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Rebalancing: An Effective Discipline Aimed at Selling High and Buying Low

JON EVANS, CFP®, AIF®, Lead Advisor

Most people have heard the saying “Buy low and sell high.” Simply put, buy things when they are on sale, and sell them when they are at higher prices. While this sounds like simple advice, many investors find it difficult to follow. Just as physicians often need to sideline their emotions in order to make the best possible choice, so do investors.

In the world of investment management, rebalancing is the process of maintaining targeted asset class weights through time. Because asset classes (stocks, bonds, real estate) tend to move in different directions at different times and different magnitudes, these divergences, over time, can push your targeted allocation out of ‘whack.’ That’s a technical investing term. These movements may result in a portfolio that is either more aggressive (risky) or more conservative than you had originally intended. Below is an example of how rebalancing can work:

![Rebalancing Diagram]

To rebalance, you will sell a portion of assets that have done well and are now at a relatively high price. Likewise, you may buy assets that have not done well and are now relatively low priced. Rebalancing does take a degree of discipline. It may seem counterintuitive to sell shares of an asset that has experienced recent strong performance or, conversely, to buy shares of an asset that has dragged behind. However, both of these actions are necessary in order to put the portfolio back into balance.

It often is said that there is beauty in simplicity. When it comes to portfolio management, systematic rebalancing is a simple and highly effective way for all of us to “buy low and sell high” more consistently.

Asset allocation and rebalancing do not ensure or guarantee better performance and cannot eliminate the risk of investment losses.

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Preparing for Fall Sports Season

By Christopher T. Dietrich, MD
SDSMA President

Unfortunately the days are getting shorter and the nights cooling off. Coupled with the deep vibrating rumble of the Black Hills motorcycle rally it is quite clear that summer is coming to an end. The new school year is upon us.

In addition to the start of the school year, fall brings the start of school sports. This brings the necessary South Dakota High School Activities Association required school pre-participation physical exam. The goal of this exam is to maximize the health of athletes and to ensure their safe participation in sports. These are well meaning and lofty idealistic goals.

The American College of Sports Medicine/American Academy of Family Physicians provide an extensive list of items that should be included in a school physical/pre-participation examination (PPE). A PPE should include a detailed history. The history alone may uncover 88 percent of medical conditions, while 67 percent of musculoskeletal problems may be identified during the PPE. In addition a detailed physical examination should be included. At minimum, the physical examination should include vital signs, vision screen, hearing screen, cardiovascular exam, and musculoskeletal examination. The most common abnormal physical examination findings are elevated blood pressure and vision problems. Any abnormal findings should lead to additional evaluation. Particular attention should be applied to areas of previous problems or injuries.

An often discussed component of sports physical exams is heart screening. Most important is the American Heart Association’s (AHA’s) recommended questions relating to exertional symptoms, the presence of a heart murmur, symptoms of Marfan syndrome, and family history of premature serious cardiac conditions or sudden death. Specifically questioned is the role of EKG and echocardiograms. The AAFP and AHA do not recommend EKG testing or echocardiograms in asymptomatic individuals. While these can be very helpful tests when used selectively, the sheer number of students that need to be tested to identify cardiac problems excludes these tests from the recommended screening list.

Concussion testing is another important part of preseason evaluations. In Rapid City, all high school athletes receive an Impact Neurocognitive baseline test. These baselines become a very helpful tool in managing the return to school and the return to play following a concussion. Current recommendations are to obtain baseline scores every two years. An Impact Neurocognitive baseline test should also be conducted in the fall if a concussion was suffered the previous season.

Athletes should also be screened and evaluated for eating disorders, psychiatric disorders, and substance abuse.

Unfortunately physicals recently have evolved into a 10-15 minute encounter. Due to this, it is very unlikely that all of the “suggested” components are covered or addressed. As a result, physicians are missing out on an important and quite possibly the only opportunity to communicate with their teenage patients.

As we roll into the fall sports season it’s important to reflect on and not to minimize the importance of the school pre-participation physical exam. This is an important opportunity for us to cement or improve the patient-physician relationship with our teenage patients. Whether it be suicide prevention, cardiac disease detection, or avoidance of a sports injury, the impact we can make may be significant.
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Contributing to a safer Minnesota – AA/EOE
2018 Scholar’s Research Symposium Abstracts

By Candace N. Zeigler, MD; Benjamin Aaker, MD; Paul A. Thompson, PhD; and Valeriy Kosmenko, MD

Sanford School of Medicine (SSOM) at the University of South Dakota (USD) offers a rigorous and challenging curriculum to help prepare students for a medical career with unprecedented demands of trying to keep current with the exponential amount of new information and scientific breakthroughs. Medical students are expected to attain academic excellence, maintain high standards of honesty, integrity and perseverance in the ever-changing landscape of medical quality and safety initiatives.

One of the best ways to develop an appreciation and understanding of this approach to medicine is to participate in medical research. Physicians that practice evidence-based medicine are required in today’s medical environment.

The Scholarship Pathways Program (SPP), now in its 11th year, provides research-oriented students this opportunity. The SPP class is usually limited to 15 participants, however, the class of 2018 submitted an unusually large number of rigorous project applications and, with special permission from Dean Mary Nettleman, MD, 24 students were offered admission!

Admission to the program involves a competitive application process. Students design a proposal in the general areas of research, education or service. Participants are chosen on the basis of the quality and feasibility of their project and work closely with faculty mentors who provide vital support and guidance. Students complete their longitudinal project with the ongoing support of their mentors in addition to the SPP administrative staff. They are expected to then write up their findings in the form of a poster (to be presented in one or more medical venues), abstract (presented as part of this document) and as a manuscript suitable for publication. Many of the students are able to publish their work in peer-reviewed journals. SPP participants have reported considerable interest in their SPP projects during residency interviews.

In this year’s annual Scholar’s Research Symposium, held in conjunction with graduation, the Scholarship Pathways Program teamed up with the Alpha Omega Alpha medical honorary society, to invite all medical student researchers to participate in the poster presentation venue. In addition to the 24 posters from the SPP class of 2018, there were eight other medical students presenting posters.

Five SPP podium presentations were featured in this year’s Scholar’s Research Symposium. Benjamin Arbeiter (mentors: Keith Hansen, MD, and Kathleen Eyster, PhD) studied the use of radiography to help surgeons identify the location of retained surgical needles. Results indicated that small needles can be identified by plain abdominal radiograph but often requires extensive searches and may not be ideal for emergent situations where the patient may have a large open surgical incision that remains open until the needle is recovered. It was suggested that online modules could be built to test identification rates of medical professionals and improve proficiency. Emma Bye (mentor: Valeriy Kosmenko, MD) examined medical student attitudes about optimal timing of interprofessional education (IPE) into the curricula. Based on survey results the second year of medical school appears to be the optimal time to implement. The majority of students felt that early introduction of IPE in the medical school curricula is important to its success. Ms. Bye was able to present her results at two international conference venues in the Netherlands and Canada. Tanner Ferguson (mentor: John Berdahl, MD) evaluated a retrospective case series of patients with severe primary open-angle glaucoma (POAG) who had trabecular micro-bypass stent with concomitant cataract extraction. The results of this study suggested that in patients with severe (POAG) it is safe and efficacious to exercise a micro-invasive glaucoma surgery option such as implantation of a trabecular micro-bypass stent to augment the pressure reduction observed with cataract removal alone. Amanda Johnson (mentor: Lee Baugh, PhD) evaluated the effects of historical trauma and medical prefrontal cortex activation in an American Indian population. In contrast to the studies hypotheses, when patients presented with negative words related to historical trauma, there was increased activation of the medial prefrontal cortex while the anterior cingulate cortex and amygdala showed no change. Although limited by the size of the study, several conclusions were proposed. Participants may be resilient — resiliency may be demonstrated by increased frontal lobe activation, which may suppress negative emotions. Also, historical trauma might not affect the brain function in the same way as post-traumatic stress disorder. Kelly McKnight (mentor: Michelle Schimelpfenig, PhD) examined student attitudes about and formal training delivering bad news to patients. She developed an elective course using the SPIKES model as a general approach to deliver bad news to patients. This course was well received by student participants. She incorporated small groups as a venue for students to practice this technique with other medical students to help improve their confidence and communications skills in a non-threatening setting. As in past years, it was not easy selecting the oral presentations from among the many exceptional projects in this 2018 Scholarship Pathway class.

We are again pleased to share this year’s Scholar’s Research Symposium abstracts and thank South Dakota Medicine for giving us this opportunity. If you have a good research idea or would like to mentor a Scholarship Pathways student please contact Candace Zeigler, MD, at Candace.Zeigler@usd.edu.
Identifying Retained Surgical Needles in the Abdominal Cavity Using Radiography

By Ben Arbeiter, MS4
Mentors: Keith Hansen, MD, and Kathleen Eyster, PhD

Introduction: Many surgical procedures involve the use of very small surgical needles. Post-operative needle counts are implemented to identify retained surgical needles and prevent the high incidence of morbidity associated with retained surgical needles. Once identified, retained needles can be identified using plain film radiography, though there is little information available on the smallest surgical needle identifiable with conventional radiographic techniques. Methods to locate the smallest identifiable surgical needle size in the human peritoneal cavity using plain abdominal radiography were studied.

Methods: The PIXY, a radiology training manikin with realistic human tissue densities, was used as a simulation model for surgical needle retention in the abdomen and pelvis. The needles, ranging from 5 mm to 13 mm, were overlaid on the PIXY in order to obtain radiographs with various needle combinations and positions. Other objects were embedded in gelatin to add density or simulate gastrointestinal air, adipose tissue, and metal surgical implants. Sixty-four plain abdominal radiographs were obtained using a portable radiography system.

Results: The smallest identifiable needle was the 10-0 5 mm needle, the smallest needle used in the study. In some instances, though, the smallest needle was difficult to locate in the manikin without image post-processing. The larger needles (6-0 6.5 mm needles and larger) were found with more ease. The most difficult needle identification typically occurred when smaller needles were placed directly in line with an air-fluid level, bone, or metal object.

Conclusions: Results show that locating the 10-0 5 mm needle (smallest used in the study) can be identified using plain abdominal radiography, though not easily. Some densities of the PIXY were nearly the same opacity of the needles and prevented identification if overlying the needle. As hypothesized, the most difficult needle identification occurred when the smallest needle was placed directly in line with a tissue density, such as adipose and GI tissue, or a bone. The only way to find some of these needles was to use post-processing techniques (adjusting contrast and brightness) which is not readily available in most operating rooms. Future studies will examine the identification rates for specific needle sizes and locations within the peritoneal cavity using an online module for medical professionals.
patients leaving AMA. Identifying potential risk factors that place pediatric patients at risk builds a foundation to decrease the number of future pediatric discharges leaving AMA.

Methods: Retrospective study using the Healthcare Cost and Utilization Project 2012 Kid Inpatient Database (HCUP-KID). The 2012 HCUP-KID contained 3 million pediatric discharges within the U.S. of patients aged 20 or less upon admission weighted to 7 million discharges. Main outcome analyzed was discharge type (AMA versus regular discharge). SES factors (insurance status and income) were assessed using multivariate logistic regression after adjustment for possible confounders. Weighted analysis using Proc Surveylogistic in SAS version 9.4 (SAS Institute).

Results: Compared to patients with private insurance, uninsured patients (ORadj = 3.36 95 percent CI: 3.04-3.70) and patients with Medicare or Medicaid (Medicare: ORadj = 1.59, 95 percent CI: 1.28-1.96; Medicaid: ORadj = 1.35, 95 percent CI: 1.25-1.45) showed increased odds of leaving AMA. Compared to individuals living in the 0-25th percentile, patients in the 26th-50th percentile had a 16 percent decreased odds of leaving AMA (ORadj = 0.84, 95 percent CI: 0.79-0.90), those in the 51st-75th percentile had a 24 percent decreased odds (ORadj = 0.76, 95 percent CI: 0.69-0.83) and those in the 76th-100th percentile showed the lowest odds (ORadj = 0.73, 95 percent CI: 0.65-0.82).

Conclusion: This study identified that uninsured and low-income pediatric patients are at highest risk for leaving AMA. This study is the first to address inpatient pediatric patients leaving AMA on a national scale within the U.S.

Developing a Native American Healthcare Elective Course for a Medical School Curriculum

By Jennifer Assam, MS4
Mentor: Gerald Yutrenka, PhD

Introduction: The objective of this project was to develop a Pillar 3 elective that would allow students from Sanford School of Medicine (SSOM) an opportunity to experience and develop a greater understanding of health and healthcare disparities experienced by South Dakota's Native American population. This project included surveying current medical students to assess their interest in the subject and present available information about Native American healthcare disparities.

Methods: A survey was created for the project. All medical students of the 2017, 2018 and 2019 graduating classes were sent the survey. The survey consisted of nine questions and was approved by the University of South Dakota Institutional Review Board. Development of the course included creating a community service project plan and a syllabus. In response to the survey a Native American healthcare elective syllabus was created which included a reading list and community service project. Syllabus objectives were formed through previous elective objectives and the student investigators personal experience as an intern on a South Dakota reservation.

Results: The survey showed that most students (90 percent) were interested in participating in such an elective. Few students (15 percent) would be unwilling to travel and spend time on a South Dakota reservation. Few (14 percent) indicated that they were very familiar with reservations in South Dakota. Most students (68.5 percent) have only some familiarity with South Dakota reservations. A minority of students (33 percent) indicated they were not at all familiar with specific tribal communities. This pattern of response was similar when the students were asked about their familiarity with Lakota/Dakota/Nakota culture. Greater than 50 percent of students indicated at least some familiarity with Native American communication style, but about 40 percent reported none at all. Most students (95 percent of respondents) indicated being either "very familiar" or "somewhat familiar" with healthcare disparities experienced by Native Americans in South Dakota. More than 20 percent (12.3 percent) of students believe they have a good amount of clinical interactions with Native Americans, 71.2 percent replied somewhat of an amount, and 16.4 percent reported not at all.

Conclusions: The survey results found that most students expressed the desire and need for an elective geared toward Native American healthcare. This highlights the fact that Native American are a large part of our patient population and that we can better educate medical students to understand their healthcare needs.
Implementing Health Policy Education in a Midwest Medical School

By Stephen Bollinger, MS4
Mentors: Susan Anderson, MD

Introduction: Graduating U.S. medical students report that medical school lacks appropriate instruction in health policy and that this should be a more integral part of their curriculum. The level of interest in health policy by students at the Sanford School of Medicine (SSOM) is not well understood. The objective of this study was to assess students’ perspectives of current curricula at SSOM in healthcare policy, healthcare finance, and healthcare law and inquire of their interest in learning more about specific health policy topics.

Methods: Students at SSOM were invited via email to participate in online surveys to evaluate current curricula during the 2015-2016 academic year. Using a 5-point Likert scale, students were asked to identify if instruction was adequate, if time devoted was appropriate, preparedness to address in the future, and importance to future practice regarding the topics of healthcare policy, finance, and law. Students were also asked to indicate from a list of 17 health policy topics those for which they desire further instruction.

Outcomes: Students indicated that current curriculum devotes inadequate time to healthcare law (72 percent), finance (86 percent), and policy (73 percent). Students felt unprepared to address issues pertaining to the topics of healthcare law (90 percent), finance (93 percent), and policy (88 percent). Students felt that current curricula are ineffective in healthcare law (73 percent), finance (83 percent), and policy (75 percent). Students felt that the topics of healthcare law (75 percent), finance (82 percent), and policy (75 percent) would be very important to their future practice. Student perceptions of current curricula as inadequate increased from year two to year four in healthcare law (p=0.001), finance (p=0.01), and policy (p=0.027). Students desire to learn more about the Affordable Care Act (ACA) (85 percent), Medicare (75 percent), malpractice (67 percent), and Medicaid expansion (66 percent).

Conclusions: Students indicated that current curricula on the topics of healthcare law, finance, and policy at SSOM are ineffective. They felt unprepared to address these topics in the future despite their importance to the students’ future practices. Students were increasingly critical of current curricula from year two to year four, which may suggest that additional exposure to the implications of these topics in the clinical setting affected student perceptions of existing curricula. SSOM students desire additional time devoted to these topics in their education and have widespread interest in learning about the ACA, Medicare, malpractice, and Medicaid expansion. Additional instruction on these topics is warranted to address perceived short-comings of existing curricula at SSOM.

Exploring Barriers to Successful Healthcare Transitions for Young Adults with Special Healthcare Needs

By Raeann Bourscheid
Mentors: Richard Parent-Johnson, PhD, and Wendy Parent-Johnson, PhD

Introduction: The transition from pediatric to adult care is a juncture during which care is often disrupted for adolescents with special health care needs. Most available research on barriers to successful transitions has been conducted from a provider or caregiver perspective. This project aimed to explore the attitudes and experiences of a small sample of young adults (N=3) with special healthcare needs who have transitioned to an adult provider. The goal was to solicit examples of key points in time and information needs during healthcare transitions, in order to inform ongoing efforts to improve resources for healthcare transitions.

Methods: After Institutional Review Board review and
The Optimal Time to Institute Interprofessional Education in the Medical School Curriculum

By Emma Bye, MS4
Mentor: Valeriy Kozmenko, MD

Introduction: Modern healthcare occurs in a dynamic and complex environment that requires providers to work together, collaborate, and quickly adapt to the continuously changing work environment. To prepare providers to meet these demands, practical healthcare and academia establish interprofessional education (IPE) opportunities for healthcare professions. Establishing the appropriate timing to institute IPE in healthcare curricula is very important; too early implementation could be of limited educational value, while late implementation a missed opportunity. No current literature in the realm of IPE collaboration has determined an ideal time to introduce IPE into health education. Our project evaluated timing as well as confounding factors such as behavioral traits, readiness to teach and learn, medical specialty preference, previous healthcare profession education or work experience, amount of clinical experience, and previous IPE exposure.

Methods: As no previous instruments were suitable for our goal we developed a 27-item Academic Interprofessional Education Attitude Scale survey. The instrument was piloted and validated at the University of South Dakota Sanford School of Medicine (USD SSOM). One hundred thirty-five out of 254 students replied (135/254, 53.1 percent response rate), and their profiles closely represented the entire medical school student body.

Results: This study found that medical students younger than 25 years, who were females, and were in the first or second year of medical school, had significantly more positive attitudes toward IPE. This discovery supported prior research findings conducted by other investigators. Among all medical specialties, primary care and family medicine in particular, along with the group of undecided specialty, demonstrated the highest mean attitude toward IPE scores. These findings agree with the previous studies that showed correlation between medical specialties and personality traits.

Conclusions: The USD SSOM conducted a survey-based study to determine the best timing to institute interprofessional education in medical school curriculum. According to the obtained data, the majority of students responded that the first year of the medical school curriculum was the best time to initiate IPE. While the entire attitude toward IPE was positive, female students were more enthusiastic about it than their male counterparts. Also, students younger than 25 years had higher attitudes toward IPE than their elder schoolmates. Since many healthcare accreditation agencies require students to be involved in the IPE activities throughout their educational curricula, this survey and its findings could be an indispensable tool in designing such a curricula.
Evaluation of a Trabecular Micro-bypass Stent with Cataract Extraction in Severe Primary Open-angle Glaucoma

By Tanner Ferguson, MS4
Mentor: John P. Berdahl, MD

Introduction: The purpose of this study was to evaluate the safety and efficacy of a trabecular micro-bypass stent combined with cataract surgery in patients with severe open-angle glaucoma. The device is a tiny, L-shaped stent intended for placement into the trabecular meshwork. The study included 59 eyes with severe primary open-angle glaucoma (POAG) and severe visual field loss as defined by American Academy of Ophthalmology (AAO) preferred practice pattern criteria.

Methods: This report was a retrospective case series that included patients implanted with one trabecular micro-bypass stent with concomitant cataract surgery. Primary outcome measures were intraocular pressure (IOP) and number of glaucoma medications. Safety measures for this study included postoperative IOP pressure spikes greater than or equal to 15 mmHg, IOP less than 6 mmHg at any time point, and the need for additional surgery.

Results: The mean preoperative IOP was 19.25 ± 6.97 mmHg. Postoperatively, the mean IOP was 14.38 ± 3.63 mmHg (P<0.01) at 12 months and 14.92 ± 3.86 mm Hg (P<0.01) at 24 months. The mean number of glaucoma medications was 2.27 ± 1.06 preoperatively and 1.63 ± 1.17 (P<0.01) at 24 months postoperative, indicating a 28 percent reduction in medication use. Four (7 percent) eyes required additional surgery. Five eyes (8 percent) experienced IOP spikes greater than or equal to 15 mmHg, 14 (24 percent) eyes had IOP spikes greater than or equal to 10 mmHg. 55 percent of eyes had a 20 percent IOP reduction 24 months after surgery. Eyes with baseline IOP less than or equal to 19 had a mean reduction of 2.24 mmHg 36 months after surgery.

Conclusions: The results of this study suggest that implantation of the trabecular microbypass stent during cataract surgery safely and effectively lowers IOP and medication use in eyes with severe primary open-angle glaucoma. This is the first report to demonstrate the safety and efficacy of the device in severe POAG.

Comparison of LUCAS Device with Manual CPR in South Dakota in 2014

By Max Fuller, MS4
Mentor: Haifa Samra, PhD

Introduction: In 2013 in the U.S., 359,400 people had an out of hospital cardiac arrest (OHCA) and 9.5 percent of these survived to hospital discharge. Emergency medical service (EMS) personnel are trained to be proficient in resuscitation practices, but fatigue leads to poor quality chest compression. In order to prevent this issue, mechanical devices have been developed to deliver chest compressions at the correct rate and depth. One of these devices is the LUCAS, which has been implemented for widespread use by EMS in South Dakota. Although manikin and animal studies have demonstrated benefits of the LUCAS device, randomized controlled trials in Europe have found no difference in patient outcomes with LUCAS compared to manual CPR. The goal of this study was to study the use of the LUCAS in a rural area like South Dakota and the hypothesis was that the probability of return of spontaneous circulation (ROSC) and survival to emergency department (ED) in OHCA will be greater with treatment by LUCAS compared to manual compressions with ventilations.

Methods: A retrospective analysis of OHCA in South
Racial Disparities in Child Fracture Pain Management in Midwest Emergency Departments

By Renita Goetz, MS4
Mentor: Susan Puumala, PhD

Introduction: Pain is often difficult to describe, as it is a sensation that is unique to each individual; complex in nature with numerous altering and alleviating factors. Additional layers of intricacy are added to children who experience pain as they are often unable to articulate when and where they are having pain. Research has shown insufficient pain management in pediatric patients is a multifactorial problem with potentially significant negative long-term consequences. This study aims to determine if race/ethnicity-based differences exist between Native American and Non-Hispanic White pediatric patients receiving pain management for long bone fracture in the emergency department (ED).

Methods: This is a retrospective study analyzing data from a study on emergency department use by pediatric patients in the upper Midwest during June 2011 to May 2012. Proc Glimmix in SAS was used to run a binomial logistic model with a covariance structure accounting for site to estimate differences in opioids prescribed. A sensitivity-analysis was completed on sites with triage information to look for associations between severity and prescriptions of opioids.

Results: Of patient visits, 87 percent (190) were Non-Hispanic White and 13 percent (28) were Native American. Multivariate logistic regression models adjusting for confounders revealed no difference in opioid prescriptions based on race (odds ratio [OR]: 1.11; 95 percent confidence interval [CI]: 0.47, 2.63). No other covariates had an independent impact on survival. When adjusting for the presence of a shockable rhythm, treatment by either the LUCAS or mechanical compressions with ventilations had no difference on survival to the ED.

Conclusions: As previous studies have shown, this study demonstrated that treatment by the LUCAS device is not associated with better patient outcomes.
Compliance with ASCCP Guidelines for Evaluation and Management of Abnormal PAP Smears

Elizabeth Hedman, MS4  
Mentor: Keith A. Hansen, MD

Introduction: American Society for Colposcopy and Cervical Pathology (ASCCP) 2012 revised guidelines were developed to improve the detection and management of cervical dysplasia. A recent study revealed that not all health care providers are knowledgeable or aware of the 2012 national cervical cancer screening guidelines. The goal of this study was to determine if primary care providers and gynecologists manage abnormal PAP smears according to ASCCP current guidelines.

Methods: This was a retrospective study conducted at a Midwestern, regional medical center. An electronic search was conducted for abnormal PAP smears from Aug. 1, 2014 through July 31, 2015. The patients’ charts were reviewed and entered into an electronic database. The results of the PAP smear and its optimal management according to the 2012 ASCCP guidelines were compared to the providers’ next step in the treatment and management of the abnormal PAP smear. Proportions and 95 percent confidence intervals were determined for age of patient, type of provider and field of medicine.

Results: Two hundred eighty-four charts were reviewed. The proportion of PAP smears that were managed appropriately was 0.658 (95 percent CI 0.603-0.714). The proportion of ASCCP guideline managed PAP smears were similar for different age groups, provider types, and medical fields.

Conclusion: In this study, providers were not always managing abnormal PAP smears according to the current ASCCP guidelines. Further research may reveal whether providers are unaware of the recent guidelines or if the guidelines are too complicated.

Effect of EMR Pre-defined Orders on Preoperative Antibiotic Use: The Good, the Bad and the Ugly

By Courtnée R. Heyduk  
Mentor: Keith A. Hansen, MD

Introduction: A previous study demonstrated that 40 percent of women undergoing laparoscopic procedures were given prophylactic antibiotics incorrectly. To improve compliance for antibiotic prophylaxis, an upper Midwest hospital developed an “opt out” procedure. This involves an order-set which automatically prescribes unless the physician modifies the order-set. The purpose of this study is to examine how the current electronic medical record (EMR) opt-out process contributes to an increase in both appropriate and inappropriate prescribed antibiotics for gynecologic surgical procedures.

Methods: This is a retrospective chart review from a randomized sample of hysterectomy or laparoscopic procedures at an upper Midwest hospital from April 2013 to April 2015.

Results: In this study, 235 charts were reviewed, 100 laparoscopies (43 percent) and 135 hysterectomies (57 percent). 100 percent of the hysterectomy procedures received antibiotics, which complies with the guidelines. Of the laparoscopies, 55 (55 percent) cases were given antibiotics which were not recommended. These results suggest the importance of reviewing current EMR order-sets and their appropriate use.

Conclusion: In reference to the title of this paper, the good outcomes that resulted from this study were the acknowledgement of 100 percent of the hysterectomy cases being treated correctly with prophylactic antibiotics. The bad outcomes which resulted from this study were the high percentage (55 percent) of laparoscopy procedures that received inappropriate antibiotics prophylactically. The
ugly outcomes which were identified and hypothesized by this study involved the potential for allergic reactions and the risk of Clostridium difficile infection that could have resulted in relation to inappropriate use of antibiotics.

These results suggest the importance of reviewing current EMR order sets for their validity in relation to current guidelines for antibiotic use and the importance of examining their appropriate use in specific surgical procedures.

The Use of Intrathecal Morphine Reduces Length of Hospital Stay and Postoperative Opioid Use After Spinal Fusion for Adolescent Idiopathic Scoliosis

By Nathan J. Jacobson, MS4
Mentor: Geoffrey F. Haft, MD

Introduction: Several previous studies demonstrated the introduction of intrathecal morphine (ITM) was a safe and effective method of pain management for posterior spinal fusion (PSF) in adolescent idiopathic scoliosis (AIS). Several studies also found the introduction of ITM was associated with a reduction in pain, opioid requirements, and adverse side effects postoperatively. However, no prior studies had examined the association between ITM introduction and length of hospital stay postoperatively for PSF in AIS. In this study, the authors evaluated the effects of intraoperative administration of ITM upon postoperative length of hospital stay and postoperative opioid use in patients with AIS undergoing PSF.

Methods: This study was a retrospective cohort comparison study from 2005-2016 of 105 consecutive patients with AIS who underwent PSF by a single surgeon. Patient data was gathered using individual electronic medical records. The first 40 patients did not receive intraoperative ITM. The next 65 patients received 6 mcg/kg of preservative free morphine sulfate (Hospira Inc. Lake Forest, Illinois) via intraoperative administration into the intrathecal space. The two cohorts were evaluated for differences in gender, number of spinal segments fused, age, Cobb angle (reference standard using measurements of the spinal column for quantitative monitoring of scoliosis), and estimated blood loss (EBL). The primary outcome measure was number of postoperative midnights spent in the hospital. The three criteria for discharge were safe and independent ambulation, ability to tolerate normal oral food and water intake, and adequate pain control with oral medications. The secondary outcome measure was total postoperative opioid usage.

Results: The ITM cohort had a statistically significant (p<0.0001) shorter hospital stay (4.2 versus 6.0 midnights) and a statistically significant (p<0.0001) decreased use of postoperative opioids (167.2mg vs 388.4mg PO Morphine) compared to the non-ITM cohort. There were no statistical differences with respect to gender (p<0.69), number of spinal segments fused (p<0.12), age (p<0.53), Cobb angle, (p<0.87) or EBL (p<0.12). There were no patients who experienced documented allergic reactions to ITM. There were no cases of cardiac or respiratory arrest.

Conclusions: The intraoperative administration of ITM is a simple and effective method for scoliosis surgeons to better control postoperative pain (57 percent reduction in postoperative opioid use) and achieves earlier discharge from the hospital (near two-day reduction in length of hospital stay). Patients, hospitals, and insurance companies benefit from the routine use of ITM as reduced length of hospital stay reduces the cost of care for any patient and care center.
Doctors in Medicine: An Evaluation of a Medical Improvisation Course

By Andrea Petersen, MS4 and Jessica Piché, MS4
Mentor: Jill Tyler, PhD

Introduction: A new method of training involving improvisational exercises has been gaining recognition and popularity among the healthcare education community. Because patient encounters are unscripted and unpredictable, parallels have been drawn between improvisational theater and medicine. Intertwining theater into medicine has proven beneficial for the few schools that have started developing these elective courses. Students have come out of these courses with an increase in confidence in responding to spontaneous situations, interviewing patients, building a rapport, and providing better medical care. Improvisation that is specifically tailored to medical students will be implemented at the University of South Dakota Sanford School of Medicine (USD SSOM) with self-assessments and evaluations used to determine the benefits of the program and improve patient-centered communication skills.

Methods: Second year medical students (n=19) at USD SSOM were enrolled in the study over the span of two years. Students completed a 10-hour medical improvisation course created at Northwestern University Feinberg School of Medicine. Pre- and post-course self-assessments, pre- and post-course standardized patient encounter evaluations, and a course evaluation survey were used to assess how the medical improvisation course affected medical students’ patient-centered communication skills.

Results: Students self-identified significant improvement in the category of spontaneity (p=0.00005), communication etiquette (p=0.00012), interpreting body language (p=0.0021), conveying sincerity (p=0.0053), empathy (p=0.047), teamwork (p=4.5E-06), communication of medical knowledge (p=0.051), confidence in eliciting a patient’s perspective on a medical issue (p=0.014), and multitasking (p=0.0032) following five two-hour classes of medical improvisation. Anxiety was found to be unchanged (p=0.76). Standardized patient encounter evaluations found an average increase of two points following the conclusion of the course. This improvement in patient-centered communication was found to be significant (p = 0.0025).

Conclusions: Students who were enrolled in the medical improvisation course displayed improvement in patient-centered communication skills through standardized patient encounters and self-assessments. With positive results following this course, the authors are investigating ways to further incorporate medical improvisation into the USD SSOM curriculum.

Historical Trauma and Neuroscience in Relation to an American Indian Population

By Amanda Johnson, MS4
Mentor: Lee A. Baugh, PhD

Introduction: American Indians (AI) continue to be at greater risk of mental health disorders than any other group in the U.S. as suicide and substance abuse rates continue to increase. Despite research and intervention efforts, there has been little systematic examination of the underlying causes for these problems in AI communities. Recently, there has been focused attention on the concept of historical trauma, which refers to the intergenerational psychological consequences of more than 400 years of discrimination, oppression, and forced acculturation. This study examined the relationship between historical trauma, positive and negative emotions, and brain activity in an AI population. It was predicted that task-related brain activity would resemble that found with post-traumatic stress disorder (PTSD) research, in which words related to trauma resulted in increased activity of the amygdala and the anterior cingulate cortices (ACC), while showing a decrease in activity of the medial
High-Dose Vitamin C in Conjunction with Anti-Cancer Agent Phenformin in Colon Cancer

By Sarvesh Kaushik, MS4
Mentor: Keith Miskimins, PhD

Introduction: Colon cancer is the second-leading cause of cancer deaths in the U.S. High-dose vitamin C, in combination with the anti-cancer agent phenformin has been suggested as a plausible colon cancer therapy. This drug regimen was examined in an in vitro cell culture setting.

Methods: CT26 is the colon cancer cell line used for all experiments. Cells were cultured and treated with different concentrations of phenformin and vitamin C. Experiments were conducted with both the reduced and oxidized forms of vitamin C. Sytox Green nucleic acid stain and Trypan blue exclusion assay were used to assess cell death. Flow cytometry using DCF, a fluorescent indicator for intracellular reactive oxygen species (ROS), was also conducted. Colony formation assay, an in vitro cell survival assay that assesses the ability of a single cell to grow into a colony of at least 50 cells, was used to test colony-forming ability of CT26 cells. Spheroids are tumor cell aggregates that mimic in vivo tumors as they exhibit different physiological characteristics of tumors such as cell morphology, formation of bonds between cells, increased cell survival, and a hypoxic core. Spheroids of CT26 cells were formed by plating cells in 3D multiwell microplates and each spheroid was exposed to a different concentration of phenformin and oxidized vitamin C. Cell viability of the 3D spheroids was assessed with CellTiter-Glo 3D Cell Viability Assay reagent, which uses a luminescent probe to quantify amount of ATP present.

Results: Cell death experiments using Sytox Green stain and Trypan Blue demonstrated that higher concentrations of phenformin, such as 250 M and 1 mM, have a cytotoxic effect on CT26 cells. Experiments did not show a strong cytotoxic effect of oxidized vitamin C alone or in combination with phenformin. Flow cytometry experimental data indicated that oxidized vitamin C produces more ROS in comparison to reduced vitamin C. Thus, oxidized vitamin C was used as agent of interest for further studies.

Conclusions: In contrast to the initial hypothesis, when presented with negative words related to historical trauma, there was increased activation in the mPFC while the ACC and amygdala showed no change. It is possible that this study was underpowered due to the small sample size and range of HLS values. Further, the participants may be resilient as the increased frontal lobe activation may effectively suppress negative emotions. Finally, it is possible that historical trauma is not relatable to PTSD with regards to brain function. Future research and analyses will focus on correlating anatomical regions of interest with levels of reported historical trauma with a larger sample size.
experiments. Flow cytometry experiments did not show any concentration-associated relationship in ROS production within cells. Colony formation assay indicated that higher concentrations of phenformin inhibit formation of colonies, but low concentrations of oxidized vitamin C have no effect. A similar result was observed in the spheroid experiments, as higher concentrations of phenformin caused a decrease in cell viability and oxidized vitamin C had no effect.

Conclusions: Treatment of CT26 cells with oxidized vitamin C in combination with phenformin did not result in enhanced cancer cell death. Although phenformin treatment demonstrated decreased cell viability and growth, oxidized vitamin C as a single agent or in combination with phenformin did not have this effect. Thus, data does not support the initial hypothesis of combination treatment enhancing the inhibition of tumor growth and cancer cell death. The experiments conducted were limited to low concentrations of oxidized vitamin C. Higher concentrations of oxidized vitamin, greater than 2 mM, in combination with phenformin will need to be tested. Future experimentation should focus on evaluating ROS production within the cytosol versus mitochondria, determining markers for DNA damage, quantifying expression levels of glucose transporters (GLUTs) and sodium-dependent vitamin C transporter (SVCTs) in post-treatment cells, and determining how cell survival pathways are affected by treatment. Also a non-cancerous colon cell line will need to be obtained as a control.

Descriptive Study of Rubella Titer Status in Infertility Patients

Jennifer L. Keating, MS4
Mentors: Keith A. Hansen, MD and Tiffany Von Wald, MD, MPH

Introduction: There is a 6.4 percent incidence of rubella exposure during pregnancy in the U.S. Given the severe effects rubella can have on a developing fetus, vaccination of women prior to pregnancy is important. Women seeking fertility treatment therefore present a population of patients primed for the vaccination. This study collected and analyzed rubella-specific immunoglobulin G (RV-IgG) titer statuses and corresponding demographics of infertility patients to identify patients at risk of rubella nonimmunity.

Methods: The study consisted of a retrospective review of electronic medical records (EMR) of female patients, ages 18 to 50, who were new patients receiving an infertility workup at a Midwestern reproductive endocrinology clinic from Jan. 1, 2014 through Dec. 31, 2016. Of those patients who had RV-IgG titers noted in their EMR, the following demographics were collected: age, race, gravidity and parity, state of residence, and community size.

Results: There were 750 patients included in the study. Rubella titers were drawn on 72.7 percent of the patients. Of those drawn, 90.8 percent had a positive rubella titer. Most of the participants (92.3 percent) were identified as Caucasian/White. Caucasians/Whites, Asians, and African Americans/Blacks had the highest rates of rubella immunity, while American Indians/Alaskan Natives had the lowest rates of immunity. The difference in titer status on the basis of race was statistically significant (p=0.0006). Nulligravida participants had a positive rubella titer rate of 94.1 percent, while primigravida participants had a rate of 89.8 percent. Statistical significance in the difference in titer status was also found with respect to gravidity (p=0.0422). Participants living in the largest sampled communities had the lowest rates of positive rubella titers, while those living in the smallest communities had the highest rates of positive rubella titers.

Conclusions: Of the infertility patients, 27.3 percent did not have an RV-IgG titer drawn as part of their fertility workup. Of the 72.7 percent of patients for whom titers were checked, nearly 10 percent were not immune to rubella. While there are a couple reasons why a patient may not have a positive titer, lack of immunization is the most common reason. Data analysis identified significance in the difference in titer status only with respect to race and gravidity, and those findings, particularly race, must be viewed critically in light of the study population. While the statistical significance of the study may be limited, it may still carry clinical significance in identifying infertility patients at highest risk of rubella nonimmunity so vaccination education and efforts can be focused accordingly.
Maternal High Fat Diet and Diabetes Affect Nephrogenesis in Developing Offspring

By Kade Klippenstein, MS4  
Mentor: Michelle L. Baack, MD

Background: Offspring of diabetic mothers have an increased risk of hypertension as early as adolescence. Hypertension often has an underlying renal pathogenesis. Diabetes and dyslipidemia are associated with altered circulating fuels which over time may lead to kidney injury in adults. The effects of in utero exposure on kidney organogenesis are largely unknown. This study used a rodent model to characterize fuel-mediated differences in the developing kidney, specifically via lipid deposition, nephrogenesis, and expression of key proliferative genes/proteins.

Methods: Female rats were fed high fat (HF) or control diet (CD) for 28 days before mating and throughout pregnancy. On gestational day 14, dams were given either citrate buffer (CB) placebo or streptozotocin (STZ) to induce diabetes. Hyperglycemia was partially controlled with twice daily sliding scale insulin. Kidneys were harvested from 1-day-old offspring (NBD1) and sections were stained for lipid droplets with Oil-Red-O, for proliferation with Ki67, and for nephrogenesis with PAX2 and NCAM. Stained sections were imaged using a Nikon 90i microscope and qualitatively compared between groups. RNA was purified from NBD1 kidneys using Quiagen RNeasy mini kit. qPCR was performed on cDNA using ABI 7500 system and data was analyzed using Student’s t-test. Significance was set at p<0.05.

Results: NBD1 kidneys exposed to HF and diabetes demonstrated decreased lipid deposition compared to control offspring (CD-CB). Diabetes exposed offspring demonstrated much fewer Ki67 positive cells; the effect was most striking in the HF-STZ group. NCAM/PAX2 staining revealed abnormal ureteric bud and tubular alignment in the HF-STZ group. qPCR revealed a 1.64 fold increase in gene expression of IRS-1 in the HF-CB group (p<0.05). There was no significant difference in gene expression of FGFR2, GDNF, PAX2, SIX2, or PTEN.

Conclusions: Late gestation diabetes is associated with decreased nephrogenesis in the developing offspring and the effect is exacerbated alongside a maternal HF diet. Abnormal ureteric bud branching and connectivity with the developing tubules may explain additional pathogenic mechanisms. The study adds to a growing body of evidence that maternal dyslipidemia during diabetic pregnancy exacerbate developmentally programmed disease and additional human studies and preventative measures should be considered. With this body of evidence, there is further reason for clinicians to spend adequate time counseling patients on the importance of a healthy diet and diabetic control for their developing child.

Blessed Journey: Using Group Prenatal Care to Address Health Disparities in the American Indian Population

By Kelly Landeen, MS4  
Mentor: Ashley Briggs, MD

Introduction: American Indian populations have some of the highest rates of preterm deliveries, low birth weights, and infant mortality in the U.S. While some efforts have been made to implement prenatal care programs for American Indian women, for the most part they have faced huge barriers and existing programs are not sustainable.

Methods: In order to improve outcomes within the American Indian community of South Dakota, the Blessed Journey program was developed. This is a group prenatal care program that specifically addresses these women’s needs in a setting where they feel comfortable and respected. This curriculum is culturally sensitive and incorporates both traditional Lakota beliefs and modern
Western medicine. Each session helps to educate, empower, and engage the patient in her own prenatal care, and specifically addresses healthcare concerns faced by the American Indian population such as substance abuse, smoking, and domestic violence.

Outcomes: The Blessed Journey program was implemented in 2016 at South Dakota Urban Indian Health (SDUIH). The program consists of ten monthly sessions that are run continuously throughout the year, and is sustainably hosted by providers at SDUIH and Sanford Women’s Health. Initially, surveys were given to participants to assess the effectiveness of the program, but loss to follow up was a major inhibiting factor on gathering this data; less than 10 surveys were completed over the course of the first year.

Conclusions: Despite significant loss to follow up, patients have given positive verbal feedback and actively engaged in Blessed Journey sessions. Published written and video materials for facilitators of these sessions will be released in the Spring, and within the next year the Blessed Journey program will be extended to other health networks in North Dakota, South Dakota, and Minnesota.

Breaking Bad News: Equipping Our Future Physicians with Compassionate and Empathic Communication Skills

By Kelly McKnight, MS4
Mentor: Michelle Schimelpfenig, DO

Introduction: An article in Oncologist from 2000 found that 60 percent of oncologists broke bad news five to 20 times a month, with an additional amount presenting bad news 20-plus times per month. Of these physicians, less than 5 percent had formal training on the topic. These numbers will not change unless a curriculum is implemented that teaches students how to give bad news. It is important that students are trained on the subject during medical school, as physicians in all fields of medicine will have to deliver bad news or have difficult conversations. Additionally, it will give students a foundation that will allow them to practice and build on these skills during clinical years, residency, and fellowship. Students are motivated to get training in this area because of the frequency and importance of these conversations. During this course, students will learn about Setting, Perception of the patient, Invitation, sharing of Knowledge, Empathy, and Summary (SPIKES) as a guide for delivering bad news. Students will gain valuable knowledge and practice in how to have these conversations and will start to build a foundation that will allow them to present bad news with compassion and empathy. This project fills the void that currently exists within medical education.

Methods: Students participated in a two-hour didactic and small group course on the SPIKES model. Pre- and post-surveys measured student knowledge as well as perceived utility of the course. A subgroup of students also completed standardized patient encounters before and after attending the course. Standardized patient encounters were graded for student skills in delivering bad news, as well as patient satisfaction. Non-parametric Wilcoxon signed rank sum test was used to analyze the pre/post data. All the analyses were carried out using SAS 9.4 (Cary, North Carolina).

Outcomes: Twenty second-year medical student participants (14 female, six male; mean age 26.3 years) attended the two-hour SPIKES course and showed increased knowledge (p<0.05). Nine students completed standardized patient encounters and displayed increased skills in communicating bad news (p<0.05). Standardized patient satisfaction increased, however, was not found to be statistically significant (p<0.84).

Conclusions: Students showed statistically significant improvement in knowledge and skills of delivering bad news after attending the course. While not statistically significant, there was an improvement in patient satisfaction. During this course students gained valuable knowledge and practice in how to communicate difficult news. This program provides a previously missing piece from medical education and equips students with skills that will be beneficial for communication with patients.
Initiating a Hepatitis C Registry for Great Plains Tribes

By Laura Rasmussen, MS4
Mentor: Jennifer Giroux, MD, MPH

Background: Hepatitis C virus (HCV) infection is at an epidemic level in the American Indian (AI) population. Even though direct acting antivirals have made it a curable disease, cost of treatment, inability to access healthcare, and lack of specialists are major barriers to treatment. Project Extension for Community Healthcare Outcomes in New Mexico piloted a remedy to the obstacles of access to care and appropriate subspecialists. By utilizing iCare, a data-gathering program of the Indian Health Service (IHS) electronic health record (EHR), patient panels are built to gather clinical data regarding HCV-infected patients.

Methods: The goal of this project was to initiate this system within all 18 Great Plains Area IHS sites. Clinic records were used to identify HCV patients needing follow-up, utilizing liver fibrosis scores calculated by the APRI and FIB-4 formulas to prioritize patients in most urgent need for therapy. These IHS sites were visited to build panels, establish a local HCV champion, and educate primary care providers with Project ECHO’s HCV treatment training. Remote methods were also utilized to build patient panels at some sites.

Results: Patient panels were completed at three sites. Two were completed locally, and one was done remotely. Approximately 500 HCV positive patients were identified. Throughout the project, experience was gained regarding major challenges involved in performing epidemiological studies with the AI population. This included experience receiving approvals from each individual tribe and IHS site, dealing with high turnover rates in healthcare leadership, unreliable information technology (IT) and apprehension of the AI population to published data.

Conclusion: During this project, a registry for three Great Plains tribes was successfully built. More than 500 HCV-positive patients were identified, and disease severity assessed with liver fibrosis scores. This information was given to healthcare providers, enabling them to prioritize treatments. There were several barriers to steady progress on this project. Most notable was a lack of centralized authority. Approval from both the head of the tribal health board and the clinical director was required to gather data. Another problem was the high rate of turnover of healthcare leadership which made it difficult to establish routine care and rapport with the individual clinical site leaders. Additionally, the IHS IT departments and EHR posed a major challenge. Three separate log-ins were required to access the IHS domain, IHS EHR, and iCare system. There were access lapses at different intervals for each of these systems. Poor response rates from IT personal meant further delays. Despite these difficulties, critical work was accomplished. A protocol for building patient panels was established, and a list of tribal leadership and IT personnel was developed to ensure greater responsiveness and better communication in the future. The goal of more efficient identification and treatment of AI patients with HCV infection is several steps closer to reality.

The Role of Socioeconomic Status in Leaving Against Medical Advice

By Sharleen Yuan, PhD, M4
Mentor: Benson Hsu, MD, MBA

Background: Individuals leaving against medical advice (AMA) are at risk for adverse health outcomes, including a 40 percent increased mortality rate a year after self-discharge. Additionally, leaving AMA may dramatically increase medical costs due to failure to complete treatment resulting in higher risk of readmission with additional co-morbidities.

Objectives: To assess the impact of socioeconomic status (SES) on leaving the hospital AMA.
Methods: This was a retrospective study of inpatients utilizing the Healthcare Cost and Utilization Project (HCUP) 2012 National Inpatient Sample (NIS) database. The study used the hospital inpatient database comprising approximately 90 percent of all discharges within the US in 2012. Participants included in this study were patients 18 years and older who were discharged AMA or through regular discharge methods. Primary outcome measure was discharge type (AMA versus regular). Multivariate logistic regression to assess SES factors (insurance status, income, and area of residence) and possible confounders. Analysis performed on the weighted discharges using multivariate logistic regression.

Results: After adjustment for possible confounders and other SES factors, increased odds of leaving AMA include a lack of insurance (ORadj = 4.16, 95 percent CI: 3.96-4.36) and presence of Medicare and Medicaid insurance (Medicare: ORadj = 2.10, 95 percent CI: 2.02-2.19; Medicaid: ORadj = 2.94, 95 percent CI: 2.81-3.08). Compared to the 0-25th percentile in zip code income, individuals in the 26th-50th percentile had a 20 percent decrease in odds of leaving AMA (ORadj = 0.80, 95 percent CI: 0.77-0.83), individuals in the 51st to 75th had a 30 percent decrease in odds of leaving AMA (ORadj = 0.68, 95 percent CI: 0.65-0.72) and individuals in the 76th to 100th percentile had the lowest odds of leaving AMA (ORadj = 0.62, 95 percent CI: 0.58-0.66).

Conclusion and relevance: Two groups at risk for leaving AMA were individuals lacking insurance and those within the 0-25th percentile in income. Our results are similar to previous analysis of 2007 NIS data, suggesting little improvement in AMA for those of lower SES. Additional work needs to be done to help healthcare providers set targeted preventative measures to address those at increased risk for leaving AMA in order to provide a higher standard of care for the patient.

Elective Early-term Deliveries: Are They Guideline Compliant?

By Bethany Zeigler, MS4
Mentor: Keith A. Hansen, MD

Introduction: Since 1979, the American College of Obstetricians and Gynecologists (ACOG) has cautioned against inductions before 39 weeks in the absence of a medical indication due to increased risk for neonatal adverse outcomes. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) issued guidelines that hospitals should not electively deliver pregnancies prior to 39 weeks unless medically indicated. This developed into a requirement that, if not followed an organization can be penalized. The goal of the study was to affirm physician documentation of appropriate indications for delivery, in compliance with JCAHO guidelines and to reevaluate cases from the external review that were found to be out of compliance.

Methods: A retrospective chart review was performed on early-term deliveries between 37 and 38 +6 weeks at a Midwest hospital from January through December 2016. Twelve parameters were evaluated: gestational age, mode of delivery, weight of baby, type of provider, indication for delivery, compliance with JCAHO, Apgar scores, mode of induction, whether there were complications in labor, maternal complications, fetal complications and what were the complications. The indication for delivery in the history and physical examination was noted and compared to JCAHO metrics to determine if the delivery was in compliance. This data was then compared to an external review done by Midas Health Analytics Solutions (Midas) of the same time period to expose any discrepancies.

Results: Of the 3,122 total deliveries done at this hospital, 759 deliveries were between 37 and 38 +6 weeks of which 328 (43 percent) were done electively. Of those done electively 295 (90 percent) were in compliance while 33 (10 percent) were not compliant with JCAHO guidelines for early-term delivery. Of the 33 non-compliant subjects listed indications included 16 with elective repeat cesarean section, three a thin lower uterine segment, two advanced maternal age, two advanced cervical dilation, two macrosomia, two maternal neurological disorders, and the remaining six were “other.” Of the 1,478 deliveries randomly selected by Midas, 165 patients met early-term delivery criteria. Of these 165 subjects eight deliveries (5 percent) were non-compliant with JCAHO guidelines. Comparison of the eight non-compliant deliveries identified by Midas to this study’s results showed four of
the Midas non-compliant deliveries had coding discrepancies that had they been coded accurately would have been compliant. This study found the other three as non-compliant, and the last one had not been included in this study’s data set.

Conclusion: In this retrospective chart review of 759 early-term deliveries 329 (43 percent) were done electively; of which 295 (90 percent) were in compliance while 33 (10 percent) were non-compliant with JCAHO’s guidelines. Over half of the elective early-term deliveries were performed for indications not compliant with JCAHO guidelines. Similar results were found in the Midas review. Interestingly, half of the non-compliant elective deliveries in the Midas review were due to coding errors. Subtle differences in coding can mean the difference between an induction delivery that meets exclusion criteria and is in compliance with JCAHO recommendations and one that does not. Appropriate identification of non-compliant deliveries is vitally important to reduce monetary penalties for health care organizations. Improvements in medical documentation would allow for more accurate coding that could significantly reduce the number of non-compliant deliveries.
Introduction

In 1928 members of the South Dakota State Medical Association (SDSMA or the Association) held a special meeting in Huron to consider a basic science bill that conformed “…in its entirety to the conditions existing in our state.” Their draft bill proposed a standardized examination for all practitioners of the healing arts. A legislative committee, with its attorney, “…was in Pierre during the early part of the 1929 legislative session to make sure the bill was properly launched and in effective channels.” Shortly after its introduction, the bill was withdrawn due to opposition from one SDSMA district whose legislative representatives were among the most influential in the legislature. A similar bill promoted by the SDSMA in 1933 also failed. It would be another six years before a basic science bill was enacted by the legislature.

Eighty-nine years later, a bill governing the practice of certified nurse practitioners (NP) and certified nurse midwives (NM), including a board independent of the South Dakota Board of Medical and Osteopathic Examiners, was considered (Senate Bill 61). Introduced by a senator who characterized herself as representing the “House of Nursing,” the bill challenged “…the overarching role that medicine thinks and perceives that they may have regarding advanced practice nursing practice.” SB 61 passed in the senate and house and was signed by the governor.

For this legislation in the 1930s and in 2017, the SDSMA’s interest was defining and maintaining control of medical practice under the twin rubrics of quality and patient welfare. In both circumstances, legislators and other health care professional organizations contested not only the SDSMA’s motivations, but also the evidence supporting their efforts.

Our research explored (1) whether the collective viewpoints and conduct of the legislature, the SDSMA, and non-physician medical professionals are comparable in the two circumstances; and (2) if the circumstances are comparable, can we derive a useful concept or theme that could help guide the SDSMA in the future?

Methods

We gathered information about the South Dakota basic science bill from 1929 through 1939 and the 2017 nurse practitioner and nurse midwife bill to compare legislative and medical professional influences on the outcomes of the two laws. We utilized (1) transactions of the SDSMA found in its digital archives and in the Journal-Lancet; (2) newspaper accounts found through searches on Newspapers.com; (3) microfilmed articles from the Pierre Capitol Journal, 1929-1939; (4) modern day legislative records available through sdlegislature.gov, including tape recordings of committee meetings; (5) direct communication with the South Dakota Department of Health, the South Dakota Board of Medical and Osteopathic Examiners, the South Dakota Board of Nursing and the Board of Regents; and (6) responses to a survey of members of the 2017 South Dakota legislature (See Appendix A at sdsm.org).

Our focus was on factors directly influencing the actions of the entities we studied. We recognized, but did not attempt to evaluate, others (e.g., personal and financial relationships among supporters and opponents; misinterpretation of information; non-public “agendas;” the
influence of corporate medicine). We did not address whether either the 1929 legislation or that of 2017 was ultimately in the best interest of patients in South Dakota.

**Basic Science Bill**

**Background.** The SDSMA was created in 1882 while South Dakota was still part of the Dakota Territories. The Association had early success in promoting legislation that maintained physicians, rather than chiropractors, osteopaths, homeopaths and other non-allopathic practitioners, as the caretakers of the healing arts. In the decades after South Dakota received statehood, the Association appeared to lose influence; the 1920s saw no increase in SDSMA membership, yet encroachment on the practice of medicine by ‘irregulars’, predominantly chiropractors, continued. To counter, the Association favored the idea of a basic science law, one that would require those seeking a license to practice the healing arts in South Dakota to pass an examination covering the subjects of chemistry, anatomy, physiology, and pathology. Encouraged by the American Medical Association (AMA), this approach was intended to deliberately exclude “chiropractors and other inadequately trained practitioners” from licensure, as it was assumed they would be unable to pass the exam without the knowledge gained from a “regular” school of medicine.

**Crafting and Introduction of the Basic Science Bill.** At the special meeting in Huron in October 1928, SDSMA members drafted, with the help of attorney A.L. Wyman, a basic science bill “…patterned after Doctor Woodward and sponsored by the A.M.A.” The SDSMA sent the draft bill to all its component districts and it was modified based upon their responses. The most significant modification was a return to a governing board composed entirely of basic science professionals rather than a mixed board composed of physicians, chiropractors and others.

The bill was introduced into the state legislature in the 1929 session with support from nearly all the Association’s districts. Only the SDSMA’s Black Hills District stood in opposition “mainly on the grounds that it was merely another piece of legislation which was unnecessary in that it only created another board of medical examiners in a field already amply provided for.” The South Dakota Chiropractors Association took out an ad in the Argus Leader agreeing with the Black Hills District physicians, quoting an editorial in the Spearfish Mail that qualified practitioners should “be able to convince their patients of their ability” and not “yelp for assistance every time the legislature meets.” Prior to knowing the content of the legislation, legislators from the Black Hills area promised the district’s physicians they would oppose it. After Association leaders discussed the bill directly with them, the legislators were willing to vote for the bill, if their constituents agreed, in order not to go back on their promises. The Black Hills District physicians did not agree, despite a visit from SDSMA president Dr. N.K. Hopkins, and the bill was pulled from the session rather than risk defeat. Even with the pushback from chiropractors, the SDSMA later noted “opposition from the cults was negligible” and “there still exists a need of education of the organized profession of the state and that this condition must be absolutely overcome before needful and vital legislation can be enacted.”

**The Basic Science Bill of 1933.** The SDSMA campaigned over the next four years to educate its members on the importance of the basic science law and again put forward the bill in the 1933 legislative session – this time with cohesive backing from the state’s physicians. Introduced into the house as HB2 by R.H. Sprat (D) of Hopkins, and the bill was discussed for some days in a committee on medicine and surgery chaired by Dr. B.F. Bettelheim, a physician from Spearfish. There was considerable opposition to the bill which reportedly was “aimed at chiropractors, osteopaths, Christian Science practitioners and others

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7. Other states had taken a different tack: they promoted legislation that defined the practice of medicine such that it could be controlled only by “regular” practitioners (see Footnote 53).
9. Chapter 143 (H.B. 68), The Laws Passed by the Seventeenth Session of the Legislature of the State of South Dakota (Pierre: State Publishing Company, 1921), 233-5. This legislation created a separate board to license chiropractors and granted to them “all the privileges granted other physicians or healers pertaining to the public health.” Chiropractors were enjoined from practicing obstetrics or treating contagious or infectious disease. Examinations were to cover the same subjects as those proposed in the Basic Science Bill.
10. William Creighton Woodward, a physician and lawyer who served as legal counsel for the AMA from 1922 to 1939.
11. Transactions of the South Dakota State Medical Association 1929, SDSMA Digital Archives.
13. Argus Leader, Sioux Falls, SD, 3 February 1929, 11.
15. Argus Leader, 7 January 1933, 4.
engaged in the healing art.” Dr. A.S. Rider, an SDSMA member from the 7th District, challenged this view, saying: “Any physician who supports this bill because he hopes to exclude chiropractors is, in my opinion, doomed to disappointment.” Dr. Rider, essentially the only physician supporting the bill in letters to the editor, distorted much about the bill (e.g., “the bill did not originate with the American Medical Association” when it indeed did) and his support was lukewarm at best. In print the bill’s most vehement opponent was Dr. E.F. Tiesen, a chiropractor from Freeman. He and others pointed out the bill was self-serving: “...the present bill is but a continuation of the battle which the American Medical Association have waged against other branches of the curative professions...with the...view of obtaining...a monopoly of the right to heal.”

When the committee report of the bill was presented to the house, the representatives refused to approve it 44-37. This effectively stripped the bill of its amendments and it was tabled indefinitely on motion of Dr. J.G. Kleinsasser, a representative from Tyndall and a chiropractor, at the very end of the House session.

Some Factors in the Outcome of the 1929 and 1933 Basic Science Bills. The SDSMA failed twice in the span of five years to secure passage of basic science legislation. Although the Association was larger in size, (in 1930, 500 physicians practiced in the state with 70 percent active in the SDSMA, while the number of osteopaths was estimated at 40 and chiropractors at 90), chiropractors and osteopaths were much better organized politically. Lewis Bicknell, the Association’s legal counsel in 1933, noted after watching the bill in session, “If we had had one man on the floor as active and interested as Kleinsasser was against us, we could have gone forward successfully.” Bicknell also pointed out that few physicians wrote letters to the legislature to voice their opinions, and public attention to the bill was either indifferent or influenced by the local chiropractors. More letters to editors in South Dakota newspapers opposed the bill than favored it (at a ratio of 6:1), and as many as 20 opposing letters per day arrived in the legislature. No other bill in the session had as much correspondence.

Passage of a Basic Science Bill. Six years later, in 1939, the SDSMA once more followed basic science legislation to the house and senate floors. The Association’s leadership again hired a lobbyist and legal advisor (Karl Goldsmith) and rallied interest among the membership to be on call and lend their influence during the session. Ten years after its initial introduction, the Basic Science Law (House Bill 10) was approved by a 24 to 6 majority in the state senate, and thereafter became law. It included a Board of Examiners comprised of one medical doctor, one osteopath, one chiropractor, and two basic science professionals (professors).

Nurse Practitioner Bill

Background. Senate Bill 61 provided for the independent practice of nurse practitioners and nurse midwives, with sole and autonomous regulation by the South Dakota Board of Nursing. Related legislation failed in 1998 and
2007. Those bills, involving nurse anesthetists and nurse midwives, respectively, had very narrow scopes in comparison to the radical changes governing advanced nursing practice introduced with SB 61.

**Previous Legislation Regarding Nurse Practitioners and Nurse Midwives.** In 1998, then SDSMA President Dr. Steven Schroeder restated a long-standing theme: “No one is questioning the competence of CRNAs, but rather we will attempt to convince the Legislature that in the interest of quality care, physicians should retain ultimate responsibility for the patient’s welfare.” Dr. Rod Parry, the next president of the SDSMA, supported that position in September 1998: “I am certain that only physicians are prepared to assume the responsibility of medical care from cradle to grave or from gene therapy to the compassion of hospice.” Members of the legislature were apparently unconvincing by these arguments, and the bill was passed and forwarded to Gov. Bill Janklow who vetoed it. Although the SDSMA was pleased with the outcome in the state capital, one of its members warned of an ominous trend: “Erosion of the medical profession at all levels continues.” Despite the legislative course of this bill, the ultimate outcome of which depended upon the action of one person, the SDSMA emerged from the 1998 legislative contest making no changes to the legislative approaches it followed for the previous 90 years.

In 2007, the nurse midwife legislation appears to have been no more than an afterthought, either within the Association or among the public. The only mention in *South Dakota Medicine* of the legislation was an editorial recording its defeat. A newspaper search of both the 1998 and 2007 legislative sessions for relevant articles yielded just one by columnist Jill Callison covering the midwife bill.

**The Introduction of SB 61.** The publication of model nursing practice act legislation in 2009 and the support of the Institute of Medicine for expanding the role of nurse practitioners in health care gave new impetus for pursuing comprehensive advanced nurse practice legislation. SB 61 was championed by Sen. Deb Soholt, chair of the Senate Health and Human Services Committee, who holds a master’s degree in nursing.

**Proponents of SB 61.** The bill’s proponents included representatives from the Board of Nursing, South Dakota Affiliate of the American College of Nurse-Midwives, Horizon Health, the Department of Health, the South Dakota Council of Mental Health Centers, Inc., the South Dakota Health Care Association, the Nurse Practitioner Association of South Dakota, Community Healthcare Association of the Dakotas, the South Dakota Municipal League, and AARP South Dakota. Although the Board of Regents was listed by the legislature as supporting the bill, the Board of Regents, in fact, took no position on the bill and did not authorize any testimony on its behalf.

Support from the Department of Health was unique for this bill, since the Department had never before articulated support for independent nursing practice. Indeed, the Department took no position on the 1998 CRNA legislation and had opposed the nurse midwife legislation in 2007 under Gov. Mike Rounds. The Department of Health based its support of SB 61 on streamlining the licensure process and removing an unnecessary barrier (collaborative agreements with physicians) to practice for nurse practitioners and nurse midwives. The Department believed the barrier could be an impediment to recruitment and retention of NPs and NMs in South Dakota. The Department of Health, part of the governor’s cabinet, could not have supported SB 61 without the agreement and cooperation of Gov. Dennis Daugaard.

Perhaps not as unique, but equally interesting was the absence of any position taken by the Board of Medical and...
Osteopathic Examiners. The board is composed of nine voluntary members appointed by the governor. The board “did not identify any concerns related to public protection or quality of care” in their review of SB 61.40 It is not clear why this board, nonetheless, chose not to offer a public opinion about the transfer of some of its responsibilities to the Board of Nursing. 

Supporters argued the bill removed barriers to recruitment and retention of nurse practitioners and nurse midwives as well as barriers to their providing care in underserved South Dakota communities. They staked out a substantiated claim that care quality would not be adversely impacted, predicted that physicians and nurse practitioners would continue to work together as teams and emphasized the absence of any change to scope of practice from current South Dakota law.

**Opponents of SB 61.** Opponents present in committee hearings numbered fewer than proponents and included lobbyist Dean Krogman from the SDSMA, Kristin Schleiter, a senior attorney with the AMA, and six physicians,41 two of whom represented the SDSMA and one the South Dakota Chapter of the American College of Physicians. The remaining three represented themselves. The opponents based their disagreement with the legislation on the claim of de facto expansion of practice scope for nurse practitioners and nurse midwives, adverse impacts on care quality, caregiver distribution, the adequacy of current collaborative agreements42 and the establishment of a double standard of qualification for the practice of medicine.43 The AMA refuted, with substantiating evidence, the claim that SB 61 would result in a migration of health care providers to rural areas, but that came at the end of testimony in the house and was not heard in the senate.

The InSession publication of the SDSMA, distributed to its members weekly, repeatedly urged members to contact legislators as the bill passed through the senate and house and, ultimately, on to the governor. The SDSMA’s core opposition arguments were maintained over the five-week course of InSession publication. Essentially no public opposition – in the form of newspaper articles, editorials or letters to the editor – appeared. SB 61 passed with an overwhelming majority in both the house and senate and was signed by the governor on Feb. 23, 2017.44

**South Dakota Legislature Survey.** Twenty-two members of the South Dakota legislature responded to a seven-question survey on the political influences surrounding Senate Bill 61 (See Appendix A at sdsma.org). Of the 21 that gave demographic information, 10 were state representatives and 11 were state senators. The 2017 legislature was made up of 69 representatives and 35 senators, and the Republican party held the majority (Table 1). South Dakota is one of very few states with a part-time citizen’s legislature, meaning the elected legislators work part-time, have low pay, a small staff, and typically have a full-time outside job or are retired.45

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<td>All Legislators</td>
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Seventy-four percent of survey respondents were contacted by the SDSMA regarding SB 61 and 94 percent of respondents heard arguments in opposition to the bill. No respondent thought the arguments were persuasive. The SDSMA had no influence on the position of 70 percent of respondents on the bill, and 18 percent reported that the SDSMA’s opposition reinforced their original position in support of the bill.

**Discussion**

**Comparisons of the Legislation.** We suggest that the outcome of Senate Bill 61 in 2017 was due to factors very similar to those surrounding the basic science bill in 1929 and 1933. South Dakota physicians in 1930 recognized

40. Margaret Hansen, Executive Director, South Dakota Board of Medical & Osteopathic Examiners. Personal communication, 11 July 2017.
41. These included Dr. Rob Alison, past president of the SDSMA and chair, Governor’s Primary Care Task Force; Dr. Robert Marciano, an SDSMA representative; Dr. Matt Bien, American College of Physicians; Dr. Ben Aaker; Dr. Fatima Kadwai; and Dr. Steve Schroeder.
42. On 8 Sep 2016 the combined boards of Nursing and Medical and Osteopathic Examiners voted to amend administrative regulations (20:62:3) for physician-advanced practice nurse collaborative agreements to permit supervision by electronic means rather than requiring direct personal contact (Minutes, Public Hearing to consider adoption and proposed rules, First National Bank Building, Sioux Falls, 8 September 2016). Only one physician, Dr. Mary Carpenter (SDSMA representative to the AMA), voted against the rule amendment.
43. Under SB 61 licensure for nurse practitioners and nurse midwives was no longer a shared responsibility between the Board of Nursing and the Board of Medical and Osteopathic Examiners.
45. HTTP://WWW.NCSL.ORG/RESEARCH/ABOUT-STATE-LEGISLATURES/FULL-AND-PART-TIME-LEGISLATURES.ASPX#SIDE_BY_SIDE.
that South Dakota state representatives held a skeptical view of medicine, observing their “...general animosity...against the medical profession. They think that we [physicians] are the richest bunch of crooks from South Dakota.” Nearly 90 years thereafter, legislative perceptions about medicine and physicians were unchanged (Table 2).

In addition to nearly identical legislative perceptions of medicine in 1929 and 2017, legislative efforts involving the Basic Science Bill and SB 61 shared other characteristics. The SDSMA lacked strong physician advocates in the South Dakota legislature. In 1929, Dr. A.E. Bostrom’s presence in the legislature was of no influence, and in 1933 Dr. B.F. Bettelheim “…was not only not enthusiastic, he was absolutely indifferent….” The situation in 2017 was similar: Sen. Richard “Blake” Curd, an orthopedic surgeon, voted for SB 61. In both time periods, the Association did not receive strong support from a broad cross section of its membership and, indeed, had members opposing the Association’s interests. Dr. Steven Schroeder, who had, in 1998 as SDSMA president, noted “Any legislation that allows allied health care providers independent practice status represents a potential barrier between physicians and patients,” testified that he was quite satisfied with his own primary care giver, a nurse practitioner.

Non-physician medical professionals acted similarly as well. In the 1930s their public messages in newspaper communications were uniform and their characterization of the SDSMA’s motivation as economic was not effectively rebutted. In 2017, they were united in their arguments about rural medical needs, practice quality and scope of practice. The undercurrent of belief that physician opposition involved only a “turf” issue was, like the economic argument of the 1930s, ineffectively countered. Different from the earlier time period was the absence of commentary in newspapers and the broader constituency arrayed in favor of the legislation (including elements of the executive branch of the state government).

That these legislative events were analogous suggested the possibility of a discoverable, unifying theme that might be useful to inform the SDSMA in the future. Our search for such a theme began with the history of organized medicine in the U.S. with respect to “irregular” practitioners.

### Regulars and Irregulars.

The AMA had, for over 100 years, actively opposed alternative healing practices beginning with the Association’s founding in 1847, an

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46. Transactions of the South Dakota State Medical Association 1930, SDSMA Digital Archives.
47. Dr. A.E. Bostrom was a physician representing the 11th District on the SDSMA Council and represented the 23rd district in the House of Representatives. Dr. B.F. Bettelheim, a physician and surgeon, represented South Dakota’s 46th district and was chairman of the House Committee on Medicine and Surgery.
48. One legislator commented, “There was minimal opposition to the bill from the medical doctors that I consulted. They felt the legislation would have some effect on the medical decisions of NPs but that their professional considerations would maintain the medical doctor/NP relationship as it would be needed.”
event which directly followed (likely not by accident) the formation of the American Institute for Homeopathy in 1844.\textsuperscript{50} AMA opposition was incorporated into its first Code of Ethics,\textsuperscript{51} setting it upon a moral pedestal that, together with other elements, established a \textit{de facto} notion of professionalism. Society transformed that notion over the next 150 years.

Within, as Starr\textsuperscript{52} called it, “the dialectic between professionalism and the nation’s democratic culture”, the opposition to non-allopathic practitioners was criticized as both elitist and economically motivated. Such criticism had a sound basis in fact, although the AMA and its associated societies consistently asserted concerns of quality and safety. In its ethics code itself, though, at least two provisions connected ethics and monetary concerns.\textsuperscript{53}

The public, however, was generally doubtful of patient-centered motives, particularly when it came to public policy and medical legislation.\textsuperscript{54} In 1901, as New York moved toward licensing osteopaths, Mark Twain (who had utilized the services of osteopaths for himself and his daughter) summarized the feelings of those opposed to narrowing the marketplace:

“…physicians think they are moved by regard for the best interests of the public. Isn’t there a little touch of self-interest back of it all? …The objection is, people are curing people without a license, and you are afraid it will bust up business.”\textsuperscript{55}

These historical considerations led us to believe that, on a framework of professionalism, we could gain a useful understanding of the events we described.

The Medical Profession and Professionalism. As a profession, medicine embodies the mastery of a complex body of knowledge and skill used in the service of others. Members of the profession cherish a commitment to competence, integrity, morality, altruism and the good of their patients.\textsuperscript{56} Although some\textsuperscript{57} have called this the basis of a social contract, others regard the commitment as a covenant.\textsuperscript{58} Society, and by extension, governments have historically given professions broad latitude to regulate practice, qualify their members, advocate for the public good, manage resources, establish regulations and much more.\textsuperscript{59} Societal recognition of professionalism as projected by medicine collectively underlies public grants of responsible control. Maintenance of the public trust is thus dependent on the continued ability to articulate a professionalism that a society views as meritorious.\textsuperscript{60}

However, as society has been transformed over time – and medicine along with it – concepts of professionalism must be reexamined, a practical imperative suggested through the South Dakota medical legislation herein described.

The Meaning of Professionalism. Formal definitions of professionalism exist\textsuperscript{61} and include the commitments mentioned earlier. More recently, professionalism has been incorporated into core competencies for medical student\textsuperscript{62} and resident training.\textsuperscript{63} Applying to all stages of a medical career, these competencies focus on behaviors including:

- Treating people with respect, compassion and dignity;
- Acting such that the patient’s needs supersede the caregiver’s self-interest;
- Treating diverse patient populations with sensitivity and respect;
- Recognizing accountability to colleagues and society; and
- Maintaining physical and mental health while seeking continued personal and professional growth.


\textsuperscript{51} Code of Medical Ethics of the American Medical Association, Chicago: American Medical Association, 1847.


\textsuperscript{55} Ober, The Pre-Flexnerian Reports, 161.


\textsuperscript{57} Whitcomb ME. Professionalism in medicine. Acad Med. 2007;82:1009.

\textsuperscript{58} Swick H. Professionalism and humanism beyond the academic health center. Acad Med. 2007; 82:1022-8.

\textsuperscript{59} Starr, Social Transformation, 47-144.


\textsuperscript{61} Cruess, Professionalism for Medicine, 208.


Professionalism is, though, more than just a set of normative behaviors. Grounded in a rich, but often forgotten, history of public service, moral leadership, and scientific advancement, professionalism “…is only beginning to be developed as a rationale and strategy for the profession’s collective, organizational, public roles.” Viewed this way (as a centering and strategic guide), professionalism may be reimagined to influence medicine, through its organizations, to seek common ground in partnerships across a spectrum of health care interests, to overcome medicine’s factious structure in order to act with unity and to win over critics who do not believe medicine is capable of shedding self-serving elements in its past.

**Practice Legislation, Professionalism and the SDSMA.**
Over the course of nearly a century the SDSMA has consistently followed the “realpolitik” of practice legislation, engaging members in campaigns of communication with and financial contributions to legislators together with direct lobbying and periodic support for the election of physician legislators. While recognizing the negative influences of the opposition’s political strength, its own member indifference, public distrust of its motivations and disunity among the fraternities of caregivers, the SDSMA has not reevaluated, much less changed, its concepts of professionalism. In the first third of the 20th century, the SDSMA embraced a professionalism that included well-trained, science-oriented practitioners operating within an accepted code of ethics who actively promoted public health and patient safety. Even from today’s perspective, that professional model was laudable, although there was, in fact, no connection between physician competence and individual outcomes and organization of health care delivery was not improved.

By the second decade of the 21st century medicine had undergone rapid technological changes, providing health care had become more complex, costs had risen substantially, an informatics “revolution” had taken place, consumerism was ascendant and chronic illness became a major issue. Medicare and Medicaid legislation began a marginalization of medical organizations as governments imposed regulations on both compensation and the conduct of practice. Throughout this time, the effects of changes in healthcare were actively discussed by the Association and reasonable actions were initiated. It does not appear, however, that the Association either formally recognized or actively addressed the challenges to its model of professionalism from the previous century.

Support for the basic science bill was a professional mandate, ethically codified, to control who could practice medicine. Couched in terms of quality medical care, the SDSMA’s efforts supporting the bill were overwhelmingly viewed by the legislature and non-physician medical professionals as self-interested, a view the Association did not effectively answer. Reasons for this inability to establish the Association as trustworthy before the early 20th century public included behavioral restrictions in its ethics code, a view of its physicians as “above” politics and possibly the lack of adherence of its members to the professional standards (professionalism) it championed.

In 2017, the SDSMA was operating under the same concept of professionalism, so it still sought to control who could practice medicine represented as a quality and scope of practice issue. As the SDSMA held fast to an anachronistic vision, its interests remained centered on issues of competition rather than cooperation and divergence of interest rather than shared values. As in 1933, it was unable to make a case for shared interests, to escape the win-lose dynamic of inter-professional conflict or to break the negative stereotype of selfishness.

**The New Professionalism.** “Faith in the doctor,” said Twain. “Perhaps that is the entire thing.” Faith can be a starting point of a new professionalism, but even this simple idea means something different when the doctor is a “team.” Other examples of concepts in a new professionalism include medical practice within a corporation, the delegated role of medical associations in administering public programs (similar to the arrangements in Canada) and a unified concept of training and qualification for health care professionals. Although historic traditions and past accomplishments for public good can effectively be

66. The lack of broadly active membership participation over the period of time studied necessarily led to dominance of the SDSMA by a self-perpetuating (or self-identified) small group of active members in leadership positions. The resulting structure may have consequently narrowed the vision of the SDSMA.
part of a “covenant for health” (involving the Association, the public, other health care providers, health care corporations, government, insurers and other professional associations), the covenant must begin with a common understanding of what medicine is and what, across all of its practitioners, it wants to be. The Association, and its member physicians, are in a uniquely favorable situation to remodel a concept of professionalism that retains its rich historical roots while establishing a trusted relevance to the needs of a changing society. South Dakota has a relatively small number of physicians (with the opportunity for tight cooperation), a single medical school (for unity of education), and a part-time, citizen’s legislature (with members available to listen).

**Conclusion**

We conclude that the collective viewpoints and conduct of the legislature, the SDSMA, and non-physician medical professionals was essentially the same for medical practice legislation in 1929-1933 and in 2017. Representation in the legislature by physicians, unity of purpose within the SDSMA and effective education of legislators and the public could all have influenced the outcome of legislation, particularly in 2017. These goals were thwarted, at least in part, by a failure to adapt the SDSMA’s model of professionalism during a period of significant socioeconomic, political and cultural change.

**A Thought About What Is Next.** Informed by our work, we are nonetheless ambivalent about suggesting what the Association might do in approaching a changing view of professionalism. We recognize this is somewhat beyond our research goals, but our findings beg for some suggestions about our future.

We think South Dakota patients and those entities having a hand in their care would be well-served if caregivers individually and organizationally embraced a need to begin a conversation. Encouraging a “retreat” for caregivers from all of South Dakota’s professional organizations and health care related schools would allow for an unhurried and broad discussion of goals, principles, ethics, practice regulation, role definitions and so on. The best outcome would be a uniform understanding of medicine in our state – its principles, practice and organization – across the spectrum of caregivers and practice settings. This may be enormously challenging, but if successful could serve not only to formulate a new covenant for health care but also to establish a basis for collective self-interest in the health of South Dakotans.

To be successful, this conversation would require unprecedented cooperation, with stakeholders consciously putting aside limited self-interest. Planning and financial support by stakeholders is crucial and should be encouraged, but not directed, by both state and local governments. Thoughtfully, productively and publicly taking “…the high ground of defining a consensus position of what, ideally, the American medical enterprise should be in the early 21st century” might be the conversation’s guiding principle.

Moreover, schools of nursing, medicine, medical technology, and others at public institutions must work with the Regents to provide a pathway (money, faculty, time) for the expanded integration of professionalism into curricula including shared programs with professional organizations.

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69. Stevens, Public Roles, 348.
Fact:

- A single JUUL pod contains as much nicotine as a pack of 20 regular cigarettes.
- Nicotine can harm a growing brain—it is known to damage brain circuits that control attention, learning, and susceptibility to addiction.
- Young people who use e-cigarettes may be more likely to go on to use regular cigarettes.

JUULing is dangerous.

The newest e-cigarettes are shaped like flash drives and are being used at alarming rates by teens. They are very discrete and come in an array of tasty flavors. Remind young patients and parents that tobacco use in all forms comes with serious health risks and encourage them to talk about JUULing.

Mom, everybody is JUULing. It’s no big deal... way safer than smoking, and it’s fun.

Well... some people use vape short term to help them quit smoking, but the truth is, vape is full of cancer causing chemicals, heavy metals, tin, lead, and high levels of nicotine. Not only is nicotine very addictive, but it can stunt your brain growth.

Some don’t contain nicotine. It’s just harmless flavor and water vapor...

A few maybe. But most kids want the nicotine buzz and all JUUL pods contain lots of nicotine. And it’s not fully regulated yet, so you may not know what you’re getting. If you keep using it, it will damage your brain permanently. You’ll never know how smart you could’ve been.

Whoa – I didn’t know that. I think I might stay away from that stuff. So not worth it.

WARNING: E-cigarette use among young people has risen significantly over the last 5 years. Use among middle and high school students has now surpassed use of regular cigarettes.
Role of Bedside Preparation in Reducing “Door-To-Needle” Tissue-Type Plasminogen Activator (Alteplase) Administration Times and Association with Patient Outcomes

By Kylee K. Lebahn, PharmD, BCCCP; Ryan A. Waybright, PharmD, BCCCP; Surachat Ngorsuraches, PhD; and Thomas J. Johnson, PharmD, MBA, BCPS, BCCCP, FASHP, FCCM

Abstract

Introduction: The purpose of this study is to assess the benefit of bedside alteplase preparation as a component of the acute stroke process.

Methods: A retrospective, single center study, designed to evaluate the impact of a bedside alteplase preparation protocol. Stroke patients receiving intravenous (IV) alteplase prepared at bedside were compared to pre-bedside alteplase preparation patients. The primary outcome was to compare door-to-needle (DTN) times between the groups. The secondary outcomes included comparison of pre-bedside alteplase preparation to post-bedside alteplase preparation on the following variables: imaging-to-drug times, order entry to drug administration times, percentage of patients achieving the 60 minute DTN goal, rate of intracranial hemorrhage (ICH), and patient discharge disposition.

Results: Patients in the pre-bedside preparation group included those who received IV alteplase between Jan. 1, 2012 and Jan. 31, 2015 and post-bedside preparation patients between Feb. 1, 2015 and March 31, 2016. Thirty-one patients were enrolled in the study, 16 in the pre-bedside preparation group and 15 in the post-bedside preparation group. The mean DTN time in the post-bedside alteplase preparation group was significantly reduced, as compared to the pre-bedside preparation group (66.6 minutes vs. 95.9 minutes, p=0.024). Percent of patients meeting the 60 minute DTN time goal was significantly improved when alteplase was prepared at bedside (53.3 percent vs. 18.8 percent) (p=0.044). Rates of ICH were not significantly different between the two populations.

Conclusion: Bedside alteplase preparation significantly reduced DTN times in an academic hospital emergency department.

Background

Ischemic stroke is a leading cause of disability and death in the developed world. Intravenous (IV) tissue-type plasminogen activator (alteplase) has been FDA approved for use in acute ischemic stroke (AIS) within three hours of symptom onset based in the NINDS alteplase trial. The NINDS trial demonstrated a 12 percent absolute improvement in functional outcomes in patients receiving IV alteplase versus placebo.1 The American Heart Association recommends IV alteplase, 0.9 mg/kg (maximum dose of 90 mg), to be administered to select patients experiencing an AIS with a goal door-to-needle (DTN) time of 60 minutes (Class I, Level of Evidence A).2 As of March 1, 2015 the Joint Commission requires Primary Stroke Centers to administer IV thrombolytic therapy to eligible patients presenting for stroke care within 60 minutes in at least 50 percent of the thrombolytic cases.3
While alteplase may be administered up to three hours, and with additional exclusion criteria up to 4.5 hours post-symptom onset, literature has demonstrated improved outcomes associated with earlier administration within the time window. A study by Saver and colleagues retrospectively evaluated 58,353 AIS patients including assessment of time to treatment with IV alteplase and outcomes. The study concluded more rapid alteplase therapy was associated with reduced mortality, fewer symptomatic intracranial hemorrhages, higher rates of independent ambulation at discharge, and more frequent discharges home.4

Fonarow and colleagues evaluated DTN times for alteplase administration and clinical outcomes in AIS before and after a quality improvement initiative.5 The study intervention was the implementation of the 10 care strategies The Target: Stroke publication recommended to achieve faster DTN times.6 One of these strategies is rapid access and administration of intravenous alteplase, which is described as having the alteplase readily available in the emergency department or CT scanner so it can be quickly prepared and administered by the stroke team. The study demonstrated a significantly higher achievement of the 60 minute DTN goal in the post intervention group. Additional benefits shown in the post-intervention group patients included decreased in-hospital mortality, decreased rates of symptomatic intracranial hemorrhage (ICH), and higher likelihood of discharge to home.5

While the decision to administer alteplase for AIS should always include a risk versus benefit analysis, outcomes and potential benefit can be optimized with certain process adjustments. Based on current literature and reflected in the Stroke Center standards, best outcomes are achieved when alteplase is administered in an expedited fashion, optimally within 60 minutes of presentation.

Recently, a protocol was developed and instituted for bedside alteplase preparation at an academic hospital emergency department. This protocol was driven by a need to reduce DTN times and guided bedside alteplase preparation by pharmacists and resource nurses in the emergency department (ED). Pharmacists and nursing staff were educated and trained on alteplase preparation and assessment of patient inclusion and exclusion criteria prior to implementation. The pharmacists trained included those working in the ED, intensive care unit (ICU), and evening decentralized clinical roles. Emergency department resource nurses were also trained on the process as the emergency department does not have 24-hour pharmacist coverage. A kit was created to be placed in the automated dispensing device located in the emergency department.

![Figure 1](image-url)
This kit included alteplase 100 mg (drug and diluent), various syringes and needles, IV tubing, an inclusion and exclusion card (based on the American Heart Association Stroke Guidelines), a dosing chart, a list of contents, alteplase preparation card, and labels for the bolus and infusion doses.

Prior to implementation of the protocol, which rolled out February 1, 2015, alteplase ordered in the ED was prepared and checked in central pharmacy and then hand delivered to the emergency department. With the new protocol, steps were reduced by having alteplase prepared in the emergency department by an ED pharmacist or resource nurse. Due to the change in the alteplase preparation process, the rationale of this study was to validate the benefit of bedside alteplase preparation as a component of the acute stroke process at our facility.

Methods

A single center, retrospective, observational trial was conducted comparing pre-bedside alteplase preparation patients to post-bedside alteplase preparation patients. Pre-bedside alteplase preparation patients received alteplase for AIS between Jan. 1, 2012 to Jan. 31, 2015 and post-bedside alteplase preparation patients from Feb. 1, 2015 to March 31, 2016. Patients in the pre-bedside group had alteplase prepared in a centralized pharmacy with hand transport to the emergency department. Patients in the post-bedside group were treated after the implementation of protocolized bedside preparation of alteplase by an ED pharmacist or RN. Eligible patients were identified utilizing reports generated by the hospital's electronic medical record. The study was approved by the institutional review board.

The primary outcome of this study was to compare DTN times in the pre-bedside alteplase preparation patients to the post-bedside alteplase preparation patients. The secondary outcomes included comparison of the protocol effect between the pre-bedside alteplase preparation and post-bedside alteplase preparation groups on the following variables: imaging-to-drug times, order entry to drug administration times, percentage of patients achieving the 60 minute DTN goal, rate of intracranial hemorrhage (ICH), and patient discharge disposition. Other data collected included: duration of hospital stay, age, gender, National Institutes of Health (NIH) stroke scale scores, administration of medications to optimize blood pressure, dose of alteplase administered, time from symptom onset to presentation to the ED, door-to-imaging times, and time of day alteplase was ordered and administered. Time divisions evaluated included 0000-0859, 0900-1259, and 1300-2359, corresponding with ED pharmacist coverage – 0900 to 0030 on the weekdays and 1300-0030 on the weekends. Pharmacist involvement in the alteplase dosing, ordering and preparation process was also evaluated.

Patients of age 18 years and above were eligible for inclusion if alteplase was administered for AIS in the emergency department. Patients were excluded only for analysis of ICH and disposition if they were transferred for admission to a different facility after alteplase was administered. Patients were fully excluded from the study for pregnancy, incarceration, or receiving alteplase at an outside facility prior to arrival at the study center. Patients were identified from the medical record through searches for patients receiving IV alteplase during the given time-frame – therefore, alteplase excluded patients were not assessed or identified.
Statistical Analysis

All variables were descriptively analyzed. Independent-samples Mann-Whitney U tests were used to compare door-to-needle times and imaging-to-drug times between the pre-bedside alteplase preparation patients and the post-bedside alteplase preparation patients. Pearson Chi-square test and Fisher’s Exact test were used to compare the percent of patients meeting the DTN goal of 60 minutes and the rate of intracranial hemorrhage respectively between the two groups. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 31 patients were included in the study, 16 in the pre-bedside alteplase preparation group and 15 in the post-bedside alteplase preparation group. In assessed variables, the groups were fairly similar except for gender distribution, symptom-to-door average, and pharmacist presence (Table 1).

The primary outcome, mean DTN time, was significantly reduced in the post-bedside preparation group (66.6 minutes vs. 95.9 minutes) \(p=0.024\) (Table 2). The mean imaging-to-drug time was significantly shorter in the post-bedside alteplase preparation group as well (54.4 minutes vs. 91.7 minutes) \(p=0.003\). The percentage of patients achieving the 60 minute DTN goal time was significantly improved in the post-bedside alteplase group, 53.3 percent vs. 18.8 percent \(p=0.044\). The rate of ICH was not significantly different between the two groups, with two patients in the pre-bedside alteplase preparation group and none in the post-preparation group \(p=0.488\) (Table 2).

A majority of the pre-bedside preparation group 10/16 (62.5 percent) were discharged to inpatient rehabilitation, 5/16 (31.3 percent) to home, and 1/16 (6.3 percent) was transferred to a heart hospital to undergo a patent foramen ovale closure. In the post-bedside preparation group 6/15 (40 percent) of patients were discharged home, 3/15 (20 percent) to inpatient rehab, and 2/15 (13.3 percent) were transferred prior to admission to another facility for endovascular intervention. One patient expired prior to discharge and one patient transitioned to hospice care in the post-bedside alteplase group.

Neither of the aforementioned outcomes, hospice care or expiration, were deemed to be due to complications of alteplase therapy. Statistical comparison and analysis regarding discharge disposition were not conducted due to the small sample size and variation of discharge dispositions. The differences in placement are likely due to our limited patient population.

A majority of patients (71 percent) in both groups received alteplase between the hours of 1300 to 2359. The next most common timeframe was 0900 to 1259, and only one patient (pre-bedside preparation group) received...
alteplase during the overnight hours of 0000 to 0859. ED pharmacists were involved in 75 percent of the pre-bedside alteplase patients and 100 percent of the post-bedside alteplase preparation patients.

Order entry to drug administration times were difficult to assess in both study groups. The process of ordering was variable, sometimes ordered by the physician and edited by the pharmacist with others being initially entered by the pharmacist. In the post-bedside alteplase preparation patients the alteplase was sometimes ordered only minutes before the dose was given. Due this variability, this secondary outcome was not assessed for final results.

**Discussion**

Recent studies evaluating the use of alteplase for acute ischemic stroke have concluded more rapid DTN times are associated with improved outcomes. It can be difficult to achieve a goal DTN time of 60 minutes or less when multiple barriers exist. With this study we mitigated one of those barriers and showed a significant reduction in DTN time.

Sauser and colleagues recently completed a cohort analysis of patients with AIS treated with alteplase. The primary outcome was a broken down measure of time from ED arrival to thrombolytic delivery. After adjustment for patient factors, imaging-to-needle (ITN) time explained 64.6 percent of the variation in hospital risk-adjusted DTN times. This study concluded ITN time was a great source of variability in hospital DTN times and is a more common contributor to delays in alteplase therapy. Our study demonstrated a significant reduction in DTN times by reducing alteplase preparation times, a component of the ITN time.

Another study, published in *Circulation* in 2011, evaluated participants in the “Get with the Guidelines-Stroke Program” (GWG-S). The authors found that among 25,504 patients, only 26.6 percent had a DTN time of 60 minutes or less. In addition, only 6.7 percent of the hospitals had a DTN time of 60 minutes or less in over 50 percent of their presenting stroke patients – a new requirement for hospitals registering as Primary Stroke Centers. In our study, pre-protocol implementation achievement of the 60 minute goal was unfortunately poor (18.8 percent). We found that having a bedside focused process of alteplase preparation in the ED significantly reduced these DTN times and increased our percentage of patients meeting the 60 minute DTN goal to over 50 percent.

A study published in 2014 by Xian and colleagues, evaluated hospital strategies and DTN times. They surveyed 304 of the GWG-S hospitals joining the Target: Stroke, from January 2008 to December 2009, regarding baseline strategies to decrease DTN times. The three strategies that were independently associated with shorter DTN times included rapid triage/stroke team notification (69 percent of the hospitals with a mean reduction of 8.1 minutes), single-call activation system (63 percent of the hospitals with a mean reduction of 4.3 minutes) and alteplase stored in the ED (62 percent of the hospitals with a mean reduction of 3.5 minutes). An alteplase administration protocol, routine premixing of alteplase, and/or alteplase stored in the ED were all factors associated with a significant improvement in percentage of patients meeting DTN time of 60 minutes or less. Simply having alteplase available in the ED, as Xian and colleagues’ study demonstrates, can help overcome certain barriers in regards to retrieval, preparation, and delivery of the product. Our study adds further validity to this conclusion, as DTN times were significantly reduced after moving this process out of the central pharmacy and into our ED. In fact, our study demonstrated a much greater reduction in DTN times (29.3 minutes vs. 3.5 minutes) which may have been aided by our strong pharmacist involvement.

Although our study was a single center, retrospective study, we found similar results to previous studies evaluating alteplase and strategies to reduce DTN times. This study adds further validation to the overall practice and found significant time savings with the pharmacist driven process of preparing alteplase at bedside. Our study wasn’t without its limitations. Limitations included small sample size, retrospective nature, lack of study power calculation, and lack of group comparison in terms of disease severity or comorbidities. These limits affected our ability to identify outcome effects, including changes in ICH rates or disposition. Despite these limitations, our study did demonstrate a significant improvement in DTN time when we addressed a barrier to administration. We included multiple data points evaluating different time points in the alteplase process and had relatively few exclusion criteria. Also, in the post-bedside alteplase preparation group pharmacist presence was 100 percent, which likely assisted in the reduction of DTN times.
Conclusion

Our study demonstrates bedside alteplase preparation significantly reduces door to needle times in the ED. These DTN reductions led to a significant increase in achievement of the 60 minute DTN goal time window, above the requirement for Primary Stroke Centers. Secondary outcomes of ICH rate did not show a significant difference, but larger studies would be valuable to confirm any benefit in this area.

REFERENCES


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Obesity and accompanying comorbidities are a growing problem in America. According to the American Society of Metabolic and Bariatric Surgery (ASMBS), there were an estimated 228,000 bariatric surgeries in 2017. Bariatric surgery is the most effective long-term therapy for the management of patients with severe obesity. Bariatric surgery procedures primarily lead to weight loss by either limiting food intake (restrictive surgery) or by decreasing the reabsorptive capacity of the GI tract (malabsorptive surgery). Familiarity with the long-term management of patients is needed by all providers secondary to the large number of annual procedures.

Hypertension and diabetes are the two most common comorbidities seen in patients who undergo bariatric surgery. Bariatric surgery has proven to be an effective procedure for blood pressure and glycemic control in a vast majority of obese patients with hypertension and diabetes. Sjostrom and colleagues assessed the effect of bariatric surgery on diabetes remission rates. Remission rates were seen in 6.5 percent of control patients versus 30.4 percent of post bariatric surgery patients ($p<0.001$). In addition, significant reductions were noted in microvascular and macrovascular events. Schiavon and colleagues assessed the outcomes of bariatric surgery on patients with hypertension. This randomized trial included hypertensive patients using two or more medications at maximum doses or more than two at moderate doses. The results showed that 83.7 percent of the bariatric surgery patients had a 30 percent or greater reduction of the total number of antihypertensive medications versus the control group with 12.8 percent (CI, 3.1-14.0; $P<0.001$). When looking at remission of hypertension, 51 percent of the surgery patients had complete remission of hypertension ($P<0.001$). Though there is undeniable evidence that

### Table 1. Select Medications to Avoid or Use with Caution

<table>
<thead>
<tr>
<th>Medication Class</th>
<th>Risk</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSAIDs</td>
<td>Increased risk of direct or systemic injury to new stomach pouch due to prostaglandin inhibition</td>
<td>Avoid permanently Use alternates such as APAP, tramadol, opioids Consider use of PPI if NSAID must be used</td>
</tr>
<tr>
<td>Salicylates Corticosteroids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral Bisphosphonates</td>
<td>Increased risk of upper GI irritation</td>
<td>Avoid Nasal/Injectable bisphosphonate preferred Ensure calcium and vitamin D levels are appropriate before treatment Raloxifene for women</td>
</tr>
<tr>
<td>Extended release or Enteric coated medications</td>
<td>Altered release characteristics</td>
<td>Use IR medications or alternate route of administration. Patients requiring extended release medications should be monitored for a change in medication efficacy and safety.</td>
</tr>
<tr>
<td>Antihyperglycemics</td>
<td>Decreased need for diabetes therapies</td>
<td>Monitor blood sugars closely Avoid meds that cause hypoglycemia</td>
</tr>
<tr>
<td>Medications associated with gallstones (e.g., Gemfibrozil)</td>
<td>Rapid weight loss is associated with the formation of gallstones leading to an increased risk.</td>
<td>Avoid Prophylaxis with ursodiol 300 mg daily for six months post-surgery may be considered.</td>
</tr>
<tr>
<td>Direct oral anticoagulants (e.g., apixaban, dabigatran, edoxaban, rivaroxaban)</td>
<td>Unknown absorption</td>
<td>Use warfarin due to the ability to measure INR DOAC levels should be monitored if using</td>
</tr>
<tr>
<td>Oral contraceptives</td>
<td>Obesity related infertility may improve Decreased absorption</td>
<td>Avoid Use non-oral options</td>
</tr>
</tbody>
</table>
Pharmacology Focus

Bariatric surgery can eliminate comorbidities associated with obesity, coverage for the procedure is minimal across America. Fortunately, South Dakota is one of the 22 states where the states healthcare exchange covers bariatric surgery and weight loss programs.

Bariatric surgery has potential effects on the action and absorption of various medications. Table 1 lists select medications to avoid with recommendations for alternative therapies. Products containing sucrose, corn syrup, maltose, fructose, honey, mannitol, and sorbitol should be avoided or sparingly used secondary to increased risk of dumping syndrome which can cause nausea, pain, diarrhea, sweating, tachycardia and fainting. Patients should take sugar free products when possible. An awareness of individual tablet size should be assessed with preference for the smallest tablet size. In addition, use of other routes of drug administration (sublingual, intranasal, rectal, subcutaneous, and transdermal) should be used when available.

Due to a decrease in stomach size and intestinal surface area, patients are more at risk for deficiencies because of reduced nutritional absorption. Bariatric surgery leads to long-term mineral and vitamin deficiency and supplementation should be considered in all patients. Table 2 displays nutritional supplementation recommendations after bariatric surgery. The ASMBS guidelines state that data shows the prevalence of micronutrient deficiency is increasing and monitoring of micronutrients continues to decrease. Chewable or liquid forms of supplementation is recommended for optimal absorption.

Decreased absorption of calcium and vitamin D puts patients at risk for hyperparathyroidism and osteoporosis and patients should receive supplementation of both. Low

<table>
<thead>
<tr>
<th>Vitamin or Mineral</th>
<th>Daily Recommendation (mg/d)*</th>
<th>When to monitor levels</th>
<th>Prevalence of deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>1500 mg-2400 mg/d</td>
<td>Every three months in the first post-surgery year and then annually</td>
<td>N/A</td>
</tr>
<tr>
<td>Copper</td>
<td>1-2 mg/d</td>
<td>Screen annually</td>
<td>10-90%</td>
</tr>
<tr>
<td>Cyanocobalamin (Vitamin B12)</td>
<td>PO: 350-500 mcg daily IM/SQ: 1000 mcg monthly</td>
<td>Every three months in the first post-surgery year and then annually</td>
<td>&lt;20% at 2-5 years</td>
</tr>
<tr>
<td>Folic acid</td>
<td>400-800 mcg/d</td>
<td>Every three months in the first post-surgery year and then annually</td>
<td>Up to 65%</td>
</tr>
<tr>
<td></td>
<td>1-2 mg/d if child-bearing age</td>
<td>Particular attention should be given to women of child-bearing age</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>45-60 mg</td>
<td>Within 3 months of surgery, then every three to six months until one year, then annually</td>
<td>13-60%</td>
</tr>
<tr>
<td>Thiamine (Vitamin B1)</td>
<td>Minimum 12 mg/d; At risk patient 50-100 mg/d</td>
<td>Every 3 months in the first post-surgery year and then annually</td>
<td>Ranges from 1-49%, depends on time frame from procedure</td>
</tr>
<tr>
<td>Vitamins A, E, K</td>
<td>Vitamin A: 5000-10,000 IU/d Vitamin E: 15 mg/d Vitamin K: 90-120 mcg/d</td>
<td>Screen for vitamin A within one year</td>
<td>Vitamin A: Up to 70% Vitamin E, K: uncommon</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>3,000 IU</td>
<td>Every three months in the first post-surgery year and then annually</td>
<td>Up to 100%</td>
</tr>
<tr>
<td>Zinc</td>
<td>16-22 mg/d</td>
<td>Screen annually</td>
<td>20-70%</td>
</tr>
</tbody>
</table>

*Daily recommended doses may depend upon type of weight loss surgery; doses of micronutrients for repletion of deficiency are much higher.

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**Table 2. Vitamin and Mineral Supplementation Recommendation After Bariatric Surgery**

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**Table 1. Select Medications to Avoid with Recommendations for Alternative Therapies**

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products containing sucrose, corn syrup, maltose, fructose, honey, mannitol, and sorbitol</td>
<td>Avoided or sparingly used secondary to increased risk of dumping syndrome. Patients should take sugar free products when possible.</td>
</tr>
</tbody>
</table>
levels of iron, folic acid, and cyanocobalamin can lead to anemia. Thiamine levels are also at risk for being deficient and can lead to headache, fatigue, nausea, depression. If left untreated a patient could develop cognitive slowing, confusion, and possible permanent memory loss.1,3-5,8,9 Thiamine supplementation should be initiated in every patient suffering from persistent vomiting. Heavy metals such as copper and zinc are important for metabolic processes.7 In order to prevent deficiencies it is generally recommended for patients to take two adult multivitamins separated as twice daily dosing plus an additional calcium supplement. Additional vitamins and minerals are for patients who are found to be deficient.1

An awareness by all providers of a patient’s bariatric surgery history is critical in being able to safely and accurately manage all medications. Counseling on lifelong nutritional and metabolic needs and continually reassessing the patient for medication appropriateness, especially in patients with continued use of medications for hypertension, diabetes mellitus, and hyperlipidemia as they continue to lose weight.

REFERENCES

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Near the end of the 1800s, the average life span of a male in Dakota territory was less than 47 years. This was partly because the practice of pioneer medicine was so different from that of today. Vaccinations and antibiotics were not yet available for the many infections that occurred; the treatment of severe trauma was without IV fluids and anesthesia; and the training of physicians was often inadequate and certainly not standardized.

Times have changed, and the average life span has improved over the years. However, some aspects of pioneer medicine haven’t changed. Now, just as then, physical trauma with lacerations and fractured bones require stitches, bone setting, and sometimes even amputation. Abscesses still need to be drained. Physicians are still stitching, setting bones, and draining puss much the same way as in the 1880s.

The primary tool for dealing with contagious diseases back then involved isolation and quarantine measures. Certainly, infections such as smallpox, scarlet fever, TB, and diphtheria, which ravaged the frontier West, are not so prevalent today. However, we know that those same isolation and support measures will have to be used again if another pandemic occurs.

Finally, although the content of the lectures at medical schools has changed, the later part of medical training is still dependent on the one-on-one mentoring/apprentice type of learning experience. It is during this mentoring phase when the student shadows a practicing physician and learns how to have compassion for patients.

The pioneer doctor traveled by horse and buggy throughout the county to practice medicine. Despite the limited number of medical tools and medicines available to them, those doctors were always most effective by caring—I mean really caring—for the sick. Some things never change.

Take home lessons:
1. Major changes in health care over the last 100 years include vaccinations, antibiotics, IV fluids, anesthesia, and the education of such methods.
2. Certain elements of frontier medicine are still happening like stitching, bone setting, abscess draining, isolation of infectious diseases, and one-on-one teaching of medical students including the teaching about how important it is to genuinely care for the patient.
South Dakota Board of Medical and Osteopathic Examiners
2018 Legislation Update

The South Dakota Board of Medical and Osteopathic Examiners (SDBMOE) submits a column to South Dakota Medicine to inform physicians and other licensees about various topics of interest that come to the Board. Here is an update of the new 2018 laws that are of interest or directly affect SDBMOE licensees.

Senate Bill 71 (SB 71) was sponsored by the South Dakota Medical Association and is effective on July 1, 2018. This new law makes two changes to the South Dakota Medical Practice Act:

1. Requires physicians to notify the Board, within 30 days, of any acts, including but not limited to:
   a. Any changes in contact information, unprofessional conduct, malpractice or privilege to practice issues, hospital disciplinary actions, alcohol or substance abuse issues, and law enforcement issues.

2. Medical licenses change from an annual renewal to a two (2) year renewal in the odd numbered years. This law will be in effect after July 1, 2018. The initial, reinstatement, and biennial renewal license fees for physicians were all increased to $400.00 as required.

House Bill 1019 (HB 1019) revised provisions regarding background checks for physicians and was passed by the South Dakota Legislature with an emergency provision, and was made effective upon Governor Daugaard’s February 5, 2018 signature. The bill requires an applicant for expedited licensure (through the Interstate Medical License Compact) to submit to a criminal background investigation.

House Bill 1020 (HB 1020) revised provisions and regulations regarding medical assistants after 2017 legislation ended the joint regulation of the Board of Medical and Osteopathic Examiners and the Board of Nursing. This legislation removed references to the Board of Nursing and any mention of joint regulation in the medical assistant practice act, and is effective after July 1, 2018.

House Bill 1079 (HB 1079) was sponsored by the South Dakota Physical Therapy Association to allow physical therapists with advanced training to perform dry needling. Physical therapist assistants are not included in this law and are not permitted to perform dry needling. The bill will go into effect after July 1, 2018; however, dry needling cannot take place until rules regarding dry needling have been established and passed by the SDBMOE. Every effort is being made to have the rules in place by July 1, and the SDBMOE will be informing all physical therapists of the process before the performance of dry needling can begin.
The clinical syndrome known as sepsis represents a profound physiologic reaction to infection. Sepsis and the systemic inflammatory response to this condition can lead to organ dysfunction and significant mortality. Promoting awareness of this disease to patients, families and health professionals, especially those working outside of hospitals and critical care units, is a goal of the Centers for Medicare & Medicaid Services (CMS) and Great Plains Quality Innovation Network (QIN).

The disease exists in a range of severity and the criteria for definition continues to evolve. Medical society guidelines place an emphasis on early identification of patients who may go on to develop sepsis. This serious health condition often presents with hypotension, tachycardia, fever and leukocytosis. Accurately identifying patients who may develop or are in early stages of sepsis is a challenge. A combination of clinical, laboratory and microbiologic data is often required, along with the crucial aspect of ongoing bedside evaluation.

Increasing knowledge of sepsis to families, caregivers and ambulance crew members is a special project of the Great Plains QIN team. There are tools, resources, education and subject matter experts available to reach communities and raise awareness of this serious health concern. The four-state region of North Dakota, South Dakota, Nebraska and Kansas are hindered by the significant distance to, or complete lack of, readily available hospital access. This geographic barrier makes rapid transportation vital.

Existing projects to compliment the efforts around sepsis awareness include antibiotic stewardship, immunization and home health infection prevention, among others. Antibiotic stewardship stresses the timely and appropriate administration of these agents in conditions such as sepsis. Promoting immunization is another effort that can help reduce influenza and pneumonia and also have an effect on reducing the numbers of these cases.

Hospitalization for this health condition is lengthy, expensive and associated with frequent life-altering complications. Sepsis is a common cause of readmissions within 30 days for these persistent problems. Promoting available support services to improve the care transition of these vulnerable patients is a tool to help decrease preventable readmissions.

It is estimated that sepsis accounts for 1.5 million cases, 270,000 deaths and over $27 billion of cost yearly in the U.S. Despite this prevalence, morbidity and expenditure, over 40 percent of Americans are not aware of sepsis and less than 1 percent can correctly identify the common symptoms. In order to increase public awareness and promote early identification of this condition, the Sepsis Alliance (www.sepsis.org) has developed an acronym that may help identify and promote rapid treatment. The letters “TIME” refer to temperature, infection, mental decline and extreme illness.

Great Plains QIN uses a variety of methods to improve recognition for patients, caregivers, families and first responders. The ultimate goal is to create a common awareness for the signs of sepsis similar to the general knowledge of the signs for heart disease or stroke. Educating and reminding the public of this devastating health condition is also a goal for the Sepsis Alliance and CMS. If you desire more information or assistance from Great Plains QIN staff members, please feel free to contact me at Stephan.Schroeder@area-a.hcqis.org.
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Your SDSMA PAC membership is very important in order to elect political candidates who understand the practice of organized medicine in South Dakota. To donate to SDSMA PAC, please visit www.sdsma.org.
**WELL-CHILD VISITS DO DOUBLE DUTY & MOST INSURANCES COVER THEM.**

<table>
<thead>
<tr>
<th>Sports Physical</th>
<th>Well-Child Visit</th>
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<tbody>
<tr>
<td>Physical Growth</td>
<td>✓</td>
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<tr>
<td>Physical Development</td>
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<tr>
<td>Social Competence</td>
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<td>Academic Competence</td>
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<td>Emotional Well-Being</td>
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<td>Risk Reduction</td>
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<td>Violence &amp; Injury Prevention</td>
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<td>Musculoskeletal Health</td>
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<td>Reproduction</td>
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<tr>
<td>Sexual Education</td>
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</tbody>
</table>

It’s especially important that teens have both physical and mental health concerns addressed in their annual checkups. Well-child visits cover ALL the bases.

For more information, please visit [doh.sd.gov/family](http://doh.sd.gov/family)
**For Your Benefit:**

**Shaping Your Profession**

The SDSMA has a member-driven focus on issues, programs and policies, professional involvement, personal development and representation in organized medicine.

- Leadership opportunities on SDSMA committees and task forces;
- Representation for students, residents, young physicians and senior physicians;
- Low-interest educational loans and scholarships for students and residents;
- Collaborating with the University of South Dakota Sanford School of Medicine on physician workforce and medical education funding; and
- Networking with colleagues during SDSMA meetings, conferences, seminars and social events.

We want to help nurture your professional development and your personal development. If you have questions about these programs, give us a call at 605.336.1965, or visit www.sdsm.org. Thank you for your membership in SDSMA.

“For Your Benefit” is the SDSMA’s monthly update on programs and services available to physicians through their affiliation with the SDSMA.

**Legal Brief Highlight: Medical Records Privacy – Disclosures Without Patient Consent**

Patient health information is protected from disclosure under both state and federal law and privacy rules mandated by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). However, law provides for circumstances where a patient’s health information may be disclosed without his or her consent.

The federal privacy rules provide for the disclosure of protected health information without the patient’s consent in certain circumstances as described below:

- Administrative or judicial proceedings pursuant to an order of the court of administrative agency, or pursuant to a subpoena;
- Law enforcement and criminal investigations and related court orders, warrants, subpoenas, or summons issued by a judge or grand jury;
- Protection of the health or safety of others;
- Treatment, payment and other health care providers for the purposes of a referral or coordination of treatment;
- Investigative or oversight agencies for regulatory activities such as audits, investigations, inspections, licensure or disciplinary actions;
- Reporting suspected abuse or neglect of children, disabled adults and the elderly;
- Public health activities for the reporting of statistical data;
- Parents or guardians of a minor or adult subject to a guardianship; and
- Workers’ compensation claims or proceedings.

For more about medical records privacy, download the SDSMA legal brief *Medical Record Privacy – Disclosure With Patient Consent* at www.sdsm.org. Through the SDSMA Center for Physician Resources, the SDSMA has developed more than 50 legal briefs that are available to members. In addition, the Center develops and delivers programs for members in the areas of practice management, leadership and health and wellness.
In order for the SDSMA office to provide members with timely information, it is important that members regularly review their contact information on file with the SDSMA. Have you changed practice locations? Is your email correct? Is your mail going to the right place?

All SDSMA members have an existing online profile. Visit www.sdsm.org and log into your secure online account. Next, access your profile by clicking the “Update my Profile” link at the top of the page.

Please take a few minutes to review your profile and make any necessary updates. Updating your secure account keeps your information up to date and notifies the SDSMA of any changes so you are accurately listed in the member directory and ensures that your membership materials, emails and renewal notices are sent to the appropriate mailing and email addresses.

Do you have a new photo? Updated photos can be uploaded to your user account or emailed to membership@sdsm.org.

South Dakota Medicaid has added a tab to its online portal called “Add Communication.” This is for providers to submit claim reviews and coverage requests in the provider online portal. This feature allows providers to submit, edit and view results of reviews and requests directly in the portal. While South Dakota Medicaid currently allows this communication to be submitted on paper, it will only be allowing online submission beginning Oct. 1, 2018.

Also, effective July 1, 2018 claims review will only be considered if they are received within six months of the date of service or within three months of the date a claim was denied. A claim review should only be submitted if a provider does not agree with a denial determination.

In addition, effective July 1, 2018 South Dakota Medicaid implemented a new review process for provider requested diagnosis and procedure code coverage requests and fee schedule changes. Coverage requests and fee schedule requests are not claim specific and will not be used to re-adjudicate specific claims. These requests will be reviewed on a quarterly basis. Only requests from enrolled providers will be considered. If the request is approved, providers will be notified on the portal. For more information, visit the Medicaid portal at dss.gov.

Source: South Dakota DSS

Over the course of the next six months, work on developing the skills to be the leader you aspire to be.

The SDSMA Center for Physician Resources Health Leadership Institute is the new initiative of the SDSMA that aims to prepare physicians to lead the transformation of health care delivery by facilitating their development of the knowledge, skills and insights needed to bring the clinical perspective to the decisions that are essential to the delivery of quality, efficient, and cost-effective health care.

The first cohort begins in September.

To learn more about participating in a cohort, please contact Mark East, SDSMA Vice President, at meast@sdsm.org 605.336.1965.
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