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South Dakota Medicine
The Journal of the South Dakota State Medical Association

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Cover photo by Nancy E. Dirks.
Appreciating the **GOOD TIMES**

**JOE BANTZ CFP®, AIF®, CKA®, Lead Advisor**

For nearly my entire life, I’ve been the model of health. I rarely got sick, was free from significant injury (except a dislocated shoulder in college), and rarely missed a day of school or work. I would hear about others’ health challenges and could empathize but couldn’t really relate. I took for granted feeling good in the morning, going out for a morning jog, and going to the gym for a good workout.

Until October 16, 2017. Cancer. Prostate cancer. The same disease that took my dad’s life six and a half years prior. I felt fine but now had all sorts of questions, uncertainty, and anxiety racing through my mind. Suddenly, I had a new appreciation for the 51 years of good health I had enjoyed. All the years of “easy good health” suddenly were put into perspective. I searched online, hoping to understand what was happening inside my body. I talked to numerous men who had walked this path before me. But ultimately, my doctor and I decided on a plan, and we walked through the plan together. I knew he had my best interests in mind as we discussed options, knowing his professional expertise and training gave him more insight than what I could find online.

Investing is kind of like that, as well. I came into this profession in 2003. In fact, I often have joked the markets woke up from the early century doldrums in March, 2003 when Foster Group issued me an opportunity to join the company. For the first 54 months, the markets just went up. I was a bit perplexed when we had a month that was flat or perhaps even slightly negative! Then, ten years ago, I learned how fickle the markets can be and appreciated the good times more as 2008 ended.

Following that, the markets had another great run, and it became easy to get complacent and think the good times were simply a “new normal.” But then the month of March happened, like a cancer diagnosis, and we were reminded: It’s the willingness to walk through the volatility that makes us investors and not speculators.

That’s where my cancer story ties in. I worked with my doctor to get through the valley, to find a solution and emerge healthy. I didn’t panic and take matters into my own hands. I listened to counsel and direction, learned how the body works, and executed the plan. The future is still unknown, though all signs indicate successful treatment. But I have confidence and peace, because I’ve stuck to a solid plan. I have a renewed appreciation for a healthy body!

If the market volatility of the last few months has gotten you a bit unsettled, talk to to your financial advisor, appreciate the good times when we have them, and walk through the valleys with confidence. Work your plan and don’t be afraid to call us. We put your interest first. **EVERY TIME.**

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A question that is often asked is “What does SDSMA do for me?” One significant benefit of membership is the advocacy the association provides on numerous political, medical, and legislative issues.

Recently I had the opportunity to attend both the South Dakota State Medical Association (SDSMA) and American Medical Association (AMA) annual meetings. In addition to collegiality and networking, some great advocacy work was accomplished.

Our organization continues to lead the way in responsible opiate prescribing education. In addition to webinars and live education presentations, we hosted a panel of experts at our annual meeting. South Dakota Attorney General Marty Jackley, Robert E. VanDemark, Jr., MD, Matt Stanley, DO, South Dakota Division of Criminal Investigation officer Pat Kneip, South Dakota Rep. Jean Hunhoff, and Kentucky Rep. Kim Moser led an amazing and interactive discussion about curtailing opiate prescription numbers and morphine milli-equivalents (MME) doses. Overall, prescribers are gaining a deeper understanding of this issue and prescribing patterns are changing. Unfortunately, an overwhelming consensus is that psychology and addiction services are inadequate and difficult to access.

At the AMA meeting, gun control was a topic heavily debated and discussed. Numerous policy statements and positions were created. At the end of the day there are typically mental health disorders at the root of most violent gun events. Taking away guns without addressing the mental health problems does not solve the problem. The general consensus is that much more needs to occur on the mental health front.

In addition to opiates and gun control, prescription drug pricing was a hot topic addressed by the SDSMA Policy Council. Both sides of the prescription drug pricing issue were presented. The Policy Council then decided to form an Ad Hoc Committee on Prescription Drug Pricing. This committee will be chaired by E. Paul Amundson, MD.

There are numerous ways for physicians to become active and involved on both the local and national levels. It is refreshing to see passionate and dedicated physicians working hard for both physicians and patients. I encourage you to participate, in your local medical chapters, in the SDSMA, or nationally with your specialty society or the AMA.

RESOURCES


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It Had a Hold on Me

By Richard P. Holm, MD

Years ago, in another state, a physician friend became addicted to opioids, also known as narcotics. She was one of the smartest doctors I knew, ethically based, raised in a loving family, had children and a spouse. I think it started with a sports injury and pain medicine. Eventually she was divorced, which likely had something to do with her addiction. She said the opioid had a hold on her, and she just couldn’t stop. Years later she told me that it wasn’t difficult to acquire the prescription medicines, but somebody must have been watching, because she was caught after three years with an accelerating need for higher doses.

My own experience with opioid pain medicines, after pancreatic cancer surgery in May of 2017, was colored by my having observed my friend’s struggle. Physicians are a high-risk group and addiction to narcotics was not something I would accept for myself. Despite that determination, the pain was bad, lasted for three or four months, and required those darn pain medicines for a prolonged period. Two months after the surgery, still needing pain meds, I better understood how people could get addicted to narcotics. In retrospect, I know that at least some of the discomfort I was experiencing had to be secondary to withdrawal from the pain medicine itself.

One definition of ‘addiction’ calls it a condition resulting when a person ingests a substance (like oxycodone, alcohol, nicotine) or engages in an activity (like gambling, shoplifting, internet gaming) that might seem pleasurable but the continuation of which becomes compulsive and interferes with ordinary responsibilities, such as work, relationships, or health. Experts tell us addiction isn’t always due to a physical dependency, a search for pleasure, or a flaw in moral character. Rather it is often a reaction to escape stress. Methods to help people find release from addictive and compulsive behaviors are myriad but the most successful seem to be faith based, associated with counseling and emotional support, and provided over a prolonged period (like 16 months).

For me, getting off opioid pain medicines was accomplished by gradually tapering off the stuff while increasing exercise, performing creative activities, finding interests outside myself, while opening my heart to spiritual sustenance. Also important, for me, was the support and companionship of my wife. I learned that surviving with comfort and escaping the compulsion and destruction of opioid addiction can be done, but requires doing the work as well as making the choice to get and receive help.

RESOURCES

Please visit the South Dakota State Medical Association website at www.sdsmoa.org and click “Rx Drug Abuse” to learn more about addiction recovery.

Early intervention is very important and can potentially prevent addiction or diversion problems from becoming irreversible.

Other resources include the National Institute of Drug Abuse at drugabuse.gov and the South Dakota Department of Social Services – Substance Use Disorder Services at dss.sd.gov/behavioralhealth/community/treatmentservices.aspx.
Adenoid Cystic Carcinoma of the Maxillary Sinus with Isolated Trigeminal Anesthesia

By Stephen Scott Bollinger, MD; Mark Gregory DeSautel, MD; William Chad Spanos, MD; and Brian Joel Tjarks, MD

Abstract

Adenoid cystic carcinoma (ACC) is a rare malignant secretory gland tumor. It is characterized by slow growth, long clinical course, local recurrences, and distant metastases. In the sinonasal tract, it most commonly arises in the maxillary sinus. It often presents at an advanced stage with perineural spread (PNS).

Our patient presented with left-sided facial numbness without other symptoms. The numbness was localized to the left cheek, left side of nose, and left upper lip. Magnetic resonance imaging (MRI) of the brain revealed an enhancing lesion involving the left maxillary sinus with orbital invasion and posterior extension into the cavernous sinus. Transnasal endoscopic exploration with tissue removal revealed ACC. 18F-fluorodeoxyglucose positron emission tomography (FDG-PET) scan revealed no evidence of distant metastases.

Presentation of sinonasal ACC (SNACC) is variable depending on the involved structures. Characteristic PNS with ACC may cause neuropathic symptoms. This case displays a unique presentation of an advanced ACC of the maxillary sinus manifesting as isolated unilateral trigeminal anesthesia without sinonasal symptoms. The patient also failed to demonstrate any ocular or oculomotor symptoms despite extensive involvement of the orbit and surrounding structures. This case highlights the importance of recognizing ACC due to its association with late symptomatic manifestations. It also reinforces the need for clinical diligence with the workup of new onset neuropathic symptoms in the maxillary distribution of the trigeminal nerve.

Introduction

Adenoid cystic carcinoma (ACC) is a rare salivary gland malignancy with a reported incidence of 3-4.5 cases per million, accounting for 1-5 percent of all head and neck malignancies. It is, however, the most common malignant tumor of the minor salivary glands and second most common tumor of the nasal cavity and paranasal sinuses, accounting for 10 percent of all malignancies of the sinonasal tract. 60-70 percent of ACC arises in the minor salivary glands located in the palate, paranasal sinuses, and nose. Presentation of sinonasal ACC (SNACC) accounts for 10-25 percent of all head and neck ACCs. SNACC most commonly arises in the maxillary sinus, followed by the nasal cavity, ethmoid sinus, and sphenoid sinus. It presents most commonly in white females in the sixth decade of life. It is known to progress slowly and remain asymptomatic or cause nonspecific symptoms that mimic rhinosinusitis. Common presenting symptoms include nasal obstruction, facial pain or pressure, recurrent epistaxis, nasal drainage, and facial numbness in the distribution of the maxillary branch of the trigeminal nerve (V2). Due to these nonspecific symptoms, it can be misdiagnosed leading to delayed diagnosis and treatment. The following case illustrates a unique presentation of a rare malignancy. Due to the indolent but aggressive nature of spread associated with SNACC, extensive involvement of multiple structures may be present before clinical detection. We will discuss the diagnostic workup for...
restrictions of her extraocular movements or vision changes. She had no nasal obstruction, nasal discharge, or other sinonasal symptoms.

Pre-operative sinus computed tomography (CT) was conducted to more adequately evaluate the bony involvement of the lesion and allow image-guided endoscopic tissue sampling. This further characterized the lesion to show destruction of the floor of the orbit. The lesion extended through the bone into the posteromedial aspect of the ethmoid air cells on the left. The left frontal, left sphenoid, and all right paranasal sinuses remained uninvolved. Additional findings in the left maxillary sinus included mucosal thickening. Widening of the sphenopalatine foramen suggested perineural spread (PNS) of the tumor.

Tissue sampling was acquired via transnasal endoscopic left maxillary antrostomy and left anterior and posterior ethmoidectomy. Biopsies were done of the posterior maxillary sinus mass, as well as tissue just posterior to the natural ostium. The anterior and posterior ethmoidal cells were also opened and noted to have dehiscence of the medial orbital wall. Dehiscence of the orbital floor was evidenced by movement of the orbital floor with gentle palpation of the orbit.

The biopsies revealed a diffuse infiltrate of basaloid cells forming cribriform glands, nests, and trabeculae within a hyalinized and chondromyxoid stromal matrix. The atypical cells had minimal cytoplasm and angulated nuclei with coarse nuclear chromatin and enlarged nucleoli. Occasional mitoses were identified. PNI was conspicuously absent. The Ki-67 proliferative index was heterogeneous, ranging from 10-70 percent. The architecture and histomorphology support a diagnosis of ACC. Because the entire tumor was not visualized histologically, adequate grading could not be performed. While the tumor demonstrated some high-grade features such as increased mitoses, high-reactivity with Ki-67, and a cribriform predominant pattern, no solid growth, necrosis, or PNI were seen. In situ hybridization analysis for high-risk HPV was performed on paraffin embedded tissue and was negative for HPV subtypes 31 and 33.

FDG-PET scan showed a single hypermetabolic mass in the left maxillary sinus with extension into the left orbit but no regional or distant metastatic disease. Due to the advanced locoregional spread of the disease to the level of the cavernous sinus, attempts at curative surgical management would have required extensive tissue resection including orbital exenteration leading to significant cosmetic deformity. The patient elected to proceed with proton beam therapy.

**Discussion**

SNACC is historically known for its indolent growth and nonspecific early symptomatology, which allow it to evade detection and progress to late stages. The closely apposed and communicating air-filled spaces allow for clinically silent tumor progression within the sinonasal tract. These tumors can grow insidiously within the sinus cavity, reaching large dimensions before revealing any symptoms. This is especially the case with the maxillary sinus, as this is the largest among the paranasal sinuses. Additionally, these tumors may remain in the submucosa of the maxillary sinus or extend in sheets underneath the peristomeum without any symptoms or gross physical findings. Maxillary sinus ACC also has a much more aggressive behavior than its counterparts in the major and other minor salivary glands. Despite being locally aggressive, rates of lymph node and distant metastases are uncommon at initial presentation. This finding may be due to the sparse lymphatic system in the sinonasal tract and surrounding structures.

Early symptoms of SNACC are nonspecific and often mimic chronic rhinitis or rhinosinusitis; however, eventual growth and bony destruction of adjacent structures leads to nasal obstruction, recurrent epistaxis, and facial pain, among other symptoms. Further spread leads to even more severe signs and symptoms such as ophthalmalgia, ophthalmoplegia, ocular proptosis, otalgia, headache, and seizures. It has been described as one of the most biologically destructive and unpredictable tumors of the head and neck.

ACC has the propensity to invade perineural tissue, fascial planes, and bone leading to significant skull base and intracranial involvement. Rates of PNI exceed 50 percent. One retrospective chart review of SNACC found extension to the skull base in 27.6 percent of cases and skull base invasion in 23.6 percent. PNS can also be seen with squamous cell carcinoma (SCC), lymphoma, and melanoma. Due to its higher incidence, SCC is the most likely cause of PNS from a sinonasal tumor. However, the close proximity of the sinonasal minor salivary glands to the basicranium, combined with the silent growth of ACC, make invasion into the skull base a particular concern with regard to SNACC.

Malignancies of the maxillary sinus can extend via...
sinonasal malignancy; the unique features of SNACC with regard to locoregional spread, symptomatic manifestations, and treatment regimens; and the importance of the pterygopalatine fossa (PPF) with regards to maxillary sinus SNACC.

Case Report
A 75-year-old white female presented to her primary care physician with a chief complaint of new left facial numbness located on the left cheek, left side of nose, and left upper lip. The numbness began three months prior and the area affected was expanding. She reported no facial muscle weakness, no hearing loss, no visual disturbances and no balance issues. Physical exam, including cranial nerves, was unremarkable except for localized diminished sensation in the left V2 distribution. Due to concern for possible vertebral artery occlusion, brain MRI with and without contrast was ordered.

MRI showed a hypointense T1, hypointense T2, enhancing lesion involving the left maxillary sinus with invasion through the orbital floor and involvement of the inferior rectus muscle. The lesion also involved the infraorbital foramen with posterior extension along the infraorbital nerve to the PPF, which was diffusely replaced by the lesion. The lesion further extended posteriorly along V2 within the foramen rotundum to the cavernous sinus and along the vidian nerve.

Following results of the MRI, the patient was referred to the otolaryngology clinic. Clinical evaluation continued to reveal no other symptoms aside from the left facial numbness. Despite MRI evidence of extensive invasion of the orbit and inferior rectus muscle, the patient had no

Figure 1. T1-weighted brain MRI showing a hypointense enhancing lesion involving the maxillary sinus with posterior extension along the infraorbital nerve to the pterygopalatine ganglion (A), within the foramen rotundum to the cavernous sinus (B), and within the vidian canal (C).

Figure 2. Sinus CT showing a mass in the superior aspect of the left maxillary sinus extending through the floor of the orbit and through bone into the posterior medial aspect of the left ethmoid air cells (A). The lesion is not separable from the left inferior rectus muscle (B). Abnormal soft tissue is present in the pterygopalatine fossa and there is widening of the sphenopalatine foramen (C).
perineural extension along branches of V2 to the PPF. The infraorbital nerve passes along the posterior wall of the maxillary sinus paralleling the inferior orbital fissure as the nerve traverses the short distance from the posterior opening of the infraorbital canal to the PPF. Similarly, the superior alveolar nerves, after perforating the lateral wall, pass along the outside of the posterior wall of the maxillary sinus. Alternatively, these tumors may erode directly into the infraorbital canal or PPF, gaining access to neural structures. Involvement of the V2 may cause pain or numbness in its sensory distribution, while involvement of the Gasserian ganglion or the mandibular branch of the trigeminal nerve can cause atrophy of the masticator muscles (pterygoid, masseter, and temporalis).

The PPF is an important structure with regards to PNS. It connects to the masticator space laterally via the pterygomaxillary fissure, the face anteriorly via the infraorbital canal, the orbit and face superiorly via the inferior orbital fissure, the nasopharynx inferiorly via the pharyngeal (palatovaginal) canal, the palate inferiorly via the greater and lesser palatine foramina, the nasal cavity medially via the sphenopalatine foramen, and the middle cranial fossa (MCF) via the foramen rotundum and vidian canal. These various pathways allow for the wide range of symptoms associated with sinonasal malignancy. Symptoms attributed to multiple nerve distributions suggest a more central involvement, such as the cavernous sinus, spread from one cranial nerve to another, or leptomeningeal disease.

The present case involved invasion of fascial planes, obliteration of bony structures, and significant PNS. Despite the extent of local destruction from the tumor, the only symptoms reported by the patient were those of anesthesia in a V2 distribution. Due to the indolent nature of ACC, it is uncertain how long the tumor would require to cause further symptoms more characteristic of SNACC, such as nasal obstruction, deep facial pain, epistaxis, and ocular symptoms. The fact that these symptoms were absent...
highlights the importance for clinicians to be attentive in the workup of new onset trigeminal anesthesia.

Diagnostic workup of SNACC is best done with a combination of CT and MRI. CT is often the first imaging modality utilized in patients with persistent or recurrent sinonasal symptoms and is the ideal modality for assessment of bony changes.\textsuperscript{37} It is critical to assess the integrity of the bone and periosteum of the orbital floor, the PPF, and anterior cranial fossa, as well as extension to the MCF because disease in these areas impacts on the choice of surgical management and diminishes the prognosis.\textsuperscript{43-45}

MRI is the method of choice for evaluating PNS due to its superior soft tissue contrast resolution. MRI findings such as effacement of the fat pads surrounding nerves should alert one to presence of PNS. High-quality CT in the hands of an experienced radiologist may also be used to detect this phenomenon, though it is limited in determining extent of disease. Bone algorithm CT reconstructions showing foraminal destruction, erosion, or asymmetric widening, are frequently present in advanced cases and should alert radiologists to the presence of PNS.\textsuperscript{49} The radiological diagnosis of PNS makes curative surgery unlikely and diminishes the prognosis.\textsuperscript{46}

A variety of treatment protocols have been used for SNACC. The recommended treatment whenever possible consists of surgical resection with adjuvant radiotherapy (RT).\textsuperscript{1,16,42,47,48} Despite refinements to surgical techniques, no evidence has shown improvements in disease control outcomes.\textsuperscript{49} When curative surgery is possible, there is significant cosmetic deformity and functional morbidity.\textsuperscript{21} Surgical procedures should attempt to achieve tumor-free margins, however, extensive resections of healthy organs and nerves are not usually feasible, and RT is used to try to control any peripheral spread.\textsuperscript{50} Though ACC is considered radiosensitive, in most patients, it cannot be cured by RT alone.\textsuperscript{22} RT alone has not resulted in acceptable survival rates and should only be used for unresectable T4 tumors and palliation.\textsuperscript{5,6,27,49,51}

Alternatively, some asymptomatic patients with incurable disease may be observed without treatment sometimes for years.\textsuperscript{32} Chemotherapy should be reserved for the palliative setting, preferably in patients with symptomatic, progressive disease.\textsuperscript{16,32} Even in this setting, chemotherapy may be associated with toxicity without known impact on disease course or patient prognosis.\textsuperscript{51}

In this case, the patient elected to pursue proton beam therapy. Proton beam therapy has been shown to be an effective treatment for ACC of the skull base.\textsuperscript{54} Definitive proton RT appears to result in promising local control as what has been achieved historically with combined surgery and adjuvant RT.\textsuperscript{48} Published studies evaluating the use of proton therapy in the treatment of ACC of the head and neck show varying locoregional control rates between 75 and 95 percent.\textsuperscript{53,56}

Although ACC grows slowly, it is locally aggressive and has the highest rate of local recurrence of all sinonasal tumors (75-90 percent).\textsuperscript{37} Recurrence and metastases can occur decades after treatment of the primary tumor;\textsuperscript{51} PNS may account for the characteristic delayed recurrence of up to 20 years.\textsuperscript{37} PNS is also associated with the increased risk of local recurrence and portends a poor overall outcome with the likelihood of residual disease proportionate to the proximal extent of the tumor\textsuperscript{58} and the diameter of the involved nerves.\textsuperscript{39} Maxillary sinus ACC is recognized to have a more unfavorable prognosis compared with those arising in the major or other minor salivary glands because of its extensive infiltration and relative surgical inaccessibility.\textsuperscript{60}

**Conclusion**

SNACC is a rare tumor that most commonly occurs in the maxillary sinus. ACC has the ability to achieve significantly advanced stage before clinical detection. Advanced maxillary sinus ACC can lead to trigeminal anesthesia in a V2 distribution through locoregional spread, among other symptoms. It is therefore, prudent to be diligent in the workup of any new onset trigeminal anesthesia in the V2 distribution.
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It's especially important that teens have both physical and mental health concerns addressed in their annual checkups. Well-child visits cover ALL the bases.

SOUTH DAKOTA DEPARTMENT OF HEALTH

For more information, please visit doh.sd.gov/family
Case Report: Intraductal Papillary Mucinous Neoplasms of the Biliary Tract

By Sara Marroquin, MD, MPH; Derek Dirks, MD; and Thav Thambi-Pillai, MD, FACS

Abstract

The present case report describes intraductal papillary mucinous neoplasms of the biliary tract (IPM-BT), a rare neoplasm of the biliary tract that is described as the biliary counterpart of intraductal papillary mucinous neoplasms of the pancreas (IPM-P). The importance of appropriate diagnosis and awareness of the clinical manifestations is highlighted. IPM-BT has a more favorable prognosis and is easier to resect than other forms of intrahepatic cholangiocarcinomas; therefore, early and accurate diagnosis is required for planning of the best treatment strategies for this neoplasm.

Introduction

Intraductal papillary mucinous neoplasms of the biliary tract (IPM-BT) has recently become recognized as a specific type of neoplasm categorized as a subset of intraductal-growth type intrahepatic cholangiocarcinoma (ICC).1 Other types include mass-forming type and periductal infiltrating type. It is characterized by dilated intrahepatic bile ducts due to a mucin-producing papillary biliary neoplasm. Diagnosis is achieved histologically.2 It is considered the biliary counterpart to intraductal papillary mucinous neoplasms of the pancreas (IPM-P). IPM-BT does display some radiographic and clinical features similar to IPM-P but it is still unclear if these neoplasms behave in a similar biological manner. It is also understood that IPM-BT has a more favorable prognosis and higher likelihood of ability to resect than other types of ICC.2 Given this, the importance of early recognition and treatment is paramount for optimal outcomes.

Case Report

An 83-year-old male with a past medical history of diabetes mellitus type 2, coronary and peripheral artery disease, pulmonary hypertension, and former smoking presented to the emergency department twice with increasing epigastric abdominal pain radiating to the right upper quadrant (RUQ) and back. Physical exam was remarkable for mild RUQ tenderness with palpation. Ultrasound was obtained on the first visit which showed a common bile duct diameter of 6 mm and dilated intrahepatic biliary ducts with a normal appearing gallbladder. White blood cell count, liver function tests, and pancreatic enzymes were within normal limits. The patient was discharged home to follow up with general surgery. Two weeks later the patient again presented to the emergency department with increased epigastric pain. Physical exam was unchanged, but labs were notable for a lipase of 1285 units/L (normal 23-300 U/L). The patient was admitted for treatment of acute pancreatitis. Workup included computed tomography (CT) of the abdomen and pelvis (Figure 1), magnetic resonance cholangiopancreatography (MRCP) of the abdomen which showed dilated left intrahepatic ducts (Figure 2) and a CA 19-9 of 59 units/mL (normal 0-35 u/mL). An endoscopic retrograde cholangiopancreatography (ERCP) was obtained, which showed a mucin-secreting, lobular frond-like mass obstructing the left main hepatic duct. Given these unusual findings, biopsies were taken. These showed a villous papilloma concerning for malignancy. The patient underwent an endoscopic ultrasound (EUS) which demonstrated a hypoechoic elongated mass in the perportal region measuring 13.8 mm x 4 mm. Fine-needle aspiration (FNA) was also done at this time. Pathology results revealed IPM-BT. Surgery was felt to be indicated given these findings, so the patient underwent laparoscopic lysis...
Figure 1. CT Abdomen/Pelvis W/WO contrast. Circle highlighting amorphous centrally obstructing lesion within the left lobe of liver with peripheral intrahepatic biliary dilatation and left lobe of liver atrophy consistent with ductal tumor.

Figure 2. MRCP with contrast. The circle is showing obstruction of the ductal system in the lateral segment of the left lobe of the liver with a late enhancing, ill-defined soft tissue density present. The arrow is pointing to dilated intra-hepatic ducts.
of adhesions and liver biopsy, which was then converted to open left hepatic lobectomy. The patient tolerated the procedure well and was discharged home in stable condition on post-operative day seven. Pathology report of the specimens confirmed IPMN-BT with microscopically clear margins. The patient’s case was brought to the institution’s gastro-intestinal tumor board to discuss post-operative management given the rarity of this disease and it was decided to proceed with yearly CT abdomen with IV contrast as surveillance.

**Discussion**

IPMN-BT has become a distinct neoplasm separate from other forms of ICC and is thought to be the counterpart of IPMN-P. IPMN-BT are also called intraductal papillary neoplasms of the bile duct as there has been no consensus on the WHO classification of this disease. IPMN-BT is a precancerous lesion that usually presents similar to cholangitis. Labs show increased bilirubin and alkaline phosphatase. These clinical findings are also commonly found as the presenting symptoms of IPMN-P.

Initially the patient is being worked up for biliary obstruction, and the initial imaging test is an abdominal ultrasound. Depending on these findings (i.e., common bile duct dilation) the patient usually undergoes an MRCP or CT abdomen. The patient usually does not need both. These images will show the mass and likely bile duct dilation. If the patient is symptomatic from the bile duct dilation, ERCP may be done for symptomatic treatment but is not required for workup. EGD with EUS and FNA is the gold standard for diagnosis and should be done.

Recent studies have shown that IPMN-P and IPMN-BT may have similar imaging findings; therefore, sampling the tissue with an FNA is extremely important for proper diagnosis. IPMN-BT is similar to IPMN-P in regards to histopathological features. Pathologically they are characterized by the presence of frond-like papillary infolds of epithelial cells that secrete mucin. They tend to spread along the mucosal surfaces. The difference between the two neoplasms is that IPMN-BT clearly originates from cells in the biliary tract and IPMN-P originates from cells in the pancreas.

It has also been found that IPMN-BT and IPMN-P share similarities in regards to genetic mutations. Numerous studies have found that about half of these neoplasms express guanine nucleotide-binding protein, alpha-stimulating activity polypeptide (GNAS) and/or v-Ki-ras 2 Kirsten rat sarcoma viral oncogene homolog (KRAS) mutations. Sasaki et al. found that IPMN-BT’s that expressed only the GNAS mutation had high mucin secretion compared to IPMN-BT’s that also expressed the KRAS mutation. The degree of dysplasia tended to be more significant in the low-mucin producing neoplasms compared to the high-mucin neoplasms, although it was not statistically significant.

Although these two neoplasms have similar histology, genetic mutations, and imaging, it is unclear whether they behave in the same biological manner. Minagawa et al. looked at the differences of the neoplasms clinically and found there was a difference in presentation and serum tumor markers. They found that the most common presentation for IPMN-BT were signs of biliary obstruction and increased alkaline phosphatase, whereas IPMN-P more commonly presents as abdominal pain and pancreatitis. They also found the serum levels of CEA and CA19-9 were significantly higher in IPMN-BT patients in comparison to IPMN-P patients, suggesting these could be used as clinical markers of the disease. Both show promising prognosis with surgical resection of the tumor. It is suggested that IPMN-BT be resected aggressively to achieve clear margins. Long term follow up and prognosis of these patients remains unclear.

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E-cigarettes. Talk to your young patients.

As a healthcare provider, your discussions with your patients—especially younger patients—will go a long way toward educating and could even prevent a dangerous habit from starting.

Patient: There are fewer risks with E-cigarettes.

Unfortunately, there are many risks to using E-cigarettes: many contain nicotine which is addictive, can disrupt brain development, can complicate pregnancy, and is a known cause of SIDS; E-liquids containing nicotine are often concentrated enough to cause poisoning if ingested or absorbed through the skin; E-cigarette batteries can explode and cause burns or other injuries.

Patient: It’s not smoke, it’s just water vapor.

When an E-cigarette heats up the e-liquid, the aerosol that is created is not just water vapor and it’s not harmless for the user or those who are exposed to it secondhand.

Patient: E-cigarettes help people quit smoking.

The jury is still out on whether E-cigarettes are a safe way for people to quit smoking, but we do know that they pose a health risk for young people.

Patient: E-cigarettes don’t have nicotine in them.

Nicotine is very common in E-cigarettes. Because they aren’t regulated, they may not be labeled to accurately show their ingredients. Our brains continue to develop through our mid-twenties and nicotine is known to damage brain circuits that control attention, learning, and susceptibility to addiction.

WARNING: E-cigarette use among young people has risen significantly over the last 5 years. Use among middle and high school students has now surpassed use of regular cigarettes.
**Journal**

**Catch Me If You Can**

By Muhammad Omar, MD; Ashwyna Sunassee, MD; Mathews Hayes, MD; and Jennifer L. Hsu, MD

**Abstract**

_Nocardiia_ is a genus of anaerobic gram-positive bacteria that most commonly infect persons with compromised immunity. Pneumonia and soft tissue infections are seen most frequently; osteomyelitis is an uncommonly reported manifestation of nocardiosis. We report a case of pelvic osteomyelitis due to _Nocardiia asteroides_ in a patient with unrecognized acquired immune deficiency syndrome (AIDS) without evidence of concomitant pulmonary or skin infection.

**Introduction**

_Nocardiia_ is a genus of anaerobic gram-positive bacteria that live in soil and aid in decay of organic matter. Occurring throughout the world, _Nocardiia_ species most commonly infect persons with underlying immunocompromising conditions. Infection most commonly occurs through inhalation of the organisms, which results in pneumonia. However, skin infection may result from direct inoculation. Disseminated infection is less common, but it can occur in heavily immunocompromised persons. We present a case of _Nocardiia_ osteomyelitis in a person with newly diagnosed acquired immunodeficiency syndrome (AIDS). The portal of entry in this patient was undetermined, making it unique among cases reported in the literature.

**Case**

A 24-year-old Jamaican male with no known medical history presented with one week of continuous left-sided hip pain and fever. His symptoms were unresponsive to ibuprofen. On physical examination, his temperature was 100 degrees fahrenheit. There was tenderness of the left iliac crest with normal left hip range of motion. The remainder of the exam, including cardiopulmonary musculoskeletal, and integumentary exams, was unremarkable. Radiography of the left hip was normal. He was prescribed diclofenac initially, but his pain persisted. Due to elevation in his white blood cell count of 13 K/µL (normal range 4 – 11 K/µL) and C-reactive protein of 118.9 mg/L (normal range 0 – 9.9 mg/L), he was empirically started on trimethoprim-sulfamethoxazole (TMP-SMX) for possible infection of undetermined location. While on antibiotics, his fever resolved and his left hip pain improved. However, after completion of one week of antibiotics, his pain relapsed. He subsequently underwent magnetic resonance imaging (MRI), which revealed a left upper iliac wing lesion with an associated peripherally-enhancing 11 x 3.9 x 4 cm complex cystic lesion extending into the gluteus and iliacus muscle (Figures 1 and 2). These findings were concerning for osteomyelitis or neoplasm and percutaneous biopsy was undertaken. Histopathology from the affected bone showed changes of acute and chronic osteomyelitis; gram stain was negative (Figures 3-6). Screening for human immunodeficiency virus (HIV) infection was positive. Subsequent laboratory testing revealed an HIV viral load of 46,100 copies/mL and CD4 count of 13 cells/µL. Bone culture grew _Nocardiia asteroides_, which was susceptible to multiple antibiotics. The abscess was surgically debrided and the patient was started on trimethoprim-sulfamethoxazole and ciprofloxacin, in addition to abacavir/dolutegravir/lamivudine for HIV infection. Further imaging with computed tomography of the head and chest showed no evidence of disseminated infection. Shortly after initiation of TMP-SMX and ciprofloxacin, the patient developed a rash. He underwent
Figures 1 and 2. MRI axial view (Figure 1) and coronal view (Figure 2). T2 weighted images showing indeterminate marrow replacing focus in the left upper iliac wing (thin arrow) with associated peripherally cystic soft tissue process extending into the iliacus and gluteal muscles (thick arrow).
Figure 3. Hematoxylin and eosin stained sections of bone marrow showing marrow fibrosis and plasma cell infiltrate consistent with chronic osteomyelitis.

Figure 4. Hematoxylin and eosin stained sections of bone marrow demonstrating marked neutrophilic infiltrate “attacking” the bone with bone resorption consistent with acute osteomyelitis.
Figure 5. Hematoxylin and eosin stained sections of bone marrow demonstrating acute inflammation with vague granuloma formation.

Figure 6. Marked acute inflammation involving skeletal muscle.
TMP-SMX desensitization followed by addition of minocycline. Over the course of two months of treatment with TMP-SMX and minocycline, he clinically improved with resolution of left hip pain.

Discussion
Nocardi a species are soil-dwelling saprophytic anaerobic gram-positive bacteria that aid in the decay of organic matter in the environment. The genus Nocardi a has close to 100 species identified based on ribosomal ribonucleic acid (rRNA) sequencing. They are found worldwide. Infection is more common in adults than children and in men more than women. It spreads sporadically and person to person spread is not well documented. Human infection is typically acquired through inhalation of bacterial mycelia, which can lead to pneumonia and disseminated infection. However, direct inoculation can also result in primary soft tissue infection. Extrapulmonary spread is prevented through T-cell-related immunity.1 Thus, persons with impaired cell-mediated immunity related to lymphoma, solid organ transplant, long-term glucocorticoid therapy, AIDS, and other conditions are at a higher risk of dissemination.2 The most common site for extrapulmonary spread is central nervous system, but other reported sites of spread include skin, kidney, bones, muscles and eyes.3 Extrapulmonary infections can result in abscess formation, as well as discharge of purulent material through sinuses tracts. Nocardi a osteomyelitis is rare and usually caused by contiguous soft tissue infection (mycetoma), or rarely, due to hematogenous spread from a primary pulmonary infection.4-6 To the authors’ knowledge, this is the first report of Nocardi a osteomyelitis without an apparent portal of entry in the lungs or skin.

The diagnosis of nocardiosis can be challenging given the lack of specific clinical or radiographic findings. Confirmation of the diagnosis most commonly rests on histopathology and tissue culture. Nocardi a is a slow-growing organism, at times taking two weeks or longer to grow in culture. Laboratories should be notified if there is clinical suspicion for nocardiosis to facilitate more rapid diagnosis.

Treatment of nocardiosis primarily consists of combination antibiotic therapy in addition to surgical debridement and modification of immunocompromising states when feasible. Trimethoprim-sulfamethoxazole (TMP-SMX) is the foundation of antimicrobial therapy, and it is most commonly combined with a second antimicrobial agent, such as amikacin, imipenem, or ceftriaxone. Due to significant variation in antimicrobial susceptibilities between Nocardi a species, susceptibility testing is required to guide long-term therapy. Treatment is often required for six to 12 months or longer depending on the specific clinical situation.

Conclusion
Although not a commonly identified pathogen, Nocardi a species can cause a variety of clinical presentations, primarily in persons with impaired T-cell immunity. For this reason, clinicians must be aware of this as a potential to facilitate more rapid diagnosis and initiation of treatment.

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ORTHOPEDIC INSTITUTE
Bilateral Chronic Exertional Compartment Syndrome of the Leg: A Rare but often Debilitating Condition in Athletes

By Nathan Truex, MD; and Travis J. Menge, MD

Abstract
This report discusses an unusual case of bilateral chronic exertional compartment syndrome (CECS) of the lower leg, a syndrome found mainly in young athletes. Pathophysiology includes exercise-induced muscle expansion against noncompliant fibro-osseous membranes separating compartments of the lower leg.

A 24-year-old female distance runner with a history significant for misdiagnosed shin splints and tibial stress fracture presented with acute-on-chronic right lower leg pain. History revealed exertional pain and numbness, alleviated by rest. Subsequent MRI found no tibial abnormalities, and intracompartmental pressure testing demonstrated four compartment pressure elevations, confirming a CESC diagnosis. A minimally-invasive four compartment fasciotomy was performed in the operating room. Two months after return to running, symptoms were improved in the right leg, but appeared in the left leg. Subsequent pressure testing on the left revealed CESC, and four compartment fasciotomy was performed. Her symptoms significantly improved and she returned to running at six weeks without pain bilaterally.

Introduction
Chronic exertional compartment syndrome (CECS) results from increased pressures within a noncompliant fibro-osseous space after the onset of physical activity, such as long distance running. This intracompartmental pressure results in ischemia, decreased tissue perfusion, and tissue hypoxia. CECS predominately affects the lower leg, but has been seen in the thigh and forearm. It is hypothesized that CECS is a consequence of increased muscle volume and weight during strenuous exercise. This increase causes inadequate perfusion and venous return, muscle hypoxia, and pain.

Objective diagnosis of CECS is obtained via history of pain and/or paresthesia reproduced by exercise and relieved by rest, and increased compartment pressures greater than 30 mmHg at 1 minute or greater than 20 mmHg at 5 minutes post exertion. Additionally, resting pressure of greater than 15 mmHg is sufficient for diagnosis. Women have a higher incidence of CECS, and respond less well to operative treatment. In this report, we discuss a case of CECS in a young, female athlete.

Case Report
A 24-year-old female with a past medical history significant for possible tibial stress fracture presented with acute-on-chronic worsening right lower leg pain. She denied any trauma or any other etiology leading to this pain. She was an avid runner who ran up to 30 miles per week. However, she was unable to continue running due to worsening symptoms. Pain was localized to her lower leg, began shortly after running, and was alleviated by rest. Given her prior history, recurrent stress fractures were suspected. A 3T MRI was obtained, which did not demonstrate evidence of a stress fracture or bony abnormality.

With no apparent stress fracture, CECS was suspected. On follow-up examination, the patient endorsed numbness
and paresthesia of her lower leg and foot additional to the pain, and began 10 minutes after initiating running. Compartment pressure testing before and during exertion was performed with a Stryker intracompartmental pressure monitor, and demonstrated significantly increased pressures in all four compartments of her right lower leg (Figure 1). Resting and five minute post exercise pressures were 12 mmHg and 84 mmHg in the anterior compartment, 21 mmHg and 84 mmHg in the deep posterior compartment, 13 mmHg and 49 mmHg in the lateral compartment, and 13 mmHg and 25 mmHg in the superficial posterior compartment. These measurements established a CECS diagnosis in all four compartments. Given failure of conservative treatment including activity modification, rest, and oral anti-inflammatories, the patient elected to undergo minimally-invasive four compartment fasciotomies of her symptomatic right lower leg.

Intraoperatively, the right anterolateral leg was visually divided into thirds, and two 3 cm incisions were made at the proximal and distal thirds over the anterolateral intermuscular septum. Under direct visualization, fasciotomies of the anterior and lateral compartments were performed on each side of the intermuscular septum using a Metzenbaum scissors. Great care was taken to avoid damage to the superficial peroneal nerve, as well as any vascular structures. To address the superficial and deep posterior compartment, a 7-8 cm incision was placed 2 cm posterior to the posteromedial edge of the tibia. The superficial posterior compartment was first released using the same methods described above. Finally, the deep posterior compartment was addressed via detachment of the origin of the soleus from the proximal tibia and fibula. The deep fascia was sharply divided with Metzenbaum scissors, completing the release. The subcutaneous tissue was closed with 2-O absorbable suture, followed by skin closure with a running subcuticular 4-0 suture.

Post-operatively, the patient began active range of motion of the knee and ankle immediately, with weight bearing and light daily activities encouraged as tolerated. At her initial two-week post-operative appointment, the patient stated she had no pain in her right lower leg, and it felt better than it had in many years. Her incisions were healing well without swelling or other abnormalities (Figure 2a – lateral leg; Figure 2b – medial leg). She was cleared to resume activities four weeks after surgery.

Upon resuming running at six weeks postoperatively, she had no complaints in the right lower extremity. However, she did admit to exertional pain in the left lower extremity. CECS was suspected, and intracompartmental pressure testing confirmed CECS in the left leg. Testing revealed pre-exercise pressures of 29 mmHg in the anterior compartment, 38 mmHg in the deep posterior compartment, 41 mmHg in the superficial posterior compartment, and 32 in the lateral compartment. Since pre-exercise measurements were diagnostic, post-exercise measures were not performed. Subsequently, a four-compartment fasciotomy using the same technique described above was performed on the left lower extremity. Following the same post-operative protocol, the patient returned to running 4+ miles 6 weeks postoperatively with no complications.
Discussion

The lower extremity is divided into 4 compartments: anterior, lateral, superficial posterior, and deep posterior, each containing one major nerve, with the anterior and deep posterior compartments containing major vascular structures (Figure 3). These neurovascular structures are at risk due to compression in compartment syndrome.

Multiple factors contribute to increased intracompartmental pressures during exercise. First, muscle fibers swell up to 20 times their resting size. Muscle expansion in a confined space results in microvasculature compression, leading to insufficient flow to meet the demands of muscles. Since flow only occurs during the relaxation phase of exercise, intracompartmental pressures are best measured when the muscle is not contracted, hence why pressures are measured post-exercise. Pain persists post-exercise until blood flow overcomes the decreasing amount of total intramuscular pressure. Fascial hernias, located at the intermuscular septum, also cause CECS, most commonly where the superficial peroneal nerve exits. It is estimated hernias are present in 39-46 percent CECS cases. When compartment pressures rise, muscles bulge through the hernia, compressing the superficial peroneal nerve, leading to numbness and pain.

CECS presents with recurrent exercise-induced leg pain that is reproducible and increases with continued exercise. The pain is described as a squeezing, cramping, or burning pain in the lower leg. Associated symptoms include numbness or paresthesia over the lower leg or foot. Patients often describe at what distance or time after starting exertion at which their symptoms occur, and how long they last after discontinuation of activity. For unknown reasons, there is a higher incidence of CECS, and less operative treatment response in women as compared to men.

Diagnosis of CECS using elevated ICP were first described...
by Pedowitz, and are the gold standard diagnostic criterion for CECS.\textsuperscript{1,5,8} Diagnosis of CECS is made with resting ICP $\geq 15$ mm Hg, one-minute post-exercise pressure of $\geq 30$ mmHg, and/or five-minute post-exercise pressure of $\geq 20$ mmHg. If any one of these three criteria are met, a diagnosis is confirmed (Figure 4). Measurements are made with a handheld fluid pressure monitor.

Conservative treatment of CECS includes activity modification, physical therapy, and oral anti-inflammatory medication. Stretching and strengthening of involved muscles are additional strategies. If conservative management fails after a three-month minimum, surgical fasciotomy of the involved compartment(s) is definitive.\textsuperscript{9,10} Recently, endoscopic, two-incision fasciotomy has been helpful. While an endoscopic approach offers smaller

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**Figure 4. Flow Chart detailing a diagnostic approach to chronic exertional compartment syndrome.**

- **Measure Resting Intracompartmental Pressures**
  - $<15$ mmHg
  - **Exercise**
  - **Measure Compartment Pressures at 1 minute post-exercise**
    - $<30$ mmHg
    - **Measure Compartment Pressures at 5 minute post-exercise**
      - $<30$ mmHg
      - **No CESC Present**
    - **>30 mmHg**
      - CESC Diagnosis Made*
        - $>30$ mmHg
          - **>15 mmHg**

*CESC = Chronic Exertional Compartment Syndrome*
incisions compared to traditional approaches, complications and clinical outcomes are similar.\textsuperscript{1} Postoperatively, active range of motion exercises and walking are encouraged immediately. Full activity may advance as tolerated, typically four to six weeks after surgery.\textsuperscript{1,2}

CECS is a disease most commonly seen in young female athletes. CESC mimics other common pathologies such as shin splints or stress fractures, and should be considered in lower extremity pain with exertion (Figure 5). In this paper, we have reported a case clinically and diagnostically consistent with bilateral CESC. Prompt diagnosis with intracompartmental pressure measurements and surgical decompression can be critical in the prevention of irreversible muscle damage and associated neurovascular injury.

Figure 5. Flow chart detailing the primary care workup of lower extremity pain or paresthesia reproduced by exercise and relieved by rest.

Lower Leg Pain or Paresthesia with Activity

If positive, refer to Orthopedics

AP and Lateral Radiographs of Lower Leg

Positive or Inconclusive

MRI without contrast

Conservative Treatment for a Minimum of 3 months:
1. Physical Therapy
2. Rest
3. Activity Modification
4. NSAIDs

Differential includes:
1. Subtle tibial/fibular stress fracture
2. Soft tissue tumor/lesion
3. Tendosynovitis of ankle dorsiflexors/plantarflexors

No

Suspect CECS, refer to Orthopedics

Follow Figure 5

Yes

Resume activity as tolerated

Symptoms Return

Differential includes:
1. Tibial stress fracture
2. Bone tumor/lesion

No

Positive-Refer to Orthopedics

Clinical improvement?

REFERENCES

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Primers in Medicine

CKDu – An Emerging Management Challenge in Rural Communities

By Mohammad Qamar, MD

Introduction
Over the last decade a new disease entity has emerged, one that has perplexed nephrologists and epidemiologists worldwide. During this time this disease has contributed to significant morbidity and mortality in agricultural communities, including the death of almost 40,000 people in Sri Lanka, India, and Chichigulpa, Nicaragua. However, unlike other health emergencies with comparable mortality, this condition has remained largely unrecognized by most health care providers. The most common name for this condition is chronic kidney disease of unknown etiology (CKDu). CKDu is distinguished from CKD by its unique epidemiological niche. CKDu appears to occur primarily in patients between 20 and 50 years of age, and it is much more frequent in males.

Geographic Distribution
Although CKDu occurs in all geographic locales, it is more common in equatorial regions. Hence, it is also often referred to as Meso-American Nephropathy (MeN). It was first reported in the pacific coastal agricultural communities of Central America. Chichigulpa is a small town in Nicaragua, where the primary industry is sugar cane farming and where 46% of all the male deaths are thought to be secondary to CKDu. The overwhelming majority of these patients are males under the age of 50 years, and this tragic epidemic has earned this town the infamous title of “La Isla De Viudas” or the island of widows. A similar epidemic has arisen in other regions of the world, including Sri Lanka, India and Northern Africa, as well as in parts of South America and South East Asia. Sri Lanka has recorded around 20,000 deaths associated with CKDu in the last 10 years.1

An interesting observation has been that not all parts of these geographic regions are equally afflicted by CKDu. Local variations in climate seem to strongly influence distribution and prevalence. The hotter and drier regions are also the hotspots of CKDu. In all of the other hotspots of CKDu around the world the common patient characteristic is of a young male farmer aged 20-50, working in conditions of high heat stress and developing CKD. The other common theme is the absence of any of the usual risk factors for CKD such as diabetes, hypertension or obesity. Proteinuria is also not common in these patients.2

Acute kidney injury (AKI) may play a role in the development of CKDu if the AKI is severe and recurrent. AKI is one of the most common illnesses across the world, and it is associated with a very high morbidity if treated late. However, as providers, we have traditionally thought of AKI and CKD as separate entities. Recent studies have shown that AKI can indeed lead to CKD and that these are interconnected syndromes. While most AKI events will not lead to CKD and are indeed reversible, the patients most at risk are ones that develop severe AKI such as those in critical care units. Developing AKI stage III based on the RIFLE criteria, correlates strongly with the risk of CKD development. At 24 months 15-20 percent of these patients will show evidence of CKD. The main factor behind this is the disconnect between normal tubular recovery and the lagging vascular recovery post a severe AKI event. This maladaptive repair is the result of cell cycle arrest and fibroblast proliferation.3

If the volume contraction that often occurs with recurrent AKI can lead to CKDu, then this upends our conventional wisdom that AKI is a reversible process. This hypothesis would fit very well in explaining the sudden jump in the numbers of CKDu patients. These individuals are engaged not only in physically demanding labor but also under conditions of extreme heat stress. The average low wage farmer whether working in the sugar cane fields of Central America or in the rice paddies of Sri Lanka spends eight to 12 hours per day in temperatures that can easily exceed 90 degrees Fahrenheit.2,4,5 Research on the effects of climate change has shown that the global average temperatures have increased by one degree Celsius in the last century and that these changes are now accelerating.6 We have only to look at the extreme heat waves in South Asia, the extreme drought conditions of California and the hyperactive hurricane season in the Atlantic Ocean
this year to get a confirmation of these findings.

**Risk Factors in Medically Underserved Areas**

Given the poverty and lack of general medical care in many of the affected communities, most of these patients present very late to the clinic or hospital. This also translates to a general lack of kidney biopsies performed and pathological data. What little pathological data are available reveal a pattern of primarily tubulointerstitial involvement and fibrosis rather than any distinct glomerular disease. Immune complexes are absent and so are the effacement of podocytes. 6

There is a feeling in the nephrology world that while this disease may have been present for decades, it has truly only reached epidemic proportion in the last 20 years. The rise of heat index patterns with regards to overall climate change may be related. In patients with CKDu setting aside patient related factors such as age and gender, working in a hot environment appears to be a near universal risk factor. It may therefore be reasonable to call this condition “Heat Stress Nephropathy.”

The heat stress model is based on three interconnected features. Hyperosmolarity, hyperthermia and volume depletion. All three result in the excess production of vasopressin or anti diuretic hormone (ADH). The primary function of ADH is to increase water reabsorption in the distal nephron by installing aquaporins or water channels in the collecting ducts. However, there is a second effect of repeated ADH production, which is increased synthesis of collagen I and IV along with mesangial cell proliferation and hypertrophy. This in turn can lead to tubulointerstitial fibrosis. Besides ADH production the other key components of the heat stress model include a pattern of oxidative stress as a result of aldolase reductase activation, renal ischemia secondary to low renal blood flow and the generation of increased amounts of lactate and uric acid. As noted earlier, these are features which are seen most commonly in another very well known entity: Acute Kidney Injury.

Because CKDu occurs primarily in agricultural communities, other risk factors are being explored as causal as well. Commonly these studies seek to quantify the impact of agrochemicals, heavy metals and water quality. 7 Most of these data come out of Sri Lanka and India. However, the lack of similar findings from locales like Central America gives these theories less credence, so far, in the eyes of CKDu researchers. What everyone can agree upon is that working long hours in conditions of high heat exposure drastically increases one’s risk for the development of CKDu. Thus, our initial focus must be to identify and properly diagnose and treat those patients that may be at risk in rural and farming communities across the U.S. It is also clear that we need to come up with specific education programs regarding hydration protocols along with improved guidelines that are more strictly enforced regarding the heat exposure work limits for the agricultural workers most at risk.

**Local Impact and Future Outlook**

Since the U.S. has quite a bit of variation in climate, we should also pay special attention to the risk that our own farm workers face in South Dakota, as well as in hot climate areas such as California and the southern states. Central California employs almost half a million agricultural workers and a recent study showed that these workers are exposed to temperatures exceeding 100 degrees Fahrenheit and face a very high risk of developing repeated events of AKI. 8 The Occupational Safety and Hazard Administration (OSHA) currently recommends frequent breaks for any activity in temperatures exceeding 78 degrees Fahrenheit.

Migratory patterns also position the U.S. to experience increasing numbers of patients suffering from CKDu. One of the largest sources of refugees arriving in the U.S. is Central America, and CKDu is highly prevalent in this population. Most of the new arrivals find work as unskilled labor and farm work is perhaps the primary occupation for the majority of them. Couple this with a lack of information about safe working conditions and access to affordable health care, we may already be vastly underestimating the scope of this problem within the continental U.S.

**Note:** the website for Dr Qamar’s Grand Rounds presentation on CKDu can be found at https://usd.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=517cdcca-5f74-4a07-ab5d-04916deb7484.

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

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Extenuating Circumstances

Eugene Milton Stansbury, MD: Physician, Surgeon, and Entrepreneur in Vermillion, South Dakota, during the First Half of the 20th Century

By Evelyn Heymann Schlenker, PhD

Early in its history Vermillion boasted physicians in 1860 when Vermillion, Dakota Territory, was located below the bluffs and after the flood of 1881 when the town moved above the bluff. Many physicians practiced medicine, but also were entrepreneurs and served their community, the university, and the state. In this essay two early physicians that meet these criteria are introduced, but the majority of this essay concerns Dr. Eugene Milton Stansbury who practiced medicine and surgery in Vermillion during the first half of the 20th century. Unlike information solely obtained from ancestry data, Schell's book: Clay County, Chapters out of the Past, and other sources for information, I utilized Dr. Stansbury's original clinical records donated to the W.H. Over Museum in Vermillion and material he loaned to me. I also read the autobiography (Dakota Doctor) Dr. Lawrence Brookman (1891-1977), a contemporary of Dr. Stansbury, wrote about his experiences as a physician in Vermillion in the first half of the 20th century.

One of the first physicians to practice medicine in Vermillion, Dakota Territory was the colorful Dr. Samuel Lyon (1835-1874) who came to Vermillion in 1860. Aside from practicing medicine, Lyon had substantial land holdings, established the first drug store in Clay County, which in 1870 also included a grocery store and built the Adelphi Hotel. Unfortunately, in 1872 Lyon was indicted by a grand jury in Dixon County, Nebraska, for "gross malpractice," but died before the case was resolved.

A second entrepreneur physician/surgeon was Frank Noyes Burdick (1839-1917) who arrived in Vermillion, Dakota Territory, in 1873. Burdick became editor of the Dakota Republican newspaper shortly after arriving in Vermillion. When Charles True, the proprietor of the paper died, Burdick ran the paper until 1887. Burdick also served as Vermillion's mayor over a 10 year period and owned substantial amounts of land in Vermillion below and above the bluff. He served in the Territorial Legislature when South Dakota became a state in 1889. Burdick also was one of the first members of the Board of Regents when the University of Dakota (now the University of South Dakota [USD]) was opened in 1882. Burdick left Vermillion in 1899.

Dr. Eugene Milton Stansbury (1881-1956), a physician and surgeon and his wife Josephine (1878-1969), a trained nurse, settled in Vermillion in 1914. Stansbury had received his medical training at the University of Nebraska in 1909 and practiced in Nebraska prior to arriving in Vermillion. Unlike earlier physicians in Vermillion who had practices in their homes or in offices, Stansbury opened a hospital at 216 East Clark Street which operated from 1915 until 1917 when Stansbury was called to serve as a physician in the Army in France. Letters he wrote from France indicated the severity of the influenza pandemic in Europe and effects of the disease on troops. Like Burdick, Stansbury was very articulate which was evidenced by his letters and articles that he published. Stansbury opened another hospital in 1922 located at 25 Prospect Street. He totally redesigned the building to conform to his standards according to very detailed contracts that he signed with Meyer Wick as denoted in the book Stansbury's Houses.

Stansbury's medical practice records indicate that he delivered several hundred babies in his long career. Information from his files include the parents' ages, occupations, country and city of birth, when the mother was first seen, expected date of birth, actual birth date, and weight, gender, and presentation of the baby. Additionally, comments about the use of drugs, difficulty of the birth, and complications were noted (Figure 1). In the earliest records from 1912-1913 live birth weights averaged 8.5 lbs and ranged from 5-11 pounds. Little or no prenatal care was indicated. Records from 1916-1921 of live births indicated an average weight of 8.75 lbs with a range of 6.5-12 lbs. The last set of data from 1931-1952
Extenuating Circumstances

Besides his extensive medical practice, Dr. Stansbury extensively invested in land, stocks, bonds, and real estate. He owned 15 houses; three became his home at different times and the rest were rented out as detailed in Stansbury’s Houses. When the Great Depression occurred, his income from stocks, bonds and medical practice was severely compromised, but he still earned income from rentals. Stansbury kept detailed records about the expenses and incomes associated with the rentals.

Another important contribution that Stansbury made was to instruct nurses prior to the development of a School of Nursing at the University in 1954. According to the USD Bulletin, Stansbury was an instructor in the USD School of Medicine for 15 years (1939-1954) teaching obstetrics and gynecology to second year medical students. Dr. Stansbury rose from the rank of clinical instructor to clinical professor. Aside from needing to keep up-to-date for teaching, he and his wife traveled to Europe to observe changes in medical practices there. At 70 years old Stansbury passed the licensure exam to practice medicine in California where his two brothers lived. Stansbury was also an active member of the South Dakota Medical Association, the American Medical Association, and served as Alderman for the City of Vermillion from 1940-1948.

There is much more to tell about Dr. Stansbury; suffice it to say that he exemplified the important roles a physician plays within the community, USD School of Medicine, and the medical profession.

indicated average weights of live births of 7.85 lbs with a range 5.25-11.4. Most deliveries were conducted in the home, but with the construction of the Dakota Hospital in 1935 (to which Stansbury contributed monetarily and otherwise), more births occurred there.

Dr. Stansbury maintained detailed records of his house calls (either within Vermillion or out of town), office visits, hospital surgeries, and costs of procedures. He also detailed facts about accident victims he treated including the cause of the accident, the medical interventions, and if the individual had insurance or workers’ compensation or not. Dr. Stansbury was a steadfast proponent of vaccination and the use of diathermy (deep tissue heating) for treatment of pain, infections, and tissue damage.9

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

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All social reform is propelled by a leader, one who inspires the question of where legitimate authority lies, and speaks truth to the powers – who have allowed other interests to precede those of whom they are to serve. History is replete with examples such as: William Wilberforce and English slavery – Susan B. Anthony and Women’s Suffrage – Aleksandr Solzhenitsyn and the totalitarian state – Nelson Mandela and

Abstract

All social reform, as evidenced by Martin Luther, requires disrupters who are willing to speak truth to power. Donald Berwick, as the most Lutheresque figure in the healthcare reform debate, has been doing just that, having defined the singular truth of patient-centeredness and its implications for both the regulated and unregulated parts of medicine. He has consequently been asking wicked questions concerning unproven assumptions, such as competition driven by the integer, over cooperation driven by the immortal. Above all he is reminding physicians of our dual role – clinical healer and social advocate – and that silence in the latter, is no longer an option. Physician-reformers must follow Berwick through this opened door and apply the principles of reformation, on behalf of the patient.

“Professional silence in the face of social injustice is wrong. It is chilling to see the great institutions of health care, hospitals, physician groups, scientific bodies assume that the seat of bystander is available. That seat is gone. To try to avoid the political fray through silence is impossible, because silence is now political.”
– Donald Berwick, December 5, 2017

“Competition is not the answer. It is the problem.”
– Donald Berwick, December 13, 2017

“It’s my job to call a folly, a folly”
– Charles Krauthammer, June 22, 2018

Keith Hansen, MD
Editor
South Dakota Medicine
Apartheid – Mahatma Gandhi and the Indian Independence Movement – Mother Teresa and the dignity of the poor and suffering – Martin Luther King Jr and American Civil Rights. All of these however, owe the principles of reformation to Martin Luther, who half a millennium ago, posted 95 truth-claims (theses), with the purpose to re-form. American medicine is now in the midst of a similar struggle over precisely the same question – where does legitimate authority lie vis-a-vis the patient? There is one among us, who has galvanized the legitimate authority of patient-centeredness – and is speaking truth to the powers.

Dr. Donald Berwick is the most Lutheresque figure in the healthcare reform debate. A pediatrician by training, founding president of the paradigmatic Institute for Healthcare Improvement (IHI), and former administrator of the Centers for Medicare and Medicaid (CMS), Berwick has been at ground zero, with famous statements like, “Every system is perfectly designed to get the results it gets.” He has boldly called out an industry, which may be fading as a patient-centered enterprise. In this regard he has helped clarify what patient-centeredness means with, “Three useful maxims…: (1) ‘The needs of the patient come first.’ (2) ‘Nothing about me without me.’ (3) ‘Every patient is the only patient.’”

Calling himself an “extremist,” Berwick has leveled repeated broadsides against the reigning principalities saying that, “I think it wrong for the profession of medicine — or any other health care profession, for that matter — to ‘reserve to itself the authority to judge the quality of its work.’…” For better or worse, I have come to believe that we — patients, families, clinicians, and the health care system as a whole—would all be far better off if we professionals recalibrated our work such that we beheld with patients and families not as hosts in the care system, but as guests in their lives. I suggest that we should without equivocation make patient-centeredness a primary quality dimension all its own….” The debate over legitimate authority is on, over whether the status quo will continue to resemble Samuel Shem’s House of God or be flipped into Donald Berwick’s Patient-Centered Home.

Berwick and colleagues, such as Dr. Lucian Leape, have been posting many theses on the door of Medicine’s “house” for three decades. The first nail was driven by Leape with the Harvard Medical Practice Studies in 1991. As a pediatric surgeon by training and now health policy innovator, Dr. Leape is considered by many to be the pioneer of patient safety. These formed the basis for two powerful Institute of Medicine (IOM) declarations in 1999 and 2001; To Err Is Human and Crossing the Quality Chasm.14 The door has been subsequently crowded to the point of collapse, with many more inconvenient truths. Some read like front-page headlines, such as “Medical error - The third leading cause of death in the U.S.”; “Widespread preventable injury to hospitalized patients persists more than 15 years after the IOM report ‘To Err is Human.’”; “Global ‘Trigger Tool’ Shows That Adverse Events In Hospitals May Be Ten Times Greater Than Previously Measured.” – and – “U.S. Last Among Wealthy Nations in Preventable Deaths.” Therefore, the pounding grows louder and Berwick is now breaking down the door – challenging us with a “moral choice” and calling silence “political.”

But he hasn’t stopped with the door, for Berwick in a recent IHI National Forum keynote address has entered the unregulated part of the house, confronting things like medicine’s long-term habit of competition over cooperation. Berwick’s cooperation stories highlighted his own brother’s near death from Legionnaires’ disease driven sepsis, ending a rural HIV outbreak, achieving zero suicides within a high-risk group of chronically ill patients and decreasing end stage renal disease among Native Americans. With all of these accounts, Berwick said that it is possible for us to work together on a massive scale to reform a broken system. He pressed the point, that status quo competition as a presumed driver of excellence, won’t spur improvements. “Competition is not the answer…it is the problem.”

Why would status quo competition not just be a problem, but rather the problem? Berwick’s critics might react by saying that given his prior praise of the British medical system, he might be promoting a certain form of cooperation like socialized medicine with its single payer philosophy or because of his rattling-the-cage type statements like, “20 percent to 30 percent of health spending is ‘waste’ that yields no benefit to patients…”11,14 These types of perspectives triggered stiff political resistance, leading to Berwick’s self-withdrawal for nomination for the permanent position of CMS administrator in December, 2011 – this following his recess appointment by President Obama in July, 2010. But even a cursory knowledge of Berwick’s impact in U.S. healthcare, via the extraordinary work of IHI, would conclude that competition as “the” problem is not so much about promoting one global ideology over
another, as it is about eschewing a certain form of competition within U.S. healthcare – one which is less like Michigan vs. Notre Dame – and more like Hatfields vs. McCoys.

Dr. Berwick indeed is pointing to an unacknowledged phenomena in our industry, which is the gradual eclipse of one summum bonum by another – the immortal with the integer. This fading of medicine’s historic telos, with the simultaneous appearance of a lesser light explains much of what we both see and are blind to. For instance, why the open marketplace, where quality of services are exchanged for the benefit of the customer and where competition means striving among your peers to be the best in those services, now becoming more like a behind-the-scenes battlefield, where peers are threats and fire is exchanged between systems, for the advantage of the combatants – or – why the conquering of territories now supersedes the conquering of complexities within each territory – or – why the ideal of “non-profit” vs. the problematic “for-profit” is now a distinction without a difference – or – why precious resources water spurious ideas while sound premises wilt for lack of irrigation – or – why massive scale cooperation occurs only in rare public health crises, such as lethal pandemic influenza, rather than in ordinary (just as lethal) patient care conundrums, such as medication reconciliation. “Marketplaces”, “territories”, “profit”, “ideas” and the “ordinary” are seen in completely different light depending on which highest good they reflect and thus deteriorates the integrity of our guild, but over time accepting the slow onset of those same conditions. The story here is no fable and the frog has a decision to make. The critique of misguided forms of status quo competition is not new for Berwick, stating in a 2009 interview that, “We believe in markets, right? Isn’t that the American way? Well markets mean competition. Isn’t that the American way? Competition makes things come out right. Well, what does that mean in health care? More hospitals so they compete with each other. More doctors compete with each other. More pharmaceutical companies. We set up war. Wait a minute, let’s talk about the patient. The patient doesn’t need a war.” Notwithstanding the faulty status quo competition-as-improvement premise, treating other-system colleagues even unwittingly as an enemy, turns respect into disdain. Worse, it subverts patient-centeredness by placing patients in harm’s way, turning our great tradition on its head. Perish the thought, per Berwick, that we might be fighting the wrong war. As a lead advocate, he is not standing for it and so is asking “wicked questions” in the court of the Colossus. Wicked questions are those that, “... do not have an obvious answer. They are used to expose the assumptions, which shape our actions and choices. They are questions that articulate the embedded and often contradictory assumptions we hold about an issue, context or organization.”

An advocate is, “one whose profession is to plead cases in a court of justice,” on another’s behalf. This idea of intercession is the kinetic energy of physician as caregiver but only the potential energy of physician as reformer. We methodically ask the hardest questions to expose an individual sickness engulfing our patients, but rarely ask the hardest questions to expose “an American sickness” engulfing our systems. As it is the physician’s obligation to name a sickness, great or small – so it is an abdication of our role to do anything less. Berwick’s pioneering advocacy teaches that we can no longer pass the buck and exacerbate the silence. Advocacy therefore begins with the physician's own identity and the willingness to say to ourselves, “It’s my job to call a folly, a folly. At a clinical level, fearless questioning is both the expectation and the standard. Physician-reformers now must extend this practice to the court of public accountability with palpable interrogatories such as: 1) Given the realities of burgeoning complexity, limited resources and underserved populations, why do systems not work together to solve intractable healthcare challenges for the greater good? 2) Further, given that quality improvement and best evidence are vanguards of patient care, what is the evidence that status quo competition improves healthcare? If there is no such proof and worse if it is actually the problem per Berwick – then how can we merely glance at the extraordinary clinical costs of not working together, while steadfastly gaze at the

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extraordinary branding paradigms, which keep us apart?
3) Even further, given an exploding knowledge base
involving tens-of-thousands of diseases, syndromes and
types of injuries, why is access to all possible expertise
limited through healthcare-plan-driven restraints? 4) And
even further yet, given that the best interest of the patient
is the animating principle throughout healthcare, why is
best evidence relentlessly pursued, openly debated and
made accountable within the clinical side of the house but
not within the non-clinical side of the house? These and
many other opaque and unregulated habits must be
questioned out into the open and answered, for the best
interest of the patient. Or as Supreme Court Justice Louis
Brandeis once opined, “Sunlight is said to be the best of
disinfectants.”

Since culture has been traditionally defined as “the way
we do things around here,” then while broader questions
beg to be asked, even more immediate incongruities are up
for query. For instance, we stand and salute the regulated
letter of the law regarding training, licensure, credential-
ing, accreditation, peer-review, CME, compliance, priva-
cy, conflict of interest and fraud – and well we must, as all
are in the patient’s best interest. Yet, we comparatively
slouch at ease, with the unregulated spirit of the law
regarding volume over value, rescue care over preventa-
tive care, specialty care over primary care, procedural care
over incremental care, opaqueness over transparency,
Hierarchies over servanthood, company over clinic, brand
over name and technology over touch. As a cultural law of
gravity, patient-centeredness deconstructs these ways of
Medicine down to size, with its wicked questions – all the
way to the foundation of legitimate authority. This,
because at the heart of professionalism lies the obligation to
self-regulate to first things. To that purpose, Berwick
reminds us that “the seat of the bystander…is gone.”

The tradition of reformation provides precedence for such
action. For instance, there are at least five transferrable
concepts from Luther himself, which might inform our
first obligation in the present? To begin, Luther was a
“doctor of the church” having achieved the highest
standard by which knowledge was measured and applied.
He therefore had de-facto authority to challenge the
powers. Second, the posting of the 95 theses was not an
attempt to bring down the status quo but rather to call it
back to the roots of legitimate authority. Third, the 95
theses exposed the proximate issue of perverse financial
incentives gone awry (the integer) and laid bare an entire
departure from original mission (the immortal). Fourth,
Luther was an obscure monk from a distant province in a
gigantic empire, demonstrating that small, purposeful
beginnings can achieve enormous, improbable ends. Fifth,
Luther was relentless, refusing to be intimidated by the
powers – and given the stakes for the immortal, many
others followed.

While Berwick and other reformers have opened the
improvement door for crucial conversations about the
state of healthcare, it is time for many more physician-
reformers to step through these doors, and directly engage
the status quo, on behalf of the patient. Medicine needs a
tipping point where a flood of physicians turn potential
energy into kinetic energy – asking any question which
might impact the patient’s best interest in any way.
Berwick puts it this way, “The work of a physician as
healer cannot stop at the door of an office, the threshold
of an operating room, or the front gate of a hospital. The
rescue of a society and the restoration of a political ethos that
remembers to heal have become the physician’s jobs, too.”

(italics mine). Berwick would have us see that our
advocacy efforts apply to both the patient and the system
into which the patient enters. At the end of his address,
Berwick described the type of ethos necessary to achieve
this kind of social reformation, an old and radical idea, far
beyond even respectful forms of competition – one where
Big Blue actually helps the Fighting Irish win and vice
versa. Why? Because both must be on the same team in the
far greater contest taking place on the field – the patient’s
struggle to be whole. “All together or not at all” Berwick
proclaimed. He might have well as dropped the mic.

Dr. Marty Makary, a surgeon at Johns Hopkins, is one who
has picked up the advocacy mic of Berwick. In his book
Unaccountable, Makary declares the following, “At the
center of this debate is a fast growing movement of doctors
pushing to make medicine less corporate and more personal.
They refuse to keep secrets and they insist on being
transparent about every option, risk, and mistake. The
movement has no leader and no formal membership. But
ours is a cause many healthcare professionals are as
passionate about as the practice of medicine itself.”

Indeed, it is time for an emergence of physician-reformers
to make this the practice of medicine, assume the full
obligation of the Healer, and together proclaim “Here we
stand, we can do no other.”

Next Month in Part 3 – Legitimate Authority and True Reform
2) Ibid
3) Ibid
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About the Author:
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Opioid Webinar Series

Prescription drug abuse and diversion has been declared a national epidemic – it affects everyone, and the statistics are staggering. While South Dakota's prescription drug abuse rates are lower than the national average, the consequences of abuse and diversion impact our families and friends, the communities we live in, and our workplaces. The SDSMA is committed to providing resources and education to help fight this epidemic in our state and is offering the following webinars in 2018:

June 19 - Opioids: Diversion, Addiction & Treatment - 6:30 pm CT
The prevalence of abuse, evaluating for opioid dependence and abuse, patient monitoring, pain assessment tools, PDMP, opioid alternatives, and proper documentation - Robert E. Van Demark, MD

June 26 - Understanding Diversion and How to Combat It - 4:30 pm CT
What does diversion look like, the creative ways people divert, diversion in the medical community, combating diversion - Pat Kneep, South Dakota DCI

July 10 - Understanding Addiction and Its Impact on the Brain - 4:30 pm CT
Addiction and how opioids impact the brain, factors that contribute to addiction, the challenges of overcoming addiction - Matthew Stanley, DO

July 17 - Drug Addiction and Pregnancy - 4:30 pm CT
Signs and symptoms of drug use/addiction, the effects of drug use during pregnancy, treatment options for pregnant women, how to prepare the mother and newborn

July 24 - Safe and Effective Tapering of Opioids - 4 pm CT
Available resources, creating a plan for tapering patients off opioids, alternatives to opioids, patient monitoring - Christopher Dietrich, MD

TBD - Beyond MAT
Understanding and identifying the ideal candidates for MAT, cautions and concerns associated with MAT, what comes next for the patient - Craig Utne, MD

Register at www.sdsma.org or 605.336.1965
Medication adherence, also referred to as compliance, or sometimes concordance, has been discussed in health care for as long as medications have been in use.¹,² Even Hippocrates warned his fellow physicians they should keep in mind that patients often lie about taking certain medications.³ In some cases, more than half of patients taking medications for chronic conditions are considered to be non-adherent during the medication use process because they are not taking their medications as prescribed.¹ As the U.S. population ages and the number of individuals with multiple chronic conditions increases, non-adherence to medication regimens becomes more significant and expensive. Medication non-adherence in the U.S. leads to over 125,000 deaths and costs over $100 billion to the healthcare system in increased hospitalizations and adverse outcomes per year.¹,³ The percentage of hospital admissions related to non-adherence is 33-69 percent. Furthermore, a study which evaluated the mortality risk based on adherence concluded that patients with good adherence had a 4.7 percent risk of death compared to 8.5 percent in patients who were non-adherent.¹ This adherence gap represents an important therapeutic opportunity. In order to capitalize on this opportunity, it is important to know what non-adherence is, what its most common types and causes are, and what methods have been developed to prevent its occurrence.

The World Health Organization released a report in 2003 which described adherence as the degree to which a person’s behavior, whether that is taking medications or making lifestyle modifications, follows through with the recommendations agreed upon by a health care provider.² The report went on to emphasize that the responsibility of adherence does not belong to the patient alone, but also to the healthcare system. Ultimately, the goal is to create communicative relationships where the patient feels comfortable engaging as an active partner in their health care, and that providers welcome the patient’s engagement as a way to promote adherence. In clinical drug trials, prescription non-adherence is usually defined as taking less than 80 percent of prescribed doses, although in practice it may also include taking too many doses or even using the medication incorrectly.¹

Non-adherence can be intentional and unintentional, and various reasons for non-adherence exist. Reasons for non-adherence can be directly related to the patient, the patients’ medical conditions, the patients’ socioeconomic situations, the therapies they are receiving, or the healthcare system.³ Patient-related causes include physical impairments (vision or dexterity), cognitive problems, and age-related factors.⁴ Medical condition-related factors include disease progression, complications, expectations of improvement, and perceptions of symptoms.² Socioeconomic factors that are associated with non-adherence include affordability of prescriptions, low reading and health literacy, and lack of social support.⁴ Therapy-related influences impacting adherence can be adverse effects, pill burden, or changes in regimen. The healthcare system can also lead to issues with adherence due to lack of care transitions, decreased access to healthcare, and poor communication between patients and providers. The initial and most critical step in correcting adherence issues is identifying the underlying non-adherence factors for each patient. Several causes of non-adherence are likely to exist for each patient, and these causes will almost certainly change throughout the duration of the patient’s therapy. For this reason, the interventions used to address non-adherence need to be frequently evaluated and adjusted.

Whatever the causes are for non-adherence, an individualized intervention plan should be developed. Medication adherence is critical to ensuring successful patient outcomes. A 2016 study reviewed over 17,000 Medicare patients who were treated for chronic cardiovascular conditions.⁷ Subjects who had previously suffered a myocardial infarction were 7.4 percent less likely to suffer
from another major adverse cardiovascular event if they were fully compliant (≥ 80 percent) compared to those who were non-adherent (≤ 40 percent) (p < 0.001). The incidence of hospitalizations and emergency room visits of adherent patients was also significantly lower compared to those who were non-adherent.

In order to ensure successful patient outcomes through increased medication adherence it is necessary to have problem solving and communication between the patient, prescriber, and pharmacist. This communication can improve the patient’s understanding about medications and remove any barriers regarding access to medications. A variety of interventions should be considered with continued monitoring, feedback, and changes in the approaches, as needed. It is important to note that unimodal interventions, such as reducing the number of total daily doses or using more convenient packaging, were less successful in improving medication adherence than multimodal interventions, including counseling and education, patient self-monitoring, and telephone reminders. A patient-centered plan which addresses the individual patient’s causes of non-adherence should be implemented with the healthcare professionals working together in a team-based approach.

Implementation of medication synchronization programs have proven to be a successful approach at improving adherence and health outcomes. These programs refill a patient’s medications on the same day every 30 to 90 days. Some medication synchronization programs incorporate face-to-face appointments with a pharmacist. These models have also shown to be successful at improving adherence rates, with those who used the synchronization program having an adherence rate 3.4 to 6.1 times greater than those who received no intervention. In the treatment group, for every 100 patients, an additional 29 to 38 individuals were adherent. Furthermore, non-persistence (patient stopped taking a medication for ≥ 30 days) was reduced by 24 to 39 patients for every 100 patients in the treatment group. A meta-analysis consisting of 176 eligible comparisons and 23,318 subjects reviewed outcomes of medication adherence interventions. The analysis demonstrated that a variety of interventions including education, problem-solving, social and behavioral support, feedback, medication administration reminders, and communication all improved outcomes. Patients’ medication knowledge, quality of life, and physical function all had significant improvements with these interventions (p < 0.001). Medication adherence interventions also led to statistically significant improvements in patient-specific symptoms, including depression, pain, energy, cardiovascular, and respiratory assessments (p < 0.001).

The identification and mitigation of the many factors contributing to medication non-adherence via individualized interventions has proven to not only increase adherence rates, but also decreases adverse events, hospitalizations, and mortality. Strategies to address medication non-adherence should attempt to address all of the patient’s barriers, paying attention to the ways each unique factor impacts adherence. Furthermore, interventions should include the entire healthcare team, patients, and their family members, to ensure that all members can play an active role in improving both adherence and health-related outcomes. Based on study results, blended models with appointment-based interventions and medication synchronization programs have proven to be effective methods to improve medication adherence and health outcomes. Increasing adherence through these types of interventions helps patients gain the full therapeutic benefits of therapy.

**REFERENCES**


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This ancient wisdom often rings so very true: “You only teach by example.”

We all have mentors in our lives, people who serve as examples, whose patterns of living teach us how to face challenges. Of course, most of us start out with our parents as mentors, and then look to other relatives, teachers, partners, and heroes in stories worth emulating.

Even before my medical training, I watched and learned from our family physician, Dr. Bob Bell. I remember how his interests outside of medicine were very broad, including hunting and fishing, water skiing, sailing, playing cards, singing in the choir, enjoying art, etc. Dr. Bell and his wife, Phyllis, gave me a sense of how a superb physician family can enjoy and savor every moment of life.

I watched Dr. Karl Wegner, a pathologist, lecturer, and the first dean of our South Dakota Medical School, as he taught through empathy. I remember how he made every one of his students feel like he was speaking directly to him or her. Dr. Wegner gave me a sense of how a superb physician values the other guy.

I watched Dr. Joe Hardison, an internist at the VA hospital in Decatur, Georgia, whose diagnostic acumen and skills were famous among residents. I remember how he cleverly examined his patients, looking for subtle clues that would allow him to make a correct diagnosis. Dr. Hardison gave me a sense of how a superb physician uses her or his senses and brain to make a diagnosis.

I watched Dr. Keller, a cancer specialist at Emory Hospital in Atlanta, whose caring way remarkably helped cancer patients deal and cope with incredibly ominous conditions.

I remember how he confidently listened and spoke with consoling words and eyes to those with widely spread cancer. Dr. Keller gave me a sense of how a superb, compassionate, physician gives relief and exemplifies medical ethics in action.

And I watched Dr. Bob Talley, a cardiologist and former dean of USD Sanford School of Medicine, whose concern for students and residents elevated our medical school to some of the highest standards of training in the country. A specific example is how he helped mold a new method of integrated training in South Dakota, which Harvard has since copied, and which is also catching on throughout the country (our present dean, Dr. Mary Nettleman is following through and expanding on this wonderful direction). Dr. Tally gave me a sense of how a superb physician, one who concentrates with all of his soul on helping young physicians learn, can result in an elevated quality of care administered by his students to patients around the world.

We only learn from and teach by example.
South Dakota Board of Medical and Osteopathic Examiners

2018 Legislation Update

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

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

1. Requires physicians to notify the Board, within 30 days, of any acts, including but not limited to:
   a. Any changes in contact information, unprofessional conduct, malpractice or privilege to practice issues, hospital disciplinary actions, alcohol or substance abuse issues, and law enforcement issues.
2. Medical licenses change from an annual renewal to a two (2) year renewal in the odd numbered years. This law will be in effect after July 1, 2018. The initial, reinstatement, and biennial renewal license fees for physicians were all increased to $400.00 as required.

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

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

House Bill 1079 (HB 1079) was sponsored by the South Dakota Physical Therapy Association to allow physical therapists with advanced training to perform dry needling. Physical therapist assistants are not included in this law and are not permitted to perform dry needling. The bill will go into effect after July 1, 2018; however, dry needling cannot take place until rules regarding dry needling have been established and passed by the SDBMOE. Every effort is being made to have the rules in place by July 1, and the SDBMOE will be informing all physical therapists of the process before the performance of dry needling can begin.
Promoting Patient and Family Engagement Strategies to Improve Health Outcomes

By Stephan Schroeder, MD, CMD, CMQ
Medical Director, South Dakota Foundation for Medical Care

The Centers for Medicare & Medicaid Services (CMS) promotes a Person and Family Engagement (PFE) strategy to improve the communication process among providers and their patients. PFE includes the patient and their family and/or caregivers, which may include relatives, friends, neighbors, social support services and residential facilities. The vision is to expand awareness and create actionable goals for patient involvement. The mission is to play a role in the transformation of the patient’s voice in healthcare delivery. PFE goes beyond mere informed consent to include proactive communication and partnered decision-making.

CMS promotes values that depend on health literacy, accountability for outcomes, and a mutual respect between the patient and the provider. This type of patient/provider relationship benefits from frequent interaction and an inclusion of the individual’s desires and beliefs. Sharing preferences and values allows informed decisions to be made. Patient engagement and disease self-management rely on frequent and frank discussions about priorities, goals, and obstacles to achieving those goals.

Social determinates of health and psychological risk factors are key elements that need patient and family engagement to help overcome difficult barriers and gaps. There is a general acceptance that health literacy and geographic location are strong predictors of health outcomes. Improving health literacy is a cornerstone of delivering quality healthcare. These social factors and a diminished understanding of often complex conditions make it important for patients to have support in the process. Healthcare professionals, such as Patient Navigators, can assist patients in making appropriate and timely choices.

CMS quality improvement, in addition to PFE, includes promoting effective patient education, improving care coordination, and assisting chronic disease management. It also emphasizes community support for a healthy living environment and ongoing efforts to keep healthcare affordable, including transparency of cost. Numerous other federal agencies have started involvement of patients into their strategic plans including areas of quality measurement, medication safety and timely transitions between levels of care. Patients are invited to provide feedback and input. This strategy will assist in elevating the dialogue and establishing definitions and consistency in how patients and their families are engaged in their healthcare.

Several health systems, hospitals, and larger clinics have begun developing patient and family advisory groups and councils to offer new perspectives to governing bodies. They provide feedback and a fresh voice into the decision and planning process. This can create a culture of engagement and offer a model for the partnership that PFE offers. Numerous resources, including commercial programs, exist for helping both patients and providers to become engaged in this collaborative process.

Patient engagement is not a fad, but an important strategy in the future of healthcare. This effort should be perceived as vital communication. It is not patient advocacy, nor intended to allow patients to receive specific requests or special treatment, but rather to make them a member of the healthcare team. This teamwork and active partnership will allow providers to deliver care not just for patients or to patients but WITH patients.

Great Plains Quality Innovation Network provides technical assistance and resources to support patient and family engagement efforts at healthcare facilities across the state. More information is available at www.greatplainsqin.org or by contacting Stephan Schroeder, MD, CMD, CMQ (Stephan.schroeder@area-a.hcqis.org).

"Quality Focus" is a monthly feature sponsored by The South Dakota Foundation for Medical Care (SDFMC), a partner in the Great Plains Quality Innovation Network. Learn more at www.greatplainsqin.org.

This material was prepared by 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. 11SOF-GPQIN-SD-C3-2970518
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See the effect in South Dakota.

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

Check the effect physicians have on the U.S. economy by viewing the national report from the AMA, as well as highlights from the South Dakota study, at ama-assn.org/go/eis.
Legal Brief Highlight: Protected Health Information

Both state and federal law protect the confidentiality of patient medical records and related information. The federal privacy rules contain exceptions for both required and permitted disclosures without a patient’s consent.

Under South Dakota law, patients may refuse to allow disclosing of confidential communications made for the purpose of diagnosis or treatment of the patient’s physical, mental or emotional condition. Individually identifiable health information held or transmitted by a covered entity or its business associate is protected, meaning information that identifies an individual. Identifying information includes the patient’s name, address, birth date, or Social Security number. Individually identifiable health information is also called “protected health information.”

A practitioner who is a covered entity may not use or disclose protected health information without patient authorization unless it is otherwise required or permitted by law. When using or disclosing protected health information, the law requires the covered entity to “make reasonable efforts to limit protected health information to the minimum necessary to accomplish the intended purpose of the use, disclosure, or request.”

More information about medical records privacy is available in the SDSMA legal brief, Protected Health Information at www.sdsmo.org. Through the SDSMA Center for Physician Resources, the SDSMA has developed more than 50 legal briefs that are available to members. In addition, the Center develops and delivers programs for members in the areas of practice management, leadership and health and wellness.

For Your Benefit:

Fighting for You and Your Patients

The SDSMA serves as your vehicle for advocacy for your patients and the art and science of medicine through lobbying at the state and federal levels, grassroots activity, and legal initiatives.

SDSMA PAC is your grassroots avenue that works to impact public policy decisions through bipartisan political participation. SDSMA PAC supports and elects pro-medicine candidates on the state level. Members of the SDSMA and their spouses can join SDSMA PAC.

The SDSMA’s motto is “Values, Ethics, Advocacy.” We take our advocacy role to heart. With your help, SDSMA and SDSMA PAC have the opportunity to dramatically impact the political and legislative process to create meaningful changes in South Dakota’s current health care system:

- Improving health and access to care in rural areas;
- Increasing Medicaid reimbursement;
- Promoting Medicare physician payment reform and stopping reimbursement cuts;
- Working to improve clinical quality and patient safety;
- Partnering with state agencies to tackle regulatory, socioeconomic, public health and scientific policy issues;
- Advocating for public health immunizations;
- Promoting adequate funding for medical education;
- Stopping inappropriate expansion of non-physician scope of practice;
- Defending the patient-physician relationship; and
- Reforming medical liability.

If you would like to become involved in any of our advocacy programs, call 605.336.1965 or visit www.sdsmo.org.

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

SDBMOE Adopts SDSMA’s Proposed Changes to Dry Needling Rules

Because of a lack of a standardized curriculum for dry needling, defining what constitutes adequate training for dry needling had been a concern to the SDSMA. Very few physical therapy degree programs offer dry needle as part of their curriculum, so it is important to make sure the training requirements adopted by the SDBMOE would ensure quality patient care. As a result of the SDSMA’s work, the following will be incorporated into the rules:

• Dry needling training will include “indications” into the training requirements listed in section 20:66:04:02(1);
• The majority of the training for dry needling must be “in-person” and include “hands-on training, with both a written and a practical examination;” and
• Dry needling programs must be “board-approved.”

CMS Releases Guidance to States on Using Medicaid to Address Opioid Crisis

The Centers for Medicare and Medicaid Services (CMS) has released guidance aimed at helping states leverage Medicaid to combat the opioid epidemic. Specifically, the guidance focuses on information related to covering services for infants born exposed to opioids and how to enhance federal funding for telemedicine and programs that keep tabs on patients’ prescriptions. Learn more at cms.gov.

Source: CMS

Dakota at Home – South Dakota’s Aging and Disability Resource Center

In February, the Department of Human Services’ Division of Long Term Services and Supports (LTSS) began a public awareness campaign for Dakota at Home, South Dakota’s Aging and Disability Resource Center (ADRC). For all new referrals the phone number is 833.663.9673. Trained resource specialists will provide information, referral, and assistance to individuals with disabilities, aging individuals and caregivers. Individuals regardless of age, disability, income or resources receive objective information on public or private services; including the type of service needed, and referral to agencies and organizations that provide the service.

The Dakota at Home website, http://dakotaathome.org/ offers additional information including FAQs, how to make an online referral, and access to various services and resources available across South Dakota.

Providers who wish to be considered for inclusion in the Dakota at Home online Resource Directory may review the policy located at http://dhs.sd.gov/ltss/providers.aspx. For consideration of inclusion, complete a form at https://dhs.sd.gov/requestForInclusion.aspx. Questions about the Resource Directory should be directed to adrc@state.sd.us.

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