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D uring every patient encounter, from a well-baby checkup in the clinic, to a surgery in the operating room, to evaluating chest pain in the emergency room, the cloud of medical liability exists. Did I do everything perfectly? Did I miss something? Could I have done something differently? Will I be sued?

The American Medical Association’s (AMA) Litigation Center was formed in 1995 as a physician resource and works to educate and defend physicians and the practice of medicine. In 2014 the Center published a comprehensive report on the status of medical liability in the U.S. I believe their introduction states the problem quite well. “The broken medical liability system remains one of the most vexing issues for physicians today. It places a wedge between physicians and their patients. It forces physicians to practice defensive medicine. It puts physicians at emotional, reputational and financial risk, and it drains resources out of an already financially strapped national health care system – resources that could be used for medical research or expanded access to care for patients”.

The medical liability problem is huge. An AMA survey found that 61 percent of physicians age 55 and older had been sued, 40 percent had been sued two or more times, 90 percent of surgeons age 55 and older had been sued, and even more worrisome, 51 percent of obstetricians/gynecologists under age 40 had been sued. Is it any wonder that the question raised is not if you will be sued, but rather when you will be sued?

The question then is whether this reflects bad medicine. No, it does not! A recent insurance industry trade association of liability insurers’ study demonstrated that 65 percent of claims were dropped, withdrawn or dismissed. Only 8 percent of claims went to a trial verdict and 89 percent of those won by the physician defendant. Their conclusion was that most liability claims were without merit.

Medical liability risk affects where physicians choose to practice. An Illinois New Physician Workforce Study discovered that 49 percent of their new physicians planned to relocate and two-thirds cited the medical liability environment as an important or very important consideration in that decision. In addition, several studies demonstrated that physician supply was enhanced, especially in rural counties, where statewide medical liability risk provisions, such as caps on noneconomic damages, were in place.

Medical liability risk drives up cost. From high dollar claims to high defense expenditures, the cost to the health care system runs into billions of dollars. In addition, liability premiums have skyrocketed with premiums over $200,000 per year in some specialties. The cost of defensive medicine is hard to assess, but the Congressional Budget Office found that total Medicare spending per beneficiary was 4 percent lower in states where noneconomic damages were capped. A U.S. Department of Health and Human Services study in 2008 estimated the cost of defensive medicine at $45.6 billion. In my opinion, the absence of medical liability reform was a glaring omission in the Affordable Care Act’s effort to control health care costs.

The current liability system often gets it wrong. A review of claims found that about 27 percent of claims with an error were uncompensated, while approximately the same percentage of claims without an error were compensated. A number of polls demonstrate that the American public, as well as representatives from both political parties, support medical liability reform. There must be a better system to enhance patient safety and fairly compensate patients with legitimate claims.

There are both traditional and innovative solutions to improving the liability climate. Traditional reforms such as caps on noneconomic damages have been shown to result in improved access to care for patients, lower medical liability premiums and lower health care costs. South Dakota currently has a $500,000 cap on noneconomic damages. The cap covers a wide range of health care providers, and I believe it is important that we all advocate for preservation of a cap in our state. The AMA currently advocates for a $250,000 cap on noneconomic damages, a sliding scale cap on attorney fees, collateral source rule reform with a ban on subrogation (an insurer to pursuing a third party that caused an insurance loss to the insured), periodic payment of future damages and a three-year-from-incident/one-year-from-disclosure statute of limitations. These are all proven strategies for decreasing medical liability risk.

Some of the innovative reforms being evaluated are health courts, liability safe harbors for the practice of evidence-based medicine, expert witness requirements, affidavit of merit and early disclosure and compensation. These innovations show promise. For more details and discussion of these innovations, please go to the full AMA report found on their website at www.ama-assn.org.

Medical liability reform remains a critical issue for all practicing and future physicians. The current system is not working for either patients or physicians. Let’s all join to advocate for medical liability reform now. 

March 2015
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Save a Life on Doctors’ Day!

By Cathie Calhoon and Stephanie Lehmann, State Health Project Co-chairs

Saving lives is one of the many amazing things doctors do. What better way to celebrate your favorite doctor on Doctors’ Day this year than to return the favor by saving a life in his or her honor? Cribs for Kids is a program that does just that. It saves the lives of infants at risk in South Dakota. By making a donation to the Cribs for Kids program in honor of a favorite doctor, you are showing your support for the very important mission to which all doctors are called, and that is to save lives. Any doctor would be thrilled to know that you are donating money to such a worthy cause in honor of them and their dedication to saving lives in South Dakota.

The Cribs for Kids Program targets the very serious problem of infant mortality in South Dakota which is higher than the rates in the surrounding states of North Dakota, Minnesota, Iowa, Montana and Nebraska. “Unsafe sleep practices” was identified by the state task force on infant mortality as one of three major contributors to infant mortality in South Dakota. By providing Safe Sleep Kits to families without a safe sleep option who show financial need, many lives are being saved in South Dakota. In fact, as of Feb. 11, 4,983 cribs have been distributed to families, child care programs, foster care providers, and domestic abuse shelters, according to the South Dakota Department of Health. It is worth noting that the infant mortality rate has dropped significantly from a rate of 8.6 deaths per 1,000 births in 2012 to a rate of 6.5 in 2013 since the implementation of the recommendations of the task force on infant mortality.

Please consider playing an important part in the SDSMA Alliance’s commitment to promoting public health in South Dakota through the Cribs for Kids program. Save a life by purchasing a Safe Sleep Kit for only $80 in honor of a physician of your choice. Each kit includes a portable crib, crib sheet, sleep sack, informational DVD, children’s book and pacifier. Since the Alliance started promoting this project in conjunction with Doctors’ Day three years ago, we have purchased over 200 Safe Sleep Kits and earned the first place National Health Awareness Promotion Award from the American Medical Association Alliance for our efforts in addressing the infant mortality problem in South Dakota.

Let’s continue our success in saving the lives of infants in South Dakota! The problem is far from over. Save a life in honor of your favorite physician this National Doctors’ Day which is celebrated annually on March 30. Send your tax deductible donation to Grace Wellman, 2309 South Holt Ave., Sioux Falls, SD 57103. Checks should be made out to South Dakota Community Foundation. In the memo space, please write Cribs for Kids 718. Remember to include the name of the physician you are honoring as well. Do not send your check directly to Pierre so that we can be sure your district will benefit from your generous donation.

Contact Cathie Calhoon at scalhoon5@rap.midco.net or Stephanie Lehmann at steph.lehmann1@gmail.com if you have any questions. Thank you in advance for helping us to continue our effort to save lives through the Cribs for Kids Program. Have a very Happy Doctors’ Day 2015!
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On page 101 of this issue of South Dakota Medicine, Flanagan et al. describe a baby born to Hutterite parents with features of the Bowen-Conradi syndrome, an autosomal recessive condition common in this population. This infant did not have the classic Hutterite mutation for Bowen-Conradi syndrome, which suggests the possibility of mutations in regulatory genes for EMG1 or a different, mimicking condition.1 Hopefully their group will continue to explore and further define the molecular basis of this condition.

From a genetic perspective, Hutterites are an interesting group because of their social characteristics and the small group (founders) of individuals who founded their group. The Hutterites were named after Jacob Hutter, who was an Anabaptist leader during the 16th century. Historically, since their founding, the Hutterites have gone through periods of persecution with reduced numbers and migration, as well as times of plenty during which they have flourished. Between 1874-1879, 443 Hutterites moved to North America from Ukraine and developed three leuts or colonies. This small founding group of individuals combined with their unique social isolationism, including marriage primarily within their leut (now between leuts is more common), has resulted in a bottleneck of genetics, amplifying potentially deleterious genes. This founder effect and social isolationism would result in the amplification of rare alleles that were introduced to the population by the founding individuals. Investigators have discovered over 30 autosomal recessive, four autosomal dominant including BRCA1 and BRCA2, and X-linked recessive conditions increased in frequency in the Hutterite population. It is important for health care providers who care for Hutterites to be aware of these conditions to provide optimal care for these patients.2

This unique group has allowed for the characterization and identification of causative mutations in a number of genetic conditions. The Hutterites’ well-maintained genealogical records have allowed for identity-by-descent mapping. This technique has allowed for the identification of a number of causative genetic mutations. In Bowen-Conradi, the gene was initially linked to chromosome 12p13.3 by linkage analysis of Canadian Hutterite families. Following this, the DNA from these families was analyzed and identified a homozygous missense mutation in the EMG1 gene. The exact function of the EMG1 protein product is not known, but it appears to play an important role in ribosomal RNA formation.

There are a number of relatively unusual genetic conditions which are more common in the Hutterite population, which have allowed an increased understanding of the molecular mechanisms of these diseases. For those of us who care for patients from the Hutterite colonies, it is important to have an understanding of the conditions that are more prevalent. This is important for the care of our patients throughout their life span.

REFERENCES

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A Hutterite Condition that Mimics Bowen-Conradi Syndrome

By Jason D. Flanagan, CGC; Suzanne Reuter, MD; Patricia L. Crotwell, PhD; Angela Myers, MD; and Kristen De Berg, CGC

Abstract

Bowen-Conradi syndrome (BCS) is a common autosomal recessive condition in the Hutterite population. In 2012, when BCS clinical testing was not available, we reported two babies believed to have BCS based upon their clinical features. Diagnostic molecular testing is now available for this condition. We describe here a brother born to the parents of one of the infants in our previous report. Although clinically both babies in the 2012 report appeared to have the same condition, this current infant was found to have a normal EMG1 gene sequence, and thus, lacks the Hutterite mutation for BCS. We discuss the importance of molecular testing in the Hutterite population.

Introduction

BCS is a common genetic condition in the Hutterite population. As we reported in 2012, it is estimated that approximately one in 335 babies will be born with this condition. The carrier frequency is now estimated at one in 10 in the Hutterite population. This is a remarkably high frequency when compared to other common genetic diseases such as cystic fibrosis, which has a carrier frequency in the Caucasian population of approximately one in 25.

In our original report, we described two cases of infants who died from BCS, which was clinically diagnosed. The gene for BCS was identified by Armistead et al. in 2009, but no clinical testing was available until recently. Therefore, all infants diagnosed with BCS have received their diagnosis based upon clinical findings that mimic trisomy 18 but where trisomy 18 testing has been normal.

In a companion paper in February 2015 in this journal, the first molecularly-confirmed diagnosis of BCS was reported. This is a remarkable step forward in diagnostic testing and genetic counseling for these families.

In this brief report, updated information on case 2 of our original paper will be reviewed. We describe here his brother who was born with similar clinical characteristics but was found to lack the BCS mutation described by Armistead et al.

Case

A 36-year-old gravida 7, para 6 Hutterite woman gave birth to a male infant at 39 weeks gestation. The pregnancy was uncomplicated and a routine ultrasound at 20 weeks was unremarkable. Per family history, the great-grandfathers of the fetus were brothers (Figure 1). Apgar scores were 1, 1, and 2 at 1, 5 at 10 minutes of age. He was subsequently transferred to our institution’s neonatal ICU (NICU) due to perinatal depression and dysmorphic features.

Birth weight was 2,365 grams, length 47.5 cm, head circumference 34.8 cm, small for gestational age. On physical exam he has noted to have simple helices, under-developed antihelix and upturned lobes left more than right, prominent nose with lack of glabellar angle, slopping forehead, other facial features were difficult to assess because he was intubated and had an NG in place. He also had redundant skin of the neck, a soft systolic murmur, bilateral camptodactyly of the second finger, distal creases were shallow, hypoplastic nails, overlapping toes with second overlapping third bilaterally, prominent heels and bilateral foot deformity right more than left.
Based on his clinical presentation, fluorescent in-situ hybridization (FISH) analysis for chromosome 18 was ordered and was negative.

The infant had an echocardiogram that indicated a moderate perimembranous ventricular septal defect. A head ultrasound noted bilateral connatal cysts adjacent to the lateral ventricles. There was also prominence of the posterior fossa that may have represented a prominent cistern magna.

Molecular testing was performed through our institution’s molecular diagnostic laboratory for the \textit{EMG1} gene. Diagnostic testing for the \textit{EMG1} gene was not available in the United States prior to the validation within our institution, though a commercial test has been available in Canada. The results of the molecular testing for this infant did not confirm the mutation in the \textit{EMG1} gene. Because the known mutation was not identified, full sequencing of the \textit{EMG1} gene was performed which was also negative for a known mutation.

The infant died at day seven of life of possible hypoxic-ischemic encephalopathy.

In our 2012 report, we described his brother who was diagnosed with BCS based on clinical findings. He had similar hand findings but was also found to have a hypospadias and a Dandy Walker malformation. At that point, chromosome testing did rule out a chromosome abnormality, but no molecular testing was available for BCS.

**Discussion**

Here we describe the sibling of a previous child diagnosed with BCS based on clinical findings. The gene for BCS was identified in 2009. The only gene mutation found in the Hutterite population studied was a homozygous c. 257A>G (p.D86G) change in the \textit{EMG1} gene. Although this condition has been described outside the Hutterite population, in the Armisted study, this gene change was seen neither in the non-Hutterite controls nor in four non-Hutterite patients with findings consistent with BCS.

In this infant’s family, there are three brothers and two sisters who have normal development, and a brother who has a motor/intellectual disability of unknown etiology (Figure 1). The affected siblings described here both had similar physical characteristics after birth and both died within their first week of life.
Infants diagnosed with BCS have not typically been reported to have internal structural abnormalities. Heart defects, brain abnormalities, cleft lip, and hypospadias are much more common in trisomy 18, but appear to be relatively uncommon in BCS. The affected infants born to this family were noted to have a heart anomaly (this case), hypospadias (previous case), and brain abnormalities (both cases). Based upon the molecular testing, the affected siblings did not have the described mutation for BCS as we assumed. Because we lack molecular testing of the previous case which closely resembled this case, it is impossible to know if this clinical presentation represents an entirely new syndrome or is due to a mutation in a gene related to EMG1.

Based upon our experience with multiple infants with dysmorphic features who are of Hutterite descent, we recommend a detailed ultrasound for all fetuses of Hutterite descent. The ultrasound should look for physical features that are included in Table 1. If features of trisomy 18 or BCS are noted, an amniocentesis could be offered to rule out trisomy 18, and molecular testing for BCS should be encouraged. If testing is not done prenatally, we recommend a genetics evaluation of the baby after birth and that testing be offered for both trisomy 18 and BCS. If both internal and external abnormalities are noted, as referenced in Table 1, and trisomy 18 is ruled out, the baby may have the same condition we describe herein, where molecular testing for BCS was negative. Full genome sequencing would be suggested to help us delineate the cause of this lethal syndrome.

In addition, all individuals of Hutterite descent should be offered carrier screening to test for conditions common in their heritage. Boycott et al. describes 30 autosomal recessive conditions having an increased prevalence in this population. While BCS testing has not been available on a clinical basis, we are hopeful that clinical testing will be available for carrier testing in the near future. As stated previously, carrier status of one in 10 for EMG1-associated BCS may be inaccurate if those cases presumed to be BCS are found to be an entirely distinct syndrome.

In conclusion, this case report further progresses our understanding of BCS. For infants born with trisomy 18 features to Hutterite families, both trisomy 18 and BCS should be excluded as causative. If there are additional affected infants born, particularly those with internal organ concerns and normal trisomy 18 and BCS testing, they may merit further testing to determine whether there is a new syndrome that explains the siblings described in our case reports.

### Table 1. Ultrasound Findings in Bowen-Conradi

<table>
<thead>
<tr>
<th>Likely Features</th>
<th>Possible Features</th>
<th>Unlikely Features (Think Trisomy 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Micrognathia</td>
<td>• Heart defects</td>
<td>• Brain abnormalities</td>
</tr>
<tr>
<td>• Rocker bottom foot</td>
<td>• Hypospadias</td>
<td>• Omphalocele</td>
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<tr>
<td>• Microcephaly</td>
<td>• Cleft lip/palate</td>
<td>• Kidney abnormalities</td>
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<td>• IUGR</td>
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<td>• Neural tube defect</td>
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<tr>
<td>• Clenched Hands</td>
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<td>• Diaphragmatic hernia</td>
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<td>• Breech position</td>
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<td>• Clubfeet</td>
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<td>• Contractures</td>
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Acknowledgement:
The authors wish to thank Dr. Megan Landsverk and the staff of the Molecular Division of the Sanford Medical Genetics Laboratory for their efforts in developing and validating a clinical diagnostic test for the EMG1 gene.

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## 2015 Annual Meeting

**WHAT:** 2015 SDSMA Annual Meeting  

**WHEN:** May 29-30  

- **Friday, May 29** - Educational sessions, exhibitors, Young Physician Mixer, Celebrating Medicine Reception, Presidential Banquet, Awards & Scholarships  
- **Saturday, May 30** - SDSMA PAC Breakfast, Council of Physicians meeting  

**WHERE:** Hilton Garden Inn, Downtown Sioux Falls  

And don't miss the golf tournament and the SDSMA Alliance Medical Student Scholarship Fundraiser on Thursday, May 28!

We hope to see you there – register today!

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Introduction
Since the first coronary balloon angioplasty, interventional cardiology has seen a steady and rapid progress in percutaneous coronary interventions. New devices have been introduced into clinical practice regularly, which have been generally safer, easier to use and more effective. The introduction of drug eluting stents (DES) marks the last major “quantum leap” of percutaneous coronary interventions (PCI). However, even DES use is not free from significant complications. Stent fracture is one of the rare complications associated with DES use.1

We present a case of left anterior descending artery (LAD) DES fracture with displacement of its distal segment in a patient with history of multiple PCI over time exposed to newer devices with each procedure. We review literature about this complication in the context of rapidly changing technology and how it affects the patients, using our case as an example.

Case Report
A 49-year-old man presented to the emergency room with lightheadedness and minor troponin level increase. He denied chest pain or dyspnea. Physical examination was unremarkable and EKG showed sinus rhythm without acute ST-T wave changes. The patient has an extensive past history of coronary artery disease (CAD). He had undergone multi-vessel PCI in the past for acute coronary syndrome and stable coronary artery disease.

Four years prior to the current presentation, he underwent PCI of proximal and distal LAD, obtuse marginal branch (OM), first diagonal branch (D1) and right coronary artery (RCA). Bare metal stent (BMS) Liberte and first generation DES Taxus stent were utilized for these procedures. At that time, second generation DES were not available for clinical use. Few months prior to current presentation, patient sustained cardiac arrest due to proximal LAD stent thrombosis with resulting ST elevation myocardial infarction (Figure 1). After flow was restored with ballooning, a distal LAD stenosis was noted as well (Figure 2). Xience V (second generation DES) was deployed in proximal LAD at the site of stent thrombosis and Cypher (first generation DES) was deployed in distal LAD with good result (Figure 3).

At the current presentation, given mild troponin elevation and extensive CAD history, coronary angiography was performed. Complete distal LAD Cypher stent fracture in its mid portion was noted with 2 mm displacement of its distal segment (Figure 4). There was an aneurysm noted at the site of stent struts separation with 70 percent in stent stenosis of the proximal stent segment (Figure 5). A Xience V stent was placed, bridging the gap between the stent segment and covering the aneurysm (Figure 6) with good results. The patient was discharged to home in a stable condition and remained asymptomatic at one year follow up.

Discussion
Stent fracture has been recognized as one of the complications of stent use, including DES use.1 Most of

Abstract
Coronary artery stent fracture is a recognized complication of drug eluting stents. It has been reported more commonly with the use of Cypher stent. Currently, there are no specific recommendations regarding the management of this entity. Routine screening for stent fractures should be avoided as not all stent fractures lead to clinically significant outcomes.
Figure 1. Coronary angiogram reveals complete occlusion of mid LAD (arrow).

Figure 2: Balloon dilation of mid LAD revealed the culprit lesion (black arrow) as well as a distal LAD lesion (white arrow).

Figure 3: Xience V stent was deployed in mid LAD (black arrow) and Cypher stent in distal LAD (white arrow) with good result.

Figure 4. Image reveals fracture of distal LAD stent. Proximal segment (black arrow) and distal segment (white arrow) of the fractured stent can be appreciated with at least a 2 mm gap between the two segments.
the reported cases have occurred with Cypher stent although Taxus DES stent fracture has been reported as well. Second generation stent fractures have been described as well. Stent fracture has been identified in all three native vessels and saphenous vein grafts (SVG). A metanalysis recently reported a mean incidence of stent fracture to be 4 percent. There is no robust literature on clinical features and outcomes of coronary stent fracture, thus there are no recommendations regarding the management of this entity. Complications associated with stent fracture include stent thrombosis, restenosis and aneurysm formation. Non-uniform strut distribution as a result of fractured stent links with resulting decreased local drug availability has been postulated as a possible mechanism for neo-intimal hyperplasia. Intravascular ultrasound appears to diagnose stent fracture with greater sensitivity than angiography.

Differing rates of stent fracture have been reported previously. This is most likely due to different study designs with higher incidence of reported fracture rates when a follow up angiography was mandatory as compared to clinically driven angiography. This also underlines the fact that clinically significant stent fractures are a small subset of all stent fractures. In a recent study with clinically driven angiographic follow up, stent fracture was identified in 1.9 percent patients over a 32-month period. All fractures occurred in patients with Cypher stent implantation. Stent fracture occurred as early as seven days post stenting and as late as 620 days. Seven patients underwent target lesion revascularization (TLR) for multiple reasons including thrombosis and restenosis. Four patients had complete stent fracture with only two requiring TLR. This study did not include patients with second generation DES placement. A recent study evaluated the rate of stent fracture in second generation DES platforms with mandatory angiographic follow up. The incidence of stent fracture in second generation DES was 1.25 percent compared to 5.8 percent in Cypher. Interestingly, restenosis rates as well as TLR were similar between the two platforms after stent fracture.

Differences in stent fracture rates between first and second generation DES could be due to stent design. Cypher has a stiffer, so called “closed cell design” platform compared to Taxus, which is more flexible possibly accounting for differences in fracture rates. Both of these stents were made of stainless steel. Second generation DES are cobalt-chromium alloy “open cell design” making them even more flexible and potentially more resilient to fracture.

More robust data regarding first generation DES fracture appeared in literature after these stents were completely replaced in less than 10 years by second-generation DES.
1 in 20

1 IN 20 PEOPLE ARE DIAGNOSED WITH COLORECTAL CANCER EACH YEAR. However, when it’s caught early, it is one of the most treatable cancers in men and women. With each early screening, we are changing statistics. Talk to your patients about getting screened. Men and women age 50 and older who meet income guidelines are eligible for colorectal cancer screening through GETSCREENEDSD.
This case is presented to highlight the pace of technological advancement in PCI. In same patient, over a period of few years, multiple coronary stents were placed, including BMS, as well as first and second generation DES. Second generation stents were just being introduced into clinical practice at the time of our patient’s procedures. Paucity of data on stent fracture is at least in part due to rapid introduction of new technology in interventional cardiology, thus by the time there is enough post marketing experience to publish the rare outcomes, the product might be off the market already (as depicted by our case). At present we use second generation DES in the U.S.; however, there are third generation DES available elsewhere, including bioabsorbable stents; thus, current DES with their specific complications might soon become obsolete as well.

Conclusion

Stent fracture is currently well recognized in patients with Cypher stent placement. There is evidence suggesting possible fatal complications associated with it. Currently there are no recommendations regarding screening or management of this entity. In our opinion, if clinical evaluation warrants revascularization, re-stenting of the fractured stent segment with second generation DES should be performed. Newer generations of stents are expected to present less complications of use, including less stent fractures. Cardiologists need to be proactive and yet very cautious in deciding on how to deal with rare complications of DES use in an ever-changing technological milieu.

REFERENCES


Please note: Due to limited space, we are unable to list all references. You may contact South Dakota Medicine at 605.336.1965 for a complete listing.

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Introduction

Pediatric vision screenings and eye exams detect risk factors which inhibit proper vision development. Failure to detect vision problems in children can lead to permanent vision loss from amblyopia. In the U.S., there are currently eight states which do not mandate some type of pediatric vision screening, despite recommendations by the American Academy of Pediatrics that all newborns and children be screened. States requiring screenings have varying requirements with some requiring a complete eye exam by an eye care professional and others simply requiring a visual acuity screening. South Dakota is one of the eight states that do not require any vision screening, and it is currently impossible to determine how many children in the state have received some sort of vision testing.

National data indicate the prevalence of amblyopia in the U.S. to be 2-5 percent, with two of the leading risk factors being refractive error and strabismus. Early detection and treatment of amblyopia risk factors, preferably less than 7 years old, has been shown to reduce the risk of amblyopia. Studies have shown untreated amblyopia to negatively affect academic performance and cause decreased self-esteem. The traditional screening methods to detect amblyopia require subjective responses from the patient that can be difficult to accurately obtain from a pediatric population when screened by lay personnel. However, automated refractors and photoscreeners can be used to produce objective responses to refractive error and ocular alignment requiring less patient cooperation and less training of vision screening staff. The purpose of this

Results of a Pediatric Vision Screening Program in Western South Dakota

By Daniel C. Terveen, MSIV; Jess M. Moser, OD; and Terrence S. Spencer, MD

Abstract

Background: South Dakota is one of eight states that do not require any vision screening for children. This study describes the results of the first children’s vision screening program in the state.

Methods: Children ages 6 months to 12 years were screened using the SPOT photoscreener by lay volunteers as part of the Northern Plains Eye Foundation’s Western South Dakota Children’s Vision Screening Initiative (CVSI). Referral criteria were based on the recommendations of the manufacturer. Data was stratified by age group, sex, and percentage of children referred for hyperopia, myopia, astigmatism, anisocoria, anisometropia, and ocular misalignment. The cost benefit of amblyopia treatment in South Dakota was also calculated.

Results: Screenings were completed on 4,784 children from August 2012 to May 2014 with 62 excluded due to age. Mean age of the 4,722 (2,373 females) subjects was 6 years 7 months. Overall, the SPOT device referred 563 (11.9 percent) children. There was no significant difference in referral rate based on sex (p=0.598). Children aged 73-144 months had the highest referral rate (12.2 percent) and children aged 12-30 months had the lowest referral rate (7.9 percent). The suspected reasons for referral based upon the screenings were as follows: 371 (7.9 percent) astigmatism, 24 (0.5 percent) ocular misalignment, 101 (2.1 percent) anisometropia, 135 (2.9 percent) myopia, 36 (0.8 percent) hyperopia, and 16 (0.3 percent) anisocoria.

Conclusions: The SPOT photoscreener yielded an acceptable referral rate of 11.9 percent. This study represents an effective model for pediatric vision screening in South Dakota.
paper is to report data collected by the SPOT photoscreener (PediaVision Holdings LLC Lake Mary, FL) in a pediatric population in western South Dakota.

**Methods**

**Study Design and Population**

IRB approval was obtained from The University of South Dakota Sanford School of Medicine, and the study conforms to the requirements of the United States Health Insurance Portability and Accountability Act of 1996. Children ages 6 months to 12 years were screened using the SPOT photoscreener by non-medical volunteers as part of the Northern Plains Eye Foundation's Western South Dakota Children's Vision Screening Initiative (CVSI), a program designed to provide free vision screenings to children in South Dakota. Volunteers from five western South Dakota Lions Clubs participated in training sessions offered by Northern Plains Eye Foundation on vision screening and device operation. Screenings were conducted by the project coordinator and Lions Club volunteers at structured locations such as schools and community centers from 2012-2014. Prior to the screening the project coordinator provided children with consent forms. Only children with completed parental consent forms were screened. Comprehensive screening results were documented and mailed to parents of children screened. The results indicated either no follow-up was required, or a complete eye exam was recommended, as well as why the child was being referred to an eye care professional. In the case of children who were referred for a complete eye exam, additional information was provided regarding the meaning of conditions identified on the screening result, eye care professionals in the region, and agencies that may provide financial assistance to families in need. When the child received an eye exam, the study was designed for Northern Plains Eye Foundation to receive an evaluation form back from the eye care professional.

**Device and Eye Examination**

The SPOT photoscreener is a wireless portable infrared device that measures and records binocular refractive error, pupil size, interpupillary distance, and ocular alignment in partially dark adapted mid-dilated pupils. The screening is done without pupil dilation or cycloplegia. The screening device is held approximately 1 meter from the child. It then produces a noise to attract the child's attention, and will not record data until the image is properly focused. Using the eyes' optical reflex an image can be obtained in a matter of seconds with multiple readings in three separate meridians. The device uses programmable criteria which refers a patient if the measurements suggest significant refractive error, anisometropia, anisocoria, or if the pupillary light reflexes indicate strabismus. A pass or fail result is displayed on the screen and can be sent wirelessly to a printer or data storage device. PediaVision reports the accuracy of the device to be +/- 0.25-0.50 D for spherical error and +/-0.50-1.00 D for cylindrical refractive error. Several studies have determined the sensitivity to be approximately 80 percent and the specificity to be 74-85 percent. Referral criteria (Table 1) were based on the guidelines initially determined from the manufacturer and differed slightly from those published by the Vision Screening Committee of the AAPOS in February 2013 (Table 2).

**Data Analysis**

Data was stratified by age group, sex, and percentage of children referred for hyperopia, myopia, astigmatism, anisocoria, anisometropia, and ocular misalignment. Sex was compared using a chi-squared test. Cost benefit analysis for the state of South Dakota was completed using the method described by Membrano et al. 19

**Results**

A total of 4,784 children were screened using the SPOT photoscreener. The mean age was 79 months with 62 children (1.3 percent) excluded due to being out of the age range determined using the categories derived from the Vision Screening Committee of the AAPOS. The final study group totaled 4,722 children consisting of 2,373 females and 2,349 males broken into four age groups (178 ages 12-30 months, 322 ages 31-48 months, 1,327 ages 49-72 months and 2,895 ages 73-144 months). Overall 563 (11.9 percent) of the children failed the screening and were referred for a complete eye exam. There was no significant difference in referral rate based on sex (p=0.598). Children aged 73-144 months had the highest referral rate (12.2 percent) and children aged 12-30 months had the lowest referral rate (7.9 percent). The reasons for referral based upon the screenings (Figure 1) were as follows: 371 (7.9 percent) astigmatism, 24 (0.5 percent) ocular misalignment, 101 (2.1 percent) anisometropia, 135 (2.9 percent) myopia, 36 (0.8 percent) hyperopia, and 16 (0.3 percent) anisocoria. The referral rate for astigmatism was highest for children aged 49-72 months (9.3 percent) and lowest for children aged 12-30 months (5.1 percent), while the referral rate for myopia was highest in children aged 73-144 months (3.8) and lowest for children aged 12-30 months (0 percent).

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was highest in children aged 73-144 months (3.8) and
lowest for children aged 12-30 months (0 percent).

The cost benefit of amblyopia was found to be highly
favorable. The South Dakota birth rate was 12,092 in 2012.\textsuperscript{17} Assuming an annual incidence of 2 percent, and that every child is screened and treated, the annual expenditure for amblyopia in South Dakota is $1,041,413.\textsuperscript{18} One study estimated an individual with untreated amblyopia will diminish a 30-year income by $281,520, this cost extrapolated to the South Dakota workforce represents a yearly loss of $23 million in earning power.\textsuperscript{19}

Discussion

Our study reported a referral rate of 11.9 percent for the SPOT photoscreener. As this is the first published study examining vision screening in South Dakota, there is no existing data for this population with which to compare referral rates. Our rate is lower than a similar study from Riverside County, California using the SPOT photoscreener which reported a referral rate of 30.6 percent,\textsuperscript{6} but higher than published rates of the MTI and Plusoptix photoscreener.\textsuperscript{10,11} Two large volunteer driven community screening programs using the MTI photoscreener in Tennessee and Iowa reported referral rates of 6.7 percent and 4.4 percent respectively.\textsuperscript{10,12} Both of these studies had a significantly higher rate of screenings deemed to be unreadable, which could partially explain the difference in referral rate. Additionally, the Iowa study reported a mean age of 40.8 months as opposed to 79 months in our study. In both studies referral rate increased dramatically as age increased.\textsuperscript{12} Thus, the large proportion of children over 6 years of age in our study (61 percent) could be driving the higher referral rate. The manufacturer’s referral criteria (Table 1) were more sensitive than that recommended by the 2013 Vision Screening Committee’s guidelines (Table 2) for all categories. As our data collection began before these guidelines were published, we chose to continue with the original criteria which also contributed to a referral rate that was higher than other studies using the updated guidelines.\textsuperscript{7}

Photoscreeners do not detect amblyopia directly, but detect problems (amblyopia risk factors) that lead to amblyopia. While our referral rate is higher than the estimated 2-5 percent of preschool age children with amblyopia, it is much more in line with the estimated 15-20 percent prevalence of amblyopia risk factors.\textsuperscript{13-16} According to South Dakota census information from 2012, there are approximately 60,000 children under the age of 5 in the state. The referral rate from this report applied to South Dakota as a whole indicates that there is greater than 7,000 children with amblyopia risk factors. Without treatment, between 1,200 and 3,000 of these children are at risk of permanent vision loss from amblyopia.\textsuperscript{17}

Amblyopia detection can only be performed by evaluation of visual acuity. Reliability of visual acuity results from a pediatric population can be inconsistent due to short attention spans, cooperation, symbol recognition, or testing by lay personnel. Although children as young as three can be screened with visual acuity testing, recent studies have shown it to have poor sensitivity and specificity.\textsuperscript{7} In preverbal children it is more efficient to detect amblyopia risk factors using photoscreeners during vision screenings.\textsuperscript{18}

The benefits of early diagnosis are widely documented. Not only is the response to amblyopia treatment quicker in younger children, but treatment has also shown to decrease in effectiveness with increasing age leading to worse visual outcomes.\textsuperscript{6,18-21} In January 2011, the United States Preventative Task Force (USPSTF) recommended screening children ages 3-5 years for amblyopia risk factors and cited insufficient evidence for screening children younger than 3 years. They also concluded that there was limited data demonstrating improved functional outcomes due to amblyopia screening. In response to these recommendations Longmuir et al.\textsuperscript{12} published data that concluded accuracy and reliability can be extended to children as young as one. This conclusion is an important consideration when developing a statewide program and suggests vision screening should be started at one year of age.

Detection and early institution of treatment of amblyopia has been shown to be cost effective and can contribute substantially to the earning power of the affected individual.\textsuperscript{19,22} The cost of detecting and treating amblyopia is relatively low with a ratio of cost to quality-adjusted life years for amblyopia screening estimated to be $2,281, much lower than the estimated $54,000 for

<table>
<thead>
<tr>
<th>Age Range, months</th>
<th>Anisometropia, Dipters</th>
<th>Astigmatism, Dipters</th>
<th>Myopia, Dipters</th>
<th>Hyperopia, Dipters</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-36</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>37-72</td>
<td>1</td>
<td>1.75</td>
<td>1.25</td>
<td>2.5</td>
</tr>
<tr>
<td>73-240</td>
<td>1</td>
<td>1.5</td>
<td>0.75</td>
<td>2.5</td>
</tr>
</tbody>
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</tr>
</thead>
<tbody>
<tr>
<td>12-30</td>
<td>&gt;2.50</td>
<td>&gt;2.00</td>
<td>-3.50</td>
<td>&gt;4.50</td>
</tr>
<tr>
<td>31-48</td>
<td>&gt;2.00</td>
<td>&gt;2.00</td>
<td>-3.00</td>
<td>&gt;4.00</td>
</tr>
<tr>
<td>&gt;48</td>
<td>&gt;1.50</td>
<td>&gt;1.50</td>
<td>-1.50</td>
<td>&gt;3.50</td>
</tr>
</tbody>
</table>
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Sean Lyden, MD – Cleveland Clinic
Gustavo Oderich, MD – Mayo Clinic
Tommy Reynolds, MD, FACS – North Central Heart
Thorn Rooker, MD, FACC – Mayo Clinic
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Timothy Sullivan, MD – Minneapolis Heart Institute
Dustin Weiss, MD – North Central Heart

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hypertension.\textsuperscript{19} Well-designed screening programs can have referral rates of less than 10 percent while maintaining high sensitivity and specificity for detecting amblyopia risk factors and low per child cost.\textsuperscript{21}

Major limitations of this study include the lack of demographic data and lack of follow-up data from the eye care professional. The racial/ethnic makeup of the Black Hills of South Dakota is distinct and could be affecting the referral rate. However, several studies have indicated that the prevalence of amblyopia and strabismus was similar among various race/ethnic groups making it unlikely that the results are skewed due to racial or ethnic factors.\textsuperscript{23} Low income and factors linked with low socioeconomic status have been reported to be associated with amblyopia.\textsuperscript{24} Our data contained no information regarding economic status which could also skew the results.

Lack of follow up after a failed screening is a common problem encountered with community vision screenings programs. A number of studies have identified barriers to obtaining eye care after failed screenings such as logistical and scheduling difficulty, cost, and lack of parental time and understanding about the results.\textsuperscript{25} Addressing these barriers as well as improved communication with eye care professionals is vital to the success of any screening program. Future studies will examine follow-up data from the eye care professional to identify these barriers in South Dakota as well as validate the diagnosis from the eye screening. This is the first project addressing pediatric vision screening in South Dakota, and represents an effective model for statewide implementation.

### Table 3. Screening results in western South Dakota with the Spot photoscreener

<table>
<thead>
<tr>
<th>Reason for referral</th>
<th>Total, % (n=4,722)</th>
<th>12-30 months, % (n=178)</th>
<th>31-48 months, % (n=322)</th>
<th>49-72 months, % (n=1,327)</th>
<th>73-144 months, % (n=2,895)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astigmatism</td>
<td>7.9 (371)</td>
<td>5.1 (9)</td>
<td>8.1 (26)</td>
<td>9.3 (123)</td>
<td>7.4 (213)</td>
</tr>
<tr>
<td>Misalignment</td>
<td>0.5 (24)</td>
<td>1.1 (2)</td>
<td>0.3 (1)</td>
<td>0.5 (7)</td>
<td>0.5 (14)</td>
</tr>
<tr>
<td>Anisometropia</td>
<td>2.1 (101)</td>
<td>1.1 (2)</td>
<td>0.6 (2)</td>
<td>2.6 (35)</td>
<td>2.1 (62)</td>
</tr>
<tr>
<td>Myopia</td>
<td>2.9 (135)</td>
<td>0.0 (0)</td>
<td>0.9 (3)</td>
<td>1.0 (13)</td>
<td>3.8 (109)</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>0.8 (36)</td>
<td>1.1 (2)</td>
<td>0.3 (1)</td>
<td>1.0 (13)</td>
<td>0.7 (20)</td>
</tr>
<tr>
<td>Anisocoria</td>
<td>0.3 (16)</td>
<td>0.0 (0)</td>
<td>0.9 (3)</td>
<td>0.4 (5)</td>
<td>0.3 (8)</td>
</tr>
<tr>
<td>Total Referred</td>
<td>11.9 (563)</td>
<td>7.9 (14)</td>
<td>10.6 (34)</td>
<td>12.1 (161)</td>
<td>12.2 (354)</td>
</tr>
</tbody>
</table>

### REFERENCES


Please note: Due to limited space, we are unable to list all references. You may contact South Dakota Medicine at 605.336.1965 for a complete listing.

### About the Authors:

Daniel C. Terveen, MSIV, University of South Dakota Sanford School of Medicine.
Jess M. Moser, OD, University of South Dakota Sanford School of Medicine; Regional Eye Institute, Rapid City, South Dakota.
Terrence S. Spencer, MD, University of South Dakota Sanford School of Medicine; Regional Eye Institute, Rapid City, South Dakota.

### Acknowledgements

We would like to thank Northern Plains Eye Foundation for their assistance with this publication.
Demographic Considerations in Anticoagulation Therapy for Atrial Fibrillation

By Kimberly Hayden; and William Schweinle, PhD

Abstract

Background: Prevalence of atrial fibrillation (AF) continues to rise in an aging population. New strategies in anticoagulation management for the prevention of stroke are expanding options for individualized, patient centered care.

Methods: Demographic information was collected on 477 AF patients undergoing international normalized ratio testing for anticoagulation therapy. Travel distances and times were calculated based on patient address and testing site.

Results: Of the 477 patients studied, 60 percent were male. The average age was 76 years with a median age of 77.5 years. The average one-way distance traveled was 11.8 miles and 16 minutes, 45 seconds. Half of the patients were traveling at least six miles and 11 minutes. Ten percent of patients traveled at least 30 miles and could be classified as rural.

Conclusion: Rural patients should be recognized and considered for alternative anticoagulation medications or individualized approaches to INR monitoring. They often encounter socioeconomic barriers to care and other health risks associated with rural travel. Providers need to consider basic demographic information when formulating treatment plans in conjunction with their patients to achieve effective patient centered care.

Background

Each year in the U.S., approximately 700,000 strokes occur. Of these, approximately 105,000 can be attributed to an embolic complication of atrial fibrillation or atrial flutter.1 Atrial fibrillation and atrial flutter are collectively referred to as AF, which increases in prevalence with age and makes risk management of associated stroke more complex.

Warfarin has long been the standard of care for anticoagulation and stroke prevention demonstrating a number needed to treat (NNT) of 15-22.2,3 The greatest risk reduction achieved in patients on warfarin were those who had the highest baseline risk for stroke.4 If a patient could not safely sustain anticoagulation, the combination of clopidogrel and aspirin was considered the alternative.4 Three new medications; dabigatran, rivaroxaban, and apixaban; have added a new dimension to the complexities of AF anticoagulation management and show equal or better efficacy in stroke prevention compared to warfarin. Patients who had otherwise been classified as poor candidates for anticoagulation therapy, due to difficulty or inability to perform the international normalized ratio (INR) monitoring required with warfarin use, should now be considered for new alternatives as well.4 Evidence based anticoagulation management for AF patients is quickly becoming an area in which practitioners can be in the forefront of personalized medicine and patient-centered care.

Age is also an important factor in selecting appropriate anticoagulation therapy. Elderly patients are at a higher risk for bleeding complications associated with anticoagulation. Providers tend to exclude elderly patients from therapy because they are generally at a greater risk for falls. However, it is important that fall-risk not be considered a contraindication to anticoagulation, as the stroke prevention benefits generally outweigh the risk of intracranial
hemorrhage as a result of falls.4

Newer agents that eliminate the need for burdensome INR testing may be especially useful in elderly, rural, underserved anticoagulation candidates. The objective of the present study was to offer demographic insight and reflection on the burdens of AF anticoagulation therapy among rural patients. Mensha provided a framework for eliminating disparities related to cardiovascular health which included emphasis on multidisciplinary partnerships, increased access to healthcare, and consideration of geography, environment and socioeconomic influences.5 This study attempts to clarify what the AF population looks like in a rural state and explores the implications in relation to that framework.

Methods
This study was approved by the University of South Dakota Institutional Review Board. Data was collected via patient anticoagulation records from Regional Heart Doctors located in Rapid City, South Dakota. The Regional Heart Doctors clinic offers anticoagulation management services to patients residing in western and central South Dakota, eastern Wyoming, northwestern Nebraska, and southwestern North Dakota. Of the active patients participating in anticoagulation management (n = 1009), inclusion criteria included a primary diagnosis of atrial fibrillation or atrial flutter (n = 694), warfarin treatment, and an active and identified testing site between May 1, 2013 and Sept. 15, 2013 (n = 577). Testing sites of the 577 participants spanned 40 different categorical locations, including “home” and “home health” for individuals who self-test or utilize home health.

Exclusion criteria included diagnoses other than AF or missing diagnoses, missing testing site information, or any other missing demographic information. An additional three individuals were excluded from the data for testing done in Arizona and for residing outside of the regional area of interest for this study. The final number of qualifying patients was 477 using 31 testing sites.

Google Maps was used to estimate distance and travel time starting from the patient’s listed address in the medical record and the testing site address designated by the medical record. Unrecognizable addresses were not included in the study and are not reflected in the final test population of 477.

Results
Of the 1,009 active patients, 68.8 percent (n=694) were undergoing anticoagulation therapy for a primary diagnosis of AF. After exclusions the final sample included 477 participants. The 477 patients had 31 distinct testing sites with a majority (n = 361) being at the Regional Heart Doctors clinic (Table 1).

The average age of the AF patient was 76 years. However, the median age for the AF patient was 77.5 years with 75 percent of patients 69.8 years or older. The oldest 10 percent were at least 87.5 years old. Previous research found the average AF patient age to be about 75 years old.6 In addition, that research indicated an equal distribution between men and women until the age of 70 after which prevalence favored women at 60 percent.6 The AFFIRM study in 2002 indicated a lower average patient age of 70 years with only a 39 percent female distribution.7

<table>
<thead>
<tr>
<th>Test Site</th>
<th>n=477</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Heart Doctors</td>
<td>361</td>
<td>75.7</td>
</tr>
<tr>
<td>Home</td>
<td>18</td>
<td>3.8</td>
</tr>
<tr>
<td>ClinLab</td>
<td>11</td>
<td>2.3</td>
</tr>
<tr>
<td>Queen City Medical Center</td>
<td>10</td>
<td>2.1</td>
</tr>
<tr>
<td>Rapid City Regional Hospital</td>
<td>10</td>
<td>2.1</td>
</tr>
<tr>
<td>Belle Fourche</td>
<td>7</td>
<td>1.5</td>
</tr>
<tr>
<td>Spearfish</td>
<td>7</td>
<td>1.5</td>
</tr>
<tr>
<td>Rapid City Medical Center</td>
<td>6</td>
<td>1.3</td>
</tr>
<tr>
<td>Chadron</td>
<td>5</td>
<td>1.0</td>
</tr>
<tr>
<td>Regional Medical Clinic</td>
<td>5</td>
<td>1.0</td>
</tr>
<tr>
<td>Sioux San Hospital</td>
<td>5</td>
<td>1.0</td>
</tr>
<tr>
<td>Hot Springs</td>
<td>4</td>
<td>0.8</td>
</tr>
<tr>
<td>Massa Berry Regional Medical Clinic</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>Home Health</td>
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<td>0.6</td>
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<tr>
<td>Gillette</td>
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<td>0.4</td>
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<tr>
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<td>0.4</td>
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<tr>
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<tr>
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<td>EAFB</td>
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<td>Faith</td>
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<tr>
<td>Hettinger</td>
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<td>Lemmon</td>
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<td>0.2</td>
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<tr>
<td>Mobridge</td>
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<td>Pierre</td>
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<td>Sanford Clinic</td>
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<td>Sturgis</td>
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</tr>
<tr>
<td>Benet County</td>
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However, females tended to decline study participation more than males. Present findings support the AFFIRM study with a female distribution of 40 percent; however, the average age of 76 years was higher than either study (Table 2).

The central focus of the present research was to more closely analyze travel required for INR testing with warfarin use. Thirty-one test sites were used from 46 originating “hometowns” based on address. The average one-way travel distance was 11.8 miles or 16 minutes, 45 seconds. The median travel distance was six miles or about 11 minutes. The 10 percent of patients who lived farthest from the clinic (approximately 48 people) were traveling at least 27.6 miles with a one-way travel time of 35 minutes. Median and furthest 10 percent round trip estimates were 12 miles/22 minutes and 54.2 miles/70 minutes, respectively. The maximum travel distance recorded was 234 miles/3 hours, 45 minutes one-way or 468/7.5 hours round trip. Twenty-four patients were traveling at least 81 miles (i.e., 1 hour, 45 minutes) round trip (Table 3).

There was no substantial correlation between travel distance and age. Therefore, age influencing a decision to live in closer proximity to health care services would not be supported by this research.

### Table 2.

<table>
<thead>
<tr>
<th>Gender</th>
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### Table 3.

<table>
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<tr>
<td>1</td>
<td>472.3</td>
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</tr>
<tr>
<td>0</td>
<td>477</td>
<td>0</td>
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</table>

*One way

### Table 4.

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<td>10.0</td>
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<tr>
<td>Distance</td>
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<tr>
<td>Minutes</td>
<td>477</td>
<td>16.8</td>
<td>22.1</td>
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Discussion

This demographic data illuminates some implications of warfarin therapy with INR testing. While it may be impossible to quantify a “reasonable” travel distance for all patients, travel should be discussed with patients when selecting AF anticoagulation therapy.

This study provides a baseline for assessing the approach to care for the rural patient. Rural patients have lower health-related quality of life scores than the urban population. Figures from 2001 indicate the average length of one-way travel for health care in the U.S. was 7.9 miles. In contrast, this study showed a somewhat greater mean distance of 11.8 miles (Table 4). The previous research reported 7.9 percent of the U.S. population was classified as having a “travel burden” categorized as 30 miles or 30 minutes. The present results indicate that approximately 10 percent exceed that distance. This seems reasonable, as the area included for this research is regarded as more rural.

There are other risks. For instance, 61 percent of traffic fatalities occur in rural areas. In addition, males more often die in traffic accidents: 57 percent in victims 65 years and older. Those 65 years and older also have the highest number of fatalities. In fact, older drivers, while driving less, have a higher fatal crash density. Thus, there are other, non-medical risks to warfarin therapy and frequent travel for INR testing.

Other challenges for rural patients include 1) making compromises between safety and expense in their health care decisions, 2) risking travel in inclement weather, as in South Dakota, or missing appointments, which can result in INR deviations from therapeutic ranges.

The average cost of INR testing is between $6 and $145. With such variability, each testing site should assess specific testing costs and frequencies for patients. Patients also often have to balance this and the costs of travel, e.g., vehicle wear and tear and gasoline. Interestingly, the most cost and clinically effective approach to INR management is patient self-testing where patients receive training on finger stick blood sampling and monitor use. The results can then be forwarded to the provider’s office after which dosing can be changed and patient counseling...
can be done via the telephone. Methods for home testing can vary based on differences between monitors and clinic protocols. A full discussion of these differences is beyond the scope of this paper; see Gardiner et al. The cost of prescription warfarin is significantly less than newer anticoagulation therapies. However, newer anticoagulants appear to be cost saving when considering decreased complications such as stroke and systemic embolism, myocardial infarction, deep vein thrombosis, pulmonary embolism, and major and non-major bleeding. In that regard, apixaban, dabigatran, and rivaroxaban all cost less than warfarin in patients less than 75 years old. For patients greater than or equal to 75, apixaban and rivaroxaban cost less. These decreased costs would impact patients, families, and healthcare systems.

On the other hand, warfarin is reversible and predictable. Antidotes are available and have been well studied with prothrombin complex concentrate and fresh frozen plasma being the agents of choice. Vitamin K is also an option but has a slower onset. The newer agents currently have no known antidotes, research is in its infancy, and options during a major bleeding event may be limited.

Trying to harness all the information surrounding anticoagulation management when deciding how to approach a patient’s care can be exasperating. However, basic patient demographic information is an important factor that should not be overlooked.

Limitations
There were several limitations to our conclusions, including insurance companies’ insistence on where lab testing can occur. For example, patients who fall under Indian Health Services (IHS) must be tested at an IHS facility unless an exception is approved.

In addition, many of the most rural patients have their addresses listed as a PO box in the nearest town, which may be far from their home. Also, some of the most rural addresses, particularly on the Pine Ridge Indian Reservation, were not defined by Google Maps and were omitted from the study. Given these factors, the distance and time estimates for travel are most likely an underestimate.

The scope of this study also did not consider how often patients were traveling for INR testing. The frequency of testing can be especially high during periods of significant dose change and adjustment. The travel burden in that case would be significantly higher than what this study was able to quantify.

Other important considerations that were not directly quantifiable from this study included direct financial impact, risk to health/life with travel, and extended family sacrifices for travel.

Conclusion
Overall this study provides a glimpse into the complex world of rural patient centered care in anticoagulation.

The management of anticoagulation associated with AF maybe be one of the more challenging areas of medicine, but it is also has some of the greatest opportunities to explore personalized medicine and patient centered care utilizing outlying facilities, family members, and local resources. The older rural population may make up an appropriate cohort for newer therapies or self-testing, where higher drug costs may be offset by decreased travel and lower socioeconomic risks. Fortunately, anticoagulation therapy has greatly expanded, thus allowing an important new consideration – travel. It is easy for providers to see patients in a clinic and to overlook the variability in travel. One must also consider the associated risks and costs, both personally and financially. When combined with the individual frequency of testing and effectiveness of maintaining therapeutic INR, a new approach to management may be appropriate.

Acknowledgements
We thank Josh Marler at the Regional Heart Doctors for coordinating access to anticoagulation records, instruction on efficient navigation through them, and thoughtful discussion about rural anticoagulation patients.

Conflict of Interest Statement: The author was an employee of Regional Heart Doctors from November 2011-October 2012.

REFERENCES


Please note: Due to limited space, we are unable to list all references. You may contact South Dakota Medicine at 605.336.1965 for a complete listing.

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Return-to-Play: A Primary Care Physician’s Guide to Management

By Mark List, MD; Zach Nolz, MD; Wesley Nord, MD; and Mark Huntington, MD, PhD

Abstract
Background: In the primary care clinic, allowing young athletes to return to play following injuries and illnesses can be a challenging balancing act between promoting speed of recovery while still allowing for full recovery and prevention of future injuries or complications.

Methods: A literature review of relevant return-to-play articles was performed for musculoskeletal injuries, concussions, and infectious mononucleosis.

Results: We identified several evidence-based approaches to allowing athletes to return to activity following injuries and illnesses. The majority of return-to-play recommendations found were expert opinion-based.

Discussion: Evidence does exist for primary care providers to assist in guiding their athletic patients back to activity, but it is limited in quantity and quality. The decision to return-to-play is complex, and is best individualized for the patient. Existing guidelines can assist in management; however, only as an adjunct to the clinical decision of a well-informed physician practicing patient-centered medical care.

Introduction
In the primary care clinic, the ability to diagnose and manage acute and chronic sports-related injuries is essential to achieving time-sensitive resolution. This becomes increasingly important when discussing return-to-play for athletes involved at all levels of play. Appropriate diagnosis, treatment, and timing of resuming pre-injury activities is vital for young athletes to prevent recurrence of injuries and to prevent acute injuries from becoming chronic in nature. In this review, we discuss several common problems faced by primary care physicians and the young athlete who desires expedient return-to-play.

Methods
The medical literature was searched electronically using PubMed for articles on the management of musculoskeletal injuries, concussions, and infectious mononucleosis. The most recently published guidelines, review, and original research articles on these topics were identified. All citations were reviewed by two investigators. Only those papers believed to be relevant to primary care were included; those solely of interest to specialized care were excluded. While randomized control studies and well-designed observational trials were preferred, due to the paucity of methodologically sound evidence, relevant systematic reviews, retrospective chart reviews and smaller observational trials were also collected and analyzed for use in this study. Abstract-only reports were excluded as incomplete for our purposes, due to the inability to access pertinent statistics, methods, and similar details. We also excluded studies that did not have specific relevance to sports medicine and return-to-play following injury or illness. Material from the included papers were analyzed and synthesized for this present article. Citations are included in the reference section when relevant as a source for, or example of, specific points made in the narrative; it is not meant to present a comprehensive bibliography of the topic.

Results
Musculoskeletal Injuries
Muscle sprains and strains are very common and distressing causes of injury that occur to athletes and are often
encountered by the primary care physician. The injured muscle can have varying degrees of damage to the myofiber, may or may not involve hematoma formation, and almost always involves some component of inflammation. These changes all occur in the acute minutes to hours following the injury. Muscle repair begins as myofibers regenerate and connective tissue begins to form scars around the injured tissue. Muscle injury can be classified in several different ways, from a simplified, generalized classification system of Grade 1 (mild), Grade 2 (moderate) and Grade 3 (severe) to a tissue specific classification system, i.e., a grade system based on loss of motor function and limited range of motion. Grade 1 muscle injuries are typically less painful than higher grade injuries, and have minor swelling and physical exam findings. They likely have minimal range of motion changes and may or may not have strength deficits. Grade 2 muscle injuries by definition involve loss of motor function and likely have corresponding range of motion deficits detected on physical exam. Compared to Grade 1 injuries, Grade 2 injuries have significant muscle tearing and damage to myofibers, increased tissue inflammation and are increasingly likely to have hematoma formation. Grade 3 muscle injuries may have complete loss of motor function and almost complete loss of range of motion, signifying full thickness muscle injury or rupture.

Treatment of muscle injuries consists of the classical regimen of rest, ice, compression, and elevation; however, no randomized control trial has ever established this management and its efficacy. The goal of treatment and, subsequently, the ability to return-to-play is guided by injury-specific and activity-specific criteria. For example, return-to-play from a Grade 1 acromioclavicular injury, by definition a strain of the AC ligament with no injury to the CC ligament, varies from a couple of days in a soccer player to two to four weeks in a hockey player or quarterback. This is due to the need for having full and painless motion, normal strength in the shoulder, and being able to complete sport-specific skills without pain.  

Guidelines exist for most individual injuries as an educational guide for patients and to help guide therapy aimed at restoring function, reducing pain, and improving stability to the affected area, allowing the athlete to return-to-play when fully healed both structurally and functionally. The return of the injured athlete back to activity is appropriate when it can be accomplished without putting the athlete at risk for re-injury and he or she can perform the sport-specific activities without pain or joint instability. However, these guidelines are no substitute for the individual clinical decision of a physician based on the symptoms, objective clinical musculoskeletal findings, and activity-specific demands seen on a case to case basis.

Concussions

Briefly mentioned here in terms of return-to-play, management of head injuries in the young athlete was the dedicated topic of the third article in this series (September 2014 issue); readers are referred there for more thorough coverage.

Concussions represent a functional disturbance rather than a structural one. Resolution of the clinical and cognitive symptoms typically follows a sequential course, usually seven to 10 days in duration for 80-90 percent of patients. However, it is important to note that in some cases symptoms may be prolonged for months. Limited evidence on the treatment of head injury in adolescents is available; many head injury studies involve adults rather than adolescents, and involve mechanisms of injury not encountered on the playing field.

1. According to the expert recommendations made at the 2012 Zurich conference on concussion management, if the diagnosis is made by a physician at a sporting event:

2. An assessment of the concussive injury should be made using the SCAT3 or other sideline assessment tools.

3. The player should not be left alone after the injury, and serial monitoring for deterioration is essential over the initial few hours after injury.

A player with a diagnosed concussion should not be allowed to return-to-play on the day of injury.

The committee recommended that return-to-play should be individually initiated for each athlete in a step-wise fashion, starting with no activity – symptom limited physical and cognitive rest (though the benefit of cognitive rest has been questioned). From there, as tolerated, the patient moves up the stages, increasing to light aerobic exercises, then to sport specific exercises. As tolerated, non-contact training drills may be initiated, followed by full-contact practice. If the patient is able to tolerate advancement through the steps with no return of symptoms, the patient may return-to-play. Using a step wise approach and advancing on average one step per day, the overwhelming majority of athletes should be symptom free at seven to 10 weeks. If any post-concussion symptoms occur during the graduated stepwise program, the patient should drop back to prior asymptomatic level for 24 hours of rest and try to progress again.
Mononucleosis

Mononucleosis, a consequence of infection with Epstein-Barr virus (EBV), is a common medical condition found in every primary care clinic across the country. It is often characterized as fever, pharyngitis with or without tonsilar exudate, and posterior cervical chain lymphadenopathy; however, the most common symptoms are malaise and fatigue, sweats, and anorexia. Nausea and headache, chills, and cough are also fairly frequently reported by patients. A generalized, maculopapular, urticarial, or palatal petechial rash may be seen in up to half of mononucleosis cases, and the maculopapular rash occurs in 70-90 percent of cases after amoxicillin or ampicillin has been administered. Labs done to confirm the diagnosis include heterophile antibody testing, of which a rapid test can be done with sensitivity and specificity on 85-95 percent. A white blood cell count with differential often demonstrates greater than 50 percent lymphocytes with 10 percent or more “atypical” lymphocytes seen. A correct diagnosis is critical in determining when an athlete with a sore throat may safely return to competition; a positive heterophile test in the clinical scenario inconsistent with an acute infectious mononucleosis may represent previous illness and not necessitate prolonged avoidance of contact sports.

Potential rupture of the spleen following mononucleosis is the limiting factor prohibiting athletes from returning to sports. About 50 percent of patients with mononucleosis develop splenomegaly, and there is the possibility of splenic rupture. This occurs at a rate of one to two cases per 1,000 cases of mononucleosis. Splenic rupture usually develops in the second and third weeks of illness; however, cases have been described up to seven weeks into the illness. Half of splenetic ruptures are spontaneous, with no evidence of trauma found on review; with several authors suggesting valsalva maneuvers contributing to splenic rupture. Splenic rupture in the mononucleosis patient can cause massive hemorrhage and shock.

According to a 2008 evidence-based review of mononucleosis and participation in sports: “The current consensus from the literature is that light, noncontact activities may commence three weeks from symptom onset. Research in the military has demonstrated no significant difference in aerobic capacity and no detrimental effects in those with infectious mononucleosis allowed to participate in light exercise ad libitum as soon as they become afebrile, compared with those restricted from activity for two weeks. The resumption of light activity assumes that the activity will avoid any chest or abdominal trauma and will not involve significant exertion or valsalva activities and that the athlete is asymptomatic. Progression of noncontact activity should then be gradually individualized as judged by the athlete’s clinical progress.”

The authors recommend that the decision on returning to contact sports as an individualized patient-physician dyad, rather than a generalized, guideline based protocol due to lack of sound research and evidence.

Seeking stronger evidence, two studies investigated possible models for ultrasonography-based management for mononucleosis-induced splenomegaly. O’Connor et al. describe a prospective study of 19 young athletes where serial ultrasonography was used to guide return-to-play management, using splenic size on repeat ultrasound to ensure optimal safety was used in determining when patients could return to contact athletics. All but three of the patients had normal ultrasounds and were returned to their sport at one month, and the other three patients were followed to two months post-diagnosis before being cleared with resolution of splenomegaly. This approach to determining return-to-play has several limitations. The studies are limited in generalizability by a small sample size. Additionally, the wide distribution of sizes of “normal” spleens means that a small spleen could be enlarged several times and still be measured as “normal.” Finally, there is limited data correlating spleen size to fragility. Nevertheless, the goal of a more objective-based management plan is admirable.

Other Upper Respiratory Infections

When an athlete has a respiratory infection, it is prudent to abstain from participation until symptoms have resolved. Studies demonstrate that while rhinovirus infection does not decrease performance, other viruses can impair respiratory function. Additionally, there may be an increased risk of transmission to fellow athletes: though moderate exercise decreases risk of infection compared to sedentary individuals, intense exercise actually increases risk of infection.

A proposed strategy for return-to-play by athletes with respiratory symptoms, while not evidence-based, may be reasonable. Once the athlete is no longer symptomatic “below the neck,” i.e., no fever, severe cough, or gastrointestinal symptoms, a workout can begin at half intensity. If symptoms do not worsen in the first ten minutes, training may be advanced as tolerated with a goal of increasing to pre-illness levels of intensity gradually (stretched over one day of training for each day of practice missed due to the illness).
See the effect in South Dakota.

The American Medical Association 2014 Economic Impact Study, completed in conjunction with the South Dakota State Medical Association, shows how much physicians add to the economic health of South Dakota.

Check the effect physicians have on the U.S. economy by viewing the national report from the AMA, as well as highlights from the South Dakota study, at ama-assn.org/go/eis.
Discussion

The majority of return-to-play guidelines are expert opinion-based; there are limited evidence-based recommendations. Medical decision making regarding young athletes and return-to-play timelines is hindered by a lack of well-designed, large scale studies, and research into these topics is needed in order to provide the best possible post-injury care and to prevent repeat injuries.

The decision to return-to-play following musculoskeletal injuries, concussions, and illnesses such as infectious mononucleosis is complex, and is best left up to the individual physician and his or her patients. In general, the athlete may return-to-play when doing so will not prevent adequate healing of the injured body part, will not increase the risk of injury to another body part, and when the athlete is able to compete at the level required for the activity. The guidelines that exist can assist in management; however, they should only be an adjunct to the clinical decision of a well-informed physician practicing patient-centered medical care. A one-stop, quick-reference the authors have found helpful is *The Sports Medicine Patient Advisor.*


Please note: Due to limited space, we are unable to list all references. You may contact South Dakota Medicine at 605.336.1965 for a complete listing.

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Type 2 diabetes mellitus has become an epidemic in the U.S. with the number of new cases tripling from 1980-2011 and continuing to rise. In 2010, diabetes ranked as the seventh leading cause of death in the U.S. Medical expenditures for diabetic patients are also a concern and are estimated to be about 2.3 times higher than costs for patients without the disease. Despite these staggering statistics, improvement has been seen in the level of A1C reduction among diabetic patients from 1999-2010, however, many patients with diabetes still do not meet glycemic control targets. New treatments are being developed to offer additional options for patients.

The first sodium-glucose co-transporter 2 (SGLT2) inhibitor, canagliflozin (Invokana), came on the market in 2013 and has since been joined by dapagliflozin (Farxiga), and empagliflozin (Jardiance). The drugs act in the proximal nephron of the kidney to block about 90 percent of glucose reabsorption, which increases urinary glucose concentrations and lowers plasma glucose. They have been evaluated as monotherapy or as add-on therapy with other antihyperglycemic agents in type 2 diabetics. The American Diabetes Association’s (ADA) most recent guidelines recommend use as add-on dual or triple therapy for refractory patients and the 2013 American Association of Clinical Endocrinologist’s (AACE) algorithm also recommends use of add-on therapy with two or three other medications in patients where weight loss would be beneficial. SGLT2 inhibitors are considered to have the benefit of a low risk of hypoglycemia, moderate effects on A1C reduction (0.45-0.92 percent), the ability to promote weight loss (0.7-3.5 kg) and decrease blood pressure. The common side effects of these medications are an increased risk of genitourinary infections along with polyuria, volume depletion, dizziness, hypotension and an increase in LDL cholesterol. Based on the mechanism of action, these medications are less effective with reduced renal function and thus are not recommended for use in this population. Each medication has variable labeling restrictions for renal dysfunction. Postmarketing studies are continuing to better define the role and side effect profiles.

Canagliflozin was studied as monotherapy at doses of 100mg and 300mg versus placebo that resulted in A1C reduction at 26 weeks of -0.77 percent, -1.03 percent and +0.14 percent, respectively. Weight loss was also measured and the 100 mg treatment group had a mean reduction of -1.9 kg while the 300 mg group saw a -2.9 kg reduction. Blood pressure also improved in both groups with the mean systolic decline of -3.7 mm Hg and -5.4 mm Hg and a mean diastolic decrease of -1.6 mm Hg and -2.0 mm Hg in the 100 and 300 mg treatment groups, respectively. In a combination study canagliflozin 300 mg demonstrated superiority to sitagliptin 100 mg in reduction of A1C when added to metformin and sulfonylurea therapy. (-1.03 percent versus -0.66 percent, respectively). The canagliflozin group also had greater reduction in body weight and systolic blood pressure.

Dapagliflozin was declined twice by the FDA for approval due to concerns regarding bladder cancer incidence and is not recommended in patients with active bladder cancer. Monotherapy was assessed in a 24-week trial that yielded A1C reductions from baseline of -0.23 percent with placebo and -0.58 percent, -0.77 percent, -0.89 percent with 2.5 mg, 5 mg, and 10 mg doses, respectively, in patients with a baseline A1C of 7-10 percent. A high-A1C cohort (baseline A1C 10.1-12 percent) showed numerically greater reductions in mean A1C from baseline (-2.88 percent with 5 mg and -2.66 percent with 10 mg). Noninferiority was demonstrated compared to glipizide as add-on therapy with metformin. Results showed anA1C reduction of -0.52 percent after 52 weeks in both groups and a significant effect on weight loss with dapagliflozin of -3.2 kg compared to weight gain with glipizide of +1.2 kg. The dapagliflozin treatment group also had significantly less reports of hypoglycemia (3.5 percent) compared to the gliptide group (40.8 percent).

The most recently approved SGLT-2 inhibitor is empagliflozin. In a dose-ranging study of empagliflozin 1, 5, 10, 25 and 50 mg in conjunction with metformin, A1C levels declined from -0.23 to -0.56 percent excluding the 1 mg group. The 1 mg group did not show a significant reduction (-0.09 percent) compared to placebo. The 5, 10,
25 and 50 mg groups also had significant body weight reductions of -2.3 to -2.9 kg compared to -1.2 kg with placebo. It was further investigated as add-on therapy to pioglitazone with or without metformin. Approximately three-fourths of the patients were on metformin in the trial. Average A1C reduction was -0.6 percent with 10 mg and -0.7 percent with 25 mg compared with -0.1 percent with placebo. Weight loss of -1.62 kg and -1.47 kg in the 10 mg and 25 mg, respectively, was found in the treatment arms compared to weight gain (+0.34 kg) with placebo.

Glucagon-like peptide-1 (GLP-1) receptor agonists include exenatide (Byetta), exenatide extended-release (Bydureon), liraglutide (Victoza), albiglutide (Tanzeum), and dulaglutide (Trulicity). GLP-1 is an incretin that has potent antihyperglycemic effects through increasing insulin, decreasing glucagon secretion, delaying gastric emptying and increasing satiety. Their place in therapy according to ADA guidelines includes add on therapy to metformin as dual or triple therapy. AACE suggests use in patients where weight loss would be beneficial as add-on dual or triple therapy or as a first line alternative to metformin in those patients who cannot tolerate metformin. GLP-1 agonists are considered to carry a low risk of hypoglycemia, have high efficacy and result in weight loss. The most common side effects with these agents are gastrointestinal adverse events with occurrence of nausea, vomiting, diarrhea, and injection site reactions. Liraglutide and exenatide have been on the market for several years, however the extended release formula for exenatide was made available in 2014.

Albiglutide was approved in April 2014 by the FDA for type 2 diabetes as a once-weekly subcutaneous injection. In a 104 week trial, albiglutide was compared to sitagliptin, glimepiride, and placebo in patients inadequately controlled on metformin. Albiglutide significantly reduced A1C compared with placebo (-0.9 percent), sitagliptin (-0.4 percent), and glimepiride (-0.3 percent). Weight change from baseline was only significant when compared to glimepiride (+1.17 kg) and was similar for albiglutide (-1.21 kg) when compared to placebo (-1.00 kg) and sitagliptin (-0.86 kg). HARMONY 7 compared albiglutide to liraglutide in patients with uncontrolled type 2 diabetes. The results did not meet the non-inferiority criteria for reduction in A1C compared to liraglutide with less reduction in A1C in the albiglutide arm. Patients on albiglutide had significantly more injection site reactions (12.9 versus 5.4 percent) but slightly fewer gastrointestinal adverse events (45 versus 35.9 percent). The HARMONY 4 trial compared albiglutide with insulin glargine in patients on metformin with or without a sulfonylurea. The A1C lowering was similar in both groups (-0.67 percent albiglutide and -0.79 percent insulin glargine) meeting non-inferiority criteria; weight loss was significant with albiglutide resulting in a 2.6 kg difference between the two groups, -1.06 kg vs +1.57 kg with insulin.

Dulaglutide was approved by the FDA also as a once-weekly injection. AWARD-6 was a non-inferiority trial comparing dulaglutide to liraglutide in uncontrolled type 2 diabetic patients receiving metformin therapy. This trial met the non-inferiority margin for lowering of A1C 0.4 percent with a -0.06 percent mean treatment difference between groups (-1.42 percent for dulaglutide and -1.36 percent in liraglutide). The incidence of gastrointestinal adverse events was similar between the two drugs and included nausea, diarrhea, dyspepsia, and vomiting. Dulaglutide has also been studied as monotherapy versus metformin. At 26 weeks, significant A1C reductions were seen with dulaglutide compared to metformin, -0.78 percent, -0.71 percent, and -0.56 percent for dulaglutide 1.5 mg, 0.75 mg, and metformin, respectively.

The risks and benefits of any medication in an individual patient must be weighed against unique individual patient characteristics. The SGLT2 inhibitors and GLP-1 agonists offer an additional option for patients who would benefit from weight loss and improved glycemic control without additive hypoglycemia risks. The role of these medications will continue to evolve as more information is gained from the ongoing studies to better define their place in therapy.

REFERENCES


Please note: Due to limited space, we are unable to list all references. You may contact South Dakota Medicine at 605.336.1965 for a complete listing.

About the Author:
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Jodi R. Heino, PharmD, Professor and Assistant Department Head, South Dakota State University College of Pharmacy.
The Patient-Centered Medical Home: A Vital Link in Improving Health Care Quality

By E. Paul Amundson, MD, FAAFP
Chief Medical Officer

As you are well aware if you have been following this column for the last few months, 2015 has been denoted as “The Year of Quality” for DAKOTACARE. Beginning next month we will dive into three distinct areas of clinical quality that our Clinical Oversight Committee felt was important to present in an open/transparent fashion with our physician colleagues. I welcome your feedback and comments as these articles are released.

I believe it is understood (and relatively well agreed upon) that payment transformations need to occur in our country for this industry to be fiscally sustainable. Medicare spending per beneficiary has already steadied at approximately 2 percent per year since 2010, which is below the growth rate of the U.S. gross domestic product. In addition, the Centers for Medicare and Medicaid Services (CMS) as well as large national payers have recently announced initiatives aimed to move their payment structures to one based on quality/value outcomes over the next few years. These so-called “alternative payment models” include accountable care organizations and bundled payments.

DAKOTACARE has similar goals and has already begun implementation of value-based reimbursement (VBR) strategies within South Dakota to encourage enhanced care coordination for our membership with chronic conditions (i.e., diabetes, hypertension). An integral piece of this “puzzle” for providing coordinated high-value services is the patient-centered medical home (PCMH), a term most of you are probably familiar with but maybe don’t fully understand. Suffice it to say it’s an intensely patient-focused approach to achieving excellence in clinical care. Although historically attributed to primary care clinics, it has the potential to be utilized successfully in other areas of medicine, such as oncology.

The Patient-Centered Primary Care Collaborative was founded in 2006 to advance an effective/efficient U.S. health care system built on a strong foundation of the PCMH model. I encourage you to check out their website for additional information, including a recent annual review of the body of evidence supporting this concept: www.pcpcc.org/about/medical-home. The data they summarize supports the assertion that the PCMH can lead to reductions in 1) overall health care costs, 2) inappropriate ER utilization, and 3) inpatient hospitalizations. In addition to these important parameters, a model of clinical care based on the PCMH concept achieves the following:

1. Improvements in population health and preventive services;
2. Increased access to primary care; and
3. Improved satisfaction by both patients and care providers.

Payments to primary care providers currently represent only 5-7 percent of total U.S. health care spending. For the medical home to be sustainable, we must invest more heavily in these primary care services while restructuring to enhance care coordination for patients. Our VBR plans will include financial incentives for clinics to achieve the PCMH designation, an accomplishment many of your facilities have already attained. We hope to provide you with additional details later this year, along with various options that may be suitable to your unique practice dynamics. Again, we need to start with primary care and grow out from there. We ask for your patience, understanding, and input as transforming an entire payment system will take time.

To make this all work, patients need to be fully engaged with this patient-centered concept. You would assume this already occurs, but a recent analysis of the DAKOTACARE fully-insured membership revealed that approximately 33 percent do not have an established primary care physician relationship. We obviously have some work to do on our end to incentivize our members to align with a primary care physician office near them and obtain the preventive services which can reduce their health care cost burden while keeping them healthy. Health plan benefit structures will need to adjust accordingly, while staying within the ever-changing Affordable Care Act rules which govern our industry.

I plan to travel the state this year, along with Scott Jamison and Chad Roggow from Provider Services, to educate and encourage our physician partners to assist us in this effort. This is a vital step in our journey to partner with South Dakota physicians to transform how health care is provided/coordinated and reimbursed. We look forward to discussing this long-term project with you in further detail!

As always, feel free to contact me with any thoughts or questions at 605.351.1125 or pamundson@dakotacare.com.
The Interstate Medical Licensure Compact: What Physicians Should Know

What is the Interstate Medical Licensure Compact?
The compact would be a new pathway to expedite and simplify physician licensing for those seeking to practice medicine in multiple states. The compact would strengthen public protection because it would help states share investigative and disciplinary information.

The proposal could:
- Increase health care access for underserved or rural areas; and
- Allow medical expert consult by telemedicine technologies.

Is the Interstate Compact a national license?
No. Each license to practice medicine will be issued by a state medical board and physicians must be licensed in the state where the patient is located. A licensed obtained through the expedited procedure will provide the same

Can a physician ineligible to participate in the Compact still obtain multiple licenses?
Yes. Physicians who are ineligible for the expedited licensure process facilitated by the Interstate Compact may seek additional licenses in those states where they desire to practice and will apply through the respective traditional licensure processes.

Who is eligible to seek licensure through the Compact process?
To be eligible, a physician would have to possess a full and unrestricted license in a member state, be board certified in a medical specialty and have no history of being disciplined, penalized or punished by a court, a medical licensing agency or the Drug Enforcement Administration. Initial surveys estimate that nearly 80 percent of the physician population licensed in the U.S. would be eligible for expedited licensure.

How do I apply for expedited licensure?
An eligible physician would designate a member state as the state of principal licensure and select the other member states in which a medical license is desired. The state of principal licensure will verify the physician's eligibility and provide credential information to the Interstate Commission. The Interstate Commission will collect applicable fees and transmit the physician's information and licensure fees to the additional states. Upon receipt in the additional states, the physician would be granted a license.

What state can serve as the state of principal licensure?
The physician must possess a full and unrestricted license to practice medicine in the state of principal licensure, and the state must be:
- The state of primary residence for the physician, or
- The state where at least 25 percent of the practice of medicine occurs, or
- The location of the physician's employer, or
- If no state qualifies, the state designated as state of residence for purpose of federal income tax.

How long will it take for me to be licensed in other states?
The compact will substantially reduce the time it takes to receive multiple licenses. As soon as eligibility is verified and fees are transferred, additionally selected states will issue a full and unrestricted license to the physician.

Will the Compact be used for renewing licenses?
As long as a physician remains eligible for the Compact, expedited licenses granted by a member state will be renewed through a process created by the Interstate Commission.

Where can I learn more about the Interstate Compact?
http://www.fsmb.org/state-medical-boards/interstate-model-compact/

Support from the U.S. Senate
In a letter sent Jan. 9 to the Federation of State Medical Boards (FSMB), a bipartisan group of 16 U.S. senators applauded the progress being made by the state medical boards in the development of an Interstate Medical Licensure Compact.

In the letter, the senators noted that the proposed compact system retains important patient-protection advantages of the current state-based medical licensing process. “We agree that allowing states to share information while allowing each state to retain jurisdiction over physicians who choose to practice in the state is in the best interest of both physicians and patients,” the letter said. The senators noted that the new expedited licensure system would help ensure telemmedicine is practiced in a “safe and accountable manner.”

The letter was signed by: John Thune (R-SD), Michael Enzi (R-WY), Lamar Alexander (R-TN), John Barrasso (R-WY), Roy Blunt (R-MO), John Boozman (R-AR), Tom Carper (D-DE), Tom Coburn (R-OK), Thad Cochran (R-MS), Al Franken (D-MN), James Inhofe (R-OK), Johnny Isakson (R-GA), Tim Johnson (D-SD), Amy Klobuchar (D-MN), John D. Rockefeller IV (D-WV), and Mark Warner (D-VA).

REFERENCES
Adapted from multiple sources including the FSMB FAQ documents by Margaret B. Hansen, PA-C, MPAS, and Tyler J. Klatt, MPA.
If you had to lose one of your senses, which would be the most devastating? Imagine losing vision and how bad it would be to no longer see the beauty of a sunset over the prairie, or the kind twinkle in Grandmother’s eyes. Play-out losing hearing and how bad it would be to no longer hear Beethoven’s 5th symphony or the babbling of a mountain brook. Consider these or losing the sense of touch, smell, or taste and it helps one appreciate five senses and empathize for those without.

One day at work about five years ago, I noted my right eye was blurry at the center of vision, and it struck me at the end of the day that I was losing my central concentration vision in my right eye. Over a few days it seemed to be getting worse.

In short order I was at the eye doctor and learned the problem was related to the bag or sack of vitreous gel, which fills the center of the eye. This bag of fluid was apparently separating from my retina, pulling and distorting vision.

My ophthalmologist sent me to the retinal specialist, and after taking pictures of the retina, and after follow-up over several months, he finally advised surgery. This involved removing the vitreous sack, called a vitrectomy, followed by peeling off the inflammatory membrane that had formed over the light-receptor-retina in the back of the eye. Since then my vision has stabilized, with some loss of the fine vision, but enough left to make me appreciate what I have with my left eye.

I have had many patients with vision loss, including one who lost an eye from a bottle rocket and several farmers who had similar traumatic loss of one eye. I know of glaucoma patients diagnosed late with vision loss, and of diabetics with progressive overgrowth of leaking blood vessels with significant blindness. Mostly, however, vision loss in my practice occurs in elderly patients with macular degeneration due to unknown causes, but sometimes related to smoking.

I have always sensed the sadness and loss these people experience as their vision goes away, but never so much as when I started to lose mine.

Bottom line, the American Academy of Ophthalmology recommends that you get a baseline eye examination at age 40, or sooner if you have a risk factor, such as diabetes, high blood pressure or a family history of eye disease. If you are 65 or older, your eyes should be checked every year or two for signs of age-related eye diseases such as cataracts, age-related macular degeneration and glaucoma.
South Dakota health care leaders including participants from health plans, healthcare systems and public health agencies participated in the Colorectal Cancer Roundtable held on Dec. 3. The purpose of the CRC Roundtable was to explore collaborative opportunities to reach the statewide goal of 80 percent of adults aged 50 and older screened for colorectal cancer by 2018. This state goal aligns with the “80% by 2018” national initiative promoted by the National Colorectal Cancer Roundtable and supported by dozens of organizations committed to eliminating colorectal cancer as a major public health problem.

The CRC Roundtable was hosted by the South Dakota Council on Colorectal Cancer (Council), an alliance of individuals and organizations working together to reduce the burden of cancer. The Council endorsed the “80% by 2018” colorectal cancer screening Initiative and Council partners pledged to make colorectal cancer a priority within their systems. Since 2006, the Council has collected Healthcare Effectiveness Data and Information Set (HEDIS) colorectal cancer measures from the four major South Dakota Health Plans and the Quality Improvement Network. Through provider education, client interventions and public awareness efforts, the HEDIS colorectal cancer rate has steadily increased (Figure 1).

While regular screening can find cancer early and detect precursor lesions, colorectal cancer (CRC) remains the second leading cause of cancer death in the U.S. “If everyone over age 50 was screened regularly for colorectal cancer, it would mean 20,000 fewer deaths every year,” said Robert Smith, PhD, director of cancer screenings for the American Cancer Society in Atlanta. During the CRC Roundtable, Dr. Smith reviewed the science behind recommended colorectal cancer tests and presented strategies for health systems to improve screening. Speakers from HealthPOINT and South Dakota Health Link described South Dakota’s vast broadband infrastructure, high electronic health record adoption and growing health information exchange. Rapid City Medical Center gastroenterologist Dale Bachwich,

Evidence shows that a provider recommendation is the single most influential factor in persuading individuals to be screened for colorectal cancer.

Figure 1. Percentage of South Dakotans ages 50 to 75 up-to-date* with recommended colorectal cancer screenings (2006-2012)

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>2006</td>
<td>36%</td>
</tr>
<tr>
<td>2007</td>
<td>39%</td>
</tr>
<tr>
<td>2008</td>
<td>38%</td>
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<td>2009</td>
<td>39%</td>
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<td>2010</td>
<td>45%</td>
</tr>
<tr>
<td>2011</td>
<td>46%</td>
</tr>
<tr>
<td>2012</td>
<td>43%</td>
</tr>
<tr>
<td>Goal</td>
<td>70%</td>
</tr>
</tbody>
</table>

Data source: Healthcare Effectiveness Data and Information Set (HEDIS)

*SD HEDIS includes South Dakotans who are enrolled with Avera Health Plans, DAKOTACARE, Sanford Health Plan, Wellmark Blue Cross Blue Shield of the South Dakota Foundation for Medical Care and have received one or more of the following: (a) colonoscopy last 3 years prior to the measurement year, (b) fecal immunochemical test (FIT) during the measurement year, (c) flexible sigmoidoscopy during the measurement year or the four years prior to the measurement year, (d) colonoscopy during the measurement year or 3 years prior to the measurement year.

**2016 incomplete data
MD, shared his clinic’s experience with colorectal cancer quality measurement and opportunities for improvement. The president of Minnesota Community Measurement Jim Chase also discussed the benefits of publicly reporting health data and shared thoughts on how South Dakota could improve statewide cancer measurement.

Following the presentations, the CRC Roundtable participants spent time in small groups brainstorming one of five questions. They identified 15 collaborative actions with the highest potential impact toward reaching 80 percent CRC screening compliance.

1. **What can be done to remove barriers to colorectal cancer screening?**
   a) Educate payers, providers and patients on coverage and cost comparison of all screening options; b) Promote multiple testing options; and c) Educate providers on the importance of recommending screening.

2. **How can we effectively engage and/or support providers in achieving colorectal cancer screening goals?**
   a) Provide colorectal cancer measurement and feedback at clinics. Clean data to determine baseline benchmark; b) Distribute primary care toolkits and provide training; and c) Leadership support to change culture and systems.

3. **How can we ensure that patients know that they have options for screening beyond colonoscopy? Fecal Immunochemical Test (FIT)?**
   a) Promote offering FIT with annual flu vaccines at rural clinics and in urban settings, b) Collaborate with health systems to educate affiliated providers on screening options; and c) Collaborate with professional organizations for FIT education.

4. **How can we effectively address disparities in colorectal cancer screening?**
   a) Develop system change for Indian Health Service, Tribal Health and Federally Qualified Health Centers; b) Increase patient education on screening options, family history risk and target messaging; and c) Determine need of testing in priority populations.

5. **How can we measure colorectal cancer screening quality?**
   a) Collaborate and investigate opportunities to utilize Minnesota Community Measurement standardized data specifications; b) Encourage facilities to utilize high quality reporting software; and c) Encourage high performing clinics to share best practices.

The South Dakota Council on Colorectal Cancer is committed to building on the efforts of the 2014 CRC Roundtable and is seeking engagement from providers, health systems and professional organizations to meet the “80% by 2018” shared goal. For more information and to join our efforts to improve colorectal cancer screening, contact Jill Ireland at the American Cancer Society at jill.ireland@cancer.org.

**About the Author:**
Jill Ireland, MPA, has worked for the American Cancer Society for nine years. In her current position as the South Dakota Health Systems Manager, she is responsible for increasing cancer screening. She is a member of the South Dakota Council on Colorectal Cancer and a steering committee member of the South Dakota Comprehensive Cancer Control Coalition.

**Acknowledgements**
Appreciation is extended to the following Roundtable Planning Committee Members:
Paul Amundson, MD
Nancy Beaumont
Jacqueline Cole
Karen Cudmore
Denise Kolba
Choosing the right test

Do You Have: Family history of colorectal cancer or polyps? Or Personal history of inflammatory bowel disease?

Yes

Colonoscopy
Provider and patient determine if testing should be started before age 50.

No

Are you: Age 50 - 75 years old?

Yes

Provider and patient decide which test is preferred.* (see table below)

No

Younger than 50 years
Testing is not recommended.

Older than 75 years
Provider and patient decide if testing is needed.

FOBT/FIT

Key facts
- Reduces death from colorectal cancer
- Safe, available, and easy to complete
- Done on your own at home and returned
- Finds cancer early by finding blood in the stool
- Finds most cancers early when done every year

Things to consider
- May produce positive test results, even when no polyps or cancer are in the colon
- When the test is positive colonoscopy is required
- Person testing themselves comes into brief close contact with stool samples on a test kit

Colonoscopy

Key facts
- Reduces death from colorectal cancer
- Can prevent cancer by removing polyps (or abnormal growths in the colon) during test
- Examines entire colon
- Finds most cancers or polyps that are present at the time of the test
- Done every 10 years if no polyps are found

Things to consider
- Stomach pain, gas or bloating is possible before, during or after test
- Must be performed at a hospital or clinic, usually with sedation or anesthesia, and someone must go with the person to take him or her home after the test
- A clear liquid diet is required before test
- Must take medication that will cause loose bowel movements to clean out the colon prior to test
- Likely needs to take a day off work/activities
- Small risk of serious complications (for example, bleeding or perforated colon)

*Flexible sigmoidoscopy may not be readily available and has largely been replaced by colonoscopy in the US.

Complete care for children and adolescents, treating:

- Headaches
- Seizures
- Cerebral palsy
- Epilepsy
- Developmental delays
- Movement disorders
- Attention difficulties
- Learning disabilities

EEG services, including ambulatory EEG monitoring
New treatment for children with intractable seizures
Acupuncture treatment available
Outreach clinics available in Mitchell and Rapid City

Child & Adolescent Neurology
117 W. 39th St.
Sioux Falls, SD 57105
605.334.8000
**For Your Benefit:**

**Membership Services**

Your membership is voluntary, and we appreciate it. SDSMA Membership Services works hard to ensure that you have the programs and services you want and need, as well as marketing the association to potential new members. We want to hear from you if you have questions, concerns or ideas on how we can serve you better, or if you know of a potential new member. It’s your Association and we’ll work with you to make it the best it can be.

We still haven’t told you about all the benefits of your membership in SDSMA, so stay tuned! If you’d like more information about Membership Services give us a call at 605.336.1965, visit the SDSMA website at www.sdsm.a.org, or email membership@sdsm.a.org. We never take your membership in SDSMA or your input and activism for granted. Thank you!

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

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**SDSMA 2015 Annual Meeting**

The 2015 SDSMA Annual Meeting heads to the Hilton Garden Inn in Sioux Falls **Friday, May 29 through Saturday, May 30, 2015.**

With presentations, discussions, networking opportunities and social and fundraising events, the annual meeting is a great time to share ideas and learn from fellow SDSMA members, including medical students, residents, active physicians and life members.

The annual meeting is a benefit of your SDSMA membership; most events are included with annual SDSMA dues. Stay tuned for more details about exciting events taking place during the 2015 SDSMA Annual Meeting!

**WHAT:** 2015 SDSMA Annual Meeting  
**WHEN:** Friday, May 29-Saturday, May 30  
**WHERE:** Hilton Garden Inn, Downtown Sioux Falls

- **Friday, May 29** – Educational sessions, Exhibitors, Young Physician Mixer, Celebrating Medicine Reception, Presidential Banquet, Awards & Scholarships
- **Saturday, May 30** – SDSMA PAC Breakfast, Council of Physicians meeting

And don’t miss the **golf tournament and the SDSMA Alliance Medical Student Scholarship Fundraiser on Thursday, May 28!**

For more information, visit www.sdsm.a.org.

Source: SDSMA staff

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**SDSMA 2015 Annual Meeting – Great Advertising Opportunity!**

The SDSMA Annual Meeting is a perfect opportunity for organizations of all sizes to market their products and services to physicians and develop working relationships with potential customers. The 2015 Annual Meeting will be held on Friday, May 29, 2015 at the Hilton Garden Inn in Downtown Sioux Falls. As a sponsor or exhibitor, you will have the opportunity to display your technologies, services, pharmaceuticals and other products. This is a valuable opportunity to reach key health care leaders from across South Dakota and meet with them face to face.

A networking lunch on Friday will give you a chance to sit and visit with potential customers, and be a part of a program that will highlight your products and services.

The Sponsor & Exhibitor Prospectus and Registration is available online at www.sdsm.a.org. Make plans now to attend the 2015 SDSMA Annual Meeting by completing the registration form.

If you have any questions or need additional information about the meeting, please contact Laura Olson at 605.336.1965 or lolson@sdsm.a.org.

Source: SDSMA staff
The Issue Is...

**Sports Medicine Licensure Clarity Bill Reintroduced**

A bill that would extend legal protections to sports medicine physicians and certified athletic trainers who travel across state lines is being reintroduced in the U.S. Senate by Sen. John Thune.

The SDSMA supports this legislation because it legally defines care provided for staff and athletes, and provides legal clarity with respect to the problem of malpractice gaps when team physicians travel across state lines. Under the proposed legislation, sports medicine professionals would be covered by the professional's medical malpractice insurance provider.

Further, the legislation respects state rights by removing questions about licensing jurisdiction from state to state, and eliminates ambiguity about malpractice coverage physicians practice out-of-state while treating a patient from the provider's home state.

Source: SDSMA

**Becoming a Certified Medical Examiner for Commercial Driver Exams**

All commercial motor vehicle drivers are now required to have physical examinations performed by a certified medical examiner listed on a national registry. The SDSMA is prepared to assist physicians in the process to become a certified medical examiner.

The SDSMA is a registered training provider for health care professionals seeking to be listed on the national registry. SDSMA’s online training course meets the Federal Motor Carrier Safety Administration core curriculum requirements and will prepare you to take the NRCME certification exam.

To register or to learn more, visit http://sdsm.a.essentialeducationwebinametwork.com

**Register to Review Sunshine Act Payment Data in April**

The second year of data submission in the Physician Payments Sunshine Act (also known as the “Open Payments” program) has begun, giving physicians the chance to register with the Centers for Medicare and Medicaid Services (CMS) to review and dispute their financial interactions with medical device and drug manufacturers.

Physicians who haven’t already registered in the agency’s Open Payments portal can do so now by visiting https://portal.cms.gov in preparation to review and dispute data this spring.

In June, CMS plans to publish the 2014 payment data and make updates to 2013 data.

Source: AMA Wire

**CMS Meaningful Use Changes and What it Means for Physicians**

The Centers for Medicare & Medicaid Services (CMS) has announced its intent to modify meaningful use requirements, potentially making it easier for physicians to meet meaningful use.

A new rule, expected this spring, would address physicians’ concerns with the program, including software implementation, information exchange readiness and other concerns.

The agency is considering modifying aspects of the program to match long-term goals, reduce complexity and lessen physicians’ and hospitals’ reporting burdens; and shortening the electronic health record reporting period.

Source: AMA Wire
Legal Brief Highlight: Advance Directives

South Dakota law allows patients to give advance directives for health care via either a durable power of attorney for health care or a living will. A patient may also give a specific advance directive concerning cardiopulmonary resuscitation.

In the absence of the attorney-in-fact designated by the patient’s durable power of attorney or other valid advance directive, health care decisions for an incapacitated patient may be made by certain members of the patient’s family or in the last resort, by a close friend.

Physicians have an obligation to relieve pain and suffering and to promote the dignity and autonomy of dying patients in their care. Where the performance of one duty conflicts with the other, the preferences of the patient should prevail; the principle of patient autonomy requires that physicians respect the decision to forego life-sustaining treatment of a patient who possesses decision-making capacity.

For more information, download the SDSMA legal brief Advance Directives at www.sdsma.org. Through the SDSMA Center for Physician Resources, the SDSMA develops and delivers programs for members in the area of practice management, leadership and health and wellness.

Source: SDSMA staff

Day at the Capitol

It was Medical Student Day at the Capitol on Feb. 5 for the University of South Dakota Sanford School of Medicine.
CME Events

Continuing Medical Education events which are being held throughout the United States
(Category 1 CME credit available as listed)

March 2015

March 4
Internal Medicine Grand Rounds: Ethics & Professional Integrity in Research – Scientific Misconduct and Plagiarism
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 4
VA Tumor Conference
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 5
Pediatrics Grand Rounds: Coping with New Diagnosis
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 6
Psychiatry Grand Rounds
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 11
Internal Medicine Grand Rounds
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 11
Dermatopathology Conference
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 11
Humphrey’s Forum on Infectious Disease
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 18
Internal Medicine Grand Rounds
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 18
VA Tumor Conference
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 19
Pediatrics Grand Rounds: Social Media
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 25
Internal Medicine Grand Rounds
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 26
Pediatrics Grand Rounds
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

March 27
VA Medical CME Activity: Pharmacy Clinical Pearls I
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

April 2015

April 1
Internal Medicine Grand Rounds
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

April 1
VA Tumor Conference
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

April 2
Pediatrics Grand Rounds: New Hyperlipidemia Guidelines with Coronary Disease
AMA PRA Category 1 Credit(s)™ available
Register online: usdssom.learningexpressce.com

DO YOU HAVE A CME EVENT COMING UP?
WOULD YOU LIKE TO HAVE IT LISTED HERE?

Contact: Elizabeth Reiss, South Dakota Medicine,
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**Clinic Only Positions** (all sites qualify for H1B):
- Eau Claire: phone call of 1:26; 4 ½ day work week; participate in Urgent Care rotation
- Urgent Care (Eau Claire)- shifts are flexible, on average 36 hours/week

**Traditional Positions:** (90% clinic, 10% hospital, Critical Access Hospital (CAH) locations, established daytime Hospitalist program at most locations. All sites qualify for H1B.)
- Barron: OB/OB optional, site qualifies for J1, Call 1:6 without OB; Call 1:5 with OB
- Chetek: OB/OB optional, site qualifies for J1, Call 1:6 without OB; Call 1:5 with OB; admit to CAH located 15 minutes away
- Rice Lake: OB/OB optional, site qualifies for J1, Call 1:6 without OB; Call 1:5 with OB; admit to CAH located 15 minutes away
- Osseo: Interest in Women’s Health preferred, call 1:4
- Bloomer: Traditional, call 1:7
- Menomonie: OB/OB optional, call 1:10

If you wish to learn more or to express interest in these positions, contact Karly Wallace Toll Free: 1-800-573-2580; email: wallace.karly@mayo.edu; or fax: 715-838-6192.

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