Liver Transplant
Dakotas' Leader: Avera Transplant Institute

As the region’s leader in transplant and liver disease expertise, the Avera Transplant Institute is dedicated to offering comprehensive care. From medical management of liver disease to the most complex liver surgery — including transplant — our multidisciplinary team is your trusted partner.

Scope of the Liver Program
- First to perform liver transplantation in the Dakotas.
- Specializing in hepatitis C treatment.
- Specializing in the management of liver cirrhosis, liver failure and liver cancer.
- Surgical resection for liver and pancreas tumors performed by abdominal transplant surgeons.
- Multidisciplinary specialists teaming up for diagnostic and therapeutic procedures such as fibroscan, radiofrequency ablation, TACE, TIPS and ERCP.

Avera Transplant Institute is the leading kidney transplant program in the Dakotas. Our facility is also home to South Dakota’s only pancreas transplant program and the Dakotas’ only bone marrow transplant program.

To make a referral, call 866-686-1062 or fax 888-692-3960. AveraTransplant.org

Dedicated Liver Transplant Team
Your kids are OUR Kids Too!

Pictures Do TELL the Story.

Cleft Lip & Cleft Palate Surgery
Rif’At Hussain M.D., FACS
Sioux Falls, South Dakota
605-231-2511
Contents

President’s Comments
147  More Than Half Full – Tom Hermann, MD

Editorial
149  Carrier Screening: What Is New? – Keith Hansen, MD

The Journal
151  Point-Counterpoint: TPMT Genotyping for Azathioprine in Adult Medicine
    – Cristina Hill Jensen, MD, FACC; Joseph Fanciullo, MD, FACR
155  Congestive Heart Failure Without Evidence of Acute Cardiac Decompensation
    – Kalyan Wagle, MD; Oluwaseun A. Akinseye, MD; Prakash Shrestha, MD;
    Madhuri Chandnani, MD; Raiko Munkarmi, MD; Vivian Ripin, MD;
    Jimmy Yee, MD
161  Gastric Zygomycosis in a Previously Healthy 56-Year-Old Male
    – Ashwyna Sunassee, MD; Desiree M. Muirhead, MD
167  Disseminated Blastomycosis Mimicking Malignancy – Jennifer L. Hsu, MD;
    B. Joel Tjarks, MD; Aaron Berg, MD; Tony Oliver, MD

Primers in Medicine
173  The 36 Hour Day, Revisited: Implementing a Caregiver Support System
    Into Primary Care Practice – Rachel Sunne, MD; Mark K. Huntington, MD, PhD
177  Duration of Antibiotics Prescribed at Hospital Discharge
    – Susan E. Hoover, MD, PhD

Pharmacology Focus
180  Evolving Pharmacologic Therapies for Heart Failure
    – James R. Clem, PharmD; Jodi Heins, PharmD

Special Features
182  Patient Education: Stress on the Prairie – Richard P. Holm, MD
183  Quality Focus: Utilizing Data to Achieve Value-Based Care
    – Holly Arends, CHSP, CMQP; Nancy McDonald, RN, BSN, CPHQ
184  University of South Dakota Sanford School of Medicine Class of
    2017 Residency Match List
186  SDSMA PAC Membership 2017

Member News
187  2017 SDSMA Annual Leadership Conference – Sponsorship & Advertising Opportunities
    2017 SDSMA Annual Leadership Conference – Registration Now Open
188  SDSMA Legislative Accomplishments
190  For Your Benefit: Your SDSMA Membership Services & Programs
    SDSMA Center for Physician Resources Upcoming Events
191  Legal Brief Highlight: Treatment of Minors

Advertisers In This Issue
192  Physician Directory
This month I would like to share with you a defining moment in my medical student education. I was a first-year medical resident on the oncology/hematology service with Dr. Robert Marschke at Sanford Hospital (formerly Sioux Valley Hospital). I distinctly remember the day when one of our dying cancer patients said to me, "my cups half full, Doc." His smile warmed my heart - which had been saddened by the steep decline this patient was facing due to his progressive cancer. Here was a patient lifting me up in spirit and making me suddenly see how much he appreciated life and the care he was receiving. His positive attitude and appreciation for life was reflected in his thoughts and actions – which continued through the few days he had remaining. There we were, his medical team, trying to help him medically survive and there he was, teaching us all that it was "okay." We all learn so many insights into living – as children, as adults, and as parents, and yes, as physicians involved in caring for our patients.

The 2017 Legislative Session will be remembered as one that brought forward some pretty significant changes to the practice of medicine – to include the independent practice of advanced practice nurse practitioners (APRNs) and the practice and regulation of lay midwifery. The politics of medicine is also abound on the national scene as our newly elected congress and newly elected president seek to revamp the Affordable Care Act (ACA). The passing of the ACA was to bring forward many changes to the future of care – for example, MACRA, as well as the emphasis on access to care through Medicaid expansion and affordable health insurance for our people. The costs of so many aspects of care continue to escalate – pharmacy, outpatient and inpatient, insurance premiums and deductibles, malpractice coverage, practice compliance, and medical education. The challenges that our practices, clinics, hospitals, and health systems face seem to lead us toward the unknown regarding how the House of Medicine should view its own future. Is our cup of medicine half empty or half full?

On the personal side of life, over this past year many of us have faced changes and even crises in our own lives. We have had to watch our medical school teachers, mentors, colleagues and loved ones become ill, face significant health issues, and in some cases die. May we be grateful for all who touch our lives and appreciate those times we have together more fully. For 135 years, our state's physicians have come together to support our medical association – its mission is well known to us all. What we as physicians, as a profession, have held most dear during all these years is the patient-physician relationship, which is at the heart of what we do every day – in every procedure, in every communication, and in every example of education. Across our systems of care and our individual practices, the collegiality, the provision and professionalism of the practice of medicine brings us together and fills our cups, and our lives, with the special spirit of serving our people as physicians.

Across many diverse cultural faiths and diverse clinical practices, may we continue to come together as a professional organization to support our profession and have the courage to advocate for what is best for patients and our practices. May the spirit of the season be uplifting for all and may we find our medical and personal “cups” more than half full. Thank you all for being part of our medical team and family.
Recently, I flew to San Francisco for a tour of Coast Guard Island with two of my daughters. We had a fantastic trip, and left with a great appreciation for the significant role the Coast Guard plays in our nation’s defense. But that role is not an easy one – there is much turbulence in the water, the air, and the environment as they daily address hostile drug runners, uncooperative fishermen, careless boaters, and desperate immigrants. How do they execute their mission so effectively, despite the turbulent environment? The answer is excellent training and disciplined focus; controlling what they can, and keeping their mind on the things that matter. It reminds me of “The Sketch Guy,” Carl Richards, who published a simple diagram of the same idea:

You may have noticed there is some “turbulence in the air” right now in America! There is an abundance of fear, distrust, and anxiety as we transition from one presidential administration to another. This drawing reminds us how the Coast Guard does it – and what we, as investors, need to do as well.
Carrier Screening: What Is New?

By Keith Hansen, MD
Editor, South Dakota Medicine

In March, the American College of Obstetricians and Gynecologists (ACOG) issued a new committee opinion (No. 691. Carrier Screening for Genetic Conditions) which updated recommendations for genetic carrier screening in couples who are considering or are currently pregnant.\(^1\) Screening for carriers of serious illnesses either prior to pregnancy or during pregnancy has changed over time due to increased understanding of the specific genetics of disease as well as improvements and decreased cost in DNA testing for mutations.

A careful family history with the construction of a three generation pedigree can help identify any potentially inherited diseases. An example is the determination that family members have a Mendelian disease for which the patient could be a carrier, such as cystic fibrosis, spinal muscular atrophy and others. In the situation where a family member is found to have a Mendelian disease, it is important to try to determine the mutation(s) in the family that are responsible for this disease, allowing one the opportunity to specifically screen the individual. One should also determine if there is any evidence of consanguinity which increase the risk of autosomal recessive conditions, even those relatively unusual, in their children. When obtaining the information for the pedigree one can also determine ethnicity of the individual and develop a profile for the risk of various genetic illnesses.

In the past, ACOG and other organizations suggested screening for carrier status based on the individual’s ethnicity. Examples include carrier screening for cystic fibrosis in Caucasians and Tay-Sachs in Ashkenazi Jewish people. Individuals in this area of the country who are at higher risk to be carriers and should be offered screening for Tay-Sachs are those with French-Canadian ancestry. Recent changes with more inter-racial couples and children have reduced the efficacy of ethnic screening and resulted in the development of panethnic screening, where one offers all couples carrier screening for a pre-determined group of conditions. Laboratories have now developed expanded carrier screening tests which allows one to screen for a number of genetic conditions – up to several hundred. Some laboratories will allow one the opportunity to develop their own panel of mutations to screen. It is important that physicians become comfortable with the screening method that they routinely offer to their patients. If the patient decides that she would like to use a different, acceptable screening method, the patient should be counseled her about the benefits and risks, and other available alternatives. Residual risk must also be discussed with the patient, which is the risk that the patient will still be a carrier of a disease for which the patient was negative on screening, because the screening test did not detect the patient’s unusual mutation.

ACOG’s new recommendation is that all women who are considering pregnancy or are pregnant should be offered carrier screening. This new recommendation includes screening for spinal muscular atrophy, cystic fibrosis, and complete blood count. A hemoglobin electrophoresis should be offered to those at high risk of a hemoglobinopathy, especially those from Asia, Africa, the Mediterranean, western India or the Middle East. Screening for fragile X should be performed in those with a family history of individuals with known or with histories suggestive of fragile X syndrome, as well as those with primary ovarian insufficiency or diminished ovarian reserve. Tay-Sachs and a number of other diseases should be screened for in those of Ashkenazi Jewish descent, while screening for Tay-Sachs should also be offered to those of Cajun and French-Canadian descent. If an individual is discovered to be a carrier of a recessive condition, then the partner should be tested, with special emphasis on their residual risk. Once an individual is screened for a specific genetic condition, repeat testing is not required unless new mutations are discovered. An advantage of the electronic medical record is that this information is readily available to all physicians to reduce the risk of unnecessary replication of the test.

Offering carrier screening to a couple prior to pregnancy offers them the most reproductive options if they are discovered to be carriers of a genetic illness. These options including in vitro fertilization with pre-implantation genetic testing and the transfer of a normal embryo, donor sperm or eggs from a normal donor, donor embryos, or adoption. If both partners are discovered to be carriers during pregnancy, they can be offered prenatal testing with options of pregnancy termination for affected fetuses, rapid diagnosis in the neonatal state and in some conditions neonatal hospice care. It is also important to note that carrier testing does not take the place of newborn screening. In individuals found to be carriers of a genetic illness, it is important to discuss notification of relatives who also may carry the mutated gene. As carrier testing becomes more complicated and widespread, the need for physicians to be comfortable discussing these tests with patients becomes more critical. Genetic counselors can assist the physician in ensuring that patients understand the tests and can make an informed choice as to whether to test or not. Those who would like more information on the new AGOG committee opinion can access it electronically through the University of South Dakota Wegner Health Science Information Center.

REFERENCES

Geriatric Fracture Program at Sanford USD Medical Center

Improving your patients’ quality of care and quality of life

Getting your patients back to an active lifestyle after a fall is our primary goal. Your patients will have immediate access to a team of experts – all with expertise in treating geriatric fractures.

We combine nurses, case managers, social workers, therapists, dietitians and pain management experts to deliver a cohesive, streamlined approach to caring for your patient from the time they arrive until discharge.

Call Katie Heynen, Sanford RN program specialist, at (605) 328-0298 or katie.heynen@sanfordhealth.org for more information.

Choose the Experts.

sanfordhealth.org/falls
The field of translational genomics is advancing rapidly, and the Food and Drug Administration now requires genomic information on the product labels of nearly 200 prescription drugs. South Dakota Medicine has therefore begun publishing a series of monthly articles dedicated to reviewing the pros and cons of gene-based drug dosing. The first article in this series was a point-counterpoint argument exploring the benefits of CYP2C19 genotyping for patients taking clopidogrel. More recently, we reviewed the potential utility of SLC01B1 genotyping to reduce myopathy risk in patients taking statin. We now explore one of the most longstanding and well characterized pharmacogenetic relationships known to date, the impact of variation in the thiopurine methyltransferase (TPMT) gene on clinical outcome for azathioprine in adult patients with autoimmune disease.

Dr. Hill Jensen: “TPMT genotyping improves safety for azathioprine”

Thiopurines like azathioprine and 6-mercaptopurine have long been used for immune modulation in the context of rheumatologic disorders (e.g., SLE), gastroenterological disorders (e.g., UC), and malignancy (e.g., ALL). In adult patients, the most commonly used thiopurine has been azathioprine. Azathioprine has been prescribed for greater than 35 years to treat inflammatory bowel disease (IBD). IBD is a chronic inflammatory disorder of the GI tract. This widely variable phenotypic spectrum of immune-mediated enteritis includes Crohn’s disease and ulcerative colitis. Immunosuppression and immune modulation is the treatment of choice. Azathioprine is highly efficacious for induction of remission and steroid withdrawal in up to 70 percent of patients with IBD. In general, it is considered safe. However, as many as one in three patients will withdraw from using azathioprine due to adverse drug reactions (ADRs). Azathioprine related ADRs include allergic response as well as mild to severe myelosuppression. Azathioprine related ADRs can often be attributed to genetic differences in the way our patients metabolize thiopurine medications. Thiopurine S-methyltransferase (TPMT) is a major enzyme in the metabolism of azathioprine, directly impacting the solubility and excretion of its metabolites. TPMT activity varies widely across populations, and patients with low TPMT activity experience potentially toxic levels of azathioprine in response to standard dosing regimens because they metabolize the drug too slowly. As many as 11 percent of our patients in the general population have at least one abnormal copy of the TPMT gene, and 0.33 percent have two abnormal copies. Because abnormalities in the TPMT gene increase patient risk for developing myelosuppression on azathioprine, knowledge about pre-treatment TPMT genotype or phenotype allows their health care provider to tailor therapy and reduce the likelihood of an ADR. This would include the potential for prediction and avoidance of hepatic toxicity. In addition, one could push dosing above standard dosing in patients with high TPMT activity.

In summary, heterozygous TPMT deficiency (11 percent of our patients) can be associated with development of mild to moderate myelosuppression. Half-dose therapy is an option in patients with one loss of function allele (heterozygotes). This would avoid unnecessary withdrawal of the medication and optimize the chance of each patient achieving clinical remission and mucosal healing. Individuals with zero TPMT activity (homozygotes, representing 0.33 percent of our patients) are at a greater risk, and these patients should avoid azathioprine. The avoidance of potentially fatal toxicity in homozygotes, while rare, is a compelling argument for assessing genotype in all patients prior to initiation of therapy with azathioprine.

Dr. Fanciullo: “Not everyone using azathioprine requires TPMT genotyping”

As noted above by Dr. Hill-Jensen, approximately one in 10 patients receiving azathioprine are at increased risk for mild to moderate myelosuppression. Severe myelosuppression
occurs only very rarely with this medication. In general, however, patients taking azathioprine for immune modulation in the outpatient setting often “start low and go slow.” In order to avoid severe myelosuppression, their healthcare providers typically monitor the complete blood count (CBC) at periodic intervals prior to titrating the dose of azathioprine upward. Hence, clinicians are guided by individual patient response in the context of both efficacy (disease remission) and potential toxicity (leukopenia).

There is certainly a compelling argument to screen some patients for TPMT deficiency prior to treatment, but the benefit of screening may depend upon the clinical circumstances. When treating a pediatric patient with a malignancy, purine analogues like 6-mercaptopurine are initiated at full dose to avoid therapeutic failure. In the context of leukemia, patients are also often exposed to a combination of other marrow toxic agents employed in their chemotherapeutic regimens, increasing the risk for life-threatening myelosuppression. In this setting, TPMT genotyping is almost always beneficial.

In the treatment of adult-onset autoimmune diseases such as SLE, however, azathioprine is added to prednisone (as a steroid-sparing agent) with the expectation that full efficacy will be reached slowly as the dose of azathioprine is gradually titrated upward, i.e., the steroids are providing the immediate control of the condition. In this situation, it makes sense to start azathioprine at a low dose and utilize step-up dosing adjusting for side-effect tolerance while the CBC is monitored. Utilizing this strategy, myelosuppression is usually detected early in the estimated one in 10 patients at risk. The azathioprine-FDA prescribing guidelines recommend that patients should have weekly CBCs during the first month, twice monthly for the next two months, then monthly thereafter. Thus, patients developing bone marrow toxicity will be promptly identified.

It should also be noted that the development of myelosuppression in patients taking azathioprine is a complex multifactorial process. For example, TPMT genotype status may only explain 25 percent of the cases of myelosuppression which develop in patients taking azathioprine to treat Crohn’s disease. Factors such as concomitant medications, infections, and other variables may contribute to this problem. Ancestry also appears to impact the effectiveness of TPMT genotype screening. Patients of Asian ancestry develop azathioprine toxicity at rates higher than patients of European ancestry despite having a lower frequency of TPMT gene variants. Some of this difference is attributable to other genetic factors, while much is environmental (non-genetic). Another gene, NUDT15, may predict thiopurine intolerance independent of TPMT, and variation in this gene is seen more commonly in Asians.

Lastly, the impact of TPMT genotype on other azathioprine-related ADRs like pancreatitis remains undefined, yet these ADRs may lead to a cessation of therapy. Further study is needed, to clarify the impact of TPMT genotyping on patient adherence and cost in an already overburdened healthcare infrastructure before TPMT genotyping is universally applied to all patients eligible for azathioprine. Ultimately, our desire is to decrease mortality from severe myelosuppression. Homozygous TPMT deficiency only occurs in 0.33 percent of the general population. With such small numbers we may not yet have sufficient evidence to make conclusions regarding mortality reduction. Therefore, TPMT genotype should be used in conjunction with clinical judgment and ongoing monitoring of 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 Authors:
Cristina Hill Jensen, MD, FACG, Associate Professor, Department of Internal Medicine, Division of Gastroenterology, University of South Dakota Sanford School of Medicine.
Joseph Fanciullo, MD, FACR, Associate Professor, Department of Internal Medicine, Division of Rheumatology, University of South Dakota Sanford School of Medicine.
Top 2 Reasons South Dakota women don’t get early Prenatal Care...

In a recent survey among South Dakota women who didn’t get prenatal care as early as they wanted, two primary barriers were reported:

1. I did not know I was pregnant.
2. I could not get an appointment when I wanted one.

You can make a difference.
Talk to your patients about the early signs of pregnancy during routine visits. Then make scheduling for new pregnant women a priority. We know prenatal care improves birth outcomes for both mother and infant. The earlier the care, the better the outcome.

Help us give every baby the best possible start to a healthy life.

If your financial plan is weighing you down, step up.

loftadvisors.com | 605.333.8266
A Division of First Dakota National Bank | 101 N. Main Avenue, Suite 201 | Sioux Falls, SD 57104

Securities offered through Raymond James Financial Services, Inc., Member FINRA/SIPC, and are not insured by bank insurance, the FDIC or any other government agency, are not deposits or obligations of the bank, are not guaranteed by the bank, and are subject to risks, including the possible loss of principal. Raymond James is not affiliated with the financial institution or the investment center.
A Case of Fulminant Hepatic Failure Secondary to Congestive Heart Failure Without Evidence of Acute Cardiac Decompensation

By Kalyan Wagle MD; Oluwaseun A. Akinseye, MD; Prakash Shrestha, MD; Madhuri Chandnani, MD; Raiko Munankarmi, MD; Vivian Ripin, MD; and Jimmy Yee, MD

Abstract

There are so far only a few reported cases of acute fulminant hepatic failure resulting from acute cardiomyopathy. This is a rare occurrence, especially in patients that do not exhibit any signs and symptoms of acute cardiac decompensation. We report a case of fulminant liver failure with non-diagnostic work up for the common causes of liver failure. This patient had concurrent history of congestive heart failure, but did not have acute decompensation. Right upper quadrant sonogram revealed hepatomegaly of 15 cm, trace amount of perihpetic ascites, pericholecystic fluid, and also thickened edematous gallbladder wall with no stones, no common bile duct stones, and no portal vein thrombosis. Echocardiogram revealed dilated left atrium and ventricle, severe mitral regurgitation, grade 4 diastolic dysfunction, diffuse hypokinesis of left ventricle, and severely and newly reduced systolic function with an ejection fraction of 10 percent (decreased from 25 percent on last ECHO 18 months prior). Liver biopsy demonstrated marked centrilobular hepatocyte necrosis and dropout accompanied by congestion, some areas of bridging necrosis and focal confluent necrosis which was suggestive of severe congestive hepatopathy. With initiation of heart failure medications, liver function improved significantly.

Introduction

Congestive heart failure (CHF) is usually accompanied by mildly deranged liver enzymes secondary to poor hepatic perfusion and portal venous congestion; fulminant hepatic failure is not common presentation of acute CHF, with only a few cases documented in literature. We report a case of severe congestive hepatopathy progressing to fulminant hepatic failure in a patient with known CHF without signs and symptoms of acute cardiac decompensation.

Case Report

A 46-year-old male presented to emergency department with a three-day history of epigastric pain described as sharp, squeezing in nature, 6 out of 10 in severity, non-radiating, and associated with nausea, retching and loss of appetite. Patient denied that there was any relation of the pain with exertion or with food intake. The patient reported one episode of vomiting on the day of admission. On review of system, there was absence of fever, chills, headache, lightheadedness, palpitations, chest pain, diaphoresis, dyspnea, orthopnea, paroxysmal nocturnal dyspnea, leg swelling, and diarrhea. There was no recent history of consumption of Tylenol, mushroom or herbal products. He declined any sort of recent travel or having any kind of sick contact. He also denied the use of tobacco or any other kind of recreational drug use. He had ceased alcohol consumption 10 years prior to the event.

However, his past medical history was significant for hypertension, non-ischemic cardiomyopathy with systolic heart failure and a left ventricular systolic function of 20 percent, requiring an implantable cardioverter
defibrillator (ICD) in 2009. He was noncompliant with his heart failure medications. He was admitted in November 2014 with an impression of abnormal liver function test secondary to hepatic congestion due to poorly controlled CHF at different hospital. Abdominal computed tomography (CT) on that admission showed a thickened gallbladder without stone or sludge, and hepatobiliary (HIDA) scan was not suggestive of cholecystitis.

Physical examination revealed elevated blood pressure of 155/108 mm Hg, associated tachycardia with heart rate of 122/min, and normal oxygen saturation on room air. His other physical findings included icteric conjunctiva, mild jugular venous distension (JVD) with normal heart sounds, lungs were clear to auscultate, mild epigastric tenderness, no petechiae or ecchymoses, and absence of bilateral pitting pedal edema. Laboratory evaluations were significant for highly elevated liver transaminases up to 50- to 70-fold (Table 1). Acetaminophen level was undetectable. Urine toxicology, hepatitis B and C serology, human immunodeficiency virus (HIV), antinuclear antibody (ANA), quantiferon gold, Brucella, cytomegalovirus (CMV), Epstein-Barr virus (EBV), and syphilis serology were all negative. Anti-mitochondrial (AMA) and anti-smooth muscle antibodies were low titer (1:20).

The ultrasound of the right upper quadrant revealed enlarged liver of 15 cm, trace of perihepatic ascites, pericholecystic fluid, and thickened and edematous gallbladder wall with no stones, no common bile duct stones, and no portal vein thrombosis. Chest X-ray showed enlarged cardiac shadow with no signs of congestion. Electrocardiogram (EKG) showed sinus tachycardia at 117 beats per minute with T wave inversion in V6, without any other ischemic changes. Echocardiogram (ECHO) revealed dilated left atrium and left ventricle, diffuse hypokinesis of left ventricle and severely reduced systolic function with an ejection fraction of 10 percent (decreased from 25 percent on last ECHO 18 months prior). It also showed severe mitral regurgitation, severe tricuspid regurgitation, and grade 4 diastolic dysfunction.

Over the course of the hospitalization, the patient developed worsening thrombocytopenia, with lowest platelet count of 74,000. Ferritin level remained persistently elevated (Table 1). Bone marrow biopsy was performed and demonstrated reactive changes with no

---

**Table 1. The progression of relevant lab values from admission to discharge and follow up**

<table>
<thead>
<tr>
<th>Labs</th>
<th>Normal Range</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>D/C</th>
<th>Day 10</th>
<th>F/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALP (U/L)</td>
<td>30-115</td>
<td>140</td>
<td>127</td>
<td>120</td>
<td>86</td>
<td>134</td>
<td>82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AST (U/L)</td>
<td>10-40</td>
<td>2328</td>
<td>2746</td>
<td>2576</td>
<td>964</td>
<td>78</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GGT (U/L)</td>
<td>9-50</td>
<td>190</td>
<td>173</td>
<td>159</td>
<td>145</td>
<td>92</td>
<td>74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>7-50</td>
<td>1825</td>
<td>2348</td>
<td>2531</td>
<td>1638</td>
<td>374</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDH (U/L)</td>
<td>90-225</td>
<td>2111</td>
<td>2890</td>
<td>1704</td>
<td>723</td>
<td>375</td>
<td>163</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total bilirubin (mg/dL)</td>
<td>0.0-1.5</td>
<td>6.54</td>
<td>7.85</td>
<td>14.26</td>
<td>31.55</td>
<td>46.62</td>
<td>43.8</td>
<td>27.25</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Conjugated bilirubin (mg/dL)</td>
<td>0.0-0.3</td>
<td>0.98</td>
<td>1.18</td>
<td>3.15</td>
<td>16.12</td>
<td>26.74</td>
<td>27.7</td>
<td>16.99</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Total protein (g/dL)</td>
<td>6.5-8.5</td>
<td>6.4</td>
<td>5.7</td>
<td>5.5</td>
<td>5.3</td>
<td>5.9</td>
<td>7.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>3.5-5.0</td>
<td>3.4</td>
<td>3.0</td>
<td>2.7</td>
<td>2.3</td>
<td>2.1</td>
<td>4.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INR</td>
<td></td>
<td>2.64</td>
<td>2.45</td>
<td>1.19</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Troponin (ng/dL)</td>
<td>&lt;=0.04</td>
<td>0.09</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferritin</td>
<td>10-230</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>122</td>
</tr>
<tr>
<td>BNP (pg/mL)</td>
<td>&lt;=100</td>
<td>799.3</td>
<td>764</td>
<td>928.8</td>
<td>1352</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonia (umol/L)</td>
<td>9.35</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>37</td>
</tr>
</tbody>
</table>

*Aspartate transaminase (AST), alanine transaminase (ALT), gamma-glutamyl transpeptidase (GGT), alkaline phosphatase (ALP), lactate dehydrogenase (LDH), international normalized ratio (INR), B-type natriuretic peptide (BNP), discharge (D/C), follow up (F/U)
evidence of hemophagocytosis. Liver enzymes peaked on day two to three of hospitalization with aspartate transaminase (AST) of 2746 U/L, alanine transaminase (ALT) of 2531 U/L and lactate dehydrogenase (LDH) of 2890 U/L. There was progressive elevation of bilirubin with maximum total bilirubin 46.62 mg/dl and conjugated bilirubin level 27.7 mg/dL. Albumin decreased to 2.1 g/dL. Liver biopsy demonstrated marked centrilobular hepatocyte necrosis (Figure 1) and dropout accompanied by congestion, some areas of bridging necrosis (Figure 2) and focal confluent necrosis suggestive of severe congestive hepatopathy with submassive hepatic necrosis (Figure 3).

Patient was empirically treated with N-acetylcysteine and the initial plan was to transfer him to a liver transplant center. We also started him on treatment for systolic CHF with lasix, angiotensin converting enzyme (ACE) inhibitor and beta blockers. CHF medications were optimized over the course of admission. Patient's liver function gradually improved over the course of time, except for bilirubin which remained elevated. Transfer to liver transplant center was canceled. He remained clinically stable and was discharged with outpatient follow up to the gastroenterology and cardiology clinics. Laboratory values obtained on follow up visits (one month later) showed normalized international normalized ratio (INR). Platelet count, ferritin level and liver enzyme were also normal. But, bilirubin levels remained mildly elevated.

Discussion

CHF can result in hepatic failure from hepatic venous congestion resulting in venous hypertension, and decreased oxygen delivery due to impaired cardiac output resulting in hepatic necrosis.2 The clinical manifestation depends on the severity and chronicity of the congestion. Presentation ranges from asymptomatic with mildly abnormal liver function test, to symptomatic with nausea, vomiting, jaundice, right upper quadrant pain, ascites and sometimes coma.
requiring liver transplantation. The usual presentation is abnormal liver biochemical tests during routine evaluation. The cases of fulminant hepatic failure with or without coma are usually due to superimposed cardiogenic shock and hepatic ischemia rather than severe hepatic venous congestion alone. There are few reported cases of acute fulminant hepatic failure resulting from acute cardiomyopathy; this remains rare especially if presented with no signs of acute cardiac decompensation. Our patient’s initial presentation mimicked ischemic hepatitis with very high LDH level, but no episodes of hypotension were recorded. There was no evidence of viral hepatitis, and right upper quadrant sonogram failed to reveal any biliary obstruction. No strong evidence of autoimmune hepatitis or drug-induced hepatitis existed. ECHO revealed reduction of the left ventricular ejection fraction from 25 percent to 10 percent.

The diagnosis of CHF as a cause of acute fulminant hepatitis should be considered along with other acute causes of fulminant hepatic failure (Table 2), and not only as a diagnosis of exclusion. CHF and acute heart failure can result in hypoxic hepatitis. The mechanism is such that left-sided heart failure results in hepatic ischemia (through decreased blood flow) and right-sided heart failure results in hepatic venous congestion with both culminating in centrilobular liver cell necrosis. In a case series of 142 consecutive episodes of hypoxic hepatitis identified in the intensive care unit of a general hospital, Henrion et al. found that 80 cases (56 percent) were due to decompensated CHF and 20 cases were due to acute cardiac failure. It is important to perform an ECHO on patients presenting with acute fulminant hepatic failure without an obvious source because cardiomyopathy is one of the few treatable causes of acute fulminant hepatic failure. In another case reported by Fussell et al., a 35-year-old female who was in five weeks of postpartum was referred to a liver transplant center for fulminant hepatic failure and worsening hepatic encephalopathy of unknown etiology. She had a previous history of Hodgkin’s disease treated with radiation and unknown course of chemotherapy four years prior to presentation, and was in remission. She denied taking acetaminophen and the serum level was undetectable. Viral serologies for hepatitis A, B, C, herpes simplex virus, HIV and EBV were negative, as were ANA, AMA, antiribonucleoprotein antibody, serum copper and ceruloplasmin levels. Evidence of poor peripheral perfusion and elevated JVD prompted an ECHO, which showed global hypokinesis and estimated EF of 15 percent and a cardiac output of 1.8L/min on pulmonary artery catheterization. Heart failure management (captopril, digoxin) and hemodialysis were initiated resulting in significant improvement in hemodynamics, liver function, INR and cardiac output (improved to 4L/min). She was discharged on an angiotensin converting enzyme (ACE) inhibitor, diuretic and β-blocker, and was completely asymptomatic at one week follow up. Thus, the improvement in cardiac function with optimal CHF management helped in the treatment of her fulminant liver failure.

**Conclusion**

It is unusual, but not uncommon for passive CHF to present with severe derangement of the liver function with coagulopathy. It is always wise to consider heart failure as one of the differential diagnoses and do essential

<table>
<thead>
<tr>
<th>Table 2. Common causes of acute liver failure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Viral</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Drugs and toxins</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Metabolic disorders</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Vascular disorders</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Others</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Adapted from Merck Manual for Professionals®
cardiac workup (like ECHO) while managing a patient with deranged liver function tests. Early recognition and optimal management of CHF can potentially reverse fulminant hepatic failure.

Acknowledgements: We would like to thank Suneetha Natarajan, MD, pathologist, Queens Hospital Center, for her assistance on the preparation and labeling of the liver histology slides; and Deborah Goss, director of library services, Icahn School of Medicine at Mount Sinai, Queens Hospital Center for reviewing and editing the final manuscript for appropriate grammar composition.

REFERENCES


About the Authors:
Kalyan Wagle, MD, Resident Physician, Department of Medicine, Queens Hospital Center, Icahn School of Medicine at Mount Sinai.
Oluwaseun A. Akinyeye, MD Resident Physician, Department of Medicine, Queens Hospital Center, Icahn School of Medicine at Mount Sinai.
Prakash Shrestha, MD, Resident Physician, Department of Medicine, Queens Hospital Center, Icahn School of Medicine at Mount Sinai.
Madhuri Chandramani, MD, Resident Physician, Department of Medicine, Queens Hospital Center, Icahn School of Medicine at Mount Sinai.
Raiko Munankarmi, MD, Resident Physician, Department of Medicine, Queens Hospital Center, Icahn School of Medicine at Mount Sinai.
Vivian Ripin, MD, Attending Physician, Department of Medicine, Queens Hospital Center, Icahn School of Medicine at Mount Sinai.
Jimmy Yee, MD, Cardiovascular Fellow, Department of Cardiovascular Disease, University of South Dakota Sanford School of Medicine.
Sanford Imagenetics provides compassionate care and diagnostic expertise in clinical genetics, genomics and precision medicine.

Our team of highly trained genetics experts is experienced in treating children and adults with inherited and familial conditions, birth defects, biochemical and metabolic disorders and cancer.

Let’s help each other bring tomorrow’s care to your patients today.
Gastric Zygomycosis in a Previously Healthy 56-Year-Old Male

By Ashwna Sunassee, MD; and Desrae M. Muirhead, MD

Abstract

Zygomycosis refers to invasive fungal infections caused by fungi belonging to the phylum zygomycota. Infections generally occur in immunocompromised individuals. The following case is of a previously healthy 56 year-old male admitted to the hospital following a motor vehicle accident. During his hospitalization, there was a significant drop in hemoglobin with no obvious source of bleeding. This prompted the clinician to insert a nasogastric tube which returned at least 2 liters of black fluid and led to an upper gastrointestinal endoscopy. The endoscopy revealed numerous large crater-like gastric ulcers with adherent clot, up to 30 mm in greatest dimension. Biopsies of the ulcer margins revealed broad pauciseptate, ribbon-like, slightly refractile fungal forms, which were highlighted with periodic acid-Schiff (PAS) stain. A Gomori methanamine silver (GMS) stain was negative. These forms were suggestive of zygomycetes. A subsequent gastrectomy was performed, which revealed similar findings. The patient experienced severe trauma, which may have contributed to the progression of his condition; however, this is an unusual presentation as the patient was previously healthy, and he did not illustrate any conditions that might compromise his immunity. The severity and rarity of this condition makes this a very unique and intriguing case.

Introduction

Zygomycosis refers to invasive fungal infections caused by the fungi belonging to the phylum zygomycota, class zygomycetes, order Mucorales and Entomophthorales. The Mucorales order contains two families namely Mucoraceae and Cunninghamellaceae. As a majority of human infections are caused by Mucorales fungi, the term mucormycosis is often used to designate this infection. These fungi are widespread in the environment and commonly found on fruit, on bread, in the soil and decaying vegetation. This opportunistic fungal infection is associated with high mortality in immunocompromised individuals. Some of the more common risk factors include diabetes, immunosuppressant use, severe burns, starvation, and intravenous drug use. While rhinocerebral and pulmonary forms are most common, primary gastrointestinal infection is very uncommon. We present a case of gastric zygomycosis in a previously healthy 56-year-old male who presented to the hospital following a motor vehicle accident.

Case Report

The patient presented to the hospital following a motor vehicle accident in which he obtained blunt force trauma including rib fractures. He had no preexisting medical conditions. Two weeks into his admission, the patient was noted to have a sudden drop in his blood hemoglobin levels. This prompted the clinician to insert a nasogastric tube which returned at least 2 liters of black fluid. Subsequently an upper gastrointestinal endoscopy was performed and it revealed multiple crater-like stomach ulcers measuring up to 30 mm in greatest dimension (Figures 1 and 2). The ulcer margins were biopsied and histologically revealed active chronic gastritis with focal fibrinopurulent debris. Within a fragment of the ulcerative debris, broad pauciseptate, ribbon-like, slightly refractile hyphal forms were noted (Figure 3). Special stains including Gomori methanamine silver (GMS) and periodic acid-Schiff (PAS), were performed to highlight the organisms. The organisms, which highlighted best with PAS stain, were suggestive of zygomycetes fungi (Figure 4). Due to
the extensive nature of the disease, a gastrectomy was performed after a week. Grossly, the serosal surface of the stomach demonstrated two areas of induration and dusky coloration which corresponded to two ulcers within the distal aspect of the stomach. The ulcers measured 2 cm and 6 cm, respectively. Microscopically, both ulcers completely penetrated the muscularis propria and extended into the perigastric adipose tissue and revealed fungal microorganisms identical to those identified in the gastric biopsy. A small caliber artery in the smaller ulcer was identified along with a small thrombus in the ulcer base. A fungal culture performed was negative.

Discussion
Zygomycosis of the gastrointestinal tract is thought to primarily arise from ingestion of fungal spores. Infection of the gastrointestinal tract is rare, accounting for only 7 percent of all reported cases of zygomycosis. The diagnosis of zygomycosis relies on tissue invasion. Specimens obtained should be processed for fungal stains (GMS and PAS) and cultures. Combining microscopy and culture increases the diagnostic yield by 15 to 20 percent. Zygomycetes have primitive coenocytic hyphae, which become easily damaged during biopsy procedures or tissue grinding in the laboratory. Thus, they may not be recovered in cultures despite their presence in microscopic or histopathological examinations. Fungal cultures are positive in only 15 to 25 percent cases thus negative cultures do not rule out the infection. In the current case,
the fungal organisms were seen on routine hematoxylin and eosin stain and PAS stain, and fungal cultures were negative. Gastrointestinal zygomycosis occasionally leads to development of necrotic ulcers and may induce hemorrhagic shock. The stomach is the most frequently reported site of gastrointestinal infection, however, infection of the colon and ileum have also been reported and, in such instances, have an extremely high mortality rate of 98 percent due to a perforated viscus. The patients diagnosed with gastrointestinal zygomycosis are typically immunosuppressed in some way. A previous case has been reported of a diabetic patient with comorbidities who developed gastric perforation that was clinically indistinguishable from perforated peptic ulcer due to invasive gastric mucormycosis. A separate case of gastric mucormycosis was identified in a 60-year-old man who was involved in a motor vehicle crash in which he obtained multiple injuries including multiple fractures and a flail chest. In contrast to the current case, the patient also had poorly controlled diabetes mellitus and schizophrenia. The current patient had no known risk factors or immunosuppression. The only significant history was of trauma, making this an unusual presentation of such severe zygomycosis infection.

The prognosis of gastrointestinal zygomycosis is poor, with a very high mortality rate (almost 100 percent) in cerebral and disseminated disease. Prompt diagnosis and treatment including antifungal therapy and surgical debridement is required to improve prognosis. Whenever possible, complete surgical excision of the lesions is critical and predictive of survival, as seen in cases of rhino-orbital infections.

**Conclusion**

This previously healthy male developed gastrointestinal zygomycosis following a history of trauma. He may have been exposed to zygomycetes prior to his accident or during his hospitalization given the ubiquitous nature of zygomycetes. He did not have the usual immunosuppressed conditions that favor such an aggressive form of this disease. It is possible that the trauma he sustained put him at risk, and previously ingested spores which would have ordinarily had no effect, now caused severe disease. This case highlights the fact that trauma can put patients at risk for life-threatening fungal infections.

**REFERENCES**


---

**About the Authors:**
Ashwyna Sunassee, MD, Pathology Chief Resident, PGY-4, University of South Dakota Sanford School of Medicine.
Desiree M. Muirhead, MD, Pathology Faculty, University of South Dakota Sanford School of Medicine.
Let's Talk About Expedited Partner Therapy

Patients diagnosed with Chlamydia and Gonorrhea who receive EPT are\textsuperscript{1,2,6}

1. More likely to report that all of their sexual partners were treated, than those who were not told to refer their partners treatment
2. Less likely to report having sex with an untreated partner
3. Less likely to be diagnosed with a repeat infection at a follow up visit

In 2016, South Dakota had 5,610 total cases of Chlamydia and Gonorrhea reported. Randomized controlled trials in the CDC publication, Expedited Partner Therapy in the Management of Sexually Transmitted Diseases (2005), have shown that to effectively manage the STD diagnosed patients, current sex partner(s) must be treated to prevent reinfection.\textsuperscript{2,6} EPT is endorsed and recommended by numerous organizations, including the Centers for Disease Control, American Public Health Association, American Medical Association, American Academy of Pediatrics, American College of OBGYN, and many others.

Expedited Partner Therapy (EPT), enables the exposed sex partner(s) to be treated in the absence of a direct clinical assessment. EPT allows the originally diagnosed patient to directly deliver medications and information to their sex partner(s), via a Partner Pack. The Partner pack contains - STD information on exposure and prevention, medication information, the medication or prescription, as well as recommendations and information on the need for STD testing and where they can get tested.

**Eligibility criteria for EPT:**

1. EPT can be provided to partners of a patient diagnosed with Chlamydia or Gonorrhea infection
2. EPT should not be provided to any partners when the patient with Chlamydia or Gonorrhea infection is concurrently infected with HIV or Syphilis.

**Ideal EPT patients:**

1. Heterosexual men and women
   a. EPT is not recommended for men who have sex with mean (MSM) because of a high risk for co-existing infections, such as syphilis and undiagnosed HIV infection, and should therefore be seen for medical evaluation.\textsuperscript{7}
2. Those with partners who are unable or unlikely to seek timely clinical services.

**Recommended EPT Drug Regimens:**\textsuperscript{7}

<table>
<thead>
<tr>
<th>Partners of patients diagnosed with Chlamydia</th>
<th>Azithromycin (Zithromax) 1gm orally once</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partners of patients diagnosed with Gonorrhea OR Partners of Patients diagnosed with Chlamydia and Gonorrhea</td>
<td>Cefixime (Suprax) 400mg orally once PLUS Azithromycin (Zithromax) 1gm orally once</td>
</tr>
</tbody>
</table>

**Number of Doses Allowed:** Will depend on the number of known sex partners in the past 60 days (or the most recent sex partner if there were no partners in the previous 60 days).\textsuperscript{2,7}

**Informational Materials:** Any medication/prescription that is provided should be accompanied by treatment instructions, appropriate warnings about taking the medications, general STD health counseling, and a statement advising that partners seek personal medical evaluation, particularly if the person has symptoms suggestive of an STD.\textsuperscript{2,7}
Patient Counseling: Abstinence until 7 days after treatment and until 7 days after partner(s) has been treated.7

Patient Re-testing: It is recommended that all patients diagnosed with Chlamydia or Gonorrhea be re-tested 3-4 months after treatment.7

EPT Partner Packs
EPT Partner packs developed by the South Dakota STD Program are a great way to get the information regarding STD exposure, treatment, testing, and prevention out to partners of the original patient.

In addition to giving the original patient information on EPT, Packs will contain:
1. STD and medication information
2. Condoms
3. Medication

As we work together in STD prevention to resolve barriers to partner treatment, and we maximize the impact the EPT, we will no doubt improve patient care and decrease STD morbidity in our state. If you think that EPT would be a good fit for you, your colleagues, and/or your medical practice, the South Dakota Department of Health would like to help.

Need more info? How do I get Partner Packs?
If you have questions, need more EPT and STD information, or if you would like to get some Partner Packs to use in your clinic, please contact Amanda Gill  M.S., STD Program Coordinator, for the South Dakota Department of Health at 605-773-4794 or amanda.gill@state.sd.us

South Dakota Doctors, you deserve a choice, the BEST choice for medical malpractice insurance. We are pleased to introduce to you the Physicians Protector Plan®, a unique insurance program with a singular focus – delivering the highest level of insurance protection to physicians and surgeons working in today's rapidly evolving health care community. We bring together the best of what the industry has to offer including:

- Financial Strength through Aspen American Insurance Company, an admitted A.M. Best ‘A XV’ rated carrier with over $11.1B in total assets (as of 12/31/2015)

- Exclusive Risk Management Consultation Program available to our insureds through www.PhysiciansRisk.com/protected

- Access to a confidential Risk Management Hotline fielded by experienced health care attorneys

- Comprehensive coverages including Cyber Liability, Billing Errors & Omissions Defense Reimbursement and FREE retirement tail after just 1 year with Aspen

- Robust claims defense supported by local counsel aimed at protecting our insureds' professional reputations

**Credits / Discounts**

We offer a variety of credits / discounts including:

- Competitive premiums for practitioners who are new or newer to practice
- Loss free credits
- Renewal (loyalty) discounts
- Group size credits
- Leave of absence
- Part-Time rates
Disseminated Blastomycosis Mimicking Malignancy

By Jennifer L. Hsu, MD; B. Joel Tjarks, MD; Aaron Berg, MD; and Tony Oliver, MD

Abstract

Blastomycosis is an endemic fungal infection commonly found within the Mississippi and Ohio River basins and Great Lakes region. While patients typically present with acute pneumonia, Blastomyces dermatitidis has the potential to spread hematogenously, resulting in disseminated infection of multiple organs. In this report, we describe a 57-year-old male with disseminated blastomycosis acquired in South Dakota. The diagnostic evaluation was confounded by concern for malignancy given the involvement of multiple locations, including brain, lungs, adrenal glands, and testes. Despite aggressive therapy with amphotericin B, the patient succumbed to this infection.

Introduction

Blastomyces dermatitidis is a thermally-dimorphic fungus found commonly around the Mississippi and Ohio River basins and the Great Lakes region. Humans acquire infection through inhalation of conidia and from the lungs; infection can disseminate widely. Initial diagnoses are frequently delayed due to the varied presentation and consideration of alternative diagnoses, including malignancy, especially in outside of endemic areas. Through presentation of a case from southeast South Dakota, we aim to highlight this pathogen and raise awareness of its presence in the state.

Case Report

A 57-year-old male resident of southeast South Dakota with a history of alcohol and tobacco abuse was brought to the emergency department by his family for evaluation of fatigue, dizziness, shortness of breath, cough, and unintentional loss of 40 pounds over the preceding six months. On admission, vital signs were normal. Physical examination revealed a lethargic, cachectic-appearing male with a scabbed skin lesion overlying the left eyebrow. Cardiopulmonary and abdominal exams were normal, while genital exam revealed diffuse, non-tender right testicular swelling. Neurologically, the patient was lethargic, but without focal neurologic deficit. Laboratory analysis revealed a white blood cell (WBC) count 6.6 K/µL (4-11 K/µL), hemoglobin 14.9 g/dL (13.5-17.5 g/dL), platelets 135 K/µL (140-400 K/µL), sodium 100 mEq/L (135-145 mEq/L), and potassium 5.0 mEq/L (3.5-5.4 mEq/L). Renal and hepatic function were both normal and HIV screening was negative. Non-contrast computed tomography (CT) of the head demonstrated mild generalized brain parenchymal volume loss without acute changes. CT angiography of the chest showed extensive reticulonodular opacities within both lungs and large bilateral adrenal gland masses, each measuring approximately 6 cm (Figure 1). CT of the abdomen and pelvis confirmed the bilateral adrenal masses and showed mild diffuse retroperitoneal lymphadenopathy (Figure 2). Scrotal ultrasound showed a focal hypoechoic mass lesion in the right testicle (1.2 x 1.3 x 1.1 cm) with intrasosional flow, an ovoid mass with solid and cystic components within the tunica (8 x 8 x 3 mm), and a hypoechoic, irregular left testicular mass (1.1 x 1.0 x 0.9 cm).

Further laboratory evaluation revealed a random serum cortisol level of 12.4 µg/dL (2.9-17.3 µg/dL). Cortisol stimulation testing was borderline abnormal with peak cortisol of 17.7 µg/dL. (A peak cortisol response of 18 µg/dL at any time is an adequate response in most patients.) The patient’s baseline adrenocorticotropic hormone was elevated to 76 pg/mL (10-60 pg/mL). He was thought to have borderline adrenal deficiency from physiologic stress and bilateral adrenal infiltration and was...
treated with hydrocortisone intravenously. The patient underwent further evaluation of hyponatremia with findings of: serum osmolality 220 mOsm/kg (285-305 mOsm/kg), urine osmolality 311 mOsm/kg (150-1,200 mOsm/kg), and urine sodium 19 mEq/L (20 mEq/L). The hyponatremia was attributed to a combination of low solute intake, syndrome of inappropriate anti-diuretic hormone secretion (SIADH), and adrenal insufficiency. The patient’s sodium improved with hypertonic saline, tolvaptan, and demeclocycline. Despite correction of the hyponatremia, he remained lethargic, which prompted magnetic resonance imaging (MRI) of the brain with contrast. This showed smooth leptomeningeal enhancement along the surface of the right quadrigeminal plate/pons and superomedial right cerebellar surface (Figure 2) consistent with meningitis. Diagnostic lumbar puncture was performed with
an opening pressure of 24 cm H₂O. Cerebrospinal fluid (CSF) analysis revealed 1,028 WBCs/µL with 89 percent neutrophils (0-5 WBCs/µL), glucose less than 20 mg/dL (50-80 mg/dL), and protein 289 mg/dL (12-60 mg/dL). This result further supported the diagnosis of meningitis. However, the process was aseptic as bacterial, fungal, and mycobacterial cultures of the CSF were negative.

In light of the imaging abnormalities and negative cultures, malignancy remained highest on the differential diagnosis. Thus, adrenal gland biopsy and right orchectomy were performed. Needle core biopsies of the adrenal gland revealed diffuse granulomatous inflammation with numerous GMS positive microorganisms (Figure 3A and B). Similarly, microscopic examination of hematoxylin and eosin (H&E) stained slides of the testicle revealed diffuse necrotizing granulomatous inflammation which nearly completely replaced the testicular parenchyma. Numerous multinucleate giant cells were identified with phagocytosed organisms. A Gomori-methenamine-silver (GMS) stain was performed highlighting abundant fungal organisms with pleomorphic morphology and occasional budding forms (Figure 3C and D). Urinary antigen testing for Histoplasma capsulatum and Blastomyces dermatitidis were both above the level of quantification (greater than 19.0 ng/mL). The pathology and urinary antigen testing prompted initiation of treatment with liposomal amphotericin B 5 mg/kg/day for treatment of possible severe histoplasmosis or blastomycosis with central nervous system involvement. After 10 days of anti-fungal therapy, repeat CSF analysis showed improvement with 89 WBCs/µL with 31 percent neutrophils (0-5 WBCs/µL), glucose 32 mg/dL (50-80 mg/dL), and protein 291 mg/dL (12-60 mg/dL). Unfortunately, the patient’s mental status progressively declined. Repeat MRI completed after 24 days of anti-fungal therapy revealed worsening basilar leptomeningeal enhancement and multiple acute to subacute infarcts in the pons, right basal ganglia, and left thalamus, which were attributed to infection-associated vasculitis. Cultures of adrenal tissue ultimately grew Blastomyces dermatitidis. The patient’s family elected to pursue comfort care measures given the lack of improvement despite aggressive care and the patient died.

**Discussion**

*Blastomyces dermatitidis* is a thermally dimorphic fungus that grows in the environment as hyphae (22-25 degrees Celsius) and as yeast in tissues (37 degrees Celsius). It is commonly found in forested, sandy soils with acidic pH and decaying vegetation near freshwater sources. The known geographic distribution of blastomycosis includes the Midwest and south-central portions of the U.S. and more specifically, states bordering the Mississippi and Ohio River basins, the St. Lawrence River valley, and the Great Lakes region. Traditionally, South Dakota has not been considered within the geographic distribution of *Blastomyces* spp. However, the geographic distribution is less well-defined than other endemic fungi due to lack of systematic public health reporting, including within South Dakota. Thus, the true incidence of infection is unknown. Additionally, approximately 50 percent of infections are subclinical or asymptomatic, increasing the likelihood of underreporting.

*B. dermatitidis* can infect both immunocompetent and immunocompromised hosts. Small-sized conidia produced in the mold phase of *B. dermatitidis* cause pulmonary infection when aerosolized from soil and inhaled into the alveoli. Thus, activities that disrupt soil, including construction, composting, brush clearing, and hunting, have been associated with acquisition of blastomycosis. Conidia that evade host innate immune defenses can germinate as yeast, which are more difficult to kill by host cells. Yeast phase organisms are phagocytized by macrophages and neutrophils, leading to mixed granulomatous and pyogenic infection of lung tissue. Control of *B. dermatitidis* infection relies on T lymphocytes sensitized to Blastomyces antigens. Although humoral immunity develops, it is not critical for controlling the infection. In our case patient, the source of infection was unknown. The authors were not aware of specific exposures or environmental conditions that may have conferred increased risk of infection in this gentleman. However, we hypothesize that alcohol abuse and associated malnutrition may have led to an impaired cellular immune response, which prevented adequate control of the infection.

More than 90 percent of patients with documented blastomycosis develop pulmonary infection, which results in acute pneumonia. However, hematogenous dissemination of *B. dermatitidis* infection is frequent and disseminated disease occurs in 25 to 40 percent of patients. The spectrum of illness can range from asymptomatic to sepsis with acute respiratory distress syndrome (ARDS). Patients may initially present with more than one site of infection, and in this situation, lung and skin are most commonly affected. In our patient, there was initial concern for malignancy given the multiple involved organs – brain, lungs, adrenal glands, retroperitoneal lymph nodes, and testicles. This illustrates the potential of
B. dermatitidis to infect nearly every organ in the body, leading to its moniker “the great pretender”. This was demonstrated in the case patient who presented with brain, lung, adrenal, and testicular involvement. Overall, mortality associated with blastomycosis has been approximately 5 percent in large series, but increases to 50 to 89 percent in patients with Blastomyces-associated ARDS even on appropriate therapy. Fewer data are available regarding mortality with central nervous system (CNS) disease, but in one series of 22 patients with CNS infection, four (18 percent) patients died during follow-up.

With the variety of presentations of blastomycosis, diagnostic delays are common. Delay in diagnosis may be due to the presentation of extrapulmonary infections occurring after the pulmonary findings have completely resolved. Even in hyperendemic areas, only 5 percent of patients with pulmonary blastomycosis are correctly diagnosed at initial presentation. Delay in diagnosis of greater than one month has been reported in half of patients. Detailed history-taking, including travel to hyperendemic areas, soil exposure, and pet health history, can lead clinicians to consider the diagnosis. However, in the absence of these known risks, clinicians must maintain a high index of suspicion.

Culture is the primary method of diagnosis, yielding confirmation in approximately 86 percent of patients with pulmonary blastomycosis. However, cultures may take four weeks or longer to correctly identify the organism. More rapid diagnostic techniques include microscopic examination of smears of respiratory secretions or histopathologic examinations of tissue specimens. Organisms are readily seen with KOH or calcofluor white preparation of respiratory secretions, Papanicolaou stains of cytology preparations, or tissue stained with GMS or periodic acid-Schiff (PAS) stains. The other primary method of rapid diagnosis is antigen testing. An antigen assay against a galactomannan component of the cell wall was developed in 2004 and can be performed on urine with reported sensitivity of 95 percent and specificity of 79 percent. The specificity of antigen testing is limited by cross-reactivity between blastomycosis and other endemic fungi, including histoplasmosis, paracoccidioidomycosis, penicilliosis, and less frequently, coccidioidomycosis. The positive histoplasma urine antigen was a false-positive due to this cross-reactivity. While this is problematic when confirming a diagnosis, initial anti-fungal regimens are similar among these pathogens.

In 2008, the Infectious Diseases Society of America published guidelines for diagnosis and treatment of blastomycosis. Treatment recommendations are based on the site and severity of infection, as well as the immune and pregnancy status of the infected person. Amphotericin B (AmB) products are recommended for all patients with severe disease, regardless of age, immunity, or pregnancy status. Large series have documented cure rates of 77 to 91 percent with AmB products. The efficacy of AmB products are, however, balanced with known cumulative toxicities, including nephrotoxicity, electrolyte disturbances, and infusion reactions. The rates of toxicity have decreased with widespread use of liposomal AmB products, but careful attention must be paid to mitigate these risks with adequate hydration, avoidance of other nephrotoxins, and electrolyte replacement. Itraconazole is the oral azole of choice for initial mild to moderate disease, non-CNS blastomycosis, and/or stepdown therapy after AmB. Serum concentrations of itraconazole are approximately 30 percent higher with solution formulation compared to capsules. However, with either formulation there is wide interpatient variability and therapeutic drug monitoring is required. Voriconazole and posaconazole have demonstrated excellent in vitro and in vivo activity against B. dermatitidis. Voriconazole has most commonly been used as oral stepdown therapy for CNS disease due to excellent meningeal penetration. The newest azoles, isavuconazole and ravuconazole, have excellent in vitro activity, creating a potential for future use in treatment of blastomycosis.

Conclusion

Blastomycosis is a common endemic fungal infection in the U.S., affecting both immunocompetent and immunocompromised hosts. The variable nature in which this organism presents can lead to delayed diagnosis, especially in areas such as South Dakota that are outside of the commonly recognized geographic distribution. Clinicians should maintain a high index of suspicion for disseminated blastomycosis as a mimicker of malignancy and consider implementation of rapid diagnostics and possibly empiric therapy while culture confirmation is pending.
### REFERENCES


### About the Authors:
Jennifer L. Hsu, MD, Assistant Professor, Department of Internal Medicine, University of South Dakota Sanford School of Medicine; Consultant, Sanford Health Infectious Disease, Sioux Falls, South Dakota.

B. Joel Tjarks, MD, Clinical Instructor, Department of Pathology, University of South Dakota Sanford School of Medicine; Resident Physician, Sanford USD Medical Center, Sioux Falls, South Dakota.

Aaron Berg, MD, Clinical Assistant Professor, Department of Neurosciences, University of South Dakota Sanford School of Medicine; Radiologist, Sanford USD Medical Center, Sioux Falls, South Dakota.

Tony Oliver, MD, Assistant Professor, Department of Internal Medicine, University of South Dakota Sanford School of Medicine; Hospitalist, Sanford USD Medical Center, Sioux Falls, South Dakota.
2017 ANNUAL LEADERSHIP CONFERENCE

WHEN: Friday, June 2

8 am  Membership Meeting with Presentations from AMA Chair-Elect Dr. Gerald E. Harmon and SSOM Dean Dr. Mary Nettleman
9:15 am Open Membership Forum
10:45 am Panel Discussion: Physician Burnout
12 pm SDSMA PAC Lunch: Clinician Health and Wellbeing – Reducing the Cost and Impact of Physician Burnout
1:30 pm Council of Physicians Meeting
4:30 pm Policy Council Meeting
6 pm Membership Mixer
7 pm Awards Banquet & Scholarship Recognition

WHERE: SpringHill Suites & Cadillac Jacks, Deadwood

We hope to see you there – register today!

To register, visit www.sdsma.org.

Abstract

An estimated 5.3 million Americans had Alzheimer’s disease in 2015. With the aging population and rapid rise in those with dementia, it is vital to not only care for the dementia patient, but also his or her primary caregiver. Caregivers often suffer from depression and neglect their own health in order to care for their loved one. In this regard, included is a review of the role of the primary care physician including the importance of discussing the diagnosis of dementia with the patient and family, providing supportive services and resources, as well as the challenges that many physicians face in tackling the care of a dementia caregiver.

Introduction

According to the Alzheimer’s Association, one in three seniors die with Alzheimer’s or other dementia. An estimated 5.3 million Americans had Alzheimer’s disease in 2015.1 With the aging population and rapid rise in those with dementia, it is vital to not only care for the dementia patient, but also his or her primary caregiver, who is often a spouse or other family member.

In this regard, as a physician, fully caring for the patient with dementia must include addressing caregiver fatigue which can include depression, neglect of their own personal health, and earlier transition of the patient to a long term care setting. About 40 percent of dementia caregivers suffer from depression. It is reported that in 2014, Alzheimer’s and dementia caregivers had $9.7 billion in additional health care costs of their own. Caregiver fatigue is not only an individual issue, but also an economic issue. Caregiver fatigue is directly related to higher number of dementia patients transitioning to a long term care facility, subsequently increasing healthcare costs. In 2014, friends and family of people with Alzheimer’s and other dementias provided an estimated 17.9 billion hours of unpaid care.1

How well do physicians, particularly primary care physicians, communicate with caregivers, offer them support services, and help guide them along the often long and exhausting course of dementia? What are the best interventions, support, and resources that can be offered? Although there is much on this topic in the medical literature, providers are limited in time, knowledge about resources, and approach to addressing caregiver concerns.2 The purpose of this paper is to provide a concise review of how to care for the caregivers.

The Important Role of Primary Care

Older adults often rely on their primary care physician for all or most of their care. When concerns about the dementia diagnosis or course arise, the primary provider is often the one the patient and family trusts.

There are four domains of concern in regards to physicians and dementia care. Those include: symptom management, medication management, emotional support, and linking to support services.2 Notably, referral to support services and emotional support were reportedly underutilized by physicians.2 Primary care providers are expected to be at the center of each patient’s care, providing support, referrals, as well as medical and symptom management. In many cases, a primary care physician may be the only provider involved in the care of a dementia patient and/or his or her caregiver. This may be especially true in rural areas.

Facing the Diagnosis

It is impossible to address the issue of caregiver fatigue if the physician does not first recognize and communicate
the diagnosis of dementia in the patient. Only 45 percent of people with Alzheimer's disease or their caregivers report being told of their diagnosis. That seems a remarkable proportion considering the profound impact it will have on their lives and the lives of their caregivers. Dementia is a difficult disease to face given the glaring reality that there is great burden and slow struggle involved, not only for the patient, but also for the caregivers.

In review of a recent article, it was noted that caregivers wish to have physicians provide more time to discuss the diagnosis, expectations, and to voice their concerns. With this comes a three-way relationship and conversation, in which the patient is not left out, regardless of his or her level or dementia and understanding. Part of the discussion must include safety concerns, memory problems, financial concerns, and planning for the future as the expected course of dementia ensues. Advanced directives should be addressed as soon as the diagnosis is expected, with the goal of the patient being involved in decision making.

The Focus on Caregivers

As a patient's dementia worsens, the physician must rely more heavily on the caregiver to follow the patient's course and adequately treat the patient as need be. Guidelines from the American Medical Association (AMA) suggest physicians should ask caregivers how they are coping, inform them about future expectations of the disease, and provide resources to help support them.

Caregivers often neglect their own health, emotions, and care for that of their family member. Many feel shame or guilt for feelings of depression during their time as a caregiver. The first key to caring for these caregivers is recognition and acknowledgement that the issues are present. Without recognition, no solution is possible.

It is recommended that physicians allow additional time at visits for dementia patients to address caregiver concerns. There is a need for individualized care focused on the needs of the patient and caregiver based on a number of factors including, but not limited to, stage of disease, level of self-care needed, financial burdens. Primary care physicians, and specifically in family medicine or internal medicine, may have the advantage of having the dementia patient's caregiver as a patient as well.

Providing Support

Once caregiver concerns are recognized and acknowledged, what do physicians have to provide? Both emotional support and community support services can offer a foundation upon which caregivers can rely on as their family member's dementia advances. It is important to not only provide the information to caregivers, but also to be actively involved by leading support groups in the community, encouraging respite care, and encouraging caregiver self-care. This includes reminding the caregiver that further worsening of dementia, asking for assistance, and needing nursing home care is not a representation of caregiver failure, but rather a reality of the disease progression.

Support may come in the form of counseling, education, in-home respite care, adult day services, support groups, hospice care. A number of studies have shown improved patient and caregiver outcomes when caregiver needs are assessed and resources are provided. A study by Bass et al. in 2003 showed lower rates of hospitalization, emergency department use, and nursing home admission of dementia patients cared for by family caregivers, who had received individualized dementia care consultations after referral by a primary care physician, when compared to those who had no referral or consultation. It has even been shown that nursing home placement for dementia patients is delayed when adequate support is provided to the caregiver.

In addition to referrals to community support services, the physician can directly impact the caregiver's well-being by asking about, listening to, and addressing the caregiver's concerns regarding the patient. This includes behavioral and symptoms management. According to Fortinsky, numerous studies have demonstrated that family caregivers are often dissatisfied with physician advice on these issues. Oftentimes, behaviors such as wandering and getting lost create high levels of caregiver stress due to safety concerns. In that regard, focusing on the dementia patient's abilities retained as opposed to abilities lost has shown improvements in the patient and caregiver's capacity to cope.

Implementation and its Challenges

Much like all things in medicine, in writing it appears simple and straightforward to properly address, recognize and treat caregiver fatigue, but how does a physician realistically and effectively implement this into a busy practice?

In Fortinsky's study discussion, she discusses the lack of physician initiative to discuss dementia management issues with caregivers. She notes possible barriers including a physician's own grief and denial regarding the diagnosis and progression, uncertainty in how to solve or treat the issues that arise, lack of confidence in counseling caregivers, and the difficulty of caring for cognitively impaired patients.
The literature suggests the need for providers to rely on supporting organizations to provide the best care for dementia patients and their caregivers. The AMA recommends that a clinic staff member be appointed to tackle these issues. This team member would work to stay current with community resources and serve as the primary contact for patients and families. With that, much of the burden can be relieved by referring to organizations such as the Alzheimer’s Association or Family Caregiver Alliance. Although this seems a realistic approach for most primary care practices, rural practice may present a particular challenge, given the lack of local resources or access to community support. With the emergence of technology, this issue may be partially resolved through use of internet resources, support groups and communications. Additionally, with the emergence of telemedicine, taking advantage of access to specialists and services that are difficult for the patient to take advantage of without telemedicine is key for primary care physicians. Another aspect is involving the entire rural community in supporting Alzheimer’s patients and their caregivers and families, which should be encouraged by the primary care provider. This may include raising awareness, serving as a voice for patients and their families, and advocating for services and support groups to be available.

In regards to the primary care physician’s role in management of dementia, the Alzheimer’s Association recommends the goals of treatment to focus on: maintaining quality of life, maximizing function in daily activities, enhancing cognition, mood and behavior, fostering a safe environment, and promoting social engagement. Through this, caregiver satisfaction will be more likely.

In a study of dementia care in the United Kingdom, it was noted that a major criticism from caregivers is the fragmentation and lack of individualization. The authors propose the use of a collaborative care model, similar to that which is used in diseases such as diabetes and hypertension. This would involve a case manager for each individual patient, who could regularly communicate between a patient’s primary care physician, specialists, and community support services.

A number of studies in the U.S. have examined similar models and noted improved quality of care, increased user satisfaction and decreased caregiver stress. Specifically, the PREVENT trial reported improved depression scores in caregivers and higher career satisfaction ratings. With the recent shift to a patient centered medical home, it seems intuitive to trial a collaborative care model for dementia patients and their caregivers.

Although most studies have examined the benefits of face-to-face interactions, one study tested the effectiveness of telephone encounters in supporting caregivers. Through this study, 250 distressed family caregivers were selected. They were randomized to receive 16 telephone calls over 6 months. Conclusions from the study noted this telephone intervention improved caregivers’ depressive symptoms and reactions to behavior problems when compared to a control. The results were similar to those noted in face-to-face interventions. Surely, telephone encounters could provide a quick, effective, low cost intervention piece to the collaborative care model suggested above.

Conclusion

In summary, it is clear that attention to a caregiver’s well-being is often overlooked and undertreated. The most feasible and sustainable model to improving our current approaches is to establish a collaborative care model in our practices that includes a case manager, the physician, as well as community support organizations. Support can be provided through counseling, respite services, in home care, support groups, online resources, face-to-face encounters, telephone encounters, and addressing caregiver concerns such as patient symptoms and behaviors that may be particularly worrisome or disruptive. With this, each physician has a personal responsibility to stay up to date on current recommendations for dementia treatment as well as for the treatment of related behaviors and symptoms. Even more prudent, is the responsibility to remain aware of and be actively involved in dementia support organizations. Through these interventions, dementia care as well as care of the dementia caregiver will be improved.

REFERENCES


About the Authors:

Rachel Sunne, MD, Avers Medical Group Brookings, South Dakota.

Mark K. Huntington, MD, PhD, Sioux Falls Family Medicine Residency Program, Center for Family Medicine, Department of Family Medicine, University of South Dakota Sanford School of Medicine.
Help Shape the Future of Medicine in South Dakota

The South Dakota State Medical Association Foundation, the philanthropic arm of the South Dakota State Medical Association, is a tax-exempt 501(C)(3) non-profit corporation, was established to assist and support medical research, medical teaching and medical education at the Sanford School of Medicine.

On average, medical students graduate with $130,000 in debt. Contributions to the South Dakota State Medical Association Foundation provide financial assistance to students at the Sanford School of Medicine and are all designated for scholarships, grants and low-interest loans for students.

Any amount can be donated at any time throughout the year. If you have questions or want more information, please call Laura Olson at 605.336.1965.

Send Your Contributions Today To:
South Dakota State Medical Association Foundation
PO Box 7406, Sioux Falls, SD 57117-7406
www.sdsma.org
Duration of Antibiotics Prescribed at Hospital Discharge

By Susan E. Hoover, MD, PhD

Abstract

Introduction: A patient’s transition from hospitalization to discharge may represent an additional opportunity for antibiotic stewardship.

Methods: We reviewed antimicrobial drugs prescribed at discharge to patients at our medical center over a nine-month period, and calculated the total duration of inpatient and outpatient antibiotic therapy.

Results: The median duration of inpatient antibiotics was three days (interquartile range [IQR] four days), of outpatient antibiotics was seven days (IQR six days), and of total antibiotics 10 days (IQR six days).

Conclusions: Our results align with the only previously published study of oral antibiotics prescribed at hospital discharge, both in the duration of inpatient and outpatient therapy and in the fact that about 60 percent of the treatment duration occurred after discharge. However, the median total antibiotic duration of 10 days is longer than that recommended by national and institutional guidelines for some of the most common infections in hospitalized patients.

Introduction

Antibiotics are among the most commonly used drugs in the hospital, prescribed to over 50 percent of inpatients. Appropriately prescribed antibiotic use has been the focus of much attention in the infectious disease, patient safety, and health care quality communities. However, an additional opportunity for stewardship may be the transition from hospitalization to discharge. With the current focus on reducing unnecessary hospital days, the majority of a treatment course for infection may take place after discharge. A recent study from an urban public hospital and health care system in the western U.S. found that 53 percent of 150 hospital discharge prescriptions for antibiotics were inappropriate based on national and institutional guidelines. In particular, 33 percent of cases were judged to have had excessive treatment duration. We were interested in comparing the duration of inpatient and outpatient antibiotics at our hospital with this benchmark.

Methods

Sanford USD Medical Center (SMC) is a 543-bed nonprofit teaching hospital that is a referral center for a larger urban and rural health network based in the midwestern U.S. It has an emergency department, medical and surgical intensive care units, oncology and transplant services, and an antimicrobial stewardship program.

This protocol was approved by the Sanford Health Institutional Review Board. We searched our administrative database for patient discharges from SMC between Jan. 1, 2015 and Sept. 29, 2015, with one or more antimicrobial drugs listed in the discharge medications. We limited the resulting list to adult patients with one or more of 410 ICD-9 codes associated with infection, yielding 5,468 unique patients. Using a computer generated random number scheme (STATA 13, StataCorp, College Station, Texas), we selected 350 charts for detailed review. This number was chosen to compare with a similar sample from...
Primers in Medicine

a similarly sized hospital.\textsuperscript{1} By manual chart review, we collected the names and start and stop dates of antibiotics given in the hospital and antibiotics prescribed at discharge. Statistical analyses were performed using STATA 13.

Results

We eliminated patients who were seen only in the emergency department (n=127), were discharged on antiviral medications only (n=12), were discharged on parenteral antibacterial drugs (n=8), were taking long-term prophylactic or suppressive antibiotics (n=8), were rehospitalized for an ongoing infection (n=1), or for whom insufficient data were available in the chart to calculate the duration of antibiotic (n=20). This left a total of 174 charts that contributed to the analysis. Frequent discharge diagnoses included urinary tract infection (42), pneumonia (19), cellulitis (17), and septicemia (15). Together these accounted for 53 percent of all cases.

The median duration of inpatient antibiotics was three days (interquartile range [IQR] four days), of outpatient antibiotics seven days (IQR six days), and of total antibiotics 10 days (IQR six days).

Discussion

Our results align with the only previously published study of oral antibiotics prescribed at hospital discharge,\textsuperscript{1} both in the duration of inpatient and outpatient therapy and in the fact that about 60 percent of the treatment duration occurred after discharge. The antibiotic durations in the two studies are very similar given that the settings are different types of hospitals and regions of the U.S.

Although we did not analyze appropriateness of prescribing for each individual case, the median total antibiotic duration of 10 days is longer than that recommended by national and institutional guidelines for some of the most common infections in hospitalized patients. For example, the recommended duration for uncomplicated cases of community-acquired pneumonia is five days,\textsuperscript{3} healthcare-associated pneumonia – seven to eight days,\textsuperscript{4} cellulitis – five days,\textsuperscript{5} catheter-associated urinary tract infection – seven days,\textsuperscript{6} exacerbation of chronic obstructive pulmonary disease – five to seven days (institutional guideline), and intra-abdominal infection – four to seven days.\textsuperscript{7}

This study was limited by the use of administrative data to determine diagnoses and medications. We were unable to examine whether the antibiotic prescriptions were filled or the medications taken by the patients. Other limitations were examination of a single medical center over a nine-month period and the number of charts excluded due to insufficient information.

Because the majority of antibiotic use occurs outside the hospital,\textsuperscript{8} the transition to discharge may be an opportunity to improve antibiotic stewardship. Many treatment guidelines give a range of durations that may be appropriate depending on how quickly the infection responds to initial therapy.\textsuperscript{6,6} At the time of discharge, the health care provider has the best perspective on the response, and thus the opportunity to choose the best duration of therapy based on the hospital course and national and institutional guidelines.

Acknowledgements: The authors thank Wendell Hoffman, MD, and Susan Puumala, PhD, for helpful discussions.

REFERENCES


About the Author:

Susan E. Hoover, MD, PhD, Associate Professor, Internal Medicine, University of South Dakota Sanford School of Medicine; Scientist, Center for Health Outcomes and Prevention Research, Sanford Research, Sioux Falls, South Dakota.
Your referrals make a difference.

Healthcare providers play a huge role in helping tobacco users quit.

We know your recommendations and referrals make a difference. That’s why we have created some new tools to help keep you up to date.

Check out our new website at SDQuitLine.com for:
• Referral Options
• Training Opportunities
• Webinars
• Cessation Medication Information
• Special Provider FAQ

We’ve also expanded our services to help make it easier for you to connect your patients to our services. Tobacco users can always call the QuitLine to enroll or request a call from us and now they can also:

• Receive a free 2-week Nicotine Replacement Therapy (NRT) Kickstart Kit
• Receive a free Quit Guide in the mail
• Check out our new Do It Yourself Self Help section

Together we can give South Dakotans the support and tools they need to quit using tobacco.
Heart failure continues to be a medical condition that significantly impacts the lives of many from young to old. Advances in the treatment of heart failure have led to improved survival rates and improved quality of life through a reduction in heart failure symptoms and a reduction in hospitalization rates due to heart failure. While some of the advances made in the treatment of heart failure over the years have led to long term benefit, others that showed initial promise have led to a lack of long term benefit. A significant update to the heart failure guidelines occurred in 2013. Since that update, additional clinical trials have been completed that have demonstrated newer medication advancements may provide additional positive benefits to patients with heart failure. These advancements were published in a focused update on the newer medication therapies for heart failure in 2016. The focus of the update was related to two different areas of medication treatment; renin-angiotensin system inhibition with an angiotensin receptor-neprilysin inhibitor (ARNI) (valsartan/sacubitril) and a sinoatrial node modulator (ivabradine).

Inhibition of the renin-angiotensin system has been a fundamental approach in the treatment of heart failure for several decades, which has led to positive outcomes (reduced mortality and morbidity) for the vast majority of patients with heart failure. The 2013 guidelines addressed the important role renin-angiotensin system inhibition with angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin II receptor inhibitors (ARBs). This is strongly supported by numerous clinical trials that have been conducted over the years.

The treatment approach with ARNI consists of angiotensin receptor blockade and neprilysin inhibition. Neprilysin is responsible for breaking down natriuretic peptides, adrenomedullin, and bradykinin, which have vasoactive properties. By inhibiting neprilysin, these peptides are not broken down and continue to have vasoactive effects. A double-blind, randomized controlled trial was conducted comparing an ARNI (valsartan/sacubitril) to enalapril in patients who had symptomatic systolic dysfunction heart failure with an ejection fraction of less than 40 percent. Both treatment groups had similar rates of use of other medications and devices for systolic dysfunction heart failure. The primary composite outcome of the trial was death due to cardiovascular causes or hospitalization due to heart failure exacerbation. The trial was halted early due to the significant benefit on the primary composite outcome for an ARNI compared to enalapril. The primary composite outcome occurred in 21.8 percent in the ARNI group compared to 26.5 percent in the enalapril group, which had a statistically significant p-value of less than 0.001. In addition, the primary outcomes of death from cardiovascular causes and hospitalization for worsening heart failure had a statistically significant difference as well when compared separately. A potential safety risk identified in the ARNI treatment group was a statistically significant higher rate of symptomatic hypotension and symptomatic hypotension with a systolic blood pressure less than 90 mm Hg. However, the discontinuation rates in both treatment groups were quite low and not statistically different. Based on the conclusions from this clinical trial, the ARNI was superior to the enalapril treatment group with a significant reduction in death from cardiac causes and hospitalization for worsening heart failure. Additional studies with this treatment approach would be beneficial to gain more evidence of the overall benefits and risks of this treatment approach. The guideline update gave the ARNI treatment approach a Class IB-R recommendation meaning a strong recommendation with a moderate quality of evidence based on randomized clinical trials. The ACEIs and ARBs remained as Class IA recommendations with the updated guidelines, which means a strong recommendation with high quality evidence.

The second treatment approach addressed in the 2016 heart failure treatment guideline update was the addition of ivabradine and a class recommendation. Ivabradine’s pharmacologic effect occurs on the sinoatrial node resulting in a reduction of heart rate and the presumed benefit is thought to occur due to a reduction in heart rate. Beta-adrenergic antagonists have demonstrated a significant benefit to many patients with systolic dysfunction heart failure and are listed in the 2013 heart
failure treatment guidelines because of this beneficial effect. A randomized, double-blind, placebo-controlled trial to assess the potential benefit of ivabradine in systolic dysfunction heart failure patients was conducted with a primary composite endpoint of death from cardiovascular causes or hospitalization for worsening heart failure. The primary composite endpoint occurred in 24 percent in the ivabradine treatment group and 29 percent in the placebo group demonstrating a statistically significant benefit for ivabradine with a p-value of less than 0.0001. The beneficial effect seen in the composite endpoint was mostly due to a reduction in hospitalizations due to worsening heart failure (16 percent for ivabradine, 21 percent for placebo, p<0.0001) compared to death due to cardiovascular causes (3 percent for ivabradine, 5 percent for placebo, p=0.014). Safety concerns from the trial showed a statistically significant higher rate of symptomatic bradycardia in the ivabradine treatment group (5 percent) compared to the placebo group (1 percent) (p-value < 0.0001). Despite the results of this trial, the updated heart failure treatment guidelines commented that only 25 percent of the patients in this particular trial were on optimal doses of beta-adrenergic antagonists, therefore, the guidelines recommend that patients be placed on optimal doses of beta-adrenergic blockers before considering the addition of ivabradine. The guideline gave ivabradine a Class IIa (moderate) recommendation with a level of evidence of B-R. The future benefit of ivabradine in heart failure requires addition study to help determine its overall role.

The 2016 updated heart failure treatment guidelines provided information to assist practitioners in determining the best pharmacologic treatment approach for patients based on the most current clinical evidence. Additional clinical trials will help determine the future role of the two treatments discussed above going forward.

REFERENCES
Special Features

Patient Education:
Stress on the Prairie

By Richard P. Holm, MD

During the summer after my freshman year in high school, my dad found a job for me working on a farm, hoping it would teach me work ethic. I remember hard physical work, long hours of hauling and stacking bales, and profound loneliness while painting farm buildings.

At the time, it was the most stressful experience of my young life, bringing me out of my lackadaisical youth and a tad closer to the world of a responsible adult. I have often referred to that time as the period in my life when I realized the value of hard work. It was a tough summer brought upon me by my dad and a kindly farmer, and I became the better for it. Of course, this was nothing compared to what some farm kids experience, but I learned that summer stress and hard work could be a good thing.

Similar types of stress can be from many causes: tension, trauma, aging, money pressure, worry, fear, and anxiety from big or only perceived problems. It is a pull or push force exerted on the body resulting in strain, with or without movement. One famous expert, Hans Selye, defined stress in two ways: there is distress, which is bad stress, and eustress, which is good stress. He found that bad stress results from being forced to face trouble without tools to cope or solve the problem. It is like being broken down in the field, and you can’t get the part to fix it.

A famous Harvard Study starting in 1938, which followed one class of sophomore men for the duration of their lives, discovered cholesterol, IQ, and childhood temperament had nothing to do with healthy aging; while smoking, alcohol abuse, and depression all had major negative effects. Healthy aging was best accomplished and measured not by money, but by how these men coped with tough times while finding ways to connect with others.

Good stress is facing adversity and finding ways to either solve problems or accept them as unresolvable. Like exercise, it involves movement and is something we can learn to accept and even enjoy. As Selye put it, good stress makes you stronger, and the opposite is also true – without stress, our muscles, bones, and hearts become weak. Indeed, the trials of life can become good stress if we can learn to deal with adversity. Stress can give us strength, direction, and even purpose.

Whether it is learning to work hard on a farm, dealing with broken down machinery, facing the inconsistencies of Mother Nature, experiencing long lonely hours in isolation, or tolerating cantankerous humans; stress is part of this life, and coping with it is a skill we can and need to develop.
Determination high-impact quality improvement projects will be essential for moving forward with value-based payment programs. Health care organizations using data to drive quality improvement priorities will be poised to take advantage of the corresponding incentives or avoid an adjustment. A variety of data resources are distributed for the purpose of impacting positive health care outcomes and promoting patient-centered care. These data resources include but are not limited to the Hospital Acquired Conditions Report, Hospital Readmission Reduction Program Report, Hospital Value Based Purchasing Report and the Hospital Five Star Rating.

As health care transformation advances, consideration must be given to the factors impacting the perception and realization of value. The Harvard Business School Press article titled “Redefining healthcare: creating value-based competition on results” defined value as outcome achieved per dollar spent. For value-based care, the outcomes are also defined around the patient and impacted by the efficiency of the clinical workflows and processes intended to achieve the desired result.

Transforming processes in any industry must be tied to the business strategies to provide motivation and focus. Health care is no different and requires aligning the unit of reimbursement to the unit of value. Providing feedback on the progress of outcomes related to costs allows for a transparent environment which inspires innovation through a coordinated approach.

Understanding the concepts in transformation provides a foundation for engaging appropriate roles, tracking progress, utilizing available resources and data and grasping the full-scope of achieving value-based care.

Knowing the use of data serves as a guide for addressing areas of highest potential, the Great Plains Quality Innovation Network developed a data dashboard for reviewing incentives and penalties. The tool was introduced during the “Healthcare Transformation: Quality Improvement Mapping for Value-Based Care” webinar (http://greatplainsqin.org/blog/event/healthcare-transformation-quality-improvement-mapping-value-based-care/) and includes the following data reports.

1. Hospital Value-Based Purchasing (HVPB)
2. Hospital Acquired Conditions (HAC)
3. Hospital Readmission Reduction Program (HRRP)
4. Hospital Electronic Health Record Incentive Program (Meaningful Use)
5. Eligible Professional Electronic Health Record Program (Meaningful Use)
6. Physician Quality Reporting System (PQRS)
7. Merit-Based Incentive Payment System (MIPS)

While there are certainly intricacies to each program, reviewing each report in a timely manner with the appropriate leadership and team members ensures the program measures are being addressed and action for correction is taken. In addition, improvement of even small percentage points can be the equivalent to a large cost benefit for the hospital. With that being said, even the smallest number of patients (sometimes even just one case) can put the facility in to a payment adjustment. As the healthcare industry moves to a quality, value-based payment system, knowing and understanding these programs and how their elements can impact your facility has never been more important. It is in the facilities best interest to have dedicated staff and resources for these value-base payment programs. These three programs alone have a maximum adjustment that could total six percent of what a hospital would normally get paid.

Identifying high-impact areas reflected in the report calculations and utilizing rapid cycle improvement processes to address these can prove to be extremely favorable for facilities.

REFERENCES

This material was prepared the Great Plains Quality Innovation Network, the Medicare Quality Improvement Organization for Kansas, Nebraska, North Dakota and South Dakota, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.
<table>
<thead>
<tr>
<th>Name</th>
<th>Specialty</th>
<th>Institution</th>
<th>City, State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assan, Jed</td>
<td>MEDC/PRE</td>
<td>U Texas Med Branch-Galveston</td>
<td>GALVESTON, TX</td>
</tr>
<tr>
<td>Bean, Kelsey</td>
<td>OGYN</td>
<td>Tripler Army Medical Center</td>
<td>HONOLULU, HI</td>
</tr>
<tr>
<td>Berndt, Paul</td>
<td>FAMP</td>
<td>Sioux Falls Family Med-SD</td>
<td>SIoux FALLS, SD</td>
</tr>
<tr>
<td>Boadwine, Dan</td>
<td>PEDS</td>
<td>University of Nebraska Med Ctr</td>
<td>OMAHA, NE</td>
</tr>
<tr>
<td>Boudreau, Dom</td>
<td>OGYN</td>
<td>Creighton Univ Affil Hosps-NE</td>
<td>OMAHA, NE</td>
</tr>
<tr>
<td>Boyd, Kassidy</td>
<td>MEDC/PEDS</td>
<td>U Arizona COM-Phoenix</td>
<td>PHOENIX, AZ</td>
</tr>
<tr>
<td>Branick, Kaitt</td>
<td>MEDC</td>
<td>Central Iowa Health System</td>
<td>DES MOINES, IA</td>
</tr>
<tr>
<td>Buse, Ryan</td>
<td>FAMP</td>
<td>Resurrection Health-TN</td>
<td>MEMPHIS, TN</td>
</tr>
<tr>
<td>Chang, Peter</td>
<td>ORTHO</td>
<td>Barnes-Jewish Hosp-MO</td>
<td>ST LOUIS, MO</td>
</tr>
<tr>
<td>Davies, Daniel</td>
<td>MEDC</td>
<td>Mayo Clinic School of Grad Med Educ-MN</td>
<td>ROCHESTER, MN</td>
</tr>
<tr>
<td>Evson, Samuel</td>
<td>PTRY</td>
<td>Univ of Vermont Medical Center</td>
<td>BURLINGTON, VT</td>
</tr>
<tr>
<td>Feehan, Brendan</td>
<td>ANES</td>
<td>U Alabama Med Ctr-Birmingham</td>
<td>BIRMINGHAM, AL</td>
</tr>
<tr>
<td>Fischer, Brooke</td>
<td>SURG/GEN</td>
<td>Rush University Med Ctr-IL</td>
<td>CHICAGO, IL</td>
</tr>
<tr>
<td>Free, Margaret</td>
<td>PEDS</td>
<td>Central Iowa Health System</td>
<td>DES MOINES, IA</td>
</tr>
<tr>
<td>Frost, Michael</td>
<td>EMR</td>
<td>Stony Brook Teach Hosps-NY</td>
<td>STONY BROOK, NY</td>
</tr>
<tr>
<td>Gilliland, Ty</td>
<td>SURG/GEN</td>
<td>Mount Carmel Health System-Oh</td>
<td>COLUMBUS, OH</td>
</tr>
<tr>
<td>Harris, Jamicah</td>
<td>FAMP</td>
<td>Clarkson Family Med Res-NE</td>
<td>OMAHA, NE</td>
</tr>
<tr>
<td>Hartnett, Sigurd</td>
<td>MEDC</td>
<td>U Cincinnati Med Ctr-Oh</td>
<td>CINCINNATI, OH</td>
</tr>
<tr>
<td>Hellekson, James</td>
<td>PTRY</td>
<td>Univ of South Dakota SSOM</td>
<td>SIOUX FALLS, SD</td>
</tr>
<tr>
<td>Hockhausen, Kirstin</td>
<td>TRAN</td>
<td>Univ of South Dakota SSOM</td>
<td>SIOUX FALLS, SD</td>
</tr>
<tr>
<td>Hockhausen, Kirstin</td>
<td>TRAN</td>
<td>Marshfield Clinic-St Josephs Hosp-WI</td>
<td>MARSHFIELD, WI</td>
</tr>
<tr>
<td>Holmes, Amber</td>
<td>FAMP</td>
<td>Univ of South Dakota SSOM</td>
<td>SIOUX FALLS, SD</td>
</tr>
<tr>
<td>Hustrulid, Matthew</td>
<td>RAD/DIAG</td>
<td>U Iowa Hosps and Clinics</td>
<td>IOWA CITY, IA</td>
</tr>
<tr>
<td>Jensen, Brooke</td>
<td>FAMP</td>
<td>Univ of South Dakota SSOM</td>
<td>SIOUX FALLS, SD</td>
</tr>
<tr>
<td>Jones, Eric</td>
<td>PEDS</td>
<td>Nationwide Childrens Hosp-Oh</td>
<td>COLUMBUS, OH</td>
</tr>
<tr>
<td>Kindle, Trevor</td>
<td>TRAN</td>
<td>Mayo Clinic</td>
<td>ROCHESTER, MN</td>
</tr>
<tr>
<td>Krolikowski, Keely</td>
<td>OGYN</td>
<td>U Iowa Hosps and Clinics</td>
<td>IOWA CITY, IA</td>
</tr>
<tr>
<td>Lancaster, Benjam in</td>
<td>ORTHO</td>
<td>U Kansas SOM-Wichita</td>
<td>WICHITA, KS</td>
</tr>
<tr>
<td>Lillevold, Jens</td>
<td>MEDC</td>
<td>Hennepin Co Med Ctr-MN</td>
<td>MINNEAPOLIS, MN</td>
</tr>
<tr>
<td>Meyerink, Benjamin</td>
<td>FAMP</td>
<td>Mayo Clinic School of Grad Med Educ-MN</td>
<td>ROCHESTER, MN</td>
</tr>
<tr>
<td>Michels, Collin</td>
<td>EMR</td>
<td>Stanford Univ Progs-CA</td>
<td>STANFORD, CA</td>
</tr>
<tr>
<td>Nachtigal, Emily</td>
<td>MEDC</td>
<td>U Wisconsin Hospital and Clinics</td>
<td>MADISON, WI</td>
</tr>
<tr>
<td>Neilson, Michael</td>
<td>ANES</td>
<td>University of Nebraska Med Ctr</td>
<td>OMAHA, NE</td>
</tr>
<tr>
<td>Noteboom, Charis</td>
<td>OGYN</td>
<td>U Kansas SOM-Wichita</td>
<td>WICHITA, KS</td>
</tr>
<tr>
<td>Name</td>
<td>Specialization</td>
<td>Institution</td>
<td>Location</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------</td>
<td>--------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Odegaard, Karah</td>
<td>PATH/ANAT &amp;CLIN</td>
<td>Univ of South Dakota SSOM</td>
<td>SIOUX FALLS, SD</td>
</tr>
<tr>
<td>Osenga, Ashley</td>
<td>MEDEC</td>
<td>Mercy Medical Center-Des Moines-IA</td>
<td>DES MOINES, IA</td>
</tr>
<tr>
<td>Parrott, Daniel</td>
<td>MEDC/PRE</td>
<td>Hofstra Northwell SOM-NY</td>
<td>GREAT NECK, NY</td>
</tr>
<tr>
<td>Parrott, Daniel</td>
<td>RADI-DIAG/Research</td>
<td>U Texas Southwestern Med Sch-Dallas</td>
<td>DALLAS, TX</td>
</tr>
<tr>
<td>Person, John</td>
<td>PTRY</td>
<td>Univ of South Dakota SSOM</td>
<td>SIOUX FALLS, SD</td>
</tr>
<tr>
<td>Rezkalla, Joshua</td>
<td>MEDC/PEDS</td>
<td>UCLA Medical Center-CA</td>
<td>LOS ANGELES, CA</td>
</tr>
<tr>
<td>Rozeboom, Paul</td>
<td>SURG/PRE</td>
<td>U North Dakota SOM</td>
<td>GRAND FORKS, ND</td>
</tr>
<tr>
<td>Ruthford, Mason</td>
<td>Peds</td>
<td>Medical University of SC</td>
<td>CHARLESTON, SC</td>
</tr>
<tr>
<td>Schild, Jordan</td>
<td>FAMP</td>
<td>U Minnesota Med School/Mankato</td>
<td>MINNEAPOLIS, MN</td>
</tr>
<tr>
<td>Shama, Meredith</td>
<td>OGYN</td>
<td>Creighton Univ Affil Hosps-NE</td>
<td>OMAHA, NE</td>
</tr>
<tr>
<td>Sherman, Andrea</td>
<td>VASCULAR SURG</td>
<td>U Wisconsin Hospital and Clinics</td>
<td>MADISON, WI</td>
</tr>
<tr>
<td>Statz, Hannah</td>
<td>PTRY</td>
<td>Rush University Med Ctr-IL</td>
<td>CHICAGO, IL</td>
</tr>
<tr>
<td>Thornburg, Danielle</td>
<td>SURG/GEN</td>
<td>Univ of South Dakota SSOM</td>
<td>SIOUX FALLS, SD</td>
</tr>
<tr>
<td>Waldner, Randall</td>
<td>FAMP</td>
<td>Texas A&amp;M-Bryan/College Station</td>
<td>BRYAN, TX</td>
</tr>
<tr>
<td>Watson, Trevor</td>
<td>OGYN</td>
<td>Creighton Univ Affil Hosps-NE</td>
<td>OMAHA, NE</td>
</tr>
<tr>
<td>Weaver, Lucinda</td>
<td>PEDS</td>
<td>U Alabama Med Ctr-Birmingham</td>
<td>BIRMINGHAM, AL</td>
</tr>
<tr>
<td>Wempe, Kristin</td>
<td>SURG/GEN</td>
<td>Grand Rapids Med Ed Partners-MI</td>
<td>GRAND RAPIDS, MI</td>
</tr>
<tr>
<td>Wong, Kelly</td>
<td>EMR</td>
<td>Rhode Island Hosp/Brown Univ</td>
<td>PROVIDENCE, RI</td>
</tr>
<tr>
<td>Young, Ethan</td>
<td>ANES</td>
<td>Vanderbilt Univ Med Ctr-TN</td>
<td>NASHVILLE, TN</td>
</tr>
</tbody>
</table>

Is South Dakota medicine in your Advertising Budget?

If not, contact us to reach over 2,500 physicians!

CONTACT:
Elizabeth Reiss,
South Dakota Medicine
PO Box 7406,
2600 W. 49th Street, Suite 200
Sioux Falls, SD 57117-7406
605.336.1965
E-mail: ereiss@sdsm.org
### Membership 2017

**Chairman’s Club $1,000+ (Physician and Spouse)**
- Virginia L. Frei, MD
- Stephen M. Kovarik, MD
- Karla K. Murphy, MD
- Thomas Murphy

**Senate Club $500+ (Physician and Spouse)**
- Allison Alvine, MD
- Gregory Alvine, MD
- Anne Barlow
- John F. Barlow, MD
- Jean Bubak
- Mark E. Bubak, MD
- Mary S. Carpenter, MD
- Dan Flynn
- Daniel C. Johnson, MD
- Janice Knutsen
- Roger S. Knutsen, MD
- Jean F. McHale
- Michael S. McHale, MD
- Mary J. Milroy, MD
- Barbara A. Smith

**House Club $300+ (Physician and Spouse)**
- William C. Fuller, MD
- James Keil, MD
- Lavina Keil
- Deborah Ann Kullerud, MD
- Kaye Lawler
- Patrick J. Lawler, MD
- Claudette Margallo
- Lucio N. Margallo, II, MD
- Karen McPherson
- Scott A. McPherson, MD
- Marlys Porter
- Richard I. Porter, MD
- Claire Reilly Allen
- Connie Schroeder
- Stephan D. Schroeder, MD
- J. Geoffrey Slingsby, MD
- Jacalyn Slingsby
- Gary L. Timmerman, MD
- Gena Timmerman
- Jaclyn Vollstedt
- Keith A. Vollstedt, MD

**Member $175+**
- David L. Kapaska, DO
- Donald H. Knudson, MD
- Alan A. Lawrence, MD
- Peter Paul Chang Lim, MD, FAAP
- Scott A. Lockwood, MD
- Thomas L. Luzier, MD
- James B. MacDougall, MD
- George Maher, DO
- Kenric D. Malmberg, MD
- Jim L. Minder, MD
- John R. Oliphant, MD
- William O. Rossing, MD
- Lycia C. Scott-Thornburg, MD
- Wesley L. Sufficool, DO
- Thavam C. Thambi-Pillai, MD
- Victoria L. Walker, MD
- Grace E. Wellman
- Robert S. Wenger, MD
- Thomas C. White, MD
- Ty A. White, MD
- Jason W. Wickersham, MD
- Joseph Wyatt, MD

**$100+**
- Sarah A. Flynn, MD
- Karl J. Heilman, III, MD
- Robert C. Hohm, MD
- Fred C. Lovrien, MD
- Vernon McGee, Sr., J.D.
- Matthew E. Simmons, MD
- Nathan J. Timmer, MD
- Jesse G. Van Heukelom, MD

**Student**
- Broderick T. Allen
- Sigurd Edward Hartnett

---

Your SDSMA PAC membership is very important in order to elect political candidates who understand the practice of organized medicine in South Dakota. To donate to SDSMA PAC, please visit www.sdsm.org.
**2017 SDSMA Annual Leadership Conference – Sponsorship & Advertising Opportunities**

The SDSMA Annual Leadership Conference is a perfect opportunity for organizations of all sizes to advertise their products and services to current and potential customers. The conference will be held June 2 at the SpringHill Suites and Cadillac Jacks in Deadwood. As a sponsor or advertiser, you will have the opportunity to market your technologies, services, pharmaceuticals and other products. This is a valuable opportunity to reach key health care leaders from across South Dakota.

Diamond sponsors have the opportunity to attend the membership mixer and awards banquet to visit with physician members. Sponsorship and advertising options are available in many varieties to meet the needs of all organizations.

Check out all of the sponsorship and advertising opportunities at sdsma.org. Complete the registration form and reach South Dakota physicians.

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

---

**2017 SDSMA Annual Leadership Conference - Registration Now Open**

The 2017 SDSMA Annual Leadership Conference heads to Deadwood at the SpringHill Suites & Cadillac Jacks on Friday, June 2. Visit www.sdsma.org to register online.

With presentations, discussions, networking opportunities and social events, the Annual Leadership Conference is a great time to share ideas and learn from fellow members.

Tickets for the banquet and SDSMA PAC lunch are available for purchase online.

Do you have a policy issue you’d like to bring to the SDSMA’s attention? Schedule a time to address the Council by contacting the SDSMA office at 605.336.1965 or visit www.sdsma.org for a submission form. Submission forms must be returned to the SDSMA office by May 5.

The Annual Leadership Conference is a benefit of your membership. For the latest details about exciting events taking place during the 2017 SDSMA Annual Leadership Conference, visit www.sdsma.org.

<table>
<thead>
<tr>
<th>Schedule</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8 am</strong></td>
<td>Membership Meeting with presentations from AMA Chair-Elect Gerald E. Harmon, MD and SSOM Dean Mary Nettleman, MD</td>
</tr>
<tr>
<td><strong>9:15 am</strong></td>
<td>Open Membership Forum</td>
</tr>
<tr>
<td><strong>10:45 am</strong></td>
<td>Panel Discussion: Physician Burnout</td>
</tr>
<tr>
<td><strong>12 pm</strong></td>
<td>SDSMA PAC Lunch: “Clinician Health and Wellbeing – Reducing the cost and Impact of Physician Burnout”</td>
</tr>
<tr>
<td><strong>1:30 pm</strong></td>
<td>Council of Physicians Meeting</td>
</tr>
<tr>
<td><strong>4:30 pm</strong></td>
<td>Policy Council Meeting</td>
</tr>
<tr>
<td><strong>6 pm</strong></td>
<td>Membership Mixer</td>
</tr>
<tr>
<td><strong>7 pm</strong></td>
<td>Awards Banquet &amp; Scholarship Recognition</td>
</tr>
</tbody>
</table>
Member News

South Dakota State Medical Association

LEGISLATIVE ACCOMPLISHMENTS

2017 South Dakota Legislature

Overview
South Dakota’s 2017 Legislative Session opened Jan. 10 and continued through March 10, with the 38th legislative day being held on March 27. Legislators brought forward 388 pieces of legislation — 49 had the potential to impact health care delivery in South Dakota.

During the nine-week session, the South Dakota State Medical Association (SDSMA) worked on a wide range of issues to protect the practice of medicine and to enhance the delivery of medical care. Some highlights of the important issues the SDSMA was involved in include the following:

Promoting the art and science of medicine
HB 1042, an act to make an appropriation to reimburse certain health care professionals who have complied with the requirements of the recruitment assistance program or the rural health care facility recruitment assistance program and to declare an emergency, was introduced by the Committee on Appropriations at the request of the South Dakota Department of Health (SDDOH). As signed, HB 1042 will appropriate $550,581 to the SDDOH to reimburse four family physicians, one physician assistant, and four nurse practitioners. An additional $292,500 was allocated for reimbursing other eligible health care practitioners. The SDSMA supported this legislation.

SB 2, an act to require prescribers to access the Prescription Drug Monitoring Program (PDMP) prior to prescribing controlled substances, was tabled. While the SDSMA understands that the nonmedical use and abuse of prescription drugs is a serious health problem in this country, we opposed making it mandatory for providers to access the PDMP prior to prescribing controlled substances. While we believe the intentions of legislators are good, lawmakers must be cautious of possible unintended consequences. If physicians believe the steps to prescribing are too onerous, many will simply stop prescribing altogether, which is not the solution. Patients who are in pain will simply choose another means to self-medicate. Many will turn to alcohol and/or other drugs — both legal and non-legal. The SDSMA opposed this legislation.

Protecting and improving public health
SB 43, an act to make an appropriation to expand intensive methamphetamine treatment services within the Department of Social Services (DSS) was passed by the legislature. SB 43 appropriates $603,740, or so much as necessary, to the DSS for the expansion of intensive methamphetamine treatment.

SB 140, an act to require schools to provide instruction in hands-only cardiopulmonary resuscitation (CPR) was signed into law on March 10. As enrolled, the governing body of any secondary school, including the school board of a school district or the governing body of a nonpublic school, shall, as a requirement for graduation, provide for the instruction of students in hands-only CPR and awareness in the use of an automated external defibrillator (AED). The requirement will go into effect at the beginning of the 2017-2018 school year. The SDSMA supported this legislation.

Improving access to and delivery of quality medical care
HB 1195, an act to revise certain provisions regarding health coverage for applied behavior analysis, was signed into law on March 10. With the passing of HB 1195, applied behavior analysis may be provided by those licensed by the South Dakota Board of Medical and Osteopathic Examiners or the Board of Examiners of Psychologists; are licensed by the South Dakota Board of Social Workers as a licensed behavior analyst; or are an assistant behavior analyst or paraprofessional as provided in subdivision 36-20 38-5(6) who are under the supervision of a professional who is
licensed as provided and are implementing the treatment program. The SDSMA supported this legislation.

Other legislative issues

HB 1189, an act to prohibit dismemberment abortions and to provide a penalty therefore, was tabled by the House Judiciary committee. As proposed, HB 1189, would have allowed family members to file civil action against a health care provider for the performance of a dismemberment abortion if performed in situations not considered a medical emergency. Providers could also have been charged with a Class 6 felony. Bills such as this are very difficult for the Association as we do not have a position on abortion other than to say that it is a matter for individuals to decide based on personal values and beliefs. The SDSMA will not take action which may be construed as an attempt to alter or influence the personal views of individual physicians regarding abortion procedures. However, the Association does oppose legislation that exposes and/or threatens physicians with criminal charges or civil suit — regardless of the procedure. The SDSMA opposed this legislation.

SB 1, an act to revise certain provisions of the prescription drug monitoring program was signed by Gov. Daugaard on March 9. As enrolled, SB1 grants authority to the South Dakota Board of Pharmacy and the Prescription Drug Monitoring Program (PDMP) to provide a link from the central repository into the electronic health record systems of health systems, pharmacies and the state health information exchange so prescribers and dispensers can seamlessly access PDMP data. SB 1 will also require that any person who has a controlled drug or substance registration pursuant to § 34-20B-29 to prescribe or dispense any controlled drug or substance, register with the PDMP program. Of note, veterinarians are not subject to this requirement. The SDSMA supported this legislation.

As proposed, HB 1082, an act to grant limited immunity from arrest and prosecution, proposed that any person who experiences a drug-related overdose and is in need of medical assistance could not be arrested, charged, or prosecuted for any misdemeanor or felony offense of possession, inhalation, ingestion, or otherwise taking into the body any controlled drug or substance if that person contacted law enforcement or emergency medical services and reported that he or she is in need of medical assistance as the result of a drug-related overdose. HB 1082 was smoked out on the Senate floor after an initial deferment to the 41st legislative day by the Senate Transportation Committee. HB 1082 was ultimately passed and signed into law on March 13. The SDSMA strongly supported this legislation.

HB 1183, an act to provide and revise certain provisions regarding mental health procedures in criminal justice, to make an appropriation therefor, and to declare an emergency, was signed into law by Gov. Daugaard. This legislation was designed to reduce the amount of time spent in jail for those awaiting a competency hearing. As passed, the law requires that the defendant complete a mental health assessment by a specified date and follow treatment recommendations. The examination must be completed within 21 days of the court order by a licensed professional unless for good cause the court grants a continuance. The SDSMA supported this legislation.

Outcome of other priorities

SB 61, an act to update, revise and repeal certain provisions relating to nurse practitioners and nurse midwives passed both legislative chambers and was signed into law by Gov. Daugaard on Feb. 23. As signed, SB 61 removes the current requirement for advanced practice registered nurses (APRNs) – to include certified nurse practitioners and certified nurse midwives – to have a collaborative agreement once reaching 1,040 practice hours. While APRNs are an integral part of the health care teams that deliver quality care to patients, the SDSMA believes that APRNs are not as well trained as physicians in diagnosing complex medical conditions, developing treatment plans, and addressing medical emergencies. The SDSMA strongly opposed this legislation.

SB 95, an act to add cannabidiol to the list of Schedule IV controlled substances and to exclude it from the definition of marijuana, was signed into law on March 13. SB 95 will allow for the prescription and possession of cannabidiol. The SDSMA maintains the position that: 1) cannabis is a hazardous drug and as such is a public health concern; 2) sale and possession of marijuana – especially for recreational purposes – should not be legalized; 3) the use of non-FDA approved cannabis and/or cannabinoid products for medicinal purposes carries serious risks by circumventing safety and quality testing for efficacy, therapeutic dosing, pharmacokinetics, drug interactions and toxicology. Moreover, we believe the FDA drug approval process is a thorough, deliberate, and exacting process grounded in science, and properly so, because the safety of our citizens relies on it.

SB 136 permits the practice of lay, non-nurse midwifery. As signed, SB 136 will create a new board for the licensure and oversight of certified professional midwives. The SDSMA is strongly opposed to the practice of midwifery by those who lack the necessary medical training and experience to provide medical care for a mother and/or her newborn if something were to go wrong. Further, the SDSMA affirms the AMA’s position on obstetrical care and deliveries as follows: obstetrical deliveries should be performed in properly licensed, accredited, equipped and staffed obstetrical units; obstetrical care should be provided by qualified and licensed personnel who function in an environment conducive to peer review; obstetrical facilities and their staff should recognize the wishes of women and their families within the bounds of sound obstetrical practice; public education concerning the risks and benefits of various birth alternatives should be encouraged.
For Your Benefit:

Your SDSMA Member Services & Programs

Your membership is voluntary, and we appreciate it. As a member of the SDSMA, you have access to valuable member services and programs. Those include:

- Member advocacy and physician representation;
- Legislative;
- Legal;
- Regulatory;
- Networking events;
- Leadership development; and
- Personal and professional education opportunities.

Want to know more? Call us at 605.336.1965, visit www.sdsgma.org or email membership@sdsgma.org.

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.

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

SDSMA Center for Physician Resources

Upcoming Events

Impact of Data Transparency on Becoming a Provider Champion

Leading Quality Improvement As a Top Performer – April 11, 12:15-12:45 pm

Reaching a comfort level related to a change requires increased understanding and task repetition. Top performers who provide guidance and support advance quality improvement efforts and enhance productivity for the entire health care team. Objectives: 1) Evaluate the provider role in quality improvement; 2) describe methods for engaging a health care team. Presenter: Stephan Schroeder, MD, CMQ, CMD, Medical Director, SDFMC: Great Plains Quality Innovation Network

Engaging the Patient Beyond the Exam Room

Helping the Patient Be Realistic – April 25, 12:15-12:45 pm

Most people struggle with making and breaking habits. Explaining the benefits of a change is the first step. Determining which intrinsic motivation will lead to a patient’s success is much more difficult. Discover basic communication tips for gaining trust and increasing compliance. Objectives: 1) Relate common barriers through personal experience; 2) demonstrate communication techniques for shared decision making. Presenter: Eric L. Johnson, MD, President, American Diabetes Association – North Dakota Affiliate; Associate Professor, Department of Family Medicine, North Dakota School of Medicine & Health Sciences

Tools and Resources to Promote Self-Management – May 9, 12:15-12:45 pm

Despite best intentions, many patients struggle to make the necessary lifestyle changes to manage chronic health conditions. Referrals to community based programs can improve health outcomes for patients by teaching them to set goals, establish accountability and track progress. Objectives: 1) Identify the provider role for patient self management; 2) utilize community based tools and resources for referral. Presenter: Eric L. Johnson, President, American Diabetes Association – North Dakota Affiliate; Associate Professor, Department of Family Medicine, North Dakota School of Medicine & Health Sciences

Register at www.sdsgma.org.

Brought to you by the SDSMA Center for Physician Resources in partnership with the South Dakota Foundation for Medical Care, a subcontractor of the Great Plains Quality Innovation Network serving as the Quality Innovation Network-Quality Improvement Organization for Kansas, Nebraska, North Dakota and South Dakota; and the South Dakota Department of Health.

Don’t forget to send in your favorite scenic photo for South Dakota Medicine front cover consideration. Send photos to ereiss@sdsgma.org.
Legal Brief Highlight: Treatment of Minors

While implied consent for treatment of a minor patient usually arises under a course of dealing between the physician and the parent or guardian of a minor patient, it is advisable to obtain parental consent for all but the most routine aspects of the treatment of minors. Consent is not necessary in certain emergency situations and for the treatment of venereal disease.

An emancipated minor is by law incapable of giving his or her consent for medical treatment, but the physician may usually rely on implied consent resulting from the course of dealing between the physician and the parent or guardian. A minor may be treated without consent if the minor’s life or health would be threatened by the delay resulting from seeking out and obtaining consent from the parent or guardian.

Physicians and other health care providers are required to report suspected child abuse or neglect, including abuse or neglect that results in the death of the child. The law provides mechanisms whereby minor patient may in some circumstances be provided medical treatment over the religious or moral objections of their parent or guardian.

For more information, download the SDSMA legal brief Treatment of Minors at www.sdsma.org. Through the SDSMA Center for Physician Resources, the SDSMA has developed more than 50 legal briefs that are available to members. In addition, the Center develops and delivers programs for members in the area of practice management, leadership and health and wellness.
We understand the art of healing and the science of avoiding risk.

Medical liability and more.

At MMIC, medical liability is just the beginning. For more than 35 years, we’ve worked directly with physicians and developed a deep understanding of the risks involved with practicing medicine. We’re there for those who are always there, drawing on a wide range of clinical data, insights and best practices from medical experts to help care teams deliver better care. To learn more visit MMICgroup.com.
300 Experts. 35 Specialties. 1 Call Away.
As the premier facility for pediatric surgery and trauma, Sanford Children’s is here for your patients with the latest and most advanced services and treatment options.

We offer:
• The region’s only dedicated pediatric neurosurgeon
• Lifesaving ECMO services, which allow the heart and lungs to rest and heal
• The largest team of pediatricians in the region

To refer a patient to any of our specialists, call (605) 312-1050 today.
childrens.sanfordhealth.org