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A QUARTERLY PUBLICATION OF THE POTTER-RANDALL COUNTY MEDICAL SOCIETY

WINTER 2013 | VOL 24 | NO. 1



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On The Cover: "Freeze Dried" by Cherine Marie

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Editor's Message

by E.F. Luckstead, M.D.

The guest editor for the 2013 winter issue of *Panhandle Health* is Dr. Brian Schneider. The primary emphasis is on current updates in surgical care in the Texas Panhandle. This issue presents a broad spectrum of surgical care existing and available in our medical practice area.

Topics covered include robotic surgery advances in several areas, as well as the exciting advent and role of the Sim Center in the education of medical students, student nurses and use in other medical areas. These roles are outlined by Dean Richard Jordan and John Smoot. Surgical critical care is discussed by Janine Pettiford and

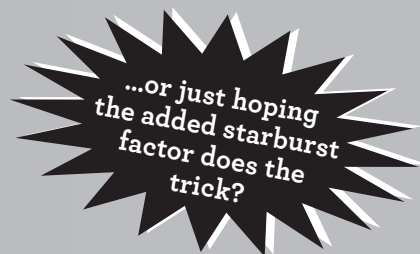
wound care by Dr. Brian Schneider. Dr. David Wilhelm provides an update of selected topics in urology.

An interesting original study involving techniques for early recognition of breast tumors is presented by Dr. Rahman from Texas Tech's surgery department. A resident surgical case study is again presented for your interest. Dr. Naguib again provides brief timely medical updates from the medical literature. Dr. Urban continues to help us monitor our medical syntax and other writing challenges; thanks Steve.

I hope you have appreciated the four journal editions that were

selected for the 2013 *Panhandle Health* Year. Dr. Jaime Zusman will be your 2014 *Panhandle Health* Editor.

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Executive Director's Message

by Cindy Barnard

According to "Medline Plus", more than 15 million Americans have surgery every year. Some operations are simply to relieve or prevent pain, but others are to reduce a symptom of a problem or improve a body function. Others are exploratory, and still others, such as heart surgery, may be life-saving.

"The first volume of the New England Journal of Medicine and Surgery, published in 1812, gave a sense of constraints faced by surgeons...in the era before anesthesia and antisepsis...Surgeons soon found, however, that anesthesia allowed them to perform more complex, invasive, and precise maneuvers than they had dared to attempt before...Surgery has continued to register a steady stream of breakthroughs, helping people live even longer and more healthy lives."

The future of surgery is constantly changing, especially due to robotics, telesurgery, surgical simulators and other advanced technologies. As Yogi Berra cleverly said, "The future is not what it used to be!" Enjoy this issue, dealing with just some of the surgical specialties practiced by our PRCMS physicians.

As the year comes to an end, I want to thank the 2013 Board of Directors for their service and dedication to our Medical Society. Dr. Samuel Cunningham has been our President. His leadership has made 2013 an exceptional year.

The following physicians deserve a big thank you for their support:

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A final thank you to our 2013 "Circle of Friends" for their continued financial support and generosity. Their commitment is absolutely essential to the success of all our events.

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Our cover is entitled "Freeze Dried" and is by Cherine Marie Kuster, artist and photographer. "She blends her unique representational and whimsical style in watercolor, acrylic, and other media to convey personality and the spirit of freedom in the world she sees. Her background in ranch life and love of the outdoors has played a large role in her subject matter." As a former nurse, she "hopes to convey a smile to her viewer's heart". Her works can be seen at www.horsefeathersstudio.com, and at *The Galleries* at Sunset Center, 3701 Plains Boulevard, Amarillo.

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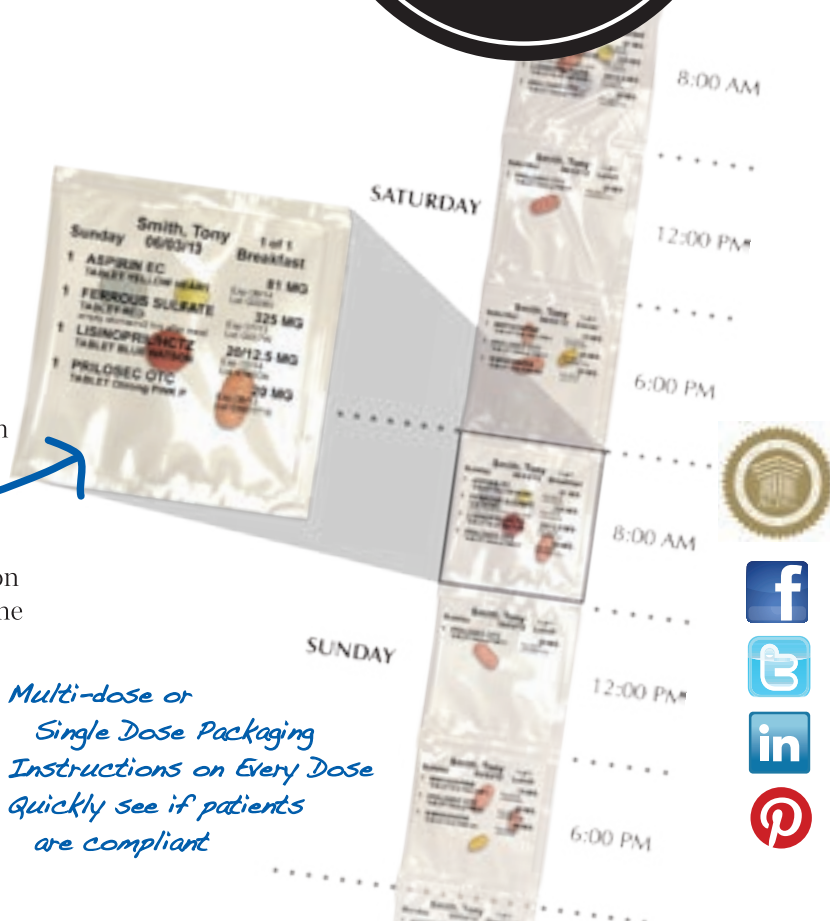
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Guest Editor:

by *Brian Schneider, M.D.*

I am pleased to have been able to participate as the guest editor of this issue of *Panhandle Health*. Surgery remains a mainstay of healthcare for many disease processes.

In looking at this problem, the question arises: What is the best way to give an update on surgery? There is no shortage of material. In this issue,

we will cover only a few select areas of surgery. These topics include urology, breast cancer, advanced wound care, and critical care. Certain technology is also highlighted; specifically the increase in the use of robotic surgery. There is more to surgery than just the technology, however.

The role of other health care providers in surgery is often overlooked. These highly trained professionals fill a vital role in the practice of surgery. Without them, physicians could not hope to accomplish all that is required. In his article, Mr. John Schnatz tells us about the role of physician extenders in the field of surgery.

Surgery requires rigorous training.

The real life-and-death scenarios that face the health care provider must be prepared for. Mistakes can be costly and are not tolerated. The most modern of techniques in training occur right here in Amarillo, Texas. Dr. Richard Jordan tells us about these techniques in his article, including the role of simulation in the training of surgeons and related personnel is discussed.

Surgical care in the Texas Panhandle is on the cutting edge. My hope is with this issue, you will learn just how technology is advancing in this ever-changing field. I am sure the readers of *Panhandle Health* will enjoy reading this issue as much as I enjoyed putting it together.

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Advances in Urology

by David Wilhelm, M.D.

It is the mark of an educated mind to be able to entertain a thought without accepting it.

— Aristotle

The field of urology has continued to adapt, question its past and search for new solutions. As medicine moves to a data driven endeavor, the interpretation of this data becomes even more important. Data with improper interpretation is meaningless. As the healthcare climate continues to change and reimbursement becomes more intimately linked to performance metrics, it is increasingly important that data is interpreted in a manner that benefits patients and improves care, not just controls cost. This tension has recently been clearly demonstrated in urology with the PSA controversy.

PSA SCREENING

Prostate Specific Antigen (PSA) was first identified in seminal fluid in 1966 and became recognized as relevant to prostate cancer (PCa) in 1979. PSA is prostate specific, but not cancer specific. Several trials have shown overall cancer detection rates rise with increasing PSA, and digital rectal exam (DRE) along with PSA offers the best combination of detection with lowest error rate. Ranges vary, but approximately 48% of men with an elevated PSA

are found to have prostate cancer (1).

There is clear evidence that mortality rates from PCa have dropped with the advent of PSA testing. From 1993 (the beginning of widespread PSA testing) to 2003, the PCa mortality rate fell 32.5% along with a 75% reduction in proportion of advanced disease at diagnosis. It was estimated that PSA screening accounted for 45-70% of this reduction in the United States (2). PSA testing has resulted in a large stage migration since the 1990's. More than 90% of cases of PCa currently detected are in the local or regional stage. This has been attributed to PSA screening. Since the adoption of PSA, the cancer survival rate for newly diagnosed men is 91% at 10 years and 76% at 15 years. Despite this data, there is ongoing concern that PSA screening may not change outcomes.

The United States Preventative Services Task Force (USPSTF) gave PSA screening a D recommendation (not recommended) in 2012. This was based on two large scale randomized controlled studies. Although this was class one evidence, it was flawed. Solely because a study is randomized, controlled and well powered does not mean it is well designed, correct or without issue. In the US based screening trial, the control arm (the

unscreened arm) had 50% of its population receive PSA testing, contaminating the results. Not surprisingly, this trial found no benefit to PSA screening. In the European based trial there was actually a small benefit to PSA screening, but based on the number needed to treat, the USPSTF decided it did not provide true benefit. This decision was based on early data with very few overall deaths to show a difference in the two arms. As the trial matured, the results became even more striking with a significant drop in the number needed to treat and actually showing a benefit to screening in the 55-69 year old age group.

The American Urologic Association evaluated the same available information in the context of prostate cancer as a whole and developed a more balanced recommendation regarding PSA screening and PCa management. The first distinction is between screening, and those with family history, symptoms, abnormal exam or other risk factors. In those individuals, PSA testing is often critical to the complete evaluation. The AUA has attempted to clarify the difference between screening populations and those at risk, so as not to have PSA testing abandoned in a population for which it is extremely important. The AUA recommends an informed decision about PSA screen-

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ing in individuals with a 10-15 year life expectancy between the ages of 55-69. This was the population that showed the greatest benefit to screening in the European trial when it reached maturity. In this trial the interval for screening was 2-4 years and so the AUA has also stated it may be reasonable to go to intervals of 2 or more years. I think these recommendations are a move in the right direction to decrease the potential for unnecessary testing and interventions and yet to maintain the benefits of PSA testing. The AUA has patient and physician tools to facilitate educated shared decision-making that is mandated yet hard to achieve in a busy primary care setting. I encourage you to use these resources in your practice. They are available at: www.auanet.org/advnews/psa-testing-toolkit.cfm

PSA testing certainly resulted in a stage migration and because of this, urology has had to change the focus from obtaining the diagnosis to what to do with the diagnosis. There is growing evidence that many individuals may not need immediate treatment and are candidates for observation or active surveillance. One of the major driving factors of the USPSTF's decision to recommend against PSA testing was potential harm from unnecessary treatment. Urologists have evolved to risk stratify patients based on pathology, comorbidities, life expectancy and patient expectations. This has led to changes in the management of PCa. This approach does not throw out the gains made with PSA testing, but uses the information obtained to make more informed choices with similar outcomes and decrease risk of overtreatment.

Once a decision is made that treatment is warranted, there are several treatment options that allow focused therapy for most men with decreased morbidity. The radiation options involve real time imaging both for brachytherapy and external beam therapy in order to limit collateral damage. Surgery has shifted nearly entirely to robotically assisted prostatectomy that has significantly lowered transfusion rates, hospitalization time and recovery time.

With attention to the data and decades of experience, this collaborative approach that encompasses both the acquisition and interpretation of data strikes a much more balanced approach to patient care. The data from the screening trials cannot be interpreted in a vacuum or the pendulum will swing back the other direction and mortality and morbidity from prostate cancer will return to their previously unacceptable levels. The area for continued growth in understanding and management is predictive genetic testing or pathologic markers that further define the natural timeline of individual tumors to allow even better decision making in the treatment or surveillance arena.

There are no great limits to growth because there are no limits of human intelligence, imagination, and wonder.

— Ronald Reagan

OVERACTIVE BLADDER

Overactive bladder (OAB) is a common symptom complex that affects over 20 million people a year. Up to a third of these patients will also suffer from urge incontinence. The evaluation of this involves ensuring there is no other underlying pathology to explain the symptoms and then management of the symptoms. There have been many therapeutic options available with first line therapy being behavioral modification to limit intake of bladder irritants such as caffeine followed secondly by pharmacotherapy. These are often effective, but sometimes not well tolerated secondary to side effect profile. There is a new option for those who have failed traditional antimuscarinics. Mirabegron

is a beta 3 adrenergic agonist that aids in the storage side of the disease by promoting more stretching of the detrusor thereby decreasing OAB and incontinence episodes. Previously, antimuscarinics decreased detrusor (bladder muscle) contractions. This same pathway also causes constipation, dry mouth and pupillary issues. The beta 3-agonist pathway eliminates these side effects. It can rarely affect blood pressure causing hypertension in about 11% of patients compared to 7.5% in placebo. It should not be used in those with liver or renal failure. This has offered another option for people who need medical therapy and cannot tolerate previous options.

For those who fail pharmacotherapy there are third line options. The first is a sacral nerve root neuromodulator. The concept is that urinary urgency and incontinence is a result of an imbalance in the reflexes between the bladder, sphincter and pelvic floor and that sacral neuromodulation restores that balance. The technique is generally done in a staged manner. The initial test leads are placed most frequently at the S2 foramen. This portion of the procedure can be done in the office or as an outpatient procedure. A temporary generator is worn externally during this trial phase. If there is a good response, a permanent implant and generator are placed subcutaneously much like a cardiac pacemaker in a second outpatient procedure. If patients have a successful trial phase and go on to permanent implant, the results show that approximately 60% of patients have a 50% or greater improvement in symptoms at

| continued on page 12

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3 years. This includes improvements such as resolution of incontinence, 50% reduction in voids per day and quality of life parameters. (3) This has offered a good option for a challenging patient population.

The second option for refractory OAB is injection of Botox into the bladder. This is an office-based procedure that is now approved for both neurogenic OAB and nonneurogenic OAB. The procedure itself involves systematic injections of Botox into the bladder muscle. This is generally well tolerated. The most significant risk is that immediately after the procedure, approximately 5% of individuals will develop transient urinary retention that may require self-catheterization or indwelling foley catheter. A sig-

nificant improvement in urgency and incontinence episodes are observed in about 60% of patients. (4) The results are durable, but not permanent. Often patients will require repeat treatment over the course of one or two years.

As in all of medicine refinements in surgical technique, minimally invasive approaches to treatment, pharmacotherapy and better understanding of disease processes undergo constant evolution and are outside the scope of this article. Urology is poised to continue to improve as urologists and urologic associations turn a more critical eye to evidence based practices and outcomes driven care that are patient centered while continuing to pursue better solutions and improvements to existing care.

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Robotics in Surgery: Fad or Future?

by Brian M. Schneider, M.D., FACS

Introduction

Robots have been the product of human imagination for almost all of our recorded history, from ancient China to Greek mythology. Not until the advent of the industrial revolution and electronics were robots capable of performing human-like tasks possible. It wasn't until late in the last century that the first robot would be used for the surgical care of a human. In 1985, the PUMA 200 was used to place a needle for a brain biopsy. (5) Since this time, several robotic platforms have come and gone. While machines used for very specific tasks have been developed, the latest trends have been to make machines capable of a variety of tasks. Currently the only such system marketed is the da Vinci Surgical System manufactured by Intuitive Surgical. (4)

The origin of the modern da Vinci robotic system was developed by SRI International as a remote surgical unit that could be operated from afar in hazardous locations such as a battlefield. The patents were sold to Intuitive, who saw the potential of this platform for minimally invasive surgery. Intuitive originally marketed the da Vinci as an adjunct to cardiac surgery. The applications have greatly broadened, having been adopted across a broad range of surgical specialties. (4)

With the big increase in the use of the system, there have been concerns regarding its safety and cost. Each of these units cost between \$1.5 and \$2 million dollars. In addition to this cost, there is the cost of service contracts, instruments, and training of

personnel in its use. There have been multiple instances of litigation surrounding the da Vinci system, as well. These allege that the da Vinci robotic system resulted in injuries to patients, sometimes fatal. (2)

So the question is: are robotic systems in surgery the greatest thing since sliced bread or are they going the way of cure-all tonics and electric hair growth stimulators? We will look at the robotic system itself, its applications, and controversies surrounding these systems.

The da Vinci Robotic System

The first question is: what is the da Vinci robotic system? First, it is not a true robot. It cannot operate independently of human input. The da Vinci robotic system helps control laparo-

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We are grateful for the support of these organizations and anticipate another great year of serving the needs of our members. The purpose for Circle of Friends is to provide a valuable base of resources to assist the physician in the business of medicine so their practice of medicine can improve.

This program has proven to be a valuable resource of services such as liability insurance, accounting, banking and much more. This year, we hope to expand the Circle to include services the physician may use in his or her personal life. Through this program, we can invite businesses serving physicians to support the Society and increase their visibility among its members. Corporate support contributes to the Society's ability to advocate and care for physicians and patients in Potter and Randall Counties.

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scopic instruments via a remote console, via a master-slave control scheme. It consists of three components: a surgeon's console, a robotic cart with four arms that is by the patient, and a high-definition 3D vision system. (4)

It is unclear based on this description how this is more than just remote-control traditional laparoscopy. There are three major enhancements that make this system different. The first is high-definition 3D vision. The 1080i resolution and real 3D gives true to life images with depth perception, which is not present on traditional laparoscopic setups. The second is the "EndoWrist" instrumentation. This is an articulated joint in the instrument that allows the surgeon to use much more natural movements, allowing more delicate and precise work laparoscopically than is normally possible in open procedures. The third is a movement filter which compensates for fine tremors of the surgeon's hand that may be present, and can be adjusted to move much more precisely than that required of the surgeon. For example, the instrument may move only a quarter of the distance that the surgeon's hand actually moved. (4) The major drawback of this system over traditional laparoscopy is a lack of tactile feedback. (2)

The system uses disposable instruments good for up to 10 uses before disposal is necessary. It also requires specialized training to be used safely. Surgeons must complete online tutorials, watch several cases, complete

various simulated tasks competently, perform surgery in an animal lab, and be proctored on several cases by a more experienced surgeon before being allowed to perform surgeries without supervision. Similarly, operating room staff must be trained in the use of the robotic system. Operating room times are generally longer than traditional laparoscopic cases, but with time the setup becomes very quick with operating room times not differing from traditional laparoscopic cases by more than 5 to 10 minutes. (2)

Applications of Robotics in Surgery

Currently, robotic systems are used in a variety of surgical fields including cardiothoracic surgery, general surgery, gynecology, otorhinolaryngology, and urology. While first used for cardiac procedures, this system was first embraced by urologists to perform prostatectomies. Currently, about 85% of the prostatectomies performed in the United States are done using the da Vinci robotic surgery system. Urologists can also use this system to perform nephrectomies, pyeloplasties, and cystectomies. (1)

Gynecologists were next to widely use this technology. Gynecological surgeons use the robotic platform for hysterectomies, myomectomies, endometriosis, pelvic prolapse and gynecological cancers. The fastest growing area currently is general surgery. Robotic systems are used for colectomies (both benign and malignant disease), low anterior resections, cholecystectomy, Nissen funduplications,

bariatric surgery, Heller myotomy, and hernia repair. (1)

The da Vinci robotic system is used in cardiothoracic surgery for minimally invasive coronary artery bypass, repair of mitral valve prolapse, and lung resection. ENTs use the da Vinci robotic system for transoral surgery for throat cancer. (1)

Currently, the use of robotic surgical system is skyrocketing. Graduating residents are applying for robotic privileges in ever-increasing numbers. Furthermore, there are other applications for this and other platforms being researched. Despite the widespread adoption of this system, there is considerable controversy over whether or not all of this use is warranted or even safe. (3)

Controversies

With this new technology, safety concerns have been made. Currently, at least 10 lawsuits have been filed since 2011 following complications arising during da Vinci procedures. It is alleged that the robotic system was responsible for causing injury to these patients. Intuitive Surgical insists its technology is safe when used correctly. Most of these injuries are apparently the result of inadvertent burns or mechanical injury done outside the field of view during the surgery. (2)

The cost of these surgeries is also a concern. While the instruments are quite a bit more expensive than their traditional laparoscopic counterparts, the robotic instruments may be used up to 10 times. Some of the traditional laparoscopic instruments are disposable after one use, cutting some of the cost difference. Still, overall robotic cases tend to be more expensive per case. It remains to be seen if decreased hospital stays and decreased postoperative pain are significant enough to make this technology practical from a financial point of view. Furthermore, as different instrumentation is developed, the cost may come down. (2, 3)

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Considerable discussion has been made over how much training is required to safely use robotic systems such as the da Vinci robotic system. Hospitals have different requirements regarding granting privileges on the robotic system. Some have called for standardization, but no one has come to a consensus on what exactly would be adequate training for surgeons on this system. (3)

On top of all of this, the question that lingers in many surgeons' minds is: "Does robotics represent a significant leap forward in surgery or is it just a gimmick?" Studies have shown that results from robotic surgery are generally not superior to laparoscopic surgery. On the other hand, technical ability (such as knot tying) using the robotic system has been shown to have a shorter learning curve and when comparing certain tasks the robotic system is superior compared to traditional laparoscopic surgery. (3)

Conclusion

Robotics and its use in surgery is a developing field. Is it currently superior to other technology? In some ways it's not. Then again, in some ways it may be. It is simply too early to tell. Similar to the introduction to laparoscopic surgery, it may take time for this technology and its potentials, as well as its limitations, to be realized.

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PANHANDLE HEALTH

A Publication of the Potter-Randall County Medical Society

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Breast Health in the Texas Panhandle: Women Inspiring Serving and Educating (WISE) Project

by Rakhshanda Layeequr Rahman, M.D.

ABSTRACT

Purpose:

The US "Healthy People 2010" program aimed at 70% breast cancer screening rate, regardless of race/social class. Innovative programs for the underserved populations are needed to achieve this goal.

Methods:

WISE program utilized "Train the Trainer Model" to train community enthusiasts in Amarillo to serve as educators for their peers on breast health. Five training modules covered risk reduction, screening, mastalgia, lump and nipple discharge. After training, the WISE women designed/conducted the demographic surveys and trained their peers. Four pre and post-training test questions were administered for each module.

Findings:

Ninety-five women completed the survey [55(58%) non-whites; 28(29%) immigrants; 47(49%) <high-school education; 53(55%) <\$20,000/yr household income]. Financial constraints (27/95; 28%) and embarrassment (22/95; 23%) were the main barriers for screening mammograms. 43(45%) women over 40 had never had a mammogram; non-whites (70% vs. 94%; $P = .08$), immigrants (57% vs. 80%; $P = .18$), women with < high school education (67% vs. 79%; $P = .6$), and low income (63% vs. 100%; $P = .0016$) were less likely to have ever had a mammogram. Seven trained WISE women trained 16-29 peers in self-designed sessions. The mean/median difference in the number of correct responses between pre and post-tests for knowledge were 1.05/1

for risk-reduction ($P = .0023$); 0.62/1 for screening ($P = .0029$); 1.45/2 for mastalgia ($P = .0015$); 1.75/2 for lump ($P = .0021$) and 0.1/0 for nipple discharge ($P = .7052$). Eighteen of the 43(42%) screen-eligible women opted to have a screening mammogram after attending the training modules.

Conclusion:

The WISE woman program positively impacted the knowledge, attitudes and practices of the underserved community in Amarillo regarding breast health.

INTRODUCTION

Breast cancer is the most commonly diagnosed cancer among women in the United States, and the second most common cause of cancer deaths in women.¹ The most important link between continued incidence and death from breast cancer is the position of socioeconomic and racial disparities regarding understanding of risk factors and screening practices.^{2,6} Therefore, the US "Healthy People 2010" program aimed to attain a 70% breast cancer screening rate by 2010, regardless of race or social class (such as minorities, the poor, new immigrants, the uninsured and women over 70 years of age).⁷ To achieve this goal, strategies are needed to address the disparity issues specific to target populations so that efforts and resource allocation can translate into actual decline in breast cancer mortality.

The health care disparity in the Panhandle of Texas is rather stark. The average invasive breast cancer incidence in Texas for the years 2002-2006 was 114.3 per 100,000 women. For the Panhandle region the rate per 100,000 was between 104.2 and 111.4. However, the mortality rate for Texas for the same time period was 23.4 per 100,000; the mortality rates in the Panhandle were the highest in the state, at 25.2 – 26.5 per 100,000. All rates are age-adjusted

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to the 2000 US Standard Population (Texas Cancer Registry, 2009). The “At-Risk” breast cancer rates for 2008 (Behavioral Risk Factor Surveillance System data), which are defined as those women over 40 years of age who have not had a mammogram within the past two years, for Texas as a whole was 27.4%. For the TX Health Services Region 1 (HSR1), which encompasses the Panhandle and counties just south of it, the rate was 32.3%; when broken down into HSR1 White versus Hispanic, the “At-Risk” population was 29.6% and 36.3%, respectively. Disparities in health for income, race/ethnicity, and low education⁸ in the Amarillo area have been documented. The 2008 projected demographic data on racial and economic disparities for the 26 counties estimated 97,000 women over 40 years of age, 22% of which represent racial minorities and 13% of which fall below poverty-line.⁹

The regional Breast Center of Excellence (BCE) was initiated in 2009. This is a comprehensive breast care program that incorporates a wide array of facility-based and community outreach services in addition to university-based medical school and residency training programs. The program is the only nationally accredited program in the Texas panhandle. This program specifically focuses on the concept of “Equity” focusing on the concept of care according to need. Given the specific cultural milieu of the area and the pockets of socially isolated and underserved populations, the community-based WISE (Women, Inspiring, Serving and Educating) Woman Program was developed. This project was funded in part by the Greater Amarillo Affiliate of the Susan G Komen for the Cure Foundation and directed by the Amarillo Area Breast Health Coalition (AABHC). Professional support was provided by the university.

The WISE Woman Project:

This program was originally conceived by American Housing foundation and the Austin Affiliate of Susan G Komen for the Cure. The specific target for the Texas-panhandle project was the women of American Housing properties including Astoria Park, Glenwood, Green Acres, Greentree Village, and Plumcreek. These pop-

ulations include a significant number of Hispanic, Black and Middle Eastern women. Several community outreach concepts that have been successful in other areas were utilized to affect a comprehensive approach. Modifications were made for the Panhandle program to target breast health awareness and delivery issues in a multi-faceted fashion that addresses social, economical and access barriers peculiar to this community utilizing the following documented concepts. First, in settings with critical lack of healthcare professionals, specific targeted training of professionals and para-professionals expands the reach of the program to the community (a concept widely reported as “Train the Trainer”).¹⁰⁻¹¹ With 22 counties in West Texas without a physician, this was deemed an essential component the WISE Woman project. Second, incorporating cultural perspectives addressing the sensitivities of the target population is pivotal to the success of breast health educational and service program.¹² This was identified as an important element of planning because the Amarillo area represents

a highly multicultural community. Third, when dealing with low income populations, strangers from educational programs are perceived as hierarchically different, and educational information is often discarded¹³; incorporation of community activists is more successful rather than medical staff personnel in imparting the message through peer influence by eliminating the “outsider phenomenon”.^{14,15} Training community activists not only provides a physical resource and a trusting relationship between the program officials and the community but acts as an “in-house” diffusion source of education.^{16,17} Lastly, the “precede-proceed” model, which involves the participatory research by the community to formulate the intervention needed, has been extremely successful in ensuring community satisfaction and compliance.¹⁸ The main crux of precede-model is community participation in formulating research questions, and utilizing data to formulate interventions as opposed to external researchers and scientists using the community for research where the

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community is the recipient of services but not a part of the research and intervention process.

The goal of the program was to create a cadre of women in the community who would become leaders and peer educators disseminating accurate breast health information and available resources and becoming liaisons between minority communities and healthcare providers.

- **The planning phase:**

The AABHC invited a collaborative group of community based organizations including the American Housing Foundation (provides subsidized housing for the low income population), the Coalition of Health Services (administers state funded Breast and Cervical Screening Program), the Susan G. Komen Foundation, Greater Amarillo Affiliate (provides funding for the underserved community screening and educational programs), the American Cancer Society (provides transportation, informational brochures, and other cancer treatment related services), West Texas Family and Community Services (a West Texas A and M project that provides counseling and advocacy for the homeless), the Texas Panhandle Family Planning and Health Center (main providers for reproductive and general health care for the underserved), local mammography service providers and the Laura Bush Institute for Women's Health (committed to provide networking and administrative support to projects impacting women's health). This group identified several sources of funding and personnel that would support the community outreach. Five residential properties of the American Housing Foundation were identified as the target community for this pilot. The plan included: (i) identification of community activist women residing in these properties - the "WISE women", (ii) development of a community breast health curriculum by the academic team from the Breast Center of Excellence, (iii) training the WISE women using the "train the trainer" model approach, (iv) performing a baseline community survey to determine the Knowledge, Attitudes and Practices (KAP study) of the target population, (v) community educational events by the WISE

women and mammogram events with local facilities and (vi) follow up survey at 1 year to study the impact of the program.

- **Curriculum Development and Training:**

The curriculum was designed by a task force put together by the BCE that covered risk reduction, screening guidelines, and significance of three most common breast related symptoms encountered in the out-patient clinic (breast lump, breast pain and nipple discharge). Five sessions were designed employing didactic teaching followed by a question / answer session. The didactic lectures were specifically designed for a 6th grade

comprehension level. Sham clinical scenarios were developed for the question / answer sessions where the WISE women were allowed to discuss the counseling, advice, guidelines and resources in presence of a moderator from the BCE. Materials were provided to the WISE women in English and Spanish languages. In addition, resource contact information was provided for backup support.

- **Execution Phase:**

Five WISE women were identified for 5 housing properties in 2 counties (Potter and Randall). The American Housing Foundation provided subsidized rent for these volunteers. Between January 1, 2009 and

Table 1: Baseline demographic characteristics (N=95)

Characteristic	Distribution
Age: Mean (SD)	42.6 (13.9)
Race / ethnicity: % (N)	
Asian	7.4 (7)
Non-Hispanic black	28.4 (27)
Hispanic	12.6 (12)
Middle Eastern	8.4 (8)
Pacific Islander	1.0 (1)
Non-Hispanic white	42.1 (40)
Born in United States, % (N)	70.5 (67)
Urban: % (N)	71.4 (60)
Marital status: % (N)	
Single, not living with partner	29.3 (27)
Single, living with partner	6.5 (6)
Married	38.0 (35)
Separated	4.3 (4)
Divorced	16.3 (15)
Widowed	5.4 (5)
Educational level: % (N)	
Post-graduate degree	6.5 (6)
Bachelor's degree	14.0 (13)
Some college	30.1 (28)
High school diploma	23.7 (22)
Some high school	19.4 (18)
Lower than high school	6.5 (6)
Annual income: % (N)	
Below \$20,000	59.6 (53)
\$20,000 - \$25,000	9.0 (8)
\$25,000 - \$30,000	9.0 (8)
\$30,000 - \$35,000	1.1 (1)
\$35,000 - \$40,000	4.5 (4)
\$40,000 - \$45,000	4.5 (4)
\$45,000 - \$50,000	2.2 (2)
More than \$50,000	10.1 (9)
Family history of breast cancer:	
No	55.8 (53)
Yes	30.5 (29)
Don't know	13.7 (13)
Ever had mammogram: % (N)	55.8 (53)
Barriers to mammogram (check all that apply): % (N)	
Uncomfortable / hurts	24.2 (23)
Embarrassing	10.5 (10)
Too expensive	14.7 (14)
No insurance	22.1 (21)
Hard to get there	1.1 (1)
Not open when I can come	1.1 (1)
Other	27.4 (26)

December 31, 2009, the trained WISE women organized 18 sessions within their local communities. During the same period 3 mammogram events were held. The group collaboration provided the scheduling, transportation and financial support services. The WISE women were also integral in conducting the baseline survey in January 2009 and the follow up survey in March 2010, utilizing the “precede-proceed” model.

The WISE women were allowed to choose the respective culturally acceptable ways for imparting the knowledge gained; however, the content was kept constant as provided in the materials (modules on screening, risk reduction and work up of lump, pain and discharge). Several venues were identified that already existed in the community, such as church sessions and game nights, where the WISE women

used Bingo and Jeopardy games for dissemination of learned knowledge.

RESULTS

Baseline surveys were filled out by 95 women; these women also filled out the post project surveys at 1 year time point. These surveys were used for analysis of change in attitudes and practices. Knowledge surveys were filled out by women who attended the module sessions (16-20 per session). These women also filled out the post session knowledge surveys. Since these were smaller number of women, we assume that the difference in attitude and practices resulted from diffusion and informal dissemination of knowledge within the community.

• Statistical analysis:

Baseline characteristics of the survey respondents were summarized using frequencies for categorical vari-

ables and means and standard deviations for continuous variables. Among women aged 40 and over, correlates of ever having a mammogram were identified using contingency tables with chi-square tests. Statistical significance of changes in knowledge and attitudes pre- and post-intervention in the full sample were assessed using sign tests, and pre-post changes in WISE women and other women were compared using exact Wilcoxon two-sample rank-sum tests. Because within-woman changes were subject to possible floor or ceiling effects (e.g., women who were very comfortable with having a mammogram pre-intervention could not respond post-intervention at a higher comfort level), we applied the method described by Twisk¹⁹ to account for relative distance from the minimum (floor) or maximum (ceiling).

Over half of the survey respondents were from a minority race/ethnic group (Table 1), almost 30% were immigrants, 60% were unmarried, 26% had less than a high school education, over half reported less than \$20,000 per annum income, and 44% had never had a mammogram. Among screen-eligible women (age > 40), 21% had never had a mammogram. In this age group, leading barriers to screening mammograms included discomfort (reported by 30.8%) and financial constraints (too expensive or no insurance reported by 28.8%). Among screen-eligible women, ever having a screening mammogram was less likely for non-whites, women with no family history of breast cancer, women with less than high school education, immigrants, and women with annual income less than \$20,000 (Table 2). Informal discussions with other county personnel identified the unavailability of local services and travel distance as another significant barrier.

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Characteristic	% (N) with mammogram	Fisher's exact <i>P</i> -value
Race/ethnicity:		.0404
White non-Hispanic	92.0 (23)	
Other	66.7 (18)	
Born in US:		.1542
No	57.1 (4)	
Yes	82.2 (37)	
Education greater than high school:		.0048
No	59.1 (13)	
Yes	93.3 (28)	
Income < \$20,000:		.0395
No	91.7 (22)	
Yes	65.4 (17)	
Family history of breast cancer:		.1347
No	72.7 (24)	
Yes	93.8 (15)	
Total	78.9 (41)	–

Module	# correct pre: Mean / Median	# correct post: Mean / Median	Within-woman change in # correct: Mean / Median	Sign test for within woman change, accounting for floor and ceiling effects
1: Risks (N=19)	2.32 / 2	3.37 / 4	1.05 / 1	.0075
2: Screening (N=29)	1.83 / 2	2.45 / 2	0.62 / 1	.0075
3: Pain (N=20)	1.75 / 2	3.20 / 4	1.45 / 2	.0003
4: Lump (N=16)	1.5 / 1	3.25 / 4	1.75 / 2	.0042
5: Discharge (N=29)	3.17 / 3	3.28 / 3	0.10 / 0	.5034

Module	# correct pre: Mean / Median		# correct post: Mean / Median		Within-woman change in # correct: Mean / Median		<i>P</i> -value ^(a)
	WISE	Others	WISE	Others	WISE	Others	
1: Risks	2.8 / 3	2.1 / 2	3.4 / 4	3.4 / 3.5	0.6 / 1	1.2 / 1	.7962
2: Screening	1.4 / 1	1.9 / 2	2.2 / 2	2.5 / 2	0.8 / 1	0.6 / 0.5	.9016
3: Pain	1.2 / 1	1.9 / 2	3.8 / 4	3 / 4	2.6 / 2	1.1 / 2	.3007
4: Lump	1.4 / 1	1.5 / 1	3.8 / 4	3 / 3	2.4 / 3	1.5 / 1	.4025
5: Discharge	3.2 / 3	3.2 / 3	3.8 / 4	3.2 / 3	0.6 / 1	0 / 0	.1672

^(a)Exact p-value, accounting for floor and ceiling effects

Pre-post changes in attitudes towards importance of breast health and recommending mammograms and self-breast exam to friends are presented in figure 1 a-c (on next page). For all three, attitudes were more favorable post-intervention compared with pre-intervention ($P < .0001$). Similarly, breast-related knowledge was greater post-intervention compared with pre-intervention for four of the five educational modules (Table 3), with no statistically significant change in knowledge for the module on nipple discharge. Moreover, the change in the knowledge observed during training of WISE women (by project staff) was not statistically different from change in knowledge of other women trained by WISE women (Table 4). Overall difference in screening compliance (screening compliance defined as mammo-

gram within past 2 years for women over 40) before and after 2 years significantly improved from 63% to 83% [$P < .0001$] (figure 2).

DISCUSSION

The WISE woman program is a multifaceted program that not only utilizes several previously tested concepts of community education and outreach but also incorporates outcomes research utilizing the “precede-

proceed” model to improve breast health knowledge and screening practices of the underserved women of the Texas Panhandle. While the program continues in its third year with extension to other counties, this paper reports the impact of one year of intervention in Potter and Randall county AHF sites. Our results demonstrated a significant positive impact in Knowledge, Attitudes and Practices (KAP) of the target popula-

Figure 1 How important is breast health to you?

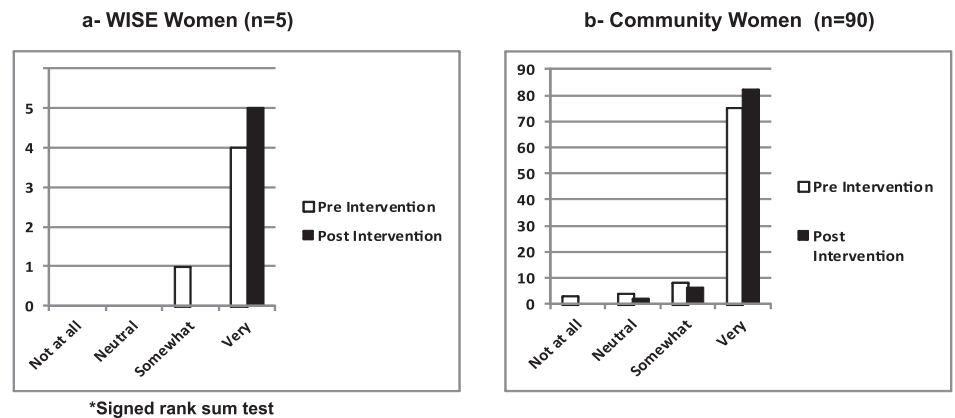


Figure 1 a-c: Changes in attitudes towards breast health pre and post-WISE woman project (P values are for the signed rank test)

Figure 2 Would you recommend regular screening mammogram to friends?

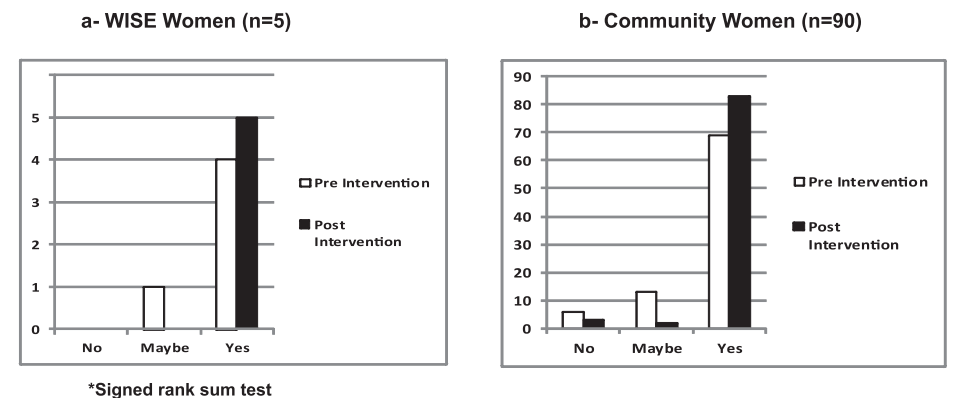
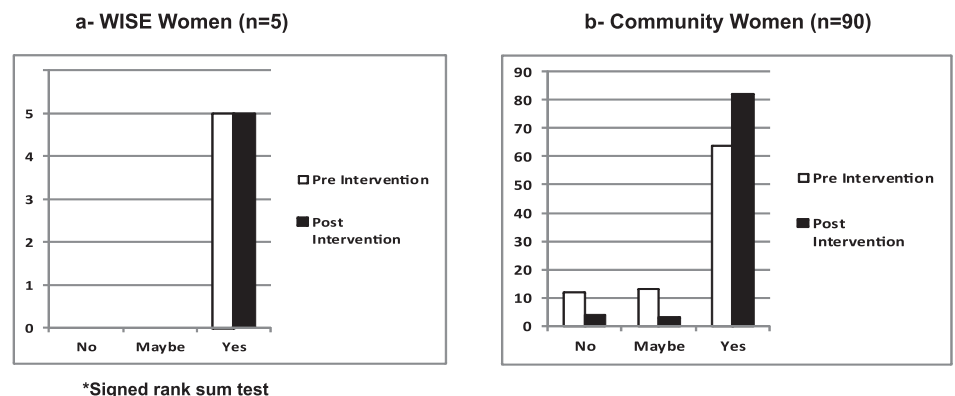


Figure 2: Impact of WISE woman project on mammographic screening in Potter / Randall county AHF community

Figure 3 Would you recommend regular self exam to friends?



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tion. Several teaching-learning strategies were utilized to foster a continued working relationship between the university intervention group and the community. First, before the development of the teaching modules, community participants were asked to brain-storm regarding the strengths, weaknesses, pitfalls and opportunities associated with the proposed intervention using the “the six thinking hats approach”.²⁰ This approach by Dr. Edward de Bono separates thinking into six distinct modes, identified with six colored “thinking hats” (White: facts, figures and objective information; Red: emotions and feelings; Black: logical negative thoughts; Yellow: positive constructive thoughts; Green: creativity and new ideas; and Blue: control of the other hats and thinking steps). “Putting on” a hat focuses thinking; “switching” hats redirects thinking. With the different parts of thinking process thus clearly defined, discussions tend to be better focused and more productive. We utilized this approach to develop the project with community involvement where WISE women were facilitated through this process to strategize the project.

Second, participants were asked how they would modify their teaching methodologies within the community to incorporate culturally sensitive approaches while keeping the message

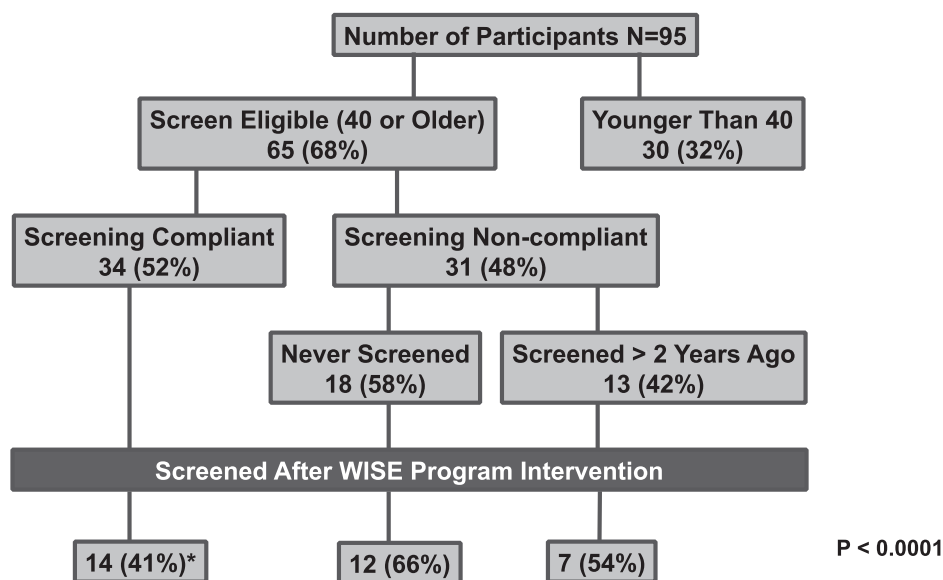
factual and consistent. Responses were rich and varied. Participants developed a list of well attended community events that were popular amongst women as judged by their attendance. These events were then targeted for dissemination of knowledge. Of note, the dissemination of knowledge was planned without disrupting the popular conduct of the event. One participant incorporated the community game night as a part of her outreach portfolio; she developed bingo and jeopardy games with breast health related questions and numbers. She described that games are much more welcome in the community than educational seminars. Another participant reported her community to be centered largely around church activities. She incorporated the church events into her educational plan and involved church officials, who disseminated principle of self-help and community help with healthcare issues with references to the designed interventional modules on breast health.

These simple teaching-learning strategies helped create an environment for open understanding and mutual participation. It is evident from our demographic data that these women represented an underserved community (60% below \$20,000 / year income, 60% ethnic minorities). More importantly, even though the post-test knowledge questionnaires were filled

out by fewer women compared with the project outcome survey (which targeted attitude changes more broadly), we could document a significant impact on attitude. We believe that even the women who did not attend the formal educational activities were impacted via diffusion of knowledge within the target community as reported by other similar programs.¹⁷ As expected, ethnic and socio-economic minorities were less likely to have been screened compared with their counterparts. On the knowledge base front, it was interesting to note that whereas a combination of didactic teaching (university interventions) and community event-based teaching (WISE women intervention) effected a significant impact in the knowledge base regarding breast cancer prevention, screening guidelines, breast lump and pain, there was no significant difference in the magnitude of impact between university intervention at the WISE women level and the WISE women intervention at the community level. This demonstrates the true success of the “train the trainer” approach. Focusing on attitude towards breast health, this intervention clearly increased awareness and enhanced proactive outlook towards breast health among women (as seen in figure 1 a-c). Finally, the impact on practices from our program is most demonstrable in the area of mammographic screening. We found a baseline rate of mammographic screening to be 55%; this value is higher than expected from the Komen Community profile. We believe that this represents the self-selection bias of women more concerned about healthcare and prevention being more likely to fill out healthcare surveys. This phenomenon has been previously seen in health intervention programs targeting minorities.²¹ However, this number rose to 83% [$P < .0001$] by the end of two years. Our data reports 1-year results generally but we calculated compliance with screening at two years to demonstrate consistency of yearly mammogram.

As mentioned above, the WISE woman project is in its third year, and we are expanding the program to other counties within the Texas panhandle. Two additional strategies

Figure 4 Change in Screening Practice



* 20 women were within compliance from screening interval with next screening scheduled

were adapted to continue to foster community educational and behavioral change: (i) dissemination of the results of the pilot county interventions via community-wide breast cancer awareness events (the successful results are likely to enhance community empowerment and nurture innovation amongst community workers); and (ii) invitation of one of the WISE women to participate as faculty for the subsequent expansion of the program.

In conclusion, the pilot analysis of the WISE woman project documents success in positively impacting knowledge, attitudes and practices of the underserved women in Texas Panhandle. This is largely attributable to incorporation of several documented concepts pertaining to community intervention design, cultural sensitivities and community participation.

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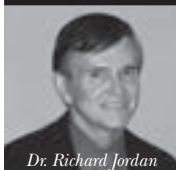
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Simulation and Surgery:

Present Capability and the Future Potential

by Dr. Richard Jordan, Regional Dean School of Medicine, TTUHSC-Amarillo; John Smoot, LP, NREMT-P, Director, SimCentral; Dr. Brian Schneider, Assistant Professor of Surgery, TTUHSC-Amarillo; Guy Gilbert, IT Network Specialist, SimCentral

Simulation training is used by many professionals whose job function requires complex technical tasks and rapid decision making. Flight simulation is used by pilots and astronauts, battlefield simulations by the military, and, more recently, simulation training is being used by health care professionals to train for emergency medical scenarios and invasive procedures. Simulation training is especially useful when highly coordinated health professional teamwork is necessary to save a patient's life. The action can be performed many times, helping trainees master situations they will see in real life scenarios. Following the training exercise (often video recorded) the entire team gathers in the "debriefing session" where the performance of each participant is evaluated and all factors are identified which could improve patient outcomes. Simulation allows trainees a safe low-risk environment to develop their knowledge, skills and confidence.

SimCentral is the simulation center located at the Texas Tech Health Sciences Center in Amarillo. It is a collaborative project between Texas Tech School of Medicine, West Texas A&M School of Nursing and Amarillo College Departments of Nursing and Allied Health. SimCentral offers a wide variety of task trainers including peripheral and central IV insertion, Foley catheter placement, and pelvic and rectal exam models. Advanced procedure trainers include TraumaMan® System, from Simulab Corporation, which allows a student to gain experience of higher risk procedures using a low-risk environment. TraumaMan allows procedure training of chest tube placement, cricothyroidotomy, and pericardiocentesis. These simulation experiences bring the trainee closer to a level of proficiency prior to independently caring for patients. Recent data indicate that student's pre-clinical participation in skills training allows for more confidence and an enhanced learning experience (1). SimCentral

is well equipped to train present and future surgeons to improve patient safety and save lives

Acute Trauma and Emergency Room Simulation

Nowhere in medicine is simulation more important than in the emergency room or acute trauma setting. Surgical resuscitation often requires intubation, chest tube placement, cricothyroidotomy, pericardiocentesis, cardiac resuscitation, volume replacement, and ventilator management. All of these can be realistically simulated with the use of highly sophisticated computerized mannequins or specifically designed task trainers. If a particular scenario requires it, the mannequin is preset to recognize mistakes in judgment and management. The mannequin can also recognize types and doses of medication based upon a specific code for each medication. Mannequins are manufactured in adult, obstetric, pediatric and neonatal models. The American College of Surgeons has incorporated the use of simulation in Advanced Trauma Life Support (ATLS) to help standardize and improve the care of trauma patients. Mannequins greatly mitigate the ethical dilemma of using and sacrificing animals for simulation.

Ultrasound Training Using Simulation

Ultrasound is a nearly indispensable diagnostic tool used by emergency room physicians, surgeons and all primary care physicians. It is very helpful for evaluating trauma patients when looking for bladder, heart, kidney, musculoskeletal or digestive organ injury. Rapidly advancing technology has allowed simplification and miniaturization of ultrasound equipment such that hand-held devices are now available giving excellent resolution ultrasound images of internal organs. This



Figure 1. TTUHSC Faculty demonstrating chest tube placement using TraumaMan trainer.

| continued on page 26



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greatly extends the physician's diagnostic accuracy and capability. Texas Tech has introduced an ultrasound curriculum to its first and second year medical school and is extending this into the third and fourth year clerkships as well as residency training programs. Simulation Centers utilize realistic anatomic software to introduce and increase the trainee's knowledge required to effectively use hand-held ultrasound technology. Like almost all other simulation learning experiences, it is embraced by learners. Also the Center for Medicare and Medicaid Services (CMS) allows physicians to bill for professional and technical components for ultrasound evaluation if a teaching physician is present while a trainee performs the exam.



Figure 2. TTUHSC Faculty demonstrating ultrasound images.

Robotic Surgery Simulation

Robotics in surgery is an up and coming technology that is being increasingly used in operating suites. Robotic systems offer advantages of high definition 3D pictures and increased dexterity when compared to traditional laparoscopy. With any new technology comes the conundrum of how to implement the technique and train physicians in its use. Many centers use a portable console with multiple software virtual reality modules that allow the surgeon to practice multiple robotic procedures. This can be supplemented with animal models

and proctoring to train surgeons in the use of robotic systems for surgery. The modules utilize the actual robotic system and put the surgeon through a multitude of tasks to increase the motor and cognitive aptitude for the surgical skills required. In this virtual reality environment, the surgeon can practice skills critical to safely carrying out surgery using this system. Northwest Texas and Baptist St. Anthony's Hospitals in Amarillo have these simulators, ensuring that robotic systems are employed in a safe and effective manner.

Surgery Boot Camp and Other Pre-Residency Simulation Internships

Surgery residency is full of challenges, both anticipated and unanticipated for new interns. The Amarillo Campus of Texas Tech University wanted to give students a "head start" on residency with an opportunity for special training to help prepare them for this new career challenge. To that end, the "Surgery Boot Camp" was developed. This one month elective encompasses didactic learning, simulation, and actual patient care to help provide and reinforce knowledge students going into surgical fields will need. Lectures on specific aspects of patient care encountered on the wards and the basics of ICU management are covered. Procedures and complex patient management are practiced in our simulation facility. Students participate in inter-disciplinary training with nursing and allied health students to foster a team-based approach to patient care. Clinically oriented anatomical exercises are practiced both at SimCentral and at the human anatomy laboratory in Lubbock, Texas.

The Departments of Internal and Family Medicine on the Amarillo campus begin orientation of PGY 1 eight days early, and the trainees participate in a pre-residency "Simulation Internship". The residents participate in their required ACLS training, receive instructions and practice invasive procedures including intubation, lumbar puncture, central line placement, thoracentesis and paracentesis. They are also presented various medical emergencies with attending physicians acting as patients speaking

through mannequins from the video control room. Patient handoffs are practiced as well.

Both students and residents consistently give feedback that the experience is an invaluable part of their training in medical school or residency and that they carry forward the knowledge and confidence gained.

Virtual Reality in Simulation

Utilizing a commonly known virtual world created by Linden Labs, Second Life® allows educators at Texas Tech HSC to immerse students into lifelike situations. Students and their patients alike operate and communicate through the use of an avatar, which is a 3 dimensional representation of themselves. The use of Second Life to enhance teaching efforts and serve as an educational medium is becoming widely used and acknowledged as an effective means of learning and instructing. Institutions including Harvard, Stanford and the Imperial College of London have created extensive and immersive environments to train their students.

Faculty and students alike well receive the use of virtual environments. In a study done within the Sydney School of Medicine and Department of Surgery, a group of students were surveyed following a simulation conducted within Second Life. Of the respondents surveyed, none had former knowledge or experience with Second Life, and they were enthusiastic and responsive to the delivery of the simulation. Eighty percent agreed that equal or more clinical content was retained using the virtual process.

According to results tabulated by Spooner, Cregan, and Khadra in Second Life for Medical Education, participants rated the virtual reality experience on the following attributes: Engaging (95%), Realistic (86%), Intuitive (59%), Efficient Learning Tool (77%), Ability to Deliver Practical Knowledge (86%) and Overall Experience (100%). A total of 82% of participants reported positive scores in support of having their next problem based learning

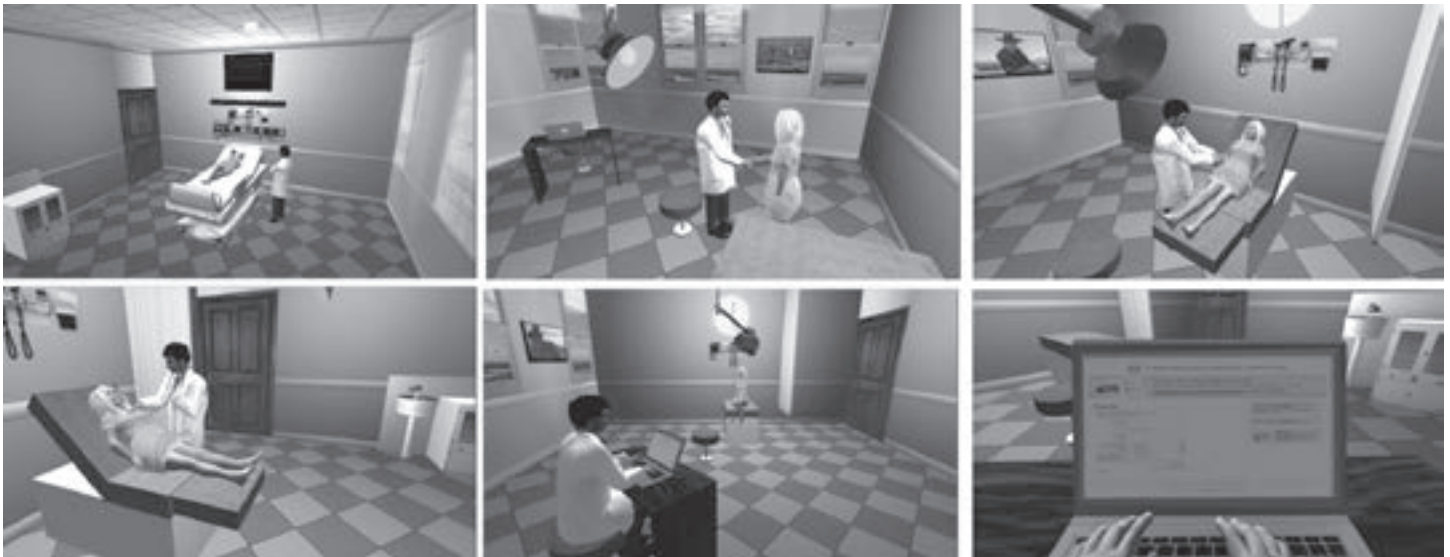


Figure 3. Virtual reality 2nd life program allowing student to communicate and perform tasks in a virtual setting.

experience delivered using the virtual Second Life experience.¹

At SimCentral, customized and specific patient cases are created in this virtual world to expand on aspects that may be rarely seen in clinical settings but are needed to supplement the student's clinical experience. It is a vast benefit to the student to operate as a licensed physician in a virtual world, to learn and operate with the comfort of knowing that no risk to an actual patient occurred during the exercise.

SimCentral houses the Visible Human Dissector Pro by TolTech, which is a 3 dimensional recreation of the Visible Human project. The Visible Human Project® entailed taking high resolution photographs of crosscuts of

a normal male and female body and reconstructing them on a 3 dimensional grid. The end product allows users to explore the human body from the inside out by seeing individual structures and systems and to mentally envision invasive and surgical procedures. It also allows users to improve their ability to identify structures on a CT scan by comparing actual photographs and reference points built into the program.

The Simulation Center of the Future

All educators involved in medical simulation training have seen a very rapid evolution and increasing sophistication of simulation equipment in just the last five to ten years. With the development of artificial intel-

ligence, rapid increase of computer speed, memory and capacity, virtual reality and human-like robots from Japan, almost no predictions seem too fantastic. More detailed anatomy in mannequins and more complex anatomical software programs are already appearing on the market. New generation and more capable computerized mannequins are available every few months. There is no reason to believe that the technology will slow its pace of development.

The time any house staff officer spends in simulation training will increase. This is in part because not all illnesses or disorders can be seen during residency training. Realistic simulation exercises can change this. The time required to see a reasonable spectrum of diseases is compressed and the overall experience is enhanced by simulation. At Texas Tech in Amarillo, we would like to increase the duration of simulation training that our internal medicine and family medicine residents receive at the beginning of their PGY1 training. This would include more extensive procedure experience, more medical emergencies, rounding on multiple mannequins with various illnesses, developing patient hand-offs and more intensive care experience. Increasing the duration of a "simulation internship" from eight days to four weeks does not seem unreasonable. The public and legislators will increas-

| continued on page 28



Figure Visible Human Dissector allowing student to view anatomy in different planes, orientations and further allows the user to highlight only portions of the anatomy desired.

ingly demand that trainees be more fully trained before they begin seeing patients. And trainees will embrace this to increase their comfort, confidence and experience before taking care of actual patients. The most significant inhibitor of the advance of simulation, however, is cost. Mannequins, sophisticated software, robots, ancillary equipment, resident training time and well trained simulation teachers are all very expensive. This is on a background of diminished government financial support for medical training and poorer reimbursement to medical schools and hospitals for providing care. Achieving a reasonable balance between cost and the need for more advanced simulation training will be a continuing challenge. Simulation centers must become more enterprising in marketing their services to produce a revenue stream that tips the balance for continued simulation advancement.

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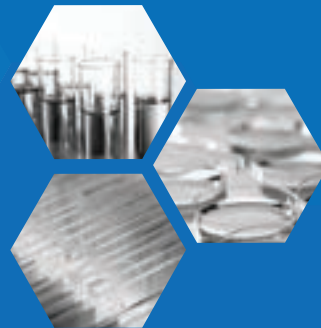
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Spinal Cord Trauma and the Utility of High Dose Methylprednisolone

by Janine Pettiford, M.D.

Spinal cord injury (SCI) can result in neurological impairment causing paraplegia or quadriplegia. The incidence of SCI is 15 to 40 cases per million and is usually due to motor vehicle accidents, violence, recreational activities, and work-related injuries [1]. The reported incidence of pediatric spinal cord injuries is between 2 to 5% of all spinal cord traumas [2]. Pediatric spinal cord injury is more prevalent in males, and 60 to 80% of vertebral injuries in children are located in the cervical spine. This is in contrast to adults in which cervical injuries result in 30 to 40 % of vertebral injuries [3]. Children also have a higher incidence of spinal cord injury without radiographic abnormality (SCIWORA). These differences are largely due to the child's greater head-to-body ratio, wedged vertebral bodies, shallow facets, immature uncinate processes, and ligamentous laxity. However, the ultimate outcome from a SCI is the result of a combination of primary and secondary mechanisms. The primary injury is due to local deformation and energy transformation commonly seen in acute compression, impact, missile, laceration, and shear injuries. Secondary injury to the spine is due to the delayed second-

ary inflammation leading to ischemia, necrosis, and even death [1].

Multiple pharmacologic agents have been used for the past 30 years in an attempt to inhibit secondary damage [4]. Methylprednisolone (MP) is the only presumed neuroprotective agent tested in controlled multicenter trials to reduce post-traumatic degenerative changes in spinal cord injuries. Studies have hypothesized that MP works by stopping the inflammatory cascade and reducing lipid peroxidation. However, despite the proposed benefits, high dose steroids are not benign. Studies have shown that high dose steroids continue to have immunosuppressive effects resulting in pulmonary and metabolic complications, sepsis, adrenal insufficiency and death [5]. The pathophysiology of SCI involves primary injury from direct impact and subsequent secondary insult from multiple complex cellular level events including increase in intracellular Na^+ and Ca^{2+} , glutamate toxicity, free radical mediated cell damage, lipid peroxidation and activation of membrane lipases [6]. This results in accumulation of arachidonic acid and its metabolites with a cascade of secondary inflammatory reactions,

edema, and ischemia. It is hypothesized that this free radical mediated lipid peroxidation causes auto-destruction of spinal cord tissue resulting in further insult. The use of steroids in massive doses is theorized to prevent these injuries due to their anti-inflammatory effects and inhibition of lipid peroxidation.

The first NASCIS trial was reported in 1984 and included 330 patients with SCI [4]. Patients were randomized to receive 100 mg or 1000 mg of MP intravenously once daily for 10 days. Neurological exam was performed at admission, 6 weeks, 6 months, and 1 year after spinal cord injury. The study found no difference between the two groups, confirming no advantage of using 1000 mg of MP. However, wound infection was 3.5 times significantly higher in the high dose steroid group. Other complications associated with high dose MP included urinary tract infection, decubitus ulcer, gastrointestinal hemorrhage, and sepsis. Finally, although not statistically significant, 28 day mortality was higher in the high dose steroid group [4].

Given the findings from NASCIS trial I, NASCIS II, published in 1990,



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compared the effect of MP administration of 30 mg/kg bolus followed by 5.4 mg/kg/hour infusion for 23 hours against placebo [7]. A third arm was given intravenous naloxone, as it had shown some benefit in an animal study [8]. The NASCIS II trial included 487 patients randomized within 12 hours of injury. Patients were categorized as complete SCI (no motor or sensory function below level of injury) and incomplete SCI (some spared function). Neurological assessment was similar to that in NASCIS trial with results reported as change in motor and sensory score. Only the patients who received MP within 8 hours of injury showed improvement at 6 months. Then in 1997, NASCIS III trial published their findings of 499 patients treated within 8 hours of SCI. Patients were randomized to one of three arms; one received 30 mg/kg bolus followed by 5.4 mg/kg/hour infusion over 23 hours (24 MP), the second arm received a MP bolus and infusion for 47 hours infusion (48 MP), and the third received a MP bolus followed by tirilazad mesylate infusion. Neurological evaluation was followed per previous protocols. FIM (functional independence measure) score, a measure of functional independence including self-care, sphincter control, mobility, locomotion, communication and social cognition was included for the first time. No differences in neurological scores were found. A subgroup analysis of patients receiving therapy within 3 hours of injury showed improvement in motor scores after 48 hour MP infusion compared to the other two groups. However, the overall FIM score did not show a statistically significant improvement at 6 weeks (p 0.86) or at 6 months (p 0.08).

The Annual Congress of Neurological Surgeons in 2002 commented on the use of steroids in SCI to be controversial [9]. A questionnaire-based study from Canada commented on the pattern of high dose steroid use in SCI [10]. More than 75% of respondents (n=60) replied that they do administer steroids in SCI; however, protocols varied and

only 17% believed steroids are beneficial in acute SCI. Not surprisingly, the most common reason for prescribing steroids was the fear of litigation (35%). A United States hospital survey reported that at least 98% of hospitals use steroids in some form for SCI, irrespective of the fact that more than 50% of the medical directors were either doubtful or did not agree with the benefit of steroids. A similar study looking at the practice patterns in United Kingdom showed that the majority of emergency units (128 of 187) prescribed steroids in spinal trauma. On the contrary, only a small proportion of specialists [i.e. spinal units (2 of 10) and neurosurgical units (7 of 17)] administered steroids due to unclear evidence. Ongoing criticism of the NASCIS trials has actually convinced some facilities to stop using steroids in spinal trauma [10]. Perhaps most compelling, the FDA does not recommend the use of steroids in acute SCI [11].

In conclusion, the available evidence on the beneficial role of steroids in SCI remains unclear. However, many reports have concluded that the usage of high dose steroids results in unwanted adverse effects. Additionally, there is a lack of evidence regarding the administration criteria for high dose MP in children, and the majority of pediatric spinal cord trauma patients are currently being managed on the basis of extrapolated evidence from adult studies. One could conclude that the use of steroids should be reserved for research purposes until better evidence has been found.

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When is Hyperbaric Oxygen Therapy a Good Idea?

by Brian M. Schneider, M.D., FACS

Introduction

Hyperbaric oxygen (HBO) therapy has been around, in a modern sense, since the 1930's. The first application was for decompression illness.

In the 1950s, Churchill Davis did several experiments proving its usefulness for other conditions.¹ Today, the Undersea and Hyperbaric Medical Society (UHMS) provides regulatory

guidance to help ensure the ethical practice and application of hyperbaric therapy.² There are a number of conditions for which HBO therapy has been approved and has proven efficacy. Many practitioners remain unaware of the indications for this therapy. In this article, we will explore the indications and therapeutic benefit of HBO therapy.

Pharmacology

What is hyperbaric oxygen? Hyperbaric oxygen is oxygen delivered to the patient at around 2 to 3 times the ambient atmospheric pressure for up to 120 minutes. This may take place in either a chamber that holds several people (multiplace) or one that is designed for one person only (monoplace). This therapy equates to dissolved oxygen levels in the bloodstream that can exceed 20 times that found in someone breathing air at sea level. This is enough oxygen to sustain the human body without any hemoglobin present.

Oxygen at hyperbaric levels has several physiological effects. The first noted was in the treatment of decompression illness. As a human breathes air under pressurized conditions, nitrogen gas is absorbed into the tissues. As that person experiences decreased atmospheric pressure, it is possible that this gas which is trapped in tissue and dissolved may come out of solution in the form of bubbles. It is these bubbles which cause decompression illness. By placing a patient in hyperbaric conditions, the bubble size will reduce or resolve due to the increase in ambient pressure. Furthermore, the pure oxygen environment helps to replace the nitrogen with oxygen which can be readily metabolized so that the bubbles will not reform.³

Other effects of hyperbaric therapy have been noted. Hyperbaric oxygen helps to restore normal oxygen levels

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in ischemic tissue which helps with a number of immunological activities within the human body. Oxygen is required for the oxidative burst used by neutrophils to kill invading bacteria. Oxygen is also lethal to anaerobic bacteria such as *Clostridium perfringens*, and even suppresses toxin production by these organisms. Hyperbaric oxygen also suppresses adherence of neutrophils to vessels walls, a key step in tissue damage due to reperfusion and crush injury.³

Proper oxygen levels are required for wound healing. The processes of angiogenesis, collagen matrix deposition, and epithelialization are all dependent on sufficient oxygen levels. HBO, by increasing oxygen concentration in ischemic tissue, can facilitate wound healing. These conditions may be found in a wide variety of patients including those with peripheral vascular disease, diabetes, and radiation damage.³

Finally, hyperbaric oxygen therapy can help displace toxic molecules that have a high affinity for hemoglobin and other molecules. This includes toxin exposure to the compounds carbon monoxide and cyanide. Carbon monoxide has a high affinity for hemoglobin. There is also evidence that it binds to cytochrome-c oxidase of the electron transport chain in mitochondria. HBO has been shown to dissociate the carbon monoxide from these compounds, which relieves the cellular ischemia produced.³ Cyanide also binds to cytochrome-c oxidase in the electron transport chain. Again, the disruption of this molecule blocks ATP production, leading to cell death. Oxygen can help restore this process by displacing the cyanide molecule.⁴

Indications

The Centers for Medicare and Medicaid Services (CMS) has approved the use of HBO therapy for the following conditions:

1. Acute carbon monoxide intoxication.
2. Decompression illness.
3. Gas embolism.
4. Gas gangrene.
5. Acute traumatic peripheral ischemia.
6. Crush injuries and suturing of severed limbs.

7. Progressive necrotizing infections (necrotizing fasciitis).
8. Acute peripheral arterial insufficiency.
9. Preparation and preservation of compromised skin grafts (not for primary management of wounds).
10. Chronic refractory osteomyelitis, unresponsive to conventional medical and surgical management.
11. Osteoradionecrosis (as an adjunct to conventional treatment).
12. Soft tissue radionecrosis (as an adjunct to conventional treatment).
13. Cyanide poisoning.
14. Actinomycosis as (an adjunct to conventional treatment).
15. Diabetic wounds of the lower extremities in patients who meet the following three criteria:
 - a. Patient has type I or type II diabetes and has a lower extremity wound that is due to diabetes;
 - b. Patient has a wound classified as Wagner grade III or higher; and
 - c. Patient has failed an adequate course of standard wound therapy.⁵

CMS defines standard wound therapy for a diabetic wound as “assessment of a patient’s vascular status and correction of any vascular problems in the affected limb if possible, optimization of nutritional status, optimization of glucose control, debridement by any means to remove devitalized tissue, maintenance of a clean, moist bed of granulation tissue with appropriate moist dressings, appropriate off-loading, and necessary treatment to resolve any infection that might be present. Failure to respond to standard wound care occurs when there are no measurable signs of healing for at least 30 consecutive days.”⁵

Carbon monoxide poisoning is a clinical diagnosis. While the levels of carboxyhemoglobin can confirm the diagnosis, the quantitative value is not helpful in determining whether or not HBO therapy should be instituted. The presence of any of the following may indicate the need for HBO therapy: loss of consciousness, neurologic deficits, pulmonary edema, myocardial ischemia, or severe metabolic acidosis. The application of HBO

reduces the half-life of carboxyhemoglobin from around 4 hours to about 20 minutes.³

Decompression illness may be seen in divers who ascend too rapidly. Divers who fly too soon after diving may be affected as well. Persons who ascend to altitudes over 18,000 feet are also at risk of developing this condition. Symptoms are wide-ranging and may include rash, joint pain, neurologic deficits, seizures, and death.³

Arterial gas embolism can cause death due to sudden ischemia. The gas may also lead to endothelial damage further exacerbating the problem. Symptoms depend on location of the embolism and may include stroke, myocardial infarction, limb or organ ischemia. This may arise due to barotrauma from mechanical ventilation or rapid dive ascent. It can also be due to invasive medical procedures such as central venous catheter placement, hemodialysis, and cardiac surgery.³

Gas gangrene, a form of necrotizing fasciitis, is a rapidly spreading bacterial infection caused by anaerobic bacteria. Immediate surgical consultation is required. HBO therapy can provide a useful adjunct in these critically ill patients, however.³

Acute traumatic peripheral ischemia, crush injuries, suturing of severed limbs, and acute peripheral arterial insufficiency can all lead to compartment syndrome and reperfusion-type injuries. HBO therapy can be an adjunct to surgery for these conditions due to the reasons outlined above. This can provide for limb salvage and reduced clinical sequelae from these injuries.³

Compromised skin grafts and flaps can benefit from HBO therapy. Relative hypoxia impairs the normal healing process as noted above. In wound beds with grafts or surgical flaps suffering from ischemia, HBO can provide enough oxygen to facilitate complete healing. It is important that referral for HBO therapy be made as soon as a potential problem with the graft or flap is identified, as once the tissue is necrotic nothing can be done.³

Osteomyelitis is a bacterial infection of the bone. Bone has relatively low blood flow compared to soft tissue. Once infection sets into the bone, the relatively lower oxygen levels and subsequently diminished immune response can make resolution difficult. In some cases, antibiotics and surgery are unable to resolve an infection short of amputation. In these situations, HBO therapy can help to resolve the infection and provide limb salvage.³

Radiation can affect all the tissues of the body including both soft tissue and bone. Radiation prohibits cellular proliferation and healing in affected tissues. Radiation injury may manifest as edema, ulceration, osteonecrosis, poor wound healing, and may increase risk of infection. This leads to diminished blood supply and wound healing in these areas. HBO therapy allows angiogenesis and healing to take place.³

In addition to standard clinical therapy, HBO therapy can help in the recovery from cyanide poisoning. Immediate application of therapy is imperative, as cyanide is a quick acting toxin. The mechanism is outlined above. Clinical symptoms may be vague, and a high level of suspicion is required.⁵

Refractory actinomyces infection is also an indication for HBO therapy. The primary modality of treatment remains antibiotics and surgery. This disease also requires a high level of suspicion, especially in the critically ill and those with compromised immune systems.⁵

Diabetic wounds are due to microvascular disease leading to ischemia, as well as neuropathy, which increase the likelihood of injury due to trauma or pressure.³ Diabetic wounds in the lower extremities may be graded on the Wagner scale. A Wagner I is a partial thickness ulcer. A Wagner II is a full thickness wound with deep structures exposed. A Wagner III is a wound that includes osteomyelitis. Wagner IV and V include either distal gangrene of the forefoot or wet gangrene of the entire foot, respectively.⁶ Wounds not responding to conventional therapy in diabetics that are a

Wagner III or worse are candidates for HBO therapy.³

Other indications for HBO therapy not approved by CMS, but that have shown clinical efficacy, include excessive anemia, brain abscess, thermal burns, central retinal artery occlusion, and acute sensorineural hearing loss. Acute anemia that is symptomatic is typically treated with transfusion. However, in patients who refuse on religious grounds or who have significant antibodies to transfused blood, this may not be possible. The conditions listed have shown promise in preliminary studies and are approved as an indication by the UHMS, but have not been approved by CMS.²

Adverse Effects

The most common pressure-related complication from HBO therapy is damage to the tympanic membrane. This presents as moderate to severe ear pain. Other pressure-related events include pain from sinuses, teeth, or lungs – although incidents involving these structures are far less common. For ear and sinus problems, ENT consultation may be necessary. Pneumothoraxes must be treated with thoracostomy prior to HBO therapy. Problem teeth should be addressed by appropriate dental care.³

Oxygen toxicity can also be a problem. The most common problem from this is a reversible myopia. This arises as a result of the effect of oxygen on the lens of the eye. Once therapy is terminated, the condition will usually correct over several weeks. Generalized seizures may result as a result of the high oxygen saturations. These are self-limited and do not cause prolonged effects. They do not make the patient a risk for seizures at other times. They can also occur at any time during a treatment cycle, and not just with the first treatments.³

Conclusion

Hyperbaric oxygen therapy is useful for a wide range of problems, from pressure-related injury to toxins to wound healing issues. It is imperative that the physician who may encounter these problems be familiar with HBO as a potential treatment. This article may serve as a guide to the practitioner encountering these diseases.

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Physician Extenders

by John Schnatz, N.P.

When patients are sick, they don't always get an appointment with their doctor. Many will see a nurse practitioner or a physician assistant. These medical practitioners, also known as "physician extenders," play a vital role in health care today.

A physician extender is a health care provider who is not a physician but performs medical activities, typically performed by a physician. This is most commonly known as a nurse practitioner or physician's assistant.¹

A Nurse Practitioner (NP) is a registered nurse who is prepared, through advanced education and clinical training, to provide a wide range of preventative and acute health care services to individuals of all ages. NP's complete graduate-level education preparation that leads to a Master's degree. NP's take health histories and provide complete physical examinations; diagnose and treat many acute and chronic problems; interpret laboratory results and X-rays; provide health teaching and supportive counseling with an emphasis on prevention of illness and health maintenance; and refer patients to other health professionals as needed.

Physician Assistant (PA) are licensed health care professionals credentialed to practice medicine with physician supervision. As part of their comprehensive responsibilities, PA's conduct physical exams, diagnose and treat illnesses, order and interpret tests, counsel on preventative health care, assist in surgery and write prescriptions (within the Physician-PA relationship), exercise autonomy in medical decision making, and provide a broad range of diagnostic and therapeutic services. A PA's practice may also include education, research, and administrative services.²

Education requirements for NP's

and PA's usually receive classroom instruction in pathology, anatomy, clinical pharmacology, biochemistry, physical diagnosis and medical ethics. Students learn about medical specialties such as family medicine, surgery, geriatrics, pediatrics and gynecology. Physician extenders must obtain licensure as a physician assistant by passing the Physician Assistant National Certifying Examination. Employers also accept applicants who possess a certification as a Nurse Practitioner.³

The first class of NP's graduated in 1965 from the University of Colorado. That same year, the first class of physician assistants graduated from Duke University Medical Center. Members of this class were chosen because of the medical training they received in the military.³

Physician extenders should have excellent customer service and patient relation skills, as they deal with patients on a daily basis. Strong interpersonal, communication and analytical skills are also needed on the job. Physician extenders should be detail orientated and careful and accurate when reviewing patient medical records, conducting medical exams and reviewing laboratory results. Other abilities that are beneficial in a physician extender position include emotional stability, patience and good bedside manner.⁴

Health insurance generally will cover services performed by both, but that can vary according to state laws. Supervision of the two types of professionals has become a key issue within the health care field. While physician assistants need a doctor looking on, nurse practitioners can practice without physician supervision in 16 states and the District of Columbia. There's a push to extend that nationwide.

The ranks of nurse practitioners and physician assistants have exploded

in the last decade, filling in shortages of primary care physicians. The boom is being driven by various pressures. The U.S. population is aging, which increases health care demands. President Barack Obama's health care reform law is expected to extend health insurance coverage to about 27 million more Americans by 2017, according to the Congressional Budget Office. Meanwhile, one recent medical journal study warned of a shortage of 52,000 primary care doctors by 2025, while another noted that more of today's medical school graduates are opting for higher-paying specialty practices.⁴

The number of nurse practitioner's has grown by about 60 percent in the U.S. in the last decade, according to the website of the American Association of Nurse Practitioners. There currently are 155,000 nurse practitioners in the U.S., says Mary Jo Goolsby, the group's vice president of research, education and professional practice.

They complete a Master's degree or Doctorate program in a variety of specialties. Most have an average 10 years health care experience before entering a graduate program. The U.S. has more than 90,000 physician assistants, double the number from a decade ago.⁴

The role of physician extenders was greatly influenced by what is known as the Bell Commission in 1989 as part of the New York State Health Code—mandating that residents work no more than 80 hours a week with 24 hours or less on call, as well as a mandatory 24-hour period off duty each week. This allowed more time for sleep and study, improvement in examination scores, and an increase in personal time.⁵

After the incorporation of nurse practitioners, we observed a statistically significant shorter length of

stay, intensive care unit length of stay, and total hospital length of stay. Patient mortality remained unchanged. Furthermore, hospital admissions remained constant and there was no change in the cost per patient.⁵

Integration of care extenders has significantly reduced the total length of stay without effecting mortality. Physician extenders expedite patient dispositions, as both floor and hospital length of stay decreased significantly after their incorporation. This translates into shorter intensive care stays, as patients were downgraded more promptly due to availability of floor beds. This study reported a 13%

decrease in total hospital length of stay, as well as a 20% decrease in transfer time to the floor. This is due to the fact that physician extenders promote patient flow because of multiple reasons. First, they are more readily available to patients, discharge planners, and social services coordinators. Physician extenders also promptly address social, family, and other patient care issues that arise during the absence of resident members of the primary team.⁵

With all the changes in healthcare, especially President Barack Obama healthcare reform law, the role of the Physician Extender will play a greater

role in healthcare today and in the near distant future.

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PROFILES IN MEDICINE

A Living Legend:

Lazar Greenfield

by Rouzbeh Kordestani, M.D.

Lazar Greenfield is considered as one of a few living legends in modern American surgery. His accolades and accomplishments are too many to recount. However, like any legend, he will be most appreciated and remembered for his contributions.

Dr. Lazar Greenfield first designed the Greenfield filter back in 1973 for the specific purpose of trapping emboli in high-risk patients while still preserving the flow through the inferior vena cava (IVC). The stainless steel apparatus was designed as an umbrella type filter so to effectively collect the emboli traveling towards the lungs from the lower extremities. The original design was novel in that it was the first non-thrombogenic, biocompatible, and easily deployable IVC device. More important, the Greenfield catheter was inexpensive in its design, MRI compatible, and was found to be easily retrievable if needed. With all of these attributes in its original design, it soon

became the benchmark for all other filters that followed. By counts from Boston Scientific, the manufacturer of the modern Greenfield filter, more than 600,000 Greenfield filters have been used in surgical patients. More impressively, as the use of filters is becoming more prevalent and more an accepted standard in the aging population, it has been estimated that between 30,000 and 40,000 filters will be used each year. These estimates are for the United States market only. The international patient impact will be more than likely far more dramatic. It is thought that worldwide, millions have benefited from the technology, the development and the use of the Greenfield filter(s).

Not to simply rest on his laurels as an inventor, Dr. Lazar Greenfield has accomplished a great deal more. He has authored more than 360 articles in peer reviewed journals, along with 8 books, and 128 book chapters. He is a fellow of the American College of Surgeons and was recently elected as

its President. He has in the past been elected President of the American Surgical Association, the American Venous Forum, American Association of Vascular Surgery and the Halsted Society (of Johns Hopkins). He also sits as a member of the prestigious Institute of Medicine of the National Academy of Sciences.

Dr. Greenfield had been the Chair of the Department of Surgery at the University of Michigan from 1987 to 2002. He was named Emeritus Professor of Surgery in 2003 by the University of Michigan. Due to his guidance over these 15 years, Dr. Greenfield had transformed the University of Michigan into a world-class medical system.

Dr. Greenfield still is the Editor in Charge of two major books on the surgery specialty/ies that are most remembered by the young medical students: *Surgery: Scientific Principles and Practice* and *Review for Surgery*.

Management of Colonic Anastomotic Abscess: When to Avoid Surgical Exploration

by M. Aterno, R. Chima, L. Kastner, M. Nazim, M.D. – TTUHSC Department of Surgery

Introduction

A colostomy is a life-saving procedure. In surgical cases requiring removal of damaged bowel due to ischemia, perforation, chronic inflammation or any of a multitude of other causes, the ability to divert the flow of colonic contents away from the damaged area buys precious time for the distal bowel to heal. These procedures, however, are very psychologically impairing to patients, and drastically reduce quality of life. Prompt reversal of colostomy is a priority in returning a patient to full mental and physical health. Many problems can occur with the reversal process. Anastomotic leaks are a common complication of colostomy reversal, and the formation of these leaks can be quite a devastating piece of news to a patient who was expecting to be able to resume normal body functions. Even a tiny leak in the re-attached segment of bowel can promptly result in significant morbidity, if not promptly treated.

A common presentation of these leaks is the formation of an abscess, typically found via imaging during an investigation of post-op fever without an obvious source. In the treatment of these abscesses, there is not a strong consensus on whether a conservative approach provides benefits over a surgical repair. Each separate surgery carries its own risk of complications, which can be devastating, and repeated surgeries over a short period of time are taxing on the body and increase morbidity and mortality. Opportunities to avoid repeated surgeries should always be seriously considered.

One option in the management of these sorts of abscesses is an open exploration, followed by the placement of drains and subsequent management in a high acuity environment. This is the traditional approach, and

would be the only correct answer if a patient were hemodynamically unstable, had high grade sepsis with any sign of end organ damage, or showed signs of peritonitis. The benefit of this technique is that no imaging is necessary, as it is well known that the CT scanner is a dangerous place for acutely decompensated patients.

Another option would be medical management. This method would be the preferable option for abscesses of a small nature (<3cm), and more specifically ones without any peritoneal signs. The medical management of an abscess would be antibiotics empirically chosen for the ability to cover anaerobes (tailored by culture and sensitivity results), bowel rest/NPO with or without initiation of TPN, IV hydration, and management in an inpatient setting with frequent reimaging.

The third, less traditional, option would be placement of a drain percutaneously. This is a minimally invasive option, and the decision to use this technique is a complex one based on a host of clinical signs and laboratory values. This technique has great potential to resolve even large abscesses without open exploration, and is the focus of our case study.

Case Report

A 54 year old woman with no significant medical history presented to the emergency department with a 36 hour history of acute-onset right lower quadrant abdominal pain, 10/10 in severity, equally tender in all four quadrants with evidence of peritonitis (rebound tenderness, guarding, decreased bowel sounds). She was afebrile on presentation with mild tachycardia (110/min) and a blood pressure of 117/66. She had a twenty pack-year smoking history, noncontributory family history, and surgical

history including hysterectomy and left shoulder repair without complications. A CT of the abdomen showed free air and fluid in the abdomen, diverticulitis and diverticulosis of sigmoid colon with significant duodenal thickening. White blood cell count was 11,000 >, 89% of which were neutrophils. Electrolytes were within normal limits.

The patient underwent sigmoid colectomy and creation of a Hartmann pouch with wound VAC. Two repeat washouts were performed with 48 hour intervals along with repeat laparotomy and reconstruction of fascia. After nine weeks, a colostomy take-down was successfully performed. Significant adhesions were noted in the pelvis and abdomen, and difficult ventilation led to high CO₂ levels during the operation. The patient was discharged after two days recovery in the SICU.

One day after home discharge, the patient presented to the ED with complaint of abdominal discomfort and left flank erythema. Vital signs were within normal limits. No clinical evidence of SIRS was present. Pain, redness and swelling were present in the left flank. CT revealed an anastomotic leak into subcutaneous tissue with a large abscess (>3cm) both extraperitoneal and intraperitoneal in location. The initial therapy included NPO, initiation of TPN and IV antibiotics. Interventional radiology was consulted for placement of a percutaneous drain to remove fluid from the abscess. The patient improved after several days, with decreased swelling. Culture and sensitivity returned, allowing for a switch to a tailored antibiotic regime. Repeat CT later showed complete resolution of anastomotic leak, and all drains were removed. The patient remained stable and was transferred to long-term rehabilitation facility.

Kidney Stones

What are Kidney Stones?

Kidney stones are actual stones that precipitate in the kidneys or related passageways like the ureters and the bladder. They form as a buildup of small gravel that precipitates from urine and accumulates in the form of bigger concretions.

How Do I Suspect Stones?

Suspect kidney stones when you have pain in the loin area on either side that comes in episodes and occasionally moves from the loin to groin. In this setting, family history of stones and history of living in temperate regions makes stone disease more likely.

How to Diagnose Stones?

When your doctor suspects stones from the history and examination, he/she may order images of the kidneys. These include computed tomography (CT) which is an advanced X-ray that reveals pictures of slices of the kidneys, ureters, and the bladder or by simply doing plain X-ray which provides less detail than CT does. This is because CT shows not only the stones but also the blockage of the passageways.

What Are the Causes of Stones?

Kidney stones are caused by super saturation of certain chemicals in the urine. It could take place during prolonged recurrent dehydration events or because of actual increase of the excretion of the chemicals in urine that eventually precipitate as stones.

Factors That Increase Risk of Stones

Dehydration slows urine flow and increases the relative concentration of some chemicals that can precipitate to form stones. Also, increased intake of some chemicals in diet like uric acid, phosphate, calcium, and oxalate causes increased excretion in urine and stone formation. In addition, recurrent urine infections of certain type and some inheritable diseases could cause kidney stones.

How Do Doctors Treat Stones?

The urologist (the kidney surgeon) is the physician who removes kidney stones and corrects the obstruction caused by them. There are different kinds of procedures that the urologist uses that range from shock wave therapy to endoscopy to actual surgical removal.

After the removal of the stone, the urologist can place the patient on management to prevent recurrence of the stone disease. The nephrologist (the kidney internist) can also help prevent the recurrence of stone disease especially in complicated patients who have other medical illnesses like hyperparathyroidism and chronic kidney disease.

How Can I Help my Stone Disease?

First, drink plenty of water. Two and half liters are minimum recommended and should be increased in summer months due to the amount of water lost to perspiration. Remember, if you suffer from edema, chronic heart disease, or kidney disease, you need to work with your internist to make sure lots of water intake is not deleterious. Second, appropriate diet that is rich in citrus content and poor in dairy content is a safe bet. For more details on diet and medications, you should follow your doctor's specific recommendations since different stone types call for different management strategies.

Reported by Tarek Naguib, MD, MBA, FACP

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by Tarek Naguib, M.D., M.B.A., F.A.C.P.

Higher Maternal Death Rate Texas Medicine (September) - Maternal Death has risen from 18.4 (2007) to 30.7 (2011) per 100,000 live births, in the state of Texas, higher than the national average rate. This has prompted the Texas Senate to pass a bill creating Maternal Mortality and Morbidity Review Task Force under the Texas Department of the State Health Services.

One in Five Texans Gets the Flu Each Year Texas Medicine (September) - It is time for the flu vaccine!

Restrict Menthol Cigarettes? JAMA (8/28) - In 2009 the FDA announced that it was banning all flavored cigarettes, except menthol, citing their allure for children. This ban accounted for only 0.2% of the US cigarette market while menthol-flavored cigarettes accounted for about 25%. FDA is funding new research to study menthol cigarettes for potential restriction.

Children Exposure to Environmental Tobacco Smoke JAMA (9/25) - Although children without asthma who were exposed to environmental tobacco smoke have decreased by about 13% between 1999 and 2010, asthmatic children's exposure did not decline in the same period!

Are E-Cigarettes Bad? USA Today (9/23) - Touted by proponents and industry supporters as free of smoke, ash, odor, and combustion of chemicals, e-cigarettes are now available to the public, including children, in many flavors. The effect of e-cigarettes in helping traditional smokers quit tobacco is still not confirmed while its nicotine is as addictive to new smokers as that of cigarettes. The debate has just started!

USPSTF Recommends Lung Cancer screening JAMA (9/4) - The US Preventive Services Task Force issued a draft that recommends CT screening of men and women between the ages of 55 and 80 years who have no symptoms but have a 30 pack-year history of smoking or have quit within the last 15 years. The draft is available for public comments for final recommendations to be issued in several months.

Youth Homicide Steady although at 30 Years Low JAMA (9/4) - The peak was in 1993 among this population which is 10-24 years of age. The decline for firearm homicide rates was slower, however. The data for 2010 show 4800 deaths and estimated \$9 billion in medical costs and lost productivity.

Firearm Homicides Decline JAMA (9/25) - Only 4.3 persons were killed from firearm homicide in 2009/2010 (per 100,000 population) as opposed to 5.2 in 2006/2007. The drop is attributed to a decline in the rates in 39 out of the most 50 populous cities in the US. The homicide rate for persons aged 10- to 19-years exceeds that for all other ages combined!

Firearm Suicides Increase JAMA (9/25) - The national firearm suicide rate increased to 7 from 6.5 persons per 100,000 population in 2009/2010 compared to 2006/2007. The suicide rate for persons aged 10- to 19-year-olds was relatively low at 1.8.

Cranberry and UTI JAMA (10/2) - An analysis of 24 studies including 4,473 persons across all ages in US, UK, the Netherlands, India, Finland, and Spain revealed no benefit from cranberry products in preventing urinary tract infections, which is possibly due to reported low adherence to the products.

Supplements May Actually Harm JAMA (9/18) - An analysis of 78 studies that were done between 1977 and 2012 including 296,707 persons across Europe, Asia, Australia, and the Americas, revealed a significant increase of all-cause mortality for persons who regularly used vitamin E and beta carotene, and in some analyses for users of high doses of vitamin A. Vitamin C and selenium were associated with neither higher nor lower all-cause mortality.

Insulin Pump with a Sensor JAMA (9/25) - Sensor-augmented insulin pump is used in type 1 diabetics to sense blood sugar level and regulate insulin release. A study showed that these pumps reduced the rate of hypoglycemia (low blood sugar) compared to using pumps that have no sensors.

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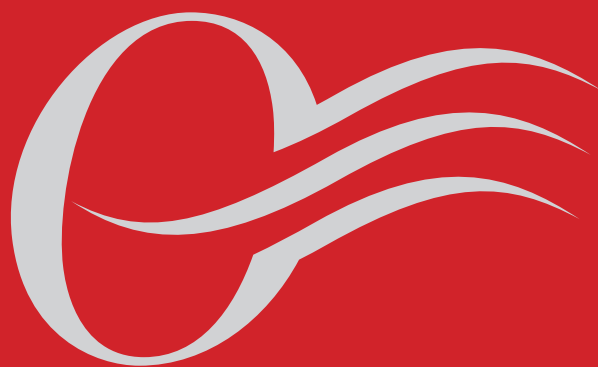
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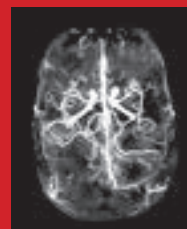
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