social aspects of the person in uniform.

Table 5. Correlations Between Spirituality Scales and Ethics Variables (CAPE, Correlational Analyses of Spirituality Scales Report, 2010)

Factor \ Spirituality Scale	Connection to Others	Religious Identification	Hopeful Outlook	Total Spirituality Score
Moral Courage/Ownership	.355**	.277**	.380**	.408**
Moral Efficacy	.331**	.257**	.380**	.391**
Embracing Army Values	.318**	.286**	.345**	.387**
Report Intentions	.309**	.232**	.283**	.335**
Soldier Identification	.274**	.219**	.234**	.295**

Notes: N = 1107–1220, * p <.05, ** p <.01.

In the correlations above, these show probabilities < 0.01, and there are notably strong correlations between Total Spirituality scores and moral courage/ownership, moral efficacy, and embracing Army values. These correlations are all between .387 and .408, so there is apparently notable interaction in the character of individuals who identify with the Army values, believe and intend to act on those moral ideas, and the beliefs and practices of spirituality.

Moral Courage/Ownership (.408)

The EXCEL study used seven items to assess personal moral courage and beliefs about ownership of moral responsibility. These items asked whether or not a Soldier would address unethical acts. Each item was anchored on a five-point Likert-scale ranging from *strongly disagree* to *strongly agree* (Hannah et al., 2010). A majority (56 percent to 72 percent, depending on the ethical issue) of Soldiers reported that they would confront others for unethical acts and would stand in the way of ethical misconduct as shown in Table 26. Soldiers were most likely to agree that they would confront a peer, rather than a leader, if they observed that person committing an ethical act. Soldiers were least likely to agree that they would not accept anyone in the unit behaving unethically, but even in this case the majority of Soldiers agreed.

Table 6. Soldier Self-reports on Personal Moral Courage/Ownership (Hannah et al, 2010)

	Percent (disagree or strongly disagree)	Percent (agree or fully agree)
I will confront my peers if they commit an unethical act	9.6%	71.8%
I will confront a leader if he/she commits an unethical act	10.8%	69.1%
I will always state my views about an ethical issue to my leaders	11.5%	63.4%
I will go against the group's decision whenever it violates my ethical standards	12.5%	58.1%
I will not accept anyone in my unit behaving unethically	12.9%	55.7%
I feel it is my job to address ethical issues when I know someone has done something wrong	13.2%	56.0%

Notes: N=2572 individual Soldiers. Effective sample size ranges from 2434 to 2468 (includes versions A & B).

In a forthcoming paper, Hannah & Avolio (in press, 2011) propose a psychological concept of moral potency comprised of moral courage/ownership and moral efficacy. Moral potency is framed as the link between moral cognition (built out of awareness and understanding) with moral action (Rest, 1979). Moral potency is proposed as the key valence in understanding an answer to the question, why do leaders who recognize the right ethical decision or action to take still fail to act when action is clearly warranted? Moral action is preceded by moral awareness and understanding, and perhaps it is in the area of moral potency where spirituality activates one's sense of identity, courage, and responsibility.

Moral Efficacy (.391)

“Moral efficacy is essentially one’s confidence in his or her capabilities to organize and mobilize the motivation and cognitive resources needed to attain desired moral ends while persisting in the face of moral adversity” (Snider, 2008). Moral efficacy is important for individual Soldiers who are facing complex moral dilemmas in the contemporary operating environment on a regular basis. Moral efficacy is developed over time in an individual’s life and indeed is never completely developed. An integrated approach involving cognitive, affective, and social domains would likely enhance moral confidence.

Embracing Army Values (.387)

The American military is a values-based organization. These values are uniquely expressed by the *Army Values*, *The Soldier’s Creed*, and *the Warrior Ethos* as outlined by the Department of Defense; its ideals are established within the Constitution of the United States of America. The Army Values are presented as a those attributes by which a Soldier must live. The expectation is mandated across forces and deemed probable regardless of the Soldier’s MOS or ranking. There are seven values stipulated as vital to the success of the warrior, thereby facilitating success of the Armed Forces. These values are: Loyalty, Duty, Respect, Selfless Service, Honor, Integrity, and Personal Courage. Soldiers who reported that they had internalized the seven Army Value Values to a great extent also reported lower levels of misconduct. They also reported higher levels of moral courage, that is, higher levels of intention to confront others for misconduct.

Intentions to Report Unethical Conduct (.335)

Six items assessed whether the respondent would report unit members if he/she observed unethical behavior directed toward a non-combatant. Each item was anchored on a five-point Likert-scale with responses ranging from *Strongly disagree* to *Strongly agree*. Soldiers reported an intention to report a fellow unit member if that member was observed mistreating non-combatants as shown below in Table 5. In particular, 70 percent would report a unit member for injuring or killing a non-combatant, while 57 percent would report “a buddy” for “abusing” a non-combatant. A minority of 15 percent stated they would not report a fellow unit member for these unethical behaviors (Hannah et al., 2010). Note that higher spirituality scores correlated with higher likelihood Soldiers would respond with their intention to report such misconduct.

Soldier Identification (.295)

Soldier identification means, in a word, internalization. The Soldier internalizes the Army’s values and identifies with the roles and responsibilities of being a Soldier. These are the aims of the character development as the Army furthers initiatives in the tiered learning model: Training—Educating—Development. The pamphlet, *US Army Concept of the Human Dimension in Full Spectrum Operations*, discusses how the Army works to have Soldiers internalize Army values as part of identity.

Four Factors of Resilience Correlating with Spirituality

Researchers in resilience (or “hardiness”) define resilience as “the ability of adults in otherwise normal circumstances who are exposed to an isolated and potentially highly disruptive event such as the death of a close relation or a violent or life-threatening situation to maintain relatively stable, healthy levels of psychological and social functioning” (Bartone, Vaitkus, & Williams, 1994; Bonanno, 2004). For Soldiers, resiliency includes not only sustaining themselves physically and emotionally while in combat but also coming home fit.

The final step in the long road home for the veteran is completing this initiation as a warrior. A veteran does not become a warrior merely for having gone to war. A veteran becomes a warrior when he learns to carry his war skills and his vision in mature ways. He becomes a warrior when he has been set right with life again (Tick, 2005).

The effect of combat and the need to adapt upon home is reiterated by a philosopher who observes the effects of combat on veterans as students. She writes how war involves a “...shifting of habit and attitude. The point is that in putting on a uniform and going to war, a soldier grows skin that does not shed lightly. And even when it is time to slough that skin, after years of service, it does not come off easily” (Sherman, 2010).

Emotional Resilience

Regarding emotional resilience, Soldiers displayed the following correlations between their level of spirituality and emotional resilience: higher spirituality scores correlated strongly with positive affectivity (.442, Strong) and higher spirituality scores inversely correlated with negative affectivity (-.185, Slight).

Table 7. Positive Affectivity Correlates with Spirituality

Variable \ Spirituality Scale	Connection to Others	Religious Identification	Hopeful Outlook	Total Spirituality Score
Positive Affectivity	.339**	.321**	.424**	.442**
Negative Affectivity	-.157**	-.084**	-.215**	-.185**

Notes: N = 1107–1220, * p <.05, ** p <.01.

Positive affectivity reflects the extent to which a person feels enthusiastic, active, and alert. In Table 6, positive affectivity correlated with spirituality and is similar to results from previous studies (see Greenfield, Gaillant, & Marks, 2009; Valliant, 2008; Ellison, & Fan, 2008; Maselko & Kubzansky, 2006). These indicate a potentially notable and strong linkage between spiritual perceptions and psychological well-being. Positive affectivity is generally viewed as a buffer against risks for depression, a serious variable in suicide risk. Also, the inverse correlation between spirituality and negative affectivity indicate some interaction.

Given the soldiers surveyed were in a combat zone, the EXCEL survey found an interestingly high level of hopeful outlook as well as other items reflecting a positive views of the future regarding the Soldier’s situation in Iraq. Among the items describing this hopeful outlook is the reported perspective by Soldiers who forgive themselves for actions which were

done in combat. This capacity to forgive oneself is relevant to emotional health in the period following combat deployment.

Resilience and Dealing with Guilt

Absolution from guilt is a core dynamic for combat veterans reentering life after war (Dewey, 2004). Encountering veterans as college students, one professor writes of how many combat veterans struggle with guilt. While researching for a recent book, Sherman found “. . .in virtually all of my interviews, guilt was the elephant in the room.” She categorized the guilt which Soldiers experience into three forms: accident guilt, luck-guilt, and collateral-damage guilt. The first of these, accident guilt is rather straight-forward, it is when veterans experience guilt for mishaps that occurred in combat resulting in the loss of their buddies or the lives of innocents. Although nobody can be found to be actually culpable in these types of situations, veterans still can blame themselves and experience “accident guilt.” Luck-guilt, is a form of guilt which Sherman describes as a generalized form of “survivor guilt.” Sherman interviewed Marines recently returned from Iraq, and who were touring Annapolis. They felt genuine guilt at relaxing on a sailboat while their brothers were still in combat. The most troubling kind of guilt which Sherman studied is what she calls “collateral-damage guilt,” associated with the accidental or unintended killing of innocents (Sherman, 2010a; Sherman, 2010b).

Physical Resilience

A Soldier’s physical health is a large part of resilience. During deployment, Soldiers may endure a wide array of physical hardships. When they return home, it is essential for Soldiers to get help for injuries and ailments incurred during deployment. This is needed in order to prepare for future deployment. Since the ongoing process of deployment, re-deployment, training, and subsequent additional deployments is a reality, resiliency is important. The correlation between a Soldier’s level of spirituality and his or her physical health is a vital link. The EXCEL study revealed an inverse relationship between a Soldier’s spirituality and somatic complaints and fatigue: Spirituality inversely correlated with physical and psychological fatigue (-.183) and spirituality inversely correlated with somatic complaints (-.146).

Table 8. Spirituality Varies Inversely with Somatic Complaints

Variable \ Spirituality Scale	Connection to Others	Religious Identification	Hopeful Outlook	Total Spirituality Score
Somatic Complaints	-.140**	-.064*	-.154**	-.146**
Fatigue	-.162**	-.124**	-.160**	-.183**

Notes: N = 1107–1220, * p <.05, ** p <.01.

This study is consistent with other investigations that link spirituality with physical health. Among military populations, Frederick M. Dini, LCDR, SC, USN, wrote an unpublished masters level thesis (2008) on a strategy for a military spiritual self-development tool and physical well-being. This thesis lists several previous studies which made this connection (Hill & Pargament, 2003; Oman & Thoresen, 2005; Miller & Kelly, 2005). Dini reports these studies show positive correlations between spiritual development and health

in the following areas: lower blood pressure, improved physical health, healthier lifestyles and less risky behavior, improved coping ability, less depression, faster healing, lower levels of bereavement after the death of a loved one, and a decrease in fear of death, higher school achievement (Huitt & Robbins, 2003). These studies describe civilian populations. For military populations, physical health is a potentially a life-and-death issue. A Soldier's health and personal resiliency can very well mean the difference between coming home or not.

Conclusions

This paper addresses initial considerations about soldier spirituality as one facet of character. It conveys notable correlations between spirituality, ethical attitudes and action, and personal resilience. Even though the subjects of this study are soldiers, the implications of these findings might be relevant in wider application. The investigation of these constructs is nested in a larger concept of character which has application in both individual development and group dynamics. Further, by considering dimensions of spirituality across this diverse and religiously pluralistic population, these findings are not confined to a single faith expression or dominant religious group.

Spirituality is multidimensional. From the survey, three specific factors emerged as correlative or included within the domain of spirituality: connection to others, religious identification, and hopeful outlook. Spirituality scores correlate moderately with age and rank. Spirituality correlates slightly with gender (higher in women), education, having children, and inversely with marriage. Regarding spirituality, the Soldiers' beliefs about prayer (personal prayers and prayers by others on their behalf) comports most closely with their Total Spirituality scores. The convergence of belief about prayer and the practice of prayer may offer a primary means for engaging Soldiers regarding spirituality, from a variety of religious perspectives.

Spirituality positively correlates with several elements of ethical attitudes and intentions. Spirituality strongly correlates with moral courage/ownership, moral efficacy, and embracing Army values. Spirituality moderately correlates with intention to report ethical violations observed in others and with soldier identification. These attitudes and intentions may be understood as an expression of character with spirituality as one dimension of character. Fostering moral potency may be a direct benefit for deepening spirituality as a dimension of character.

Spirituality correlates with indications of emotional and physical well-being. Spirituality strongly correlates with positive affectivity and inversely with negative affectivity. Spirituality reveals a strong inverse correlation with somatic complaints and fatigue. Somatic complaints and fatigue contribute to physical risk. As described above, studies of other populations have consistently reported of the apparent connection between spirituality, physical and emotional well-being.

Regarding character, at a June 2010 ethics and leadership program convened at Joint Forces Command, Suffolk, Virginia, mid-grade and senior non-commissioned officers (NCOs) offered perspectives as they presented personal reports of exemplary conduct observed or performed in close combat (Joint Forces Command [JFC], CAPE, and Institute

for National Security Ethics and Leadership [INSEL], 2010). The theme of the symposium was ethical decision-making and high performing teams. It involved approximately 100 combat-seasoned members of the armed forces, US Special Operations Command, US Joint Forces Command, civilian academics, and law enforcement leaders—all focused on ethical conduct in ambiguous and hostile situations. The NCOs observed that “members of the military operate both with highly trained skills and a human and moral core. This core of *character* is formed before and beyond the military. While in uniform, experiences can both test and potentially help develop moral strength” (JFC, CAPE, and INSEL, 2010). This captures the essential context of how personal spirituality and significant family and community influences affect men and women in military service, both in terms of their moral awareness and understanding as well as their resilience under stress.

As one population sampled for investigating these constructs, Soldiers are one among other populations where such research may yield insights across disciplines. Soldier spirituality could benefit from further investigation using more robust instruments than the truncated combination of items used in the EXCEL study. The EXCEL study helps bring spirituality alongside other constructs such as ethical attitudes and behavior and emotional and physical well-being. Though often categorized as in the domains of anthropologists, psychologists, sociologists, and religious leaders, the interaction of spirituality with ethics and resilience deserves to be replicated and further examined regarding the dynamics between leaders and followers.

Appendix A: EXCEL Spirituality Questions with References

(Haber, Jacob, & Spangler, 2007)

1. I feel that on a higher level all of us share a common bond.

- *Question source:* Piedmont-Spiritual Transcendence Scale
- *Original question:* I feel that on a higher level all of us share a common bond.

2. Although there is good and bad in people, I believe that humanity as a whole is basically good.

- *Question source:* Piedmont-Spiritual Scale
- *Original question:* Although there is good and bad in people, I believe that humanity as a whole is basically good.

3. There is an order to the universe that transcends human thinking.

- *Question source:* Piedmont-Spiritual Scale
- *Original question:* There is an order to the universe that transcends human thinking.

4. Although individual people may be difficult, I feel a bond with all of humanity.

- *Question source:* Piedmont-Spiritual Scale
- *Original question:* Although individual people may be difficult, I feel an emotional bond with all of humanity.

5. My spiritual life is an important part of who I am as a person.

- *Question source:* Allport's Extrinsic Religion (The Age-Universal" version of Allport and Ross's Religious Orientation Scale as reported by Haber, p. 278)
- *Original question:* Although I am religious, I don't let it affect my daily life.
- *Original question:* Although I believe in my religion, many other things are more important in life.

6. I feel deep inner peace or harmony.

- *Question source:* Existential Well-Being ("Spiritual Well-Being Scale" by C. W. Ellison as reported by Haber, p. 277)
- *Original question:* I feel deep inner peace or harmony.

7. I feel a sense of well-being about the direction in which my life is heading.

- *Question source:* Existential Well-Being (Haber, p. 277)
- *Original question:* I feel a sense of well-being about the direction in which my life is heading.

8. I have the sense of a larger of purpose in my life.

- *Question source:* Existential Well-Being (Haber, p. 277)
- *Original question:* I have been able to step outside of my ambitions and failures, pain and joy, to experience a larger sense of fulfillment.

9. I go to my place of worship (Chapel, Church, Synagogue, Temple) because it helps me to connect with friends.

- *Question source:* Fetzer/NIA Religious Support ("Brief Multidimensional Measure of Religion and Spirituality" by Fetzer Institute/National Institution of Aging, as reported by Haber, p. 278)
- *Original question:* I go to my place of worship (Church, Synagogue, Temple) because it helps me to make friends.
- *Original question:* I go to my (Church, Synagogue, Temple) mostly to spend time with my friends.

10. I believe my personal prayers help me during this deployment.

- *Question source:* R/S Motivation, Devotion, & Coping
- *Original question:* How important is it to you to be able to turn to prayer when you are facing a personal problem?

11. I believe the prayers of my family and friends back home help me.

- *Question source:* This question was created by the Chaplain Corps to determine the recognized level of spiritual support from home.

12. I believe the presence and ministry of my unit chaplain brings value to the mission.

- *Question source:* This question is a military centric question created to meet the specific needs of the Chaplain Corps.

13. I feel good about my future.

- *Question source:* Existential Well-Being
- *Original question:* I feel good about my future.

14. I have forgiven myself for things that I have done wrong.

- *Question source:* Existential Well-Being
- *Original question:* I have forgiven myself for things that I have done wrong.

15. If I have a problem or difficult situation, the people in my chapel Community will comfort me and get me through it.

- *Question source:* Fetzer/NIA Religious Support
- *Original question:* If you were ill, how much would the people in your congregation help you out?
- *Original question:* If you had a problem or difficult situation, how much comfort would the people in your congregation be willing to give you?

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Assessment of Formal Trauma Training in the Dominican Republic as Part of an Ongoing International Humanitarian Mission

Guillermo A. Navarro, MD

Emergency Medicine PGY 4
Naval Medical Center Portsmouth
620 John Paul Jones Circle
Portsmouth, VA 23708-2197
Tel: 302-377-7772
Email: guillermo.navarro@med.navy.mil

Michael Owens, MD

Emergency Medicine Attending
Naval Medical Center Portsmouth
620 John Paul Jones Circle
Portsmouth, VA 23708-2197
Tel: 757-953-1365
Email: michael.owens@med.navy.mil

Todd Parker, MD

Emergency Medicine Attending
Naval Medical Center Portsmouth
620 John Paul Jones Circle
Portsmouth, VA 23708-2197
Tel: 757-953-1365
Email: todd.parker@med.navy.mil

Veronica Rios, MD

Emergency Medicine Attending
Naval Medical Center Portsmouth
620 John Paul Jones Circle
Portsmouth, VA 23708-2197
Tel: 757-953-1365
Email: veronica.rios@med.navy.mil

Author Note

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Abstract

The management of trauma patients was greatly improved by the establishment of a standardized algorithmic approach embodied by the Advanced Trauma Life Support (ATLS) system. Less developed countries lack such a formalized training program and there is significant interest in adopting a similar system. The emergency residency program at the Naval Medical Center Portsmouth (NMCP) presented a formalized trauma curriculum over three days in the Dominican Republic capital of Santo Domingo in cooperation with their emerging residency program in La Plaza de la Salud hospital. Approximately 30 physicians attended the course and completed a pre and post course evaluation of their content knowledge in basic trauma management. Retrospective analysis of this data showed a statistically significant improvement in test scores from 48% to 70%. A course feedback questionnaire was also filled by the participants and revealed that the course was well received. This small pilot study promotes development of future comprehensive courses and serves as a catalyst for further research in the effectiveness of these programs.

Keywords: Trauma training, international teaching, international cooperative programs

Introduction

The delivery of quality trauma care is predicated on a physician's ability to quickly and appropriately manage a trauma patient. In the United States, the initial management of the trauma patient in and out of the emergency department follows an algorithm described within the Advanced Trauma Life Support (ATLS) program. This program was introduced in Nebraska in the early 1970s and administered by the American College of Surgeons (ACS) to provide cognitive and psychomotor skills required to provide optimal care of the trauma patient (Olson et al., 2001; Williams, Lockey, & Culshaw, 1997; Carmont, 2005). This program is now taught in many countries of the world as this type of formal approach to trauma care is gaining international acceptance (Kortbeek et al., 2008).

The Dominican Republic recently established its first Emergency Medicine residency program which created a demand for formal training in trauma care for future residency trained physicians. Currently, emergency departments throughout the country are staffed by full time surgeons, anesthesiologists, and general practitioners with limited formal trauma training. Although there is no national trauma data, morbidity and mortality secondary to trauma is believed to be high and anecdotally exposes a potential source of improvement. Therefore, we presented a three day trauma curriculum which included didactic lecture sessions, trauma ultrasound, procedural skill stations, and static and dynamic trauma simulations. The goal of the trauma curriculum is to train motivated future leaders in Emergency Medicine in those key skills necessary for resuscitation of the trauma patient. This is a first part of a three part intervention which includes separate didactic sessions on trauma care in the Emergency Department, pre hospital and preventive care, and trauma critical care.

Emergency Medicine is the only specialty that has a scientifically derived and commonly accepted description of the domain of its clinical practice. This is formalized in

The Model of the Clinical Practice of Emergency Medicine (EM Model) which includes the delivery of trauma care (Thomas et al., 2008). Improvement in trauma care can be in part assisted with additional cognitive knowledge. This knowledge may arise from three equally important sources to include psychomotor, cognitive, and attitudinal changes (Ali et al., 1993). The goal of this study was to assess the cognitive and attitudinal change from a three day Emergency Department focused trauma curriculum in the Dominican Republic to Emergency Medicine care providers. Our aim was to provide an evidenced based trauma curriculum and familiarize physicians in the Dominican Republic with trauma concepts based in the ATLS clinical approach. Our intent was to apply this curriculum in a manner that was consistent with the unique environments and populations in which they practiced in order to make these applications practical to their everyday patient care. Our follow-up evaluation included a self-assessment into the implementation of the information provided as well as their overall impression of the course's potential to inspire attitudinal changes. Finally, we used a pre and post written test to assess the group's overall improvement in cognitive knowledge.

The goal of this program, which is now in its 4th year and has included six trips, is to establish a self-sustaining system for the training of emergency providers in trauma management. The real harms associated with one time trips with limited temporary interventions have been described (Welling, Ryan, Burris, & Rich, 2010). We strive to establish a self-sustaining continuing educational program that engages future generations of emergency medicine residents and staff. Organized initiatives that specifically promote ongoing cooperative educational and medical efforts such as this one exemplify the Navy's new emphasis on worldwide humanitarian missions and have been established as formal institutional instructions (*DoDI 6000.16, 2010*).

Methods

A three day trauma course took place in Santo Domingo, Dominican Republic, and consisted of a series of didactic presentations; trauma skill stations to include airway, emergency procedures, x-ray evaluation, case simulations, ultrasound FAST exams, and triage scenarios; and a pre and post written evaluation. The didactic presentations, simulation scenarios, and skill stations were geared towards developing a standardized approach to emergency department management of trauma victims. These didactic topics included the general approach to the trauma patient, airway management, chest trauma, spinal trauma, abdominal/pelvic/GU trauma, head trauma, extremes of age considerations, burn, combat casualty care, ultrasound basics, and the Focused Assessment with Sonography in Trauma (FAST) exam. The lectures were based on current ATLS algorithms and delivered as 45 minute power point presentations. Follow up discussion forums were held after each topic during which provider experiences, both presenters and students, were discussed.

The afternoons on days two and three were used for skill and practical stations. There were four stations each day lasting 45 minutes each. Each of the four groups rotated through each station. These stations included airway management, x-ray interpretation, static and dynamic simulations using protocols used by the Emergency Medicine Residency Program at the Naval Medical Center Portsmouth, FAST exam, triage scenarios, and emergency medicine procedures. Additionally, there were demonstrations on airway adjuncts and the primary and secondary survey in a simulated trauma patient.

All power point (Microsoft 2003) lectures were prepared in the Spanish language and presented in Spanish or in English with simultaneous translation by a native speaker. The instructional team consisted of two Board Certified Emergency Physicians, four Emergency Medicine residents from the Naval Medical Center Portsmouth, and the chief of the national burn center. The audience consisted of 30 participants who ranged from residents to staff attendings, all of whom practiced emergency medicine. The participating physician specialties included emergency and surgical residents, general practitioners, radiologists, surgeons, and anesthesiologist. There were currently no residency graduated emergency physicians from the Dominican Republic at this time.



Figure 1. Dr. Veronica Rios engages the audience while explaining the initial airway management of the traumatized patient. (photo by Guillermo Navarro)

A 27 question pre and post evaluation was given to each student. The pretest was administered at the beginning of the course on day one and the posttest immediately upon completion of the course on day three. In addition, a questionnaire was provided to each student with the final evaluation on day three. This questionnaire assessed participants' opinion of each lecture, benefits of trauma simulations, of each procedural station, and a self-assessment of their individual ability to handle trauma before and after the course all on a 1–5 scale. Additionally, we asked each student to identify which were most helpful in their understanding of trauma care by having them choose from simulations, procedural stations, or lectures.

Results

Twenty-nine course participants took the pre course evaluation and 30 participants took the post course evaluation. The average scores in the pre course and post course evaluations were 48 % (13/27) and 70% (18.9/27) respectively. This difference is statistically significant when analyzed with an unpaired t test ($P < 0.0001$).

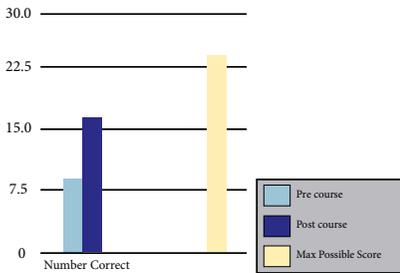


Figure 2. Pre and post course test scores

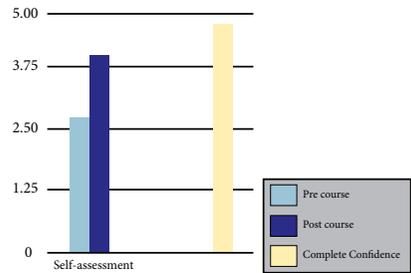


Figure 3. Pre and post course confidence grading

A total of 30 course feedback questionnaires were obtained of which 29 were fully completed. Review of these questionnaires showed individual lectures scores ranging from 4.53 to 4.83 on a 1–5 point scale. Simulation stations received average score of 4.73 while procedural stations received average scores ranging from 4.48 to 4.84. Simulation stations were rated as “most helpful” when compared to lectures and procedural stations for learning and understanding trauma management. The student’s self-assessment of their ability to manage trauma patients increased from an average of 3.33 pre course to an average of 4.50 post course on a 1–5 scale. This subjective self-assessment in improvement is also statistically significant when analyzed with an unpaired t test ($P < 0.0001$).

Discussion

The aim of this study was to evaluate the objective and subjective changes after a formal trauma program in the Dominican Republic. Our study showed improvement in cognitive knowledge, attitudinal change, and psychomotor self-assessment in managing trauma patients upon completion of the course. Improvement in trauma morbidity and mortality after the implementation of a formal trauma program has been previously shown in such countries (Ali, Adam, Stedman, Howard, & Williams, 1994; Kadish et al., 1996).

Review of the scores from the pre and post course evaluation indicates that students derived significant benefit from the material presented. It is important to emphasize that the participants were not given time to study the material in preparation for the test and that the evaluations were presented only as a tool to assess their pre and post course cognitive knowledge and attitudinal change. The participants did not place their names on the tests so a paired t-test analysis was not possible. This assessment tool was not used to rate or certify individuals. One student who did not take the pre course test was 30 minutes late to the first session and therefore missed the evaluation. However, this isolated pre course score is

unlikely to have changed the overall averages. Additionally, there was some initial difficulty with the translation of the questions into a Spanish format. This was handled by going over each translated phrase or word that presented some confusion in the question and answer choices as a group in order to clarify any points of misunderstanding.

The attitudinal course rating questionnaires revealed a high index of course satisfaction and reinforced our belief in the use of simulation training as an important adjunct to lectures and skills stations. The significant improvement noted in their own comfort level with the management of the trauma patient indicates that these training opportunities are well received and material covered will likely be incorporated into their daily medical practice. The overwhelming majority of students commented on the need for more of these types of courses as well as hands on practice with new tools such as ultrasonography. The intense interest and enthusiasm of the course participants made it apparent that they welcomed this training opportunity and understood the important improvement in patient management that it enabled.

Although this was a rather small course with limited number of participants, it is our belief that it serves as an advocate for the standardized training of Dominican Republic physicians in the management of the trauma patient. Although course participants represented a wide spectrum of specialties, the establishment of formal emergency medicine residency programs in this country creates a new eager future audience for the material presented in the course. Our study was limited by a small sample size and therefore should be considered a pilot study which is a starting point for the future testing of larger groups and its overall national impact on trauma morbidity and mortality. The general welcoming attitude of participants toward the material presented and the format used has inspired the creation future courses as part of an important new initiative towards the creation of a nationalized trauma system in the Dominican Republic.

The United States Navy has many ongoing humanitarian missions that include public health initiatives in developing countries. International preventive medicine and medical education programs are proven to be as important as disaster relief efforts to the overall wellbeing of the populations they serve. Ongoing data gathering that supports the effectiveness of such programs is important to assure continuing governmental funding of these important humanitarian efforts as well as providing a critical tool to assess the potential harms or benefits that results from such interventions. Furthermore, future large randomized controlled studies can be undertaken by motivated resident investigators that can shed light into novel ways of sharing valuable medical knowledge with our international colleagues.

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Using Social Network Analysis to Assess Collaboration in Health Research

Jenny Godley, PhD
Department of Sociology
University of Calgary
2500 University Dr. NW
Calgary, AB T2N 1N4
Email: jgodley@ucalgary.ca
Tel: (403) 220-7566

Gary Barron, BA
Department of Sociology
University of Calgary

Arya M. Sharma, MD, PhD
Department of Medicine
University of Alberta

Author Note

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Abstract

While interdisciplinary research is necessary to understand the causes and consequences of complex health issues such as obesity, few studies utilize appropriate methods to evaluate interdisciplinarity. This study uses social network analysis, a methodology developed in anthropology, psychology, and sociology, to examine collaboration among health researchers at one institution. A whole network survey of obesity researchers at one Canadian university was conducted. Whole network measures examined include: density; isolates; average degree; and multiplexity. Analysis of variance (ANOVA) is used to examine the network composition variables by Faculty. Quadratic Assignment Procedure (QAP) regression is used to assess the impact of individual-level variables (Faculty affiliation, length of time at the university, professorial rank, and gender) on collaborative relationships. Belonging to the same Faculty has the largest impact on collaborative work. However, respondents are most likely to co-apply for grants and co-supervise students with members of other Faculties, suggesting that these are the most interdisciplinary activities. This study demonstrates the utility of social scientific methods and approaches to assess interdisciplinary research collaboration in the health sciences. Expanding the study across time, institutions and research areas would be useful to track the progress of interdisciplinary research and to assess methods of encouraging interdisciplinary collaboration in health research.

Keywords: Social Network Analysis; Research collaboration; interdisciplinary

Introduction

Obesity, like most chronic health conditions, is an extremely complex health issue. The determinants and consequences of obesity can be considered from medical, biological, social and psychological perspectives (Agurs-Collins & Bouchard, 2008; Allison et al., 2008; Wyatt, Winters & Dubbert, 2006). Many professionals who work in the field of obesity management and prevention agree that effective obesity prevention and treatment services must adopt an interprofessional approach and should span system levels and sectors (Apovian et al., 2009; Godley & Russell-Mayhew, 2010; Institute of Medicine [IOM], 2004; MacLean et al., 2010). American guidelines have focused on an interdisciplinary approach to prevent and treat obesity for over ten years (National Institutes of Health (NIH), 1998). The most recent Canadian obesity guidelines also call for an interdisciplinary approach (Lau et al., 2006).

Academic researchers are also calling for interdisciplinary explorations of the causes and consequences of complex chronic health issues such as obesity (Spiegel & Alving, 2005). A recent review demonstrated that much of the leading literature on obesity is appearing in non-obesity journals (Baier, Wilczynski & Haynes, 2010). Funding agencies are increasingly requesting that proposals for obesity research come from interdisciplinary research teams both within and between universities (Hall, Bainbridge & Buchan, 2006). Yet the extent to which collaborative interdisciplinary research is actually occurring in the obesity field has yet to be examined.

The terms interdisciplinary, multidisciplinary and transdisciplinary are all used to describe academic work that crosses traditional disciplinary boundaries (Courtourier, Gagnon, Carrier & Etheridge, 2008; Kessel & Rosenfield, 2008; Rosenfield, 1992). Such collaborative work is generally understood to enhance scientific enquiry and improve productivity (Hackett, 2005; Aboelela, Merrill, Carley & Larson, 2007; Cummings & Keisler, 2005), yet is acknowledged to be difficult due to differing academic socialization between disciplines and institutional challenges (Glied, Bakken, Formicola, Gebbie & Larson, 2007; Porter, Roessner, Cohen & Perreault, 2006). Methods for assessing scientific collaboration across disciplines are not yet well established (Harris, 2010; Yang, Park & Heo, 2010; Levitt & Thelwall, 2008).

Social Network Analysis

In this paper, we use social network analysis, a research tradition originating in cognitive psychology and anthropology in the 1930's and 1940's, to examine the collaborative activities of obesity researchers across six different faculties in one university. Social network analysis in its current form represents the confluence of several research traditions. Social psychologists began using network concepts and sociograms to study social interaction in small groups and group dynamics in the 1930's and 1940's (seminal works include Moreno, 1934; Lewin, 1940). Anthropologists began using social network analysis to systematically analyze social ties in various rural and urban communities in the 1940's and 1950's (seminal works include Radcliffe-Brown, 1940; Barnes, 1954; Bott, 1971). Sociologists, long concerned with the effects of patterned social relationships on social behaviour (Simmel, 1908), adopted many of the formal graph-theoretic and matrix-algebraic techniques of network analysis in the 1960's and 1970's (seminal works include White, 1965; Lorrain & White, 1971; Burt 1980). Over the past 50 years, structural sociologists have

employed social network analytic techniques and methods to understand social action (Burt, 1982), social exchange (Cook, 1977), cross-cutting group memberships (Breiger, 1974), the diffusion of information and ideas (Coleman, Katz & Menzel, 1966; Granovetter, 1974), and interpersonal relationships (Davis, 1970).

Today, the easy availability of social network analysis software programs such as UCINET (Borgatti, Everett & Freeman, 2002) enables researchers from disciplines as diverse as public health and physics to employ network analytic techniques. We argue that social network analysis, which provides concepts, study designs, data collection methods, and data analytic techniques and was developed specifically for relational data, is an ideal method for describing and assessing scientific collaborations because of its focus on relationships (Scott, 2000; Wasserman & Faust, 1994; Wellman, 1988). Social network analysis prioritizes the structure of social relationships over the attributes of individuals (Emirbayer, 1997). Social action, therefore, is a result of patterned social interaction. Reflecting on the sociology of science, network analysts would argue that scientific output is the product of social relationships. In the current paper, we use network analysis to understand the patterning of relationships among a group of health scientists at one university.

Network analysts typically conduct one of two types of relational analyses: whole network studies, where the boundaries of the population are known and information is gathered from the whole population; or ego-centred network studies, where individuals are asked to report on others with whom they have certain relationships (referred to as the ego's 'alters' in network terminology) and the characteristics of their alters (Wasserman & Faust, 1994). In this paper, we conduct a whole network analysis of all the obesity researchers at Western Canada University (WCU – a pseudonym as required by the Ethics Board that approved this research).

Social network analysis has been used in a variety of ways to examine academic research collaboration. Most commonly, scholars have applied whole network analytic techniques to bibliographic databases to investigate how networks of co-authorship and citation change over time (Barabasi et al., 2002; Bellanca, 2009; Racherla & Hu, 2010; Wagner, 2005; Estabrooks et al., 2008). Some researchers have used network survey data to highlight barriers and facilitators to interdisciplinary research both within and across universities (Aboelela et al., 2007; Cummings & Keisler, 2005). Others have used social network analysis to evaluate the output of established collaborations of researchers organized into institutes or research groups (Crane, 1969; Stokols et al., 2003; Stokols, Harvey, Gress, Fuqua & Phillips, 2005).

This paper differs slightly from prior social network research on scientific collaboration by examining survey data collected on the professional relationships among 44 obesity researchers from one university (WCU). While these researchers are not part of an officially established group or research institute, they are all faculty members at the same university, and they share a substantive interest in research on obesity. A whole network survey was conducted, and the researchers were asked whether they know of each other, have met, co-supervised a student, co-applied on a grant, co-organized a conference session, or co-authored a paper together. This data enables us to assess the extent of collaboration, and the predictors of (and barriers to) collaborative relationships within a single institution.

We first provide a descriptive examination of the amount of collaboration that is occurring within the group across the different activities. Next, we focus on the faculty affiliations of the researchers to determine whether researchers are collaborating across administrative boundaries at the university level, and whether collaborative activities are patterned by Faculty affiliation. Finally, we examine which aspects of individual similarity (being in the same Faculty, being at the same professorial rank, being the same gender, etc.) best predict collaborative research practices between individuals.

The paper is organized around three research questions. Given that obesity research and treatment are necessarily becoming increasingly interdisciplinary, these research questions are of particular interest in the obesity field (Spiegel & Alving, 2005; Golay et al., 2004). However, we propose that these methods could be used to study collaboration in any complex research field.

1. What is the level of collaboration among obesity researchers at WCU, across the various professional activities?
2. Are researchers more likely to collaborate within their own Faculty or outside their Faculty? What is the patterning of collaboration by Faculty?
3. Does similarity across individual level variables (Faculty affiliation, length of time at the university, professorial rank, and gender) predict collaborative relationships between individuals?

Methods

Study Description

In July 2008, a complete list of obesity researchers at WCU was compiled through an examination of electronic bibliographic databases. The list included all WCU faculty members who had published anything that was indexed with the keyword obesity in the past five years. Fifty-four individuals, representing six different Faculties, were identified. A questionnaire was sent to each of these researchers. Each researcher was given a list of the other 53 obesity researchers at WCU, and asked to indicate if they had any of the following relationships with the other researchers: “aware of”; “have met”; “co-applicant on a grant with”; “co-organized meetings with”; “co-authored papers with”; or “co-supervised students with.” Descriptive information collected on the respondents included: gender, faculty, department, professorial rank, and years at WCU. The questionnaires were returned either by mail or by fax. Data collection continued through the end of August 2008, and forty-four questionnaires were returned (a response rate of 82%).

The study was approved by the Ethics Board at WCU. In order to comply with recommendations from the Ethics Board, all individuals who did not respond to the survey were completely removed from the data. Thus, the complete networks consist only of the 44 individuals who returned their surveys. Additionally, although we have respondents from 17 different departments, we are not able to analyze the data on departmental affiliation because several departments had only one obesity researcher, which creates the possibility of disclosure. Instead, we focus our analysis of administrative affiliation on Faculty. WCU has fifteen different faculties; we had respondents from six of them. One Faculty had only

one respondent and another had only two, so we have combined these into a Faculty we are calling 'Other' in order to reduce the likelihood that these individuals might be identified. The descriptive statistics for the sample are contained in Table 1.

We examined publicly available data on the nine non-respondents in order to ascertain whether our sample was representative of all the obesity researchers at WCU. We found no significant differences between the respondents and the non-respondents in terms of the distribution of gender, academic rank, or Faculty affiliation.

Networks

We constructed six networks from the survey data: the "aware of" network; the "have met" network; the "co-applied for grants" network; the "co-authored" network; the "co-organized" network; and the "co-supervised" network. Although the original data collection included a valuation of each tie (for example, if a respondent had co-authored one paper with another researcher they would circle 1 under that researcher's name, while if they had co-authored more than 3 papers with another researcher they would circle 3 under that researcher's name), for the purpose of the current analysis all ties were dichotomized. Any relation was given a value 1, and no relation was given a value 0. We conducted all our statistical analyses on both the valued and the dichotomized data, and all our results are substantively the same. We present the dichotomized data for ease of interpretation.

All of the relationships except for "aware of" should be reciprocal. However, we found that network reciprocity (the percent of all ties that are reciprocated) (Wasserman & Faust, 1994) ranged from a high of 69% for "have met" and 63% for co-authored down to a low of 40% for co-organized. Thus, for all the networks except for "aware of," we only examine reciprocal ties. The practice of only examining confirmed ties is considered to increase the reliability of self-reported network data (Scott, 2000).

Descriptive Analyses

To answer our first research question (What is the level of collaboration among obesity researchers at WCU, across the various professional activities?), we examine the following whole network measures: density; the number of isolates; average degree; and multiplexity. These network measures are described below.

Table 1. Sample Descriptive Statistics

Faculty	n	%
Medicine and Dentistry	20	45
Agricultural Life and Environmental Science	7	16
Physical Education and Recreation	6	14
School of Public Health	8	18
Other	3	7
Total	44	100
Gender		
Female	15	34
Male	29	66
Total	44	100
Professorial Rank		
Assistant	9	20
Associate	7	16
Full	24	55
Other	4	9
Total	44	100
Years at WCU (n=43)		
(min=1; max = 41; median = 10)	Mean 10.88	SD 8.792

1. *Density* is the proportion of actual linkages to possible linkages among group members (Wasserman & Faust, 1994). Density can be regarded as a measure of how interconnected individuals in a network are, where a density value of 100% would indicate that every person in the network is directly connected to every other person in the network (Scott, 2000).

2. *Isolates* are individuals who are not connected to any others in a network. The number of isolates in a network indicates the percentage of respondents who are not involved with any other network members for a particular activity (Wasserman & Faust, 1994).

3. *Degree* (which is also considered a measure of *centrality*) is the number of alters a respondent mentions, or the number of people in the network with whom they report having this particular relationship. In all of the networks except for the 'aware of' network, we only assess reciprocated ties, thus the degree measure represents the number of reciprocated ties for each individual. We examine average degree to illustrate the average amount of interaction in each network.

4. *Multiplexity* measures the extent to which actors share multiple relationships. To create the multiplex network, we sum across all of the networks (Koehly & Pattison, 2005). The tie value for each pair is thus the total number of types of relationships between any two individuals, and can range from 0 to 6. For example, if two individuals were aware of each other, co-authored a paper, and co-applied for a grant, their tie value would be 3. We examine the average tie value and the distribution of tie values in the multiplex network, to assess how many individuals share multiple relationships, and the patterning of relationships shared.

Statistical Analyses

To answer our second research question (Are researchers more likely to collaborate within their own Faculty or outside their Faculty? What is the patterning of collaboration by Faculty?), we first examine network graphs that provide a visual representation of the patterning of collaboration across and within faculties. Next, we construct individual-level network composition measures for each type of relationship. We create a variable measuring the percent of ties to individuals from the same Faculty versus the percentage of ties to individuals from a different Faculty for each network.

We use analysis of variance (ANOVA) to examine the network composition variables by Faculty. Across the six networks, we look for significant differences between the members of different Faculties on the percent of ties to individuals from the same Faculty. Since we have no a priori hypotheses about differences between the Faculties on the network variables, we use the least significant difference (LSD) procedure in a post-hoc analysis to examine group differences for all significant ANOVAs.

To answer our third research question (Does similarity across individual level variables such as Faculty affiliation, length of time at the university, professorial rank, and gender predict collaborative relationships between individuals?), we perform Quadratic Assignment Procedure (QAP) regression (Carley & Krackhardt, 1996; Brewer & Webster, 1999; Burris, 2005). This procedure is implemented in UCINET 6 (Borgatti, Everett & Freeman, 2002). There are 1,892 dyads created by multiple relations among the 44 researchers. These dyadic observations are not statistically independent, thus the data violates the assumptions of Ordinary Least Squares (OLS) regression.

The QAP regression procedure, which overcomes the limitations of autocorrelation, is best understood as a form of simulation (Burris, 2005). First, OLS coefficients are calculated for the independent variables in the regression. Next, the rows and columns of the dependent variable matrix are randomly permuted and the OLS regression coefficients are re-calculated. The simulation is repeated 2,000 times in UCINET 6. The initial regression coefficients are then compared with the distribution of all possible coefficients, and significance tests are based on these distributions.

Results

Density, Isolates, Degree, Multiplexity

Table 2 shows the whole network measures for each of the networks: density; the number of isolates; and the degree distribution.

Figures 1 and 2 show the graphic representations of the “co-apply” and “co-author” networks. These graphs were created in Netdraw. The nodes (which represent the researchers) are shaped by Faculty membership. Lines represent the presence of a relationship between two researchers. All of the relationships shown in both networks are reciprocal. For the graph layout, we used the spring embedded procedure in Netdraw 2.24, which graphs the nodes according to their geodesic (shortest distance) proximities. The isolates (researchers with no connections to the other researchers) are shown in the upper left hand corner of the network diagrams.

Table 2. Density, number of isolates, and mean degree for all networks

	Density	Isolates	Mean Degree	Sd	Min	Max
Aware of	.38	None	22.14	8.88	7	39
Have met	.24	6	10.18	7.26	0	25
Co-applicant	.09	13	4.04	9.41	0	14
Co-organize	.02	25	1.04	2.43	0	7
Co-author	.05	11	2.32	5.39	0	10
Co-supervise	.03	22	1.36	3.17	0	10

NOTE: The ‘aware of’ network contains all (directed) ties; all the other networks contain only reciprocal ties.

1. *Density*: The “aware of” network is the densest, with 38% of all possible ties being present. Twenty-four percent of all possible ties are present for “have met”. All the other networks are much less dense, ranging from 9% (“co-applicant”) to 2% (“co-organize”). Comparing Figures 1 and 2, it is clear that the “co-applicant” network is denser, with 9% of possible ties present, than the “co-author” network, with 5% of possible ties present.

2. *Isolates*: There are no isolates in the “aware of” network, and only six isolates in the “have met” network. The number of isolates increases for the other networks, rising from 11 (25% of the sample) for the “co-author” network, to 25 (57% of the sample) for the “co-organize” network. It is important to remember that if a respondent is an isolate in these

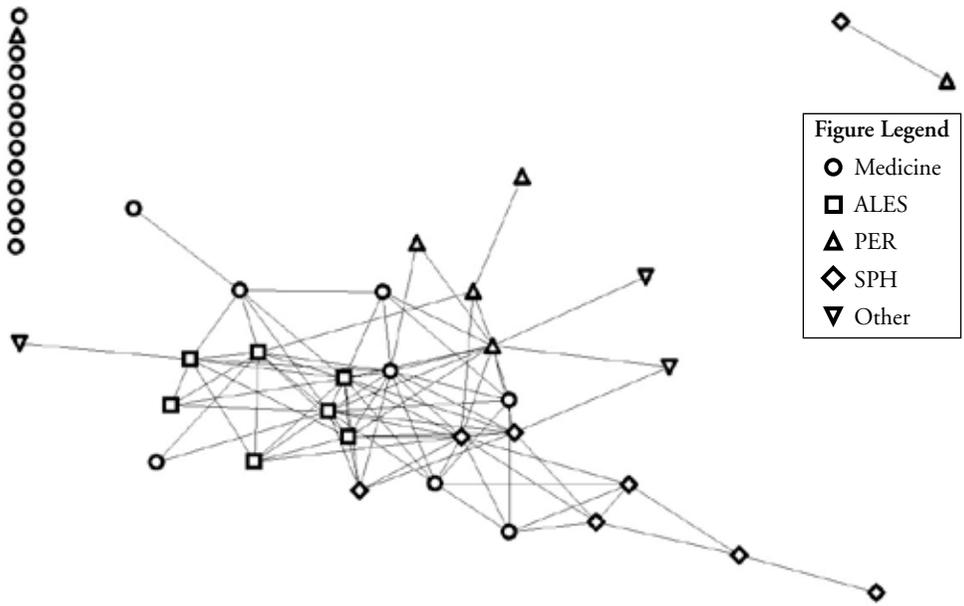


Figure 1. 'Co-Applicant' Network, by Faculty

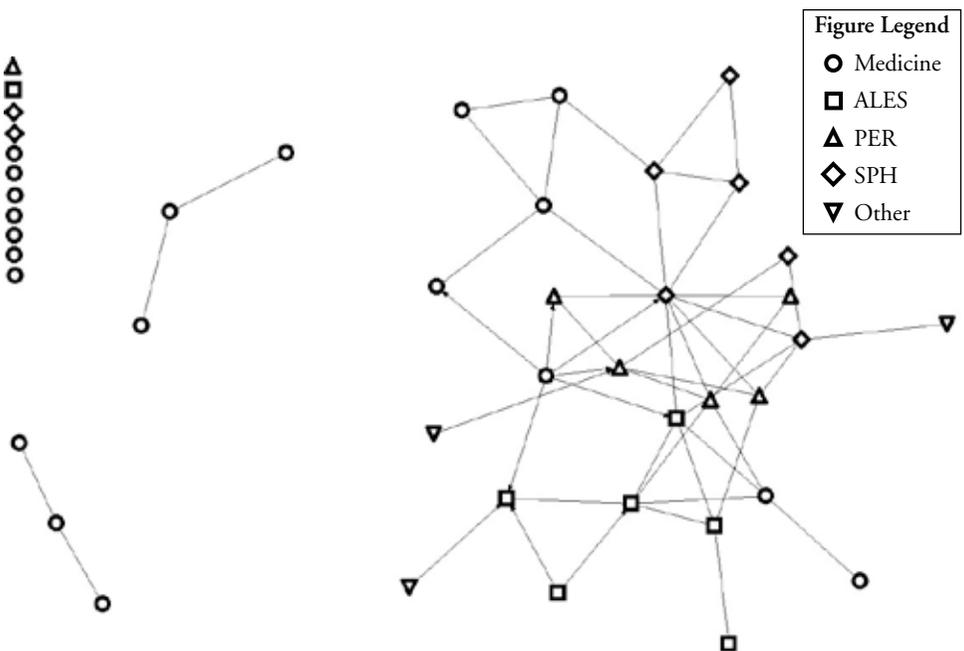


Figure 2. 'Co-Author' Network, by Faculty

networks it does not mean that they do not engage in these activities with others, it simply means that they have not shared this activity with the other respondents from WCU. A respondent who is an isolate in the “co-applied for grants” network, for example, might have applied for grants with other researchers at WCU who do not study obesity, or with obesity researchers at other institutions. Figure 1 and 2 shows the 13 isolates in the “co-applicant” network and the 11 isolates in the “co-author” network in the upper left hand corner.

3. *Degree*: Examining the average degree statistics, we see that on average, respondents are “aware of” over half (22) of the 43 other obesity researchers at WCU, and “have met” 10 others. One person is aware of 39 others, and has met 25 of these. Respondents report co-applying for grants with four others, on average, and co-authoring with two others, on average. “Co-supervise” and “co-organize” have the lowest mean degree, with values of 1.36 and 1.04 respectively.

4. *Multiplexity*: Table 3 shows the distribution of tie strength for the multiplex network. There are 762 ties present in the sample (out of a possible 1,892). Of these, 41% represent single relations (most of these are simply being “aware of” another researcher). This indicates that 59% of the relationships between respondents involve more than one activity. Thirty-four percent of ties involve two relations, and 14% involve 3 relations. Eleven percent of the ties involve 4 relations or more. The average tie strength of the multiplex network is 2.03. Thus once two researchers establish a relationship (we may assume that being “aware of” each other is the starting point), it is likely that they will go on to have another type of professional relationship with each other. And a quarter of the ties involve three relationships or more, indicating that once the respondents begin working together, they are likely to engage in multiple joint professional activities.

Table 3. Multiplex network

Strength of tie	Number	Percent of all ties (=762)
0	1130	
1	309	41
2	260	34
3	107	14
4	45	6
5	25	3
6	16	2

Collaboration by Faculty

Percent of Ties to Same Faculty by Network and by Faculty

Table 4 shows the distribution of the network composition variable, percent of ties to members of the same Faculty. The first column shows the average for all Faculties, and the next five columns show the average for each Faculty separately. It is clear from the first column that the most homogenous network is the “co-author” network, with 64% of ties in this network linking members of the same Faculty. “Aware of” is the least homogenous, with only 39% of all ties linking members of the same Faculty.

The differences between the “co-applicant” network (where 48% of the ties are to members of the same Faculty) and the “co-author” network (where 64% of the ties are to members of the same Faculty) are illustrated graphically in Figures 1 and 2. There is clearly more clustering by Faculty in Figure 2, the “co-author” network.

We conducted ANOVAs to compare these measures across Faculties, and found significant differences across Faculties for the “aware of,” “have met,” “co-applicant” and “co-author” networks. Using the least significant difference (LSD) procedure in a post-hoc analysis, we examine group differences for all significant ANOVAs. In two of the networks (“aware of” and “have met”) members of the Faculty of Medicine have considerably more ties to members of their own Faculty than do members of other Faculties. In the “co-author” network respondents from the Faculty of Medicine have a significantly higher percentage of ties to members of their own Faculty (83%) than do members of PER (40%). Members of the Other Faculty have no ties to each other, thus their percent of ties to same faculty is significantly lower than all the other faculties for all four networks.

Table 4. Percent of ties to same faculty

	%ties same faculty – overall (N=44)	Medicine (N=20)	ALES (N=7)	PER (N=6)	SPH (N=8)	Other (N=3)
Aware of	39	60*	20	24	32	0***
Have met	43	61*	33	34	17	0***
Co-applicant	48	52	58	43	37	0***
Co-organize	63	37	88	40	28	ND
Co-author	64	83**	71	40	31	0***
Co-supervise	45	43	48	44	40	0

Significance (based on post-hoc LSD tests for all significant ANOVAs); ND = No Data.

* greater than all other Faculties

** greater than PER

*** less than all other Faculties

QAP Regression Results

Table 5, opposite, contains the QAP regression results for the six original networks and the multiplex network.

There are four independent variables included in these models: belonging to the same Faculty, being the same gender, having the same appointment level, and the difference in time at WCU. Examining the coefficient of determination, or R², we can see that these models do not explain a large proportion of the variation. Together, these independent variables explain approximately 7% of the ties observed in the “aware of” network, 5% in the “have met” network, 4% in the “co-apply” network, 3% in the “co-author” network, 2% in the “co-organize” network and 1% in the “co-supervise” network.

However, Burris (2005) argues that when interpreting QAP regression results, the focus should be on the comparative magnitude of the coefficients, rather than on the overall model R² or the level of statistical significance for each coefficient. In Table 5 we report the standardized coefficients for each independent variable, and their significance level. Discussion will focus on the comparative magnitude of those coefficients which are significant.

Table 5. QAP regression results

	Aware of	Have Met	Co-apply	Co-author	Co-organize	Co-supervise	Multiplex
Same faculty	.173** (.001)	.112* (.019)	.123** (.009)	.142** (.001)	.105** (.006)	.056 (.082)	.180** (.002)
Same gender	.003 (.433)	-.015 (.419)	.015 (.302)	.061* (.050)	.023 (.267)	.005 (.423)	.014 (.336)
Same appointment level	.168** (.002)	.168** (.010)	.063 (.116)	.033 (.120)	.081* (.026)	.101* (.026)	.167** (.006)
Difference in length of time at WCU	-.110* (.039)	-.078 (.134)	-.124* (.018)	-.073 (.059)	-.042 (.192)	-.037 (.237)	-.121* (.050)
R ²	.071	.047	.035	.031	.019	.014	.077

Note. Table 5 shows standardized coefficients and proportion significance in parentheses.

All the networks are reciprocal ties only, except for Aware of, which includes non-reciprocal ties.

All the networks are dichotomized, except for the multiplex network, which is a valued network (0–6).

For the multiplex network, the coefficients are predicting strength of tie, rather than just the existence of a tie.

* significant at the 0.05 level

** significant at the .01 level

Controlling for the other independent variables, belonging to the same Faculty significantly increases the likelihood of all of the relationships except for co-supervise. In fact, belonging to the same Faculty is the strongest predictor of ties in the “aware of,” “co-apply,” “co-author” and “co-organize” networks. Coming from the same Faculty is also the strongest predictor of the number of ties two people share in the multiplex network.

The next most important independent variable is being at the same appointment level, which has a positive impact on the presence of ties in the “aware of,” “have met,” “co-organize” and “co-supervise” networks, net of the other independent variables. Being at the same appointment level also positively impacts the number of ties between two individuals in the multiplex network.

A larger difference in the time two respondents have worked at WCU is negatively related to tie in the “aware of” and “co-apply” networks, and is also negatively related to the number of ties between two respondents in the multiplex network, net of the other independent variables.

Controlling for Faculty membership, appointment level, and difference in length of time at WCU, being the same gender is positively related to co-authorship, although the magnitude of the shared gender effect is less than half the magnitude of the shared Faculty effect. Since the gender distribution of the sample is skewed (66% male), it is not surprising that men would be more likely to publish with other men. However, this finding holds for both genders, indicating that women are also more likely to publish with other women, even though they only represent 34% of the possible co-authors in the study. Thus the result suggests that women are disproportionately choosing to co-author with other women.

Discussion

Assessments of obesity prevention and management programs are increasingly focused on the interdisciplinary nature of these programs (Golay et al., 2004). Similarly, assessment of obesity research needs to address the extent to which current research manages to cross disciplinary boundaries. Social network analysis has enabled us to make the following assessment of obesity research at one Canadian institution.

While obesity researchers at WCU are aware of, on average, 22 other obesity researchers on campus, and have met, on average, 10 others, their level of collaboration in terms of the research activities of applying for grants, organizing workshops, writing papers, and supervising students is fairly low. For each of these professional activities, less than 10% of the ties that could exist among these researchers actually do exist. It appears that co-applying for grants is the most collaborative activity (density = 9%, average degree = 4.04), followed by co-authoring papers (density = 5%, average degree = 2.32). However, there are isolates in all of the networks except for “aware of.” Over half of the researchers do not co-organize or co-supervise with any other obesity researchers at WCU.

Less than half of all the ties that could exist among these researchers are actually there, and 41% are uni-dimensional (involving only one relationship). However, on average researchers who do collaborate share two relationships with one another, and a quarter of all the ties involve three relationships or more. Thus it appears that once the obesity researchers do get connected to others at WCU, they are likely to expand their relationship to include more than one research activity.

We may be underestimating the level of collaboration among these researchers by only including reciprocal ties in our analyses. However, we have more confidence in the self-report data by using only the confirmed ties. Additionally, it is important to note that we do not have any information on collaboration with researchers outside of WCU. We do not mean to imply that obesity researchers at WCU have few collaborative professional relationships, just that they do not have that many collaborative relationships with others at the same institution.

The network graphs show that there is clustering by Faculty in both the “co-applicant” and the “co-author” networks. However, the clustering appears to be stronger in the “co-author” network, where we see (in particular) groups of researchers from Medicine co-authoring with each other, but not with members of other Faculties.

On average, we find that less than half of all ties in the “aware of,” “have met,” “co-apply” and “co-supervise” networks are to members of the same Faculty. However, 63% of the ties in the “co-organize” network and 64% of the ties in the “co-author” network are to members of the same Faculty. Thus it appears that while there is quite a bit of collaboration across Faculties in terms of meeting, applying for grants and supervising students, the least collaborative activities (in terms of crossing Faculty boundaries) are co-organizing and co-authoring.

We find significant differences across the Faculties in terms of network composition for the “aware of,” “have met” and “co-author” networks. Members of the Faculty of Medicine are more likely to be aware of and to have met members of their own Faculty than members of all the other Faculties, and are more likely to co-author with members of their own Faculty (83%) than members of the PER Faculty (40%). However, as 45% of our sample comes from the Faculty of Medicine, these results may be an artefact of sample composition. It is important to remember that respondents from the Faculty of Medicine have a larger pool of others to choose from who come from within their own Faculty, since almost half the respondents come from the Faculty of Medicine.

Members of the “Other” Faculty do not report any collaborative activities with each other, and thus appear to be best at collaborating across Faculty boundaries. However, this result is likely due to the fact that this was an artificially created category (constructed to avoid respondent identification). “Other” really represents two Faculties, not a meaningful administrative unit. We are thus limited in our understanding of cross-Faculty collaboration because of our sample size, and distribution. Additionally, while we are using cross-Faculty collaboration as an indication of interdisciplinary work, there may be interdisciplinary work occurring within Faculties, too. Each Faculty contains a varying number of Departments (for example, PER contains only one department, while there are 20 departments in the Faculty of Medicine) and collaboration between members of different Departments may be just as interdisciplinary as collaboration between members of different Faculties.

In the QAP regression models, the most important individual-level commonality, which predicts all of the relationships except co-supervising (net of the other similarity variables), is belonging to the same Faculty. Belonging to the same Faculty also predicts the strength of the relationship between two people in the multiplex network, net of the other variables.

The next most important commonality is being at the same appointment level, which predicts ties in the “aware of,” “have met,” “co-organize” and “co-supervise” networks, and also predicts strength of ties in the multiplex network, controlling for other individual-level similarities. The difference in the length of time two people have been at WCU has a negative effect on the likelihood of two individuals being aware of each other or co-applying for grants, and has a negative effect on the strength of tie between two people in the multiplex network, net of the other variables. Thus we see that professional similarity, in terms of Faculty membership, appointment level, and shared time at WCU, increases the likelihood of forming collaborative relationships.

An intriguing gender finding also emerges from the QAP regression results. Researchers are more likely to co-author with others of the same gender, controlling for similarity across Faculty level, appointment level, and time at WCU. While the gender effect is much smaller in magnitude than the same Faculty effect, it is an interesting suggestion of some of the social processes that may go into co-authorship.

Conclusions

As the field of obesity research becomes more diverse, and interventions become more complex, questions about the level of interdisciplinary research will become more salient (Spiegel & Alving, 2005; Baier et al., 2010). We have demonstrated the utility of social network analysis in understanding the extent to which interdisciplinary research actually occurs in one institution. We propose that social network analysis could be used in other institutions, to analyze interdisciplinarity across any number of complex research areas.

The research activities of co-applying for grants and co-supervising students appear to be the most interdisciplinary, in terms of spanning Faculty boundaries. We find that individuals who are from the same Faculty, at the same appointment level, and who have been at WCU for similar amounts of time are more likely to work together.

In order to better understand how we can promote and foster collaboration within the contextual constraints of a university setting (Stokols et al., 2005), it would be very interesting to conduct a longitudinal project at WCU. We could examine the changing relationships of the obesity researchers over time to determine whether interdisciplinary research was increasing (Aboelela et al., 2007), and which individual-level variables were most conducive to collaboration.

It would also be interesting to conduct this type of whole social network survey in other universities, with a different set of Administrative units, and focusing on a different research area. Practically, there are four main issues to address before conducting a network analysis to evaluate academic collaboration. First, researchers must decide the boundaries of the network under consideration. They must decide whether they are looking at a group with a defined membership, or whether they are defining membership based on external criteria. Second, researchers must choose the relationships they wish to measure. In the current study we only measured professional relationships, but it might be interesting to measure more informal interpersonal relationships, too. Third, researchers must be aware that they will need a high response rate (at least 80%) in order to analyze their data. They will need a high level of cooperation from their respondents in order to achieve a high response rate. And finally, researchers must be aware of the complicated ethical issues raised when conducting whole network analysis. When data is gathered from a known population, it is easy to identify non-respondents as well as respondents. Therefore care must be taken to reduce the risk of deductive disclosure.

We have highlighted the utility of using methods from the social sciences to understand both process and outcome in the health sciences. In order to understand and evaluate interdisciplinarity, we ourselves must view the world through an interdisciplinary lens. Understanding the extent to which interdisciplinary research is already occurring around the globe, and what can be done to promote it, will further the mission of a comprehensive interdisciplinary research program in the health sciences.

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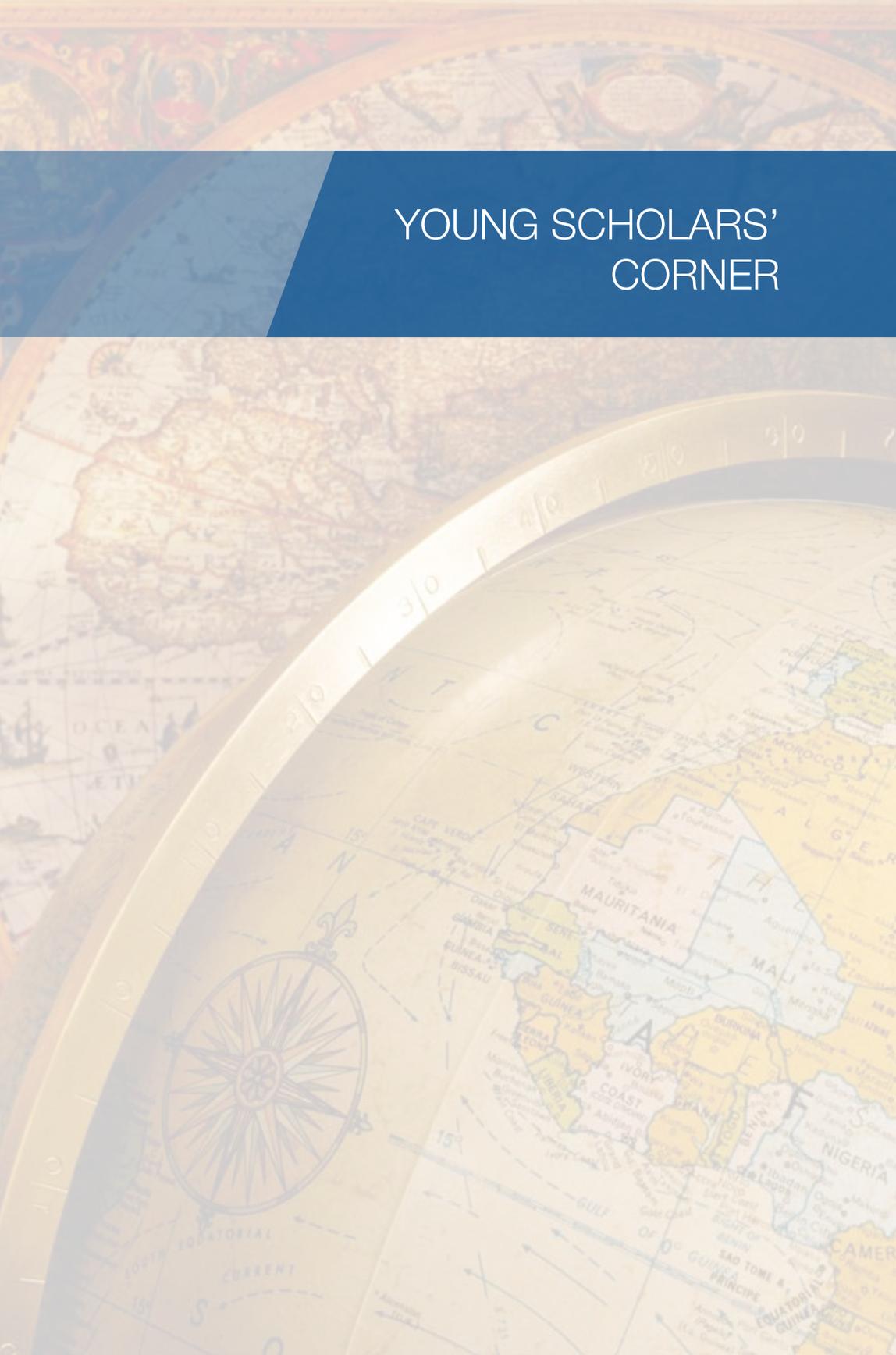
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YOUNG SCHOLARS' CORNER



Reflections on Our Inaugural Year as Clinical Ethicists

Laurie Hardingham, BN, MA

Clinical Ethicist (ret)
St. Joseph's Healthcare, London, Ontario
Email: lbhardin6@hotmail.com

Karen Faith, BSW, MEd, MSc, RSW

Ethicist, Private Consultant and Educator
28 Lonsdale Road
Toronto, Ontario MV4 IM5
Email: kefaith@rogers.com

Dianne Godkin, RN, PhD

Senior Ethicist
Trillium Health Centre, Toronto, Ontario
Email: dgodkin@thc.on.ca

Paula Chidwick, PhD

Director, Clinical & Corporate Ethics
William Osler Health System, Brampton, Ontario
Email: Paula.chidwick@williamoslerhs.ca

Author Note

This work was initially presented as a paper titled "Trials, Tribulations and Triumphs: The Transition from Fellow to Clinical Ethicist" at the Canadian Bioethics Society Conference in Calgary Alberta, October 30th, 2004. Our collaboration continued for the next four years during which time we reviewed and revisited the literature, our narratives, themes and insights. The final manuscript resulted from several weekend retreats during which we time we further developed the paper.

Abstract

Our inaugural year as clinical ethicists was a transformative year of coming to understand ourselves—our way of knowing, being, and doing. We sensed that deeper reflection upon our experiences might yield fruitful insights that would be helpful, not only in our own growth and development, but also to others who may be considering a career in clinical ethics and to those already engaged in this demanding work. Drawing from both a narrative and reflective practice approach, we wrote stories about pivotal experiences that occurred during our transition from a fellowship role under the tutelage of seasoned clinical ethicists to that of an independently-functioning clinical ethicist. From the transcripts emerged four recurrent themes: attending to process, building relationships, facing resistance, and keeping the vision.

Through our reflections we achieved a deeper understanding of what it means to be a clinical ethicist and the importance of sharing experiences with colleagues in this field.

Keywords: Clinical ethicist; clinical ethics consultation

Introduction

Embarking upon a career as a clinical ethicist is an exciting, challenging, and sometimes daunting endeavour. Increasingly, more positions for clinical ethicists have emerged in health care. The fields that lead to clinical ethics work include but are not limited to medicine and other health disciplines, law, theology, philosophy and anthropology. Although the academic backgrounds may be diverse, there are common functions identified with the role and these include: ethics consultation, research ethics, ethics education and the development of organizational policies (Turner, 2002; Chidwick, Faith, Godkin, & Hardingham, 2004; Agich, 2005). In their development of core competencies for clinical ethicists, the American Society for Bioethics and Humanities (1998) focused primarily on the clinical ethicist's role in ethics consultation and paid limited attention to core competencies for other aspects of the work. Examples of ethics consultation activities include: helping address ethics and resource allocation decisions, ethical considerations in end of life treatment decisions as well as clarifying ethical standards for research (Chidwick et al., 2010). However, consensus has yet to be reached on the nature and scope of the role of a clinical ethicist (Agich, 2005; Chidwick et al., 2010; Childs, 2010; Fox, McGee, & Caplan, 1998). Much of the literature, including the work of the American Society for Bioethics and Humanities on the lived experience of clinical ethicists, is limited. By describing and reflecting upon our experience as clinical ethicists in our first year of work, we seek to further the dialogue on, and enhance the understanding of the role of a clinical ethicist.

After completing a clinical ethics fellowship at the University of Toronto Joint Centre for Bioethics, each of the authors assumed full-time positions as clinical ethicists in a variety of health care settings. Throughout our transitional year, we shared our individual experiences and began to recognize that this process of reflection was of great value in supporting our practice. The insights gleaned from this process may be helpful to others engaged in, or who are considering a career, in this field.

Approach

We used both a narrative and reflective practice approach (Schön, 1983) to explore our experiences during our transitional year. Each of us wrote several narratives describing pivotal experiences as a means to reflect on our actions, decisions and/or behaviours within our roles as clinical ethicists. The analysis of these narratives involved three steps. First, we read each story aloud and collectively identified emerging themes. Second, we independently reviewed the narratives to ensure that we had not overlooked additional themes. Third, we met and achieved consensus on the most salient themes. As the analysis progressed, interconnections and linkages amongst and between the themes became evident. Four themes were identified: attending to process, building relationships, facing resistance, and keeping the vision. We selected an excerpt of a narrative that illustrates each theme, followed by a reflection on the theme and its relevance to our practice. Quotations from narratives are illustrated in italics.

Themes

Attending to the Process

The consult took longer because the family was present. The team questioned and were uncertain whether the family should even be there. "What would they say or do?" they wondered. I thought that the family should be present and that time put in now in a relaxed and unrushed manner would be helpful to all. The family needed time to receive information and process it, and I did not think two hours was too long to do this. It was very important to me, and also, I think, to the team, to hear the story directly from them. (After all, the family had requested the consult.) I thought we needed to take seriously the problem of "the disappearing patient." It was powerful to hear directly about the patient from her family. Not hearing the patient's voice, we are bereft of an important part of the picture. Hearing the family's voice significantly altered the team's perceptions of the situation. This helped open space for conversation. Even though the team had concerns that the consultation was too long, team members demonstrated respect by staying and listening for the whole meeting. Afterwards, the family told me that they felt heard and had their questions answered.

Attending to complex situations within our roles as clinical ethicists is as much about process as it is about outcomes (Daniels, 2001; Faith & Chidwick, 2009). It is necessary to have all of the relevant parties at the table where each can contribute his/her perspective. This approach requires an open environment free of repercussions where every attempt is made to reduce imbalances in terms of power and knowledge. Maintaining an open stance and modelling excellent communication skills enables all the different voices at the table to be heard. Patients and families need time to tell their stories, ask questions and express concerns. Teams need to take the time to listen and to better understand the diverse perspectives at the table. We identified a need to develop passionate resistance to the external and internal pressures to speed up the ethical discernment process.

There was a need also to be cognizant of the "disappearing patient." We have observed that teams lose sight of the patient as a whole person with beliefs, values, lived experiences and relationships in deference to dominant clinical perspectives. Recognizing that uncertainty is an inherent reality in clinical ethics work, being adaptable and flexible is necessary in order to deal with the unexpected, uncomfortable, and diverse range of responses. We learned to trust our training and education that supports keeping the patient at the centre of the consultation process (Howe, 2009; Reiter-Theil, 2003). It takes courage for the clinical ethicist to be present and remain steadfast in his/her commitment to attending to process and to ensuring that the patient remains the centre of concern.

Building Relationships

As I arrived to set up for a unit "meet and greet," I interrupted a lunch break of about 3 or 4 nurses. I told them I was the ethicist and was presenting shortly - the manager chimed in that the inservice would be starting in 5 minutes. And the groans began. "Oh, boy - not ethics - I am leaving - this is not for me."

Again, as a new ethicist I had encountered varying degrees of acceptance, a great deal of skepticism and a lot of misunderstandings about the role of the ethicist. But, I had never had such an audience - one so frank about how they felt. How should I handle this so it would maximize the potential for a positive relationship?

First, I apologized for not having chocolate for them – and I got a little laugh—it was enough to get their attention for a split second. Who was this person called an ethicist talking about chocolate? I then went straight into the slides I brought – explaining the presentation would take only 5 minutes and then they could ask questions. And, I was going to be absolutely trustworthy to this time frame and I was. They asked some questions – and we talked a bit – they then started on some of the cases, which revolved around feeding tubes – I offered to come back and present on the ethical issues – they asked when. I said next week same time, same place – they looked relieved. We agreed and I left. It all took maybe 22 minutes.

Building trusting relationships is an essential and ongoing process. Doing the right thing and embedding ethical considerations in decision-making is a shared responsibility of all, not any particular individual. In the course of building relationships, we recognized the importance of resisting the frantic pace of the health care environment. Time was needed to build solid relationships. One of the strategies we found helpful was identifying ethics champions in the organization. Making good first impressions was important, as we may not get a second chance. As clinical ethicists we needed to capitalize on every opportunity to build ethics capacity even when time was significantly limited. On many occasions we had to adapt our approach to fit the busy schedules and competing demands of healthcare professionals working in highly pressured environments. Building relationships and ethics capacity helped to contribute to better decision-making and delivery of care.

Facing Resistance

My usual approach to ICU rounds was to be present for anything that might arise and to be a resource for any ethical aspect of a case. As I approached the team, the intensivist looked distracted and distressed. I introduced myself and then was promptly asked to leave by the intensivist. “We don’t want you here today, at all.” I asked myself, was this just a bad day? Did he not hear my earlier presentation saying that I was not the moral police? Was the right thing to insist on staying? What about the patient, the family, and the team? Did they want me to leave? These questions flashed through my mind as I raced to make the best decision I could in a split second. So, in the moment I said that I would be happy to leave - it was nice to meet him and I would be willing to come back at any time if he thought it might be helpful. And, then I promptly left. I learned a very important lesson. As you build an ethics program it is important to get “buy in” - maybe first before you do anything else. “Buy in” means you have earned the trust of the team. They understand your role but not necessarily what to expect from you. I did not have ‘trust’ on that day – but I would be there next week with a different intensivist. The long term goals of building a sustainable and integrated ethics program would still be intact even by leaving today. I realized more importantly, that I was not the only person responsible for the well-being of the patient. The team knew they could call. I needed to be scarce that day. Things did work out over time.

It was important for us to acknowledge and understand the unique cultures within our organizations, departments and teams. We discovered that staff, patients and families had differing interpretations and expectations of the role of the ethicist. Engaging in respectful communication in these kinds of situations was imperative. It was necessary to be sensitive to people’s readiness to engage in ethical dialogue. When resistance occurred, we learned not to take it personally. Our ability to persevere was a necessary attribute for building an ethics program. In our experience, capacity-building often involved one person at a time and

sometimes occurred during the most unpredictable moments. In situations where we faced resistance, we learned to celebrate seemingly minor accomplishments such as keeping doors and lines of communication open.

Keeping the Vision

I was asked to consult on a case where there was conflict between the team and family concerning an end of life care plan for an incapable elderly patient. As a relatively new clinical ethicist, I was still uncertain whether I was sufficiently prepared to go solo in such complex cases and I immediately questioned my competence. I understood my role was to facilitate ethical decision-making, reflect on the challenges and assist with conflict resolution. When I arrived the senior physician understood my role differently. All he wanted of me was verification that the treatment plan he had proposed was ethical. I found the situation challenging. There was conflict, a sick patient, and an intimidating physician. Still, I persevered drawing from what I understood were the skills and objectives needed for clinical ethics consultation—raising the ethical considerations, supporting ethical discourse, facilitating a process of ethical decision-making and conflict resolution. I began to question my value as the mutual frustration grew between myself and the physician. It was only when I focused the discussion on the patient, his values and life history, and acknowledged the moral angst of the physician providing care for this patient, that a dawning of shared understanding emerged between us. The easing of tension allowed the physician to express his feelings of moral distress about this case and I in turn expressed my empathy about the complex situation and responsibility he faced as primary physician in determining the best course of treatment for this frail, elderly patient. We ended the conversation with the physician stating that he was quite certain he would not readmit this patient to the ICU once discharged. However, he was willing to find another physician who would consider re-admission in the event of recurrent respiratory distress. This was my moment of transformation from fellow to clinical ethicist.

Because the role of the clinical ethicist is not well understood, it was imperative for us to remain clear about our ultimate goals and to rely on our skills and knowledge. Healthcare team members, patients, and their family members may misinterpret our role due to misinformation, personal biases, or previous experiences. Frequently, we are called to assist in emotionally charged situations when our role is susceptible to being co-opted, such as justifying a particular course of action or decision from one stakeholder viewpoint. Therefore we had to be prepared to explain our roles as clinical ethicists, along with our objective of supporting ethical decision-making processes. These efforts to uphold our vision for an ethics program served to both harmonize expectations and to help build knowledge about our role.

Conclusion

Attending to process, building relationships, facing resistance, and keeping the vision required that we continually draw upon our personal character traits of humility, respect, humour, flexibility, compassion, courage and perseverance. Sharing our narratives and reflecting on these experiences with one another was, in itself, a transformative experience. Through this process we achieved a deeper understanding of what it means to be a clinical ethicist—our way of knowing, being, and doing. Lastly, we all emphatically agreed that the work of a clinical ethicist ought not to be done in isolation and that having colleagues with whom one can dialogue is intrinsically important.

Post Script

Although this paper focuses on reflections of our experiences during our first year as clinical ethicists, after a number of years of practice, we continue to benefit from sharing reflections on our ongoing practice. Our identity and development as clinical ethicists remain a work in progress. As we wrote this paper, it became evident that these themes and character traits remain relevant to how we do our work and who we are as clinical ethicists today.

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Technology and Innovation Report

Using Virtual World Journalism for Health Education

Joshua S. Fouts

Executive Director, Science House Foundation
Senior Fellow for Digital Media & Public Policy
Center for the Study of the Presidency and Congress
Email: josh@sciencehouse.org

Introduction

What each must seek in his life never was on land or sea. It is something out of his own unique potentiality for experience, something that never has been and never could have been experienced by anyone else. - Joseph Campbell

Two years before the revolution in Tahrir Square in Cairo put Egypt in the headlines of all major news outlets in 2011, my collaborator, Rita J. King, and I were working with some of the key political bloggers who became leading voices in the revolution. We helped them explore new venues to develop their journalistic contacts, skills, and, in this case, reliable information about critical health science journalism. Many of the bloggers, such as Wael Abbas, were already well-known in Egypt for their commitment to tell the truth about life in Egypt, long before international news outlets like CNN and Al Jazeera cast their voices onto an international stage.

As journalism and science entered the 21st century, the intersection—and, more importantly, evolution—of internet-based tools for communication have radically transformed our understanding of what it means to be a global citizen, how we communicate across cultures, how we do research, how we report and tell the news, and more importantly, how we understand what it means to be human.

Internet platforms from Twitter to Facebook to virtual worlds have been documented as critical venues empowering revolutions across the Middle East in 2011. Virtual worlds, though extant in the 1990s, only began to be explored in earnest by journalists, artists, scholars and scientists in the early 2000s. And there is still significant work to be done.

This is a report on an experiment in how virtual worlds can be used to collapse geography and empower journalism and global health sciences education.

In a scientifically unfounded approach to disease prevention, the Egyptian government began slaughtering its pig population on April 29, 2009 as a response to concerns about a possible worldwide epidemic of the H1N1 virus (known as the “Swine Flu”) (Naughton, 2009). The H1N1 swine variant was first identified by the US Centers for Disease Control and Prevention (CDC) earlier that month. The primary goal of CDC is to inform the US public about risks and responses to these kinds of issues. However, as the Swine Flu outbreak quickly evolved into a possible global pandemic, another issue arose. Without

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either complete or accurate information about the course of the virus worldwide, countries like Egypt were making hasty decisions based on assumption and fears rather than fact.

The World Health Organization, per its mandate from the United Nations, is tasked with providing global health information worldwide. But since information about H1N1 was evolving rapidly and the most current and in-depth source of information was at the CDC, the question remained: how could this information have been made available to journalists in Egypt interested in alternative, fact-based solutions to the crisis?

As witnessed with recent events, Egypt has a well-known history of media censorship. Blogs offer Egyptians one of the few sources for independent thought, news and reporting (Shenker, 2010). Egypt has a vibrant community of citizen journalists who write, report and blog about national events. The country also boasts an avid and passionate readership, many of whom share their government's concerns about the lack of adequate health information around the H1N1 outbreak. By not being part of a mainstream journalistic outlet, their access to reliable information was ultimately limited.

This is the story of how limitations can be turned into opportunities by leveraging the potential of digital tools and the Internet to expand journalistic informational resources about health issues.

A Virtual Newsroom for the American University in Cairo

As part of our digital media and culture strategy work, my colleague, Rita J. King, and I collaborated with Lawrence Pintak, head of the Kamal Adham Center for Journalism Training and Research at The American University in Cairo (AUC), in the spring of 2009 to explore the potential of virtual worlds for journalism education and training. Earlier that year King's company, Dancing Ink Productions, had built a newsroom inside the virtual world of Second Life to provide a venue for journalism training for a group of Egyptian political bloggers (King, 2009). Funded by a grant from the US Agency for International Development, this project first brought the bloggers to the United States during the autumn of 2008 during the US Presidential campaign. They did residencies at journalism schools across the nation and reported on the street about their observations on US politics and culture through a blog called *Donkeys, Elephants & Crocs: Egypt Blogs America* (Fouts, 2008). In Egypt, some of these bloggers had been arrested by the Egyptian police for covering domestic Egyptian politics and political unrest. Others had spent significant time in hiding for fear of government reprisals (Abbas, 2007).

After the bloggers returned to Egypt from their US tour, our role was to explore how these citizen journalists could gain multi-layered access to people, places and information worldwide they might not be able to normally from their bases of operation in Egypt.

The Virtual Newsroom we built for the Kamal Adham Center was a modernistic gleaming glass box set in the middle of the desert (King, 2009). Tents, an oasis and pyramids, ancient architectural motifs familiar to someone in Egypt (or even those familiar with Egyptian tourism), could be seen in the distance. But the newsroom itself contained all the accessories of a modern newsroom including cameras, laptops, a large conference room, and a big screen monitor that could stream broadcast news as well as the blogs and Twitter feeds



Figure 1. The first press conference in the AUC Virtual Newsroom featured James K. Glassman, then US Undersecretary for Public Diplomacy and Public Affairs. Illustration by Rita J. King.



Figure 2. The AUC Virtual Newsroom (far left in distance) was built in the middle of a virtual desert adorned with traditional Egyptian architectural elements. Illustration by Rita J. King.

of the participants. The desert, the newsroom and even the people in it were entirely digital. The bloggers in the newsroom and their instructors and collaborators at the American University in Cairo interacted via avatars or 3D computer renderings of themselves they had created or we had created for them.

Virtual Worlds

Virtual Worlds are 3D spaces accessible via Internet-connected computers in which users create avatars or 3D representations of themselves to interact with people around the world. They can operate via specific software that is installed on a computer or via a web browser.

Typically what distinguishes a virtual world from a game is that there are no rules or objectives, and participants can often create original content modified to suit various goals. In an online 3D game, such as the popular PC-based MMOs (massively multiplayer online games), in which Internet connected people play and game together, the players are assigned tasks or quests by the game. In virtual worlds, they are not.

Some groups form organically in virtual worlds, coming together to build communities, temporary projects or even complex science and engineering experiments. In the case of the AUC Virtual Newsroom project, the participants were brought together for a specific purpose.

The Virtual World of Second Life

Launched in 2003, the virtual world of Second Life is a 3D immersive computer platform run by San Francisco-based Linden Lab. The Second Life software is free to download and accessible worldwide to anyone who registers and installs the software on an internet-connected computer.

Second Life's users, or "residents" as they are referred to in Second Life vernacular, interact via personalized 3D version of themselves called avatars. Residents communicate in multiple languages in real time using chat or voice. For example, in a 2009 study "Digital Diplomacy: Understanding Islam through Virtual Worlds" (King and Fouts, 2009) that Rita J. King and I conducted as senior fellows at the Carnegie Council for Ethics in International Affairs, we interviewed and interacted with numerous avatars. We used real-time text translation devices to translate multiple languages back into English, since many of the avatar's owners were not native English speakers or did not speak English at all.

Behind each avatar is a real person. Avatars may be representational or fantastical—even non-human. For example, Mitch Wagner, a technology journalist and writer in San Diego, California, hosted a Second Life-based interview show called Copper Robot. His avatar was a copper-colored robot, while many of his guests, some of whom are best-selling authors, have avatars that look like the people they represent (King, 2009).

Everything one sees in Second Life, from beaches where avatars snorkel and surf, to a life-like rendering of the Eiffel Tower, to an interactive African savannah, is created by its residents. Residents create 3D digital representations of skyscrapers, tree houses, temples, homes and offices. At the time, Linden Lab allowed the creators of these digital objects

or virtual goods to retain copyright and thus sell digital copies of those objects to other residents. A virtual currency called the Linden Dollar, only usable inside Second Life, is used to purchase these virtual goods, ranging from dresses and suits to houses and yachts. Linden Dollars are purchased via a credit card or PayPal at an exchange rate of approximately 250 Linden Dollars to 1 US dollar. Sellers, in turn, can cash out their currency for a small fee, with Linden Lab charging a fee for each transaction.

In a 2010 *Washington Post* article, Rosenwald noted:

Last year, as the physical economy withered, Second Life's economy blossomed, with user-to-user transactions topping \$567 million in actual U.S. currency, a 65 percent jump over 2008. About 770,000 unique users made repeat visits to Second Life in December 2009, and the users ... cashed out \$55 million of their Second Life earnings last year, transferring that money to PayPal accounts (Rosenwald, 2010).

Linden Lab makes money selling the virtual land on which the houses, storefronts and beaches are located. The total number of digital properties operating in Second Life, would cover a space as large as the Washington, DC metropolitan area.

Why Second Life?

Second Life has suffered and benefited from a mercurial media narrative ranging from glowing reports describing it as a Utopian world to blistering criticism declaring the platform dead. Neither of these extremes is completely true. What is true, and what has always been of central interest to our work and research, is that Second Life has a global community of users. When Rita J. King and I began our project in 2008, the United States accounted for less than 50% of the platform's overall user base (King & Fouts, 2009). This statistic alone, combined with the fact that Second Life, unlike a game, does not direct new users to any specific kinds of behaviors or directions, increased the odds of a Second Life user encountering a person from another country or culture, which was our key interest. We also chose Second Life because we believed that the potential of virtual worlds to enable human beings to transform and change is only just beginning to be understood.

Why are virtual spaces transformational? For one thing, the brain has a hard time distinguishing between experiences that are real and those that are virtual. In a 1998 article about physical, psychological and virtual realities, Max Velmans, at the University of London, notes that in psychological studies of perception:

...No phenomenal distinction can be drawn between what we normally think of as the 'physical world' and the 'world as-experienced'. With our eyes open the 'physical world' is what we experience. ... Note, however, that this experienced 'physical world' may be very different from the world described by Physics, for example, in terms of Relativity Theory or in terms of Quantum Mechanics ... Virtual realities are artificial worlds as experienced. Like the everyday world that we take to be 'real', they are phenomenal models constructed by the mind or brain." (pp. 51-2)

Velmans also states that there are many examples wherein "inner" information such as a phantom limb is considered by the brain to be real. The inverse, one might observe, is

not distinguishing between material learned in a “virtual” environment versus that taught in a “physical” one (Velmans, 1998)

Our report, *Digital Diplomacy: Understanding Islam through Virtual Worlds* (King 2007; Fouts, 2009) illuminated much about virtual worlds’ potential for enabling cultural collaboration with an emphasis on how this could be leveraged toward improving foreign policy outreach. But we have far to go before the potential is fully understood on a mass scale. Virtual world potential is being explored by neuroscience and psychology researchers today. A 2008 article in TIME reported that Stanford University professor Jeremy Bailenson “has found that even 90 seconds spent chatting it up with avatars is enough to elicit behavioral changes offline — at least in the short term” (Dell, 2008). Current studies are exploring the potential therapeutic value of virtual worlds for autism and post-traumatic stress disorder (Dell, 2008). In fact, a recent report states that for soldiers with post-traumatic stress disorder immersive games such as virtual worlds “corresponded with the overall lowest levels of post-traumatic stress disorder, depression, suicide attempts or domestic violence” (McGonigal, 2011).

The Launch of a Virtual Newsroom

After the Egyptian bloggers returned to Egypt from their stint in the US we began working with them to help them create avatars in Second Life. The first use of the Virtual Newsroom at the American University in Cairo (hereafter referred to as the “AUC Virtual Newsroom”) in January, 2009 was going to be a dramatic first. Weeks earlier, President George W. Bush’s outgoing Undersecretary of State for Public Diplomacy and Public Affairs, James K. Glassman, who had been a vocal advocate of the use of all forms of new media to engage foreign publics, gave a dramatic speech challenging government to think differently about technology and offered a roadmap for public diplomacy in an era of ubiquitous internet technology. In a speech entitled, “Public Diplomacy 2.0”, given at the New America Foundation on 1 December 2008, Glassman offered this challenge to those afraid of using new technology tools for cultural engagement:

...in this new world of communications, any government that resists new Internet techniques faces a greater risk: being ignored. Our major target audiences – especially the young – don’t want to listen to us lecture them or tell them what to think or how wonderful we are.” (King, 2008)

In keeping with his progressive stance on technology, Glassman agreed to provide the first press briefing in the AUC Virtual Newsroom to the Egyptian political bloggers via his Second Life avatar before he left office at the end of January. The briefing would mark a number of firsts. It was the first (and, since then, only) time a sitting US Undersecretary of State had appeared via his own avatar in a virtual world (Fouts, 2009). It was also unique in that the Egyptian bloggers were provided access to a high-ranking US government official, the likes of whom they might never have been able to interview, certainly not from their homes or offices, in Egypt. The briefing with Undersecretary Glassman and the Egyptian bloggers from the AUC Virtual Newsroom was streamed live to the Internet from Second Life. Using a technology called “Chatbridge” we were able to allow viewers who were watching from around the world, to chat with the participants inside Second Life.



Figure 3. The newly-minted avatar of US Undersecretary of State for Public Diplomacy and Public Affairs, James K. Glassman.

The conversation was uncensored and impassioned; many of the bloggers had strongly negative views about the Bush Administration and were upset about recent violence in Gaza, which they felt the US had not addressed appropriately. They addressed these issues in the hour-long press briefing. Glassman in an answer to one of the blogger's questions about US policy in Egypt offered, "I don't think just because we have concerns that we should break off relations with Egypt or any other nation that does not uphold the highest standards of democracy." (Fouts, 2009)

When asked about US image abroad, Glassman offered, "There is no doubt the views of the U.S. were influenced by the policies the U.S. adopted. Now is it a matter of us not explaining our policies well or people not liking what we are doing? I lean toward [the fact that] people don't like what we are doing, but I do think we can do a better job of explaining our policies." (Fouts, 2009)

Afterward, we interviewed the bloggers for a short documentary we produced on the subject. Overwhelmingly, their response was positive; they were surprised at the candor of a high-ranking US government official speaking to them about difficult subjects. (Fouts and King, 2009)

The Virtual Newsroom Hosts a CDC Briefing for Egyptian Political Bloggers



Figure 4. The bloggers meet in the newsroom to discuss story ideas and use of the newsroom space.

When we initially reached out to the Center for Disease Control (CDC) to see if they would appear in the virtual world of Second Life to speak to a group of Egyptian political bloggers in Cairo, we were encouraged to contact the World Health Organization (WHO), whose mandate is to provide global health education. The CDC's primary audience is a domestic U.S. one. However, the Internet and worldwide access to information over the Internet has created an expansion of their audience. The CDC agreed to speak after we explained that the CDC had the most reliable information about responding to the H1N1 crisis. We also discovered the CDC had a facility in Second Life.

On Saturday, May 16, 2009, the AUC Virtual Newsroom hosted Glenn Nowak and Jay Bernhardt of CDC, a group of Egyptian political bloggers in Cairo, members of the collaborative community news blog Global Voices, and journalists from 12 countries in a discussion about Swine Flu and the transformation of media. (Following the success of the Glassman press briefing the participatory audience had been expanded beyond the Egyptian bloggers to a worldwide group of citizen journalists writing for Global Voices.) The event was simulcast to the web worldwide so that people without accounts in Second Life could watch the event in Second Life as it was happening. We also used software that allowed people to

ask questions via chat that could be seen inside Second Life. Among those representing the Egyptian bloggers and journalists in the virtual newsroom was Walid Al-Saqaf. Al-Saqaf, a former editor-in-chief of the Yemen Times, the founder and administrator of YemenPortal.net and a TED (Technology, Entertainment, and Design) Fellow. Geere (2010), wrote, “There is something about Second Life that is good and that is that you can, never get contaminated by any disease even though you meet millions of people.”

Lawrence Pintak, who hosted and chaired the event, said:

This has been an adventure for all of us ... One story that the whole world is dealing with these days is swine flu. Here in Cairo, the government has ordered that every single pig be killed. That's something the WHO and other experts oppose. So we thought it appropriate to use this unique virtual bridge to allow our group here in Cairo – and bloggers participating in this event around the world – to learn a little more about how to get to the truth about the disease in order to better educate their audiences. For that, we have turned to the Centers for Disease Control.

Panel moderator Rita J. King, commented that:

Before the event, we met with many of the participants to discuss the free flow of information they wanted to achieve. The CDC is new to social media but is setting an example among government agencies. The journalists and bloggers are from 12 different countries. Some are dealing with various limitations in the struggle to deliver accurate, meaningful information to their respective audiences.

A New Approach to Global Dialogue

While this was the first time the CDC had participated in a live broadcast from Second Life, the agency already had a headquarters set up within the virtual world when they were invited to participate in the broadcast from the AUC Virtual Newsroom. Glenn Nowak, Director, Division of Media Relations, Office of Enterprise Communication and Jay M. Bernhardt Director, National Center for Health Marketing at the Centers for Disease Control and Prevention, both at the CDC, already had avatars. This was particularly significant to us because it demonstrated that two high-ranking US government officials had already been exploring the potential of virtual worlds for outreach. In fact, we discovered that the CDC had developed an entire island for global health education. Unfortunately, the island had not been updated with current advisories about the H1N1 pandemic, apparently because the staff person in charge of the space had been promoted and their successor had not yet taken on the mantle. As with any organization, new ventures can often be the victim of the person with the good idea getting promoted away from the project.

Jay Bernhardt, who heads the social media operation, told the audience:

I recommend people visit the CDC social media website. On that site it lists a lot of different things people can get access to. Some are subscriber based like Twitter feeds for example and you can sign up for any or all of our Twitter feeds, which obviously can be mobile enabled.

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Glen Nowak offered these thoughts on the fact that people around the world rely on the CDC's data.

What we're trying to do with people living in developing countries when it comes to things like novel flu viruses or other health threats is we're trying to raise awareness of what the health issues are. We're trying to give people a perspective. We're trying to give them the information we have about how much a threat this does pose.

The event, which was scheduled for an hour went overtime. The CDC speakers graciously stayed logged into Second Life and continued answering health related questions about the H1N1 and the CDC.

Recommendations and Findings

The 2009 CDC event in the AUC Virtual Newsroom was generally considered a success. The goal was to provide an inexpensive, globally accessible way to bring citizen journalists together with experts. In this event we also explored how to provide citizen journalists in developing countries with reliable health information during a crisis. In contrast to our expectations, many of the bloggers and journalists who had been new to Second Life for the Inaugural Broadcast from the AUC Virtual Newsroom arrived to the event customized, and familiar with how to communicate and navigate within the space.

Second Life has two major limitations which inhibit true worldwide accessibility (even though they have over 100,000 weekly users and millions of registered accounts). It requires users to download and install proprietary software to run it. It should be noted, however, that Linden Lab, the makers of Second Life, has announced a forthcoming web version of Second Life. Second Life is also notoriously challenging in the first five minutes of use, which means that some first-time users may become frustrated and stay beyond the first five minutes. That said, those that make it past orientation tend to stay longer.

Since this 2009 project, a number of web-accessible virtual world platforms have come on the market. Rita J. King has done a series of projects using the software web.alive as part of a project as Innovator-in-Residence at the IBM Virtual Analytics Center (King, 2010). Another new entry into the market is Kataspace, which has received good reviews (Paul, 2010).

Hundreds of thousands of people and organizations still use Second Life and virtual worlds writ-large as a meaningful place to explore ideas, the transformation of work and the sciences. In a 2009 interview by Rita J. King, with Dr. Peter Mills, the Chief Health Officer of global health services company CIGNA-vielife, about the utility of virtual worlds and Second Life for health education, Dr. Mills said, "This is the future of health care." Dr. Mills further explained that "large enterprises have always had globally distributed workforces, yet—perhaps now more than ever—they need to communicate with employees effectively to manage health risks. "With health care costs increasing, advice about areas of modification is critical.... There's no reason why a virtual environment can't eventually be used for disease management for diabetes or asthma." (King, 2009) And perhaps they provide a new venue for global health sciences journalism as well.

Why should health science education and health science journalism seriously consider virtual worlds?

Memories are Real: Experiences shared within virtual worlds, particularly user-created environments such as the virtual world of Second Life, are perceived by the brain as real and thus remembered differently and more concretely (Velms, 1998).

Collaboration across Time and Space: IBM used virtual worlds to enable scientists in Brazil, the US and China to collaborate on 3D Modeling demonstrations of Protein Folding. (King, 2007)

People can collaborate on developing the infrastructure and experiences created within virtual environments, unlike in social platforms that, while valuable for other reasons, have flat, standard user interfaces that cannot create the same nuanced shared experiences with people from all over the world in real time (King, 2011).

Collaboration across Cultures: Virtual spaces are culturally neutral. One of the things we observed in our research is that proxemics of the physical world are carried across into the virtual world. In research we conducted with Brazilians in virtual worlds we observed that Brazilian avatars interacted in a non-verbal proximity that emulated their non-verbal comfort level in the physical world. We also reported on a debate around whether wearing digital shoes into a virtual mosque is disrespectful of Islamic customs requiring that shoes be removed before entering a place of worship (Fouts and King, 2009). Extrapolated further, virtual worlds allow for a culturally neutral and arguably safe space for dialogue between different cultures wherein the cross-cultural issues and even the discomfort of overcoming shyness, language gaps or other impediments to meaningful communication across cultures.

Cross-Cultural Journalism: Virtual worlds like Second Life are accessible worldwide to anyone with a compatible computer and Internet connection. From a journalistic standpoint, this means that journalists using virtual worlds for training or reporting theoretically have global access to communities and cultures they would otherwise have to travel physically to encounter.

Free of Physical Harm or Illness: Virtual experiences shield users from physical harm. When dealing with remote dissemination, explanation and communication of information, virtual encounters serve as both an environment that is secure from transmission of disease but also one in which no physical harm is possible between participants. The ramifications of this can be applied to cross-cultural negotiations as well disease prevention.

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Book Review

***Educating Physicians:
A Call for Reform of Medical School and Residency (2010)***
Molly Cooke, David M. Irby, and Bridget C. O'Brien
Jossey-Bass, 304 pp.

Corry Jeb Kucik, MD, DMCC, FCCP

Navy Trauma Training Center
Los Angeles County + University of Southern California Medical Center
1200 N State St, Rm 1050
Los Angeles, CA
Email: jkmd97@gmail.com

Educating Physicians: A Call for Reform of Medical School and Residency, both informs and advances the debate on the direction American medical education, and by extension, all of Western medicine, should take in the next century. Concentrating first on the legacy that American medicine has inherited, the authors then focus on the spheres of both Undergraduate Medical Education (UME) and Graduate Medical Education (GME) as they exist today. Financial and regulatory influences are next explored, and recommendations, including transformational leadership and forward-thinking policies, complete the authors' vision of the path forward.

The work has big shoes to fill. The Foreword by Lee Shulman, President Emeritus of the Carnegie Foundation for the Advancement of Teaching at Stanford, succinctly captures the book's monumental aim – to reiterate and elaborate upon the important work of Abraham Flexner's landmark 1910 *Medical Education in the United States and Canada*, a work that has significantly influenced, standardized, and improved North American medical schools, thus changing the face of physician education. Subtitled "On the Shoulders of Flexner," the Foreword quickly impresses upon the reader the great debt both American medicine and American patients owe this teacher.

Abraham Flexner (1866–1959) trained as an educator at Hopkins, Harvard, and the University of Berlin, and his successful ideas about curricular individualization brought him early renown in academia. However, he had never visited a medical school, and upon being approached by Henry Pritchett, then President of the Carnegie Foundation, Flexner assumed Pritchett was mistaking him for his brother Simon, a medical researcher for the Rockefeller Institute. On the contrary, Pritchett explained that he wished to commission "not a medical study, but an educational one," viewed by a new set of eyes, crafted by a new set of hands, and written by a "legitimate outsider." Such a study would not only take an unfettered look at medical education, but would also be easily comprehensible to the public or the patient.

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Throughout 1909, Flexner toured every allopathic and osteopathic medical school in the United States and Canada, a substantial sum of 155 schools at the time, finding shockingly disparate levels of quality, ranging from the diploma mill with locked but empty rooms marked “anatomy” and “histology,” to the trade school only a step up, to the well-endowed and -staffed university-affiliated medical school deeply rooted in scientific method. The report he authored at the end of this incredible tour of *ambulando discimus* shook the foundations of medical education, caused the rapid closure of nearly 100 of those schools, and led inexorably toward curricular standardization, quality improvement, and a system of medical education that is envied the world over. While Flexner’s advances were much needed changes in his time, a century’s worth of social upheavals, technological advances, and economic pressures now warrant reappraisal and even modification of the existing system.

Like Flexner’s report, *Educating Physicians* is a readily accessible work about the training of contemporary physicians. The book reprises Flexner’s legacy of having intelligent “outsiders” investigate physician training without the entrenched biases of having been trained within the system. The cross-pollination of specialist/non-specialist interplay underscores the perpetual cycle of self-evaluation and improvement that is so critical in today’s milieu of limitless demands and meager supply. (Perhaps, since this book reviews physician education primarily through the lens of non-physicians, it is in keeping with the Flexnerian process of cyclical evaluation that the book itself be reviewed by a physician!) However, unlike Flexner’s work, *Educating Physicians* limits its fieldwork to 11 of the 130 allopathic medical schools and three teaching hospitals in the United States. Sites were chosen based on their educational innovations.

Educating Physicians is the latest report in the Carnegie Foundation’s *Preparation for the Professions Program* (PPP) series, all of which are dedicated to faithfully cataloguing the education of professionals critical to the common good, as well as to divining paths toward progress for these indispensable parts of our society. Other books in the series (covering lawyers, engineers, clergy, and nurses) are written largely by authorities in their respective fields; however, they all incorporate a great deal of current educational theory and make every effort to be accessible to the external judgment of professionals in other fields. This “fresh set of eyes” approach, so similar to that of Flexner himself, eschews jargon and techno-terms, making each report accessible to the unbiased common sense of thinkers from all fields.

The authors set a unifying vision, focusing throughout the book on four key goals they feel are most critical to the future success of medical education, and discussing their increasing impact and gradual realization throughout the past, present, and potential future of UME and GME.

While the first among these goals, *standardization of learning outcomes and individualization of learning process*, might initially confuse readers, the authors deftly explain that while *quality* of medical education should gain uniformly high levels of sophistication and control (i.e., standardization), individualized options that respect the different ways people learn should be available to medical students and residents. Incorporating individualized approaches and abandoning set curricular lengths can not only increase learner comprehension and retention, but also allow faster completion of certain subjects and faster assimilation of new doctors into the healthcare workforce.

Second, a lack of *integration of formal knowledge and clinical expertise* is a common concern of medical students and residents throughout their training. Stilted formal courses in medical school are often taught in lockstep by basic science faculty, and little guidance regarding clinical applicability prompts many students to “relearn” what they thought they knew when they reach their clerkship experiences. Short-sighted curricula such as these had become the norm, as they are cheap and require little or no collaboration amongst faculty members; however, this arrangement neglects the important bonds that undergird science-based practice, or indeed, practice-based scientific discovery.

However, the cyclical interplay between learning and application, between research and practice, should not be limited to the UME and GME years alone. Therefore, the authors propose their third goal, *development of habits of inquiry and innovation*. Constant questioning, perpetual self-assessment, and iterative knowledge growth must be taught as necessary attributes of both outstanding physicians and outstanding medical institutions. For doctors, these attributes are appropriately inculcated in medical school and residency, if they were not already present from earlier experience.

As a fourth requisite, the authors propose that a *focus on professional identity formation* should be an essential component in building a physician. The best attitudes and values of altruism and respect should be instilled early in medical training, and the corporate involvement of physicians, whether in their hospitals, their professional societies, or their communities at large, should be encouraged. Not only will such emphasis on the *public* aspect of being a physician increase the influence of the House of Medicine on the individual patient, but if properly executed, it will also positively influence public health to the benefit of all.

Beyond these four succinct and well-reasoned goals, further strengths of this report are well articulated. Even in the introduction, it is quickly obvious how expansive the book’s research base is. Not only are the current systems of medical school and residency closely investigated, but the complex environment of regulating bodies and financing sources are also explained. A fine compendium of educational theory, curriculum development, and the history of American medicine supports the work, which the reader can access through an ample reference list. Of course, we have Flexner to thank for a century-old emphasis on approachability, and while the report is blessedly free of jargon that might dissuade the layperson or patient, it still maintains the feel and flavor of an important curriculum design and medical policy book appealing to practicing physicians and faculty alike.

While the importance of the work is profound, some minor improvements might be made in a follow-on edition. The well-reasoned flow of the table of contents would be enhanced by inclusion of an itemized outline at the beginning of each chapter. The interdisciplinary gains gleaned through Flexnerian approachability are marred by an occasional awkward flow within individual chapters. Given the importance of the subject matter to the common good, the authors might have been well-served by more rigorously organizing their final product.

The brief biographical sketches of the authors certainly attest to their academic credentials. No doubt, their education, experience, and work in medical education give them a solid vantage point from which to judge the current state of affairs of American medical

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training at both the undergraduate and graduate levels. Naturally, their various affiliations with the Carnegie Foundation in the past made them excellent candidates for authoring this critically important work. However, in a work of such importance, solicitation of the input of authors from institutions other than the University of California, San Francisco would have lent an appreciable degree of unassailable autonomy to the final product. For the thousands of excellent physicians in the American heartland, the incorporation of the viewpoints of clinicians and educators from other institutions (and I don't mean Harvard or Hopkins) would remarkably augment the "street-credit" of the work. While the authors do an excellent job addressing the needs of underserved urban and rural populations, having a co-author from Indiana or Emory or the University of Texas would irreproachably raise the debate above any semblance of political machination. Through a combination of insight and independence, Abraham Flexner's report led to the most revolutionary overhaul of medical education in history; however, the ability (or indeed, the wisdom) of a small group of authors to effect such far-reaching change should be questioned.

Though the authors stress the importance of preventive medicine and bemoan the disparities between primary care and other specialties, they devote little attention to the Sisyphean task of training physicians to the level of quality that Americans have come to expect, even in an era of dwindling resources. The common yet unfair comparison of American medicine outcomes to those of "other developed nations" is mentioned, though the authors make little attempt to "normalize" for the vast differences in racial, ethnic, or regional differences in the U.S. *vis-à-vis* more homogeneous cultures.

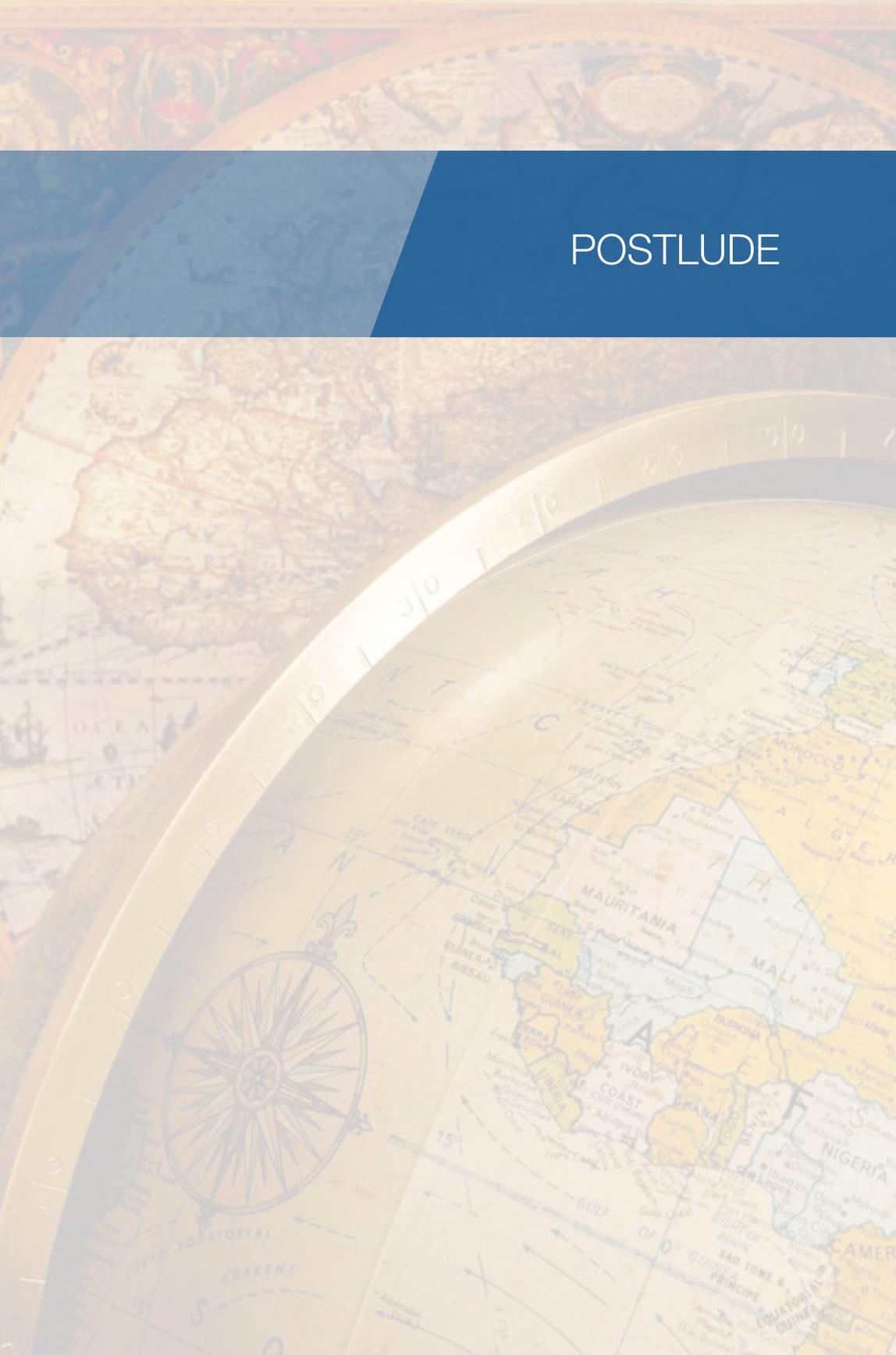
Flexner's cursory visits to all 155 allopathic and osteopathic medical schools operating in 1909 were sufficient to get a gestalt of where each school fell within the wide quality range of the time. However, our modern Carnegie authors – who conducted exhaustive investigations at 11 of 130 allopathic medical schools – do not have such an easy job. Thanks to Flexner's work, such large and readily evident disparities in quality between schools are a thing of the past. Therefore, in defense of our authors, looking at a smaller sample is reasonable given the generalized high quality of American medical schools and modern cost constraints. Nonetheless, looking at a few more schools (including osteopathic schools) would be justifiable, as no doubt many readers would prefer to see a 15% sampling rather than the limited 8%. Perhaps a study design using augmented remote surveys, as well as the previously mentioned inclusion of geographically dispersed authors, would have mitigated this shortcoming at little to no additional cost. In any event, future revisiting of the topic might easily reprise the authors' exemplary work, taking up where they left off in an iterative review of another dozen or so schools. Perhaps we'll be reading of these authors' groundbreaking work in another century?

In sum, *Educating Physicians* is not a book solely for medical school administrators. It offers something for everyone interested in the health of our nation, from the historian, to the leader, the educator, or the passingly interested but extremely busy clinician simply wondering "how did we get here?" Whether or not one agrees with the authors' recommendations takes nothing from the fact that the book presents requisite knowledge upon which providers, consumers, and administrators base decisions, and it does so in a succinct and digestible format. It elegantly informs the current status of debate for the future of American medical education, and should be a "must have" in the seabag of our physician-leaders.

Author Note

The views and opinions expressed in this article are solely those of the author and do not reflect the official position or policy of the University of Southern California Keck School of Medicine, the Department of the Navy, the Department of Defense, or the U.S. Government.





POSTLUDE



A Maturing Vision for the 21st Century

Patrick H. DeLeon, PhD, JD, MPH

Chief of Staff for Senator Daniel K. Inouye
722 Hart Senate Office Bldg.
Washington, DC 20510-0001
Email: patdeleon@verizon.net

Jacqueline D. Rychnovsky, PhD, RN, CPNP

Captain, Nurse Corps, USN
Nurse Corps Policy and Practice
Bureau of Medicine and Surgery
Washington, D.C.
Email: jacqueline.rychnovsky@med.navy.mil

Christopher M. Culp, MD

Captain, Medical Corps, USN
Deputy Chief, Navy Medical Corps
Bureau of Medicine and Surgery
Washington, D.C.
Email: christopher.culp@med.navy.mil

During the past quarter of a century our nation's health care system has been steadily undergoing fundamental and unprecedented change. The national debate surrounding the enactment of President Obama's landmark Patient Protection and Affordable Care Act [PPACA] (P.L. 111-148) brought home to the American public many of the underlying policy issues experts have been struggling with for years (i.e., cost containment, increased access, the clinical skills of non-physician providers, and evolving definitions of "quality care"). In his first address before a Joint Session of Congress the President stressed the importance of effectively curtailing the ever-escalating costs of health care:

This is a cost that now causes a bankruptcy in America every 30 seconds.... In the last eight years, premiums have grown four times faster than wages. And in each of these years, one million more Americans have lost their health insurance. (Obama, February 24, 2009)

Numerous economists and health policy experts have emphasized that as a nation we have been spending more per capita on health care than any other country, and yet we often lag significantly behind the developed world on important health parameters. That evening the President also highlighted the critical historical and political context of his vision:

I suffer no illusions that this will be an easy process. It will be hard. But I also know that nearly a century after Teddy Roosevelt first called for reform, the cost of our health care has weighed down our economy and the conscience of our nation long

enough. So let there be no doubt: health care reform cannot wait, it must not wait, and it will not wait another year. (Obama, February 24, 2009)

Indeed, since the Great Depression, presidents of both parties have urged the Congress to ensure that necessary health care would be available for all Americans. In his September 9, 2009 joint session address, the President further noted:

I am not the first President to take up this cause, but I am determined to be the last. It has now been nearly a century since Theodore Roosevelt first called for health care reform. And ever since, nearly every President and Congress, whether Democrat or Republican, has attempted to meet this challenge in some way.

Over the years we have collectively experienced the leaders of the federal health care system, and particularly that of the Department of Defense (DoD), providing the nation with an exciting 21st century vision for transforming what has historically been an acute care, illness-oriented, and silo/medicine-dominated service delivery model to one that strives to be individual patient-centered and one in which at least 90 percent of clinical decisions are supported by accurate, timely, and up-to-date clinical information, reflecting the best available scientific evidence (Institute of Medicine [IOM], 2010). The 21st century will be an era of educated consumers utilizing the unprecedented advances occurring daily within the communications and technology fields to ensure that they have timely access to the best possible care. No longer will the Institute of Medicine (IOM, 2001) report that:

the lag between the discovery of more efficacious forms of treatment and their incorporation into routine patient care is unnecessarily long, in the range of about 15 to 20 years. Even then, adherence of clinical practice to the evidence is highly uneven. (p. 155)

We are confident that in both the public and private sector our nation will move beyond the IOM (2001) finding that: “(H)health care delivery has been relatively untouched by the revolution in information technology that has been transforming nearly every other aspect of society” (p. 15). We would further note that the strategic and clinical importance of embracing health information technology (HIT) was prominently noted by former President G.W. Bush, who was particularly impressed by the efforts of the Department of Veterans Affairs (VA) and who, by Executive Order #13,335, established the Office of the National Health Information Technology Coordinator in April, 2004 (Exec. Order #13,335). The Obama Administration seeks to bring physician HIT utilization up from 5 percent to 90 percent by 2019 and hospital utilization to 70 percent during the same time frame, with their current estimate being that only 1.5 percent of hospitals have a comprehensive electronic system available in all units. Under no circumstances should providing quality health care be considered a partisan issue.

During our involvement over the past quarter of a century at the health policy, administrative, and clinical levels, we have learned that change, especially fundamental change, takes time – often far longer than one would anticipate. For example, it was under President Jimmy Carter that the U.S. Public Health Service Surgeon General released his visionary report *Healthy People* (1979). This futuristic document heralded the importance of health promotion and disease prevention. Its express purpose was to encourage a second public health revolution in the history of the nation:

It represents an emerging consensus among scientists and the health community that the nation's health strategy must be dramatically recast to emphasize the prevention of disease (p. vii)... Prevention is an idea whose time has come. We have the scientific knowledge to begin to formulate recommendations for improved health.... In fact, of the 10 leading causes of death in the United States, at least seven could be substantially reduced if persons at risk improved just five habits.... (pp. 7, 14)

From today's vantage point, this was a clear call over three decades ago for the development of integrated, interdisciplinary and cross disciplinary clinical treatment teams, rather than reliance upon traditional hierarchical and silo-oriented decision making.

More recently, the President of the IOM (2006) addressed the need for long overdue change for our nation's health care system:

Improving our nation's general health and the quality problems of our general health care system depends upon equally attending to the quality problems in health care for mental and substance-use conditions. The committee calls on primary care providers, other specialty health care providers, and all components of our general health care system to attend to the mental and substance-use health care needs of those they serve. Dealing equally with health-care for mental, substance-use, and general health conditions requires a fundamental change in how we as a society and health care system think about and respond to these problems and illnesses. Mental and substance-use problems and illnesses should not be viewed separate from and unrelated to overall health and general health care....To this end, the Institute of Medicine will itself seek to incorporate attention to issues in health care for mental and substance-use problems and illnesses into its program of general health studies. (p. x)

The behavioral and psychosocial-cultural-economic gradients of health care are today being recognized at the highest policy level as being integral to society's definition of "quality care." This is a transformational change in orientation.

In all of these arenas, military and federal medicine offers a guidepost to a future health care delivery model that addresses these most challenging systemic issues. Military medicine's approach to the transformation of its model of care delivery is the enterprise launch of the "Medical Home." The Navy's Medical Home Port, the Army's Community Based Medical Home, the Air Force's Patient Centered Medical Home, and the VA's Patient Aligned Care Teams strive to meld the old virtues of personal, available, and comprehensive holistic care with the contemporary requirement that all care provision be evidence-based. These are not a program or a specific care delivery model but instead seen as a change in the philosophy of how care is rendered. The mission of these initiatives, according to the *Navy and Marine Corps Medical News* (2011), is to "provide primary care in a way that best meets the needs of... beneficiaries... ensuring that care is all-inclusive and integrated with all other care provided within the healthcare system" (p. 8). Care delivered in all three versions of the medical home model includes, but is not limited to, readiness, prevention, wellness, behavioral health, and disease management. The core concepts focus on increased access to care (to include behavioral health, same-day and after hours acute care), improved clinical

quality with an emphasis on disease prevention and wellness, enhanced satisfaction through relationship building, and an alignment with civilian care standards of health care delivery. We would note that this approach was urged by the highest health policy levels of the Government of Canada nearly 40 years ago (Lalonde, 1974).

The federal Medical Home initiative is also closely aligned with President Obama's focus on an increased presence of nursing, seen as a vital component to the successful launch of health reform. In a 2008 speech then-Senator Obama referred to the nation's 2.9 million nurses as a group that knows what must be done and how to get things moving in the right direction – whether it is with their patients or policymakers who need a nudge. In addition to serving as primary providers in the Medical Home, nurses support population health management (as case managers and disease educators), manage clinical operations, monitor key performance measures to assess achievement of Medical Home objectives, train support staff to build skill sets and share responsibility of patient care, and utilize new technologies to virtually manage patients and enhance access. The DoD Tri-Service Nursing Research Program (TSNRP) focuses upon producing new knowledge that informs clinical practice, the delivery of health care, education, management, and policy. Examples of military nursing research that addresses clinical questions of relevance to warriors and their families include: 1) evaluation of blast-induced traumatic brain injury; 2) prediction of sepsis for the burn intensive care patient; 3) iron status of deployed military members; 4) nurse-managed electromyostimulation and strength walking for knee injuries; 5) couple functioning and post-traumatic stress in OIF/OEF/OND veterans and spouses; 6) military stress-busting programs for family caregivers, and 7) military medics' experiences providing women's health services (M. DeJong, personal communication, February 6, 2011).

With implementation of comprehensive inpatient and outpatient electronic health record systems (VistA for the VA and AHLTA and Essentris for DoD), federal medicine is far ahead of the vision set by President Bush and the goals set by President Obama. The current ability in DoD to follow, via the electronic health record, the case for a wounded marine who begins at a battalion aid station in Afghanistan, continues at a field hospital in theater, a staging hospital in Germany, and ultimately on to a definitive tertiary facility in Washington, DC portends a day in which every American can expect a seamless migration of their health information through each stage of life.

The Medical Home and Health Information Technology (HIT) initiatives in the federal sector are not independent. It is the universal availability of the medical record that allows the real time response of the medical home providers to patient needs. More importantly, it provides programmatic and patient specific structure to the preventive, follow-up, and monitoring needs of each patient receiving care from the Medical Home.

These are truly extraordinarily exciting times for our nation and especially for those colleagues who will ultimately become the next generation of health care providers, researchers, and educators. It is never possible to predict the future with any sense of certainty. However, we are confident that with the President's articulated vision as a map and the systemic integration throughout our health care system of the advances occurring in communication technology, we are in the forefront of an unprecedented era of individualized and patient-centered care that will be scientifically based. Fundamental change is always somewhat unsettling. However, as we continue along this journey the ultimate benefits to

our nation's citizens and their families far outweigh any alternatives. Those involved in the federal health care system should be proud of its accomplishments and equally important, its vision for the future. Health care for the 21st century will be an exciting adventure, surpassing any of our expectations.

Author Note

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government. Address inquiries to Jacqueline D. Rychnovsky at jacqueline.rychnovsky@med.navy.mil.

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Navy Medicine Institute for the Medical Humanities
and Research Leadership
USN Bureau of Medicine and Surgery
Code M00E
2300 E Street NW
Washington, DC 20372