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Photo credit: Iron Creek Lake by Roger Merriman
It was a crisp Friday morning in September, the leaves were just starting to turn, and the day was young. I was driving on Interstate 90 on my way to Mitchell for a South Dakota State Medical Association (SDSMA) Council of Physicians meeting. Many things were going through my head that morning. How would I be received? I had never attended a meeting before, and therefore was apprehensive about the events to unfold. Granted, I had heard about the association, albeit in a very superficial manner. After all, I was one of those incredibly busy physicians just trying to negotiate the landscape of patient care. I had all I could do simply dealing with complex patients, the day to day operations of the clinic, the call schedule, and everything else associated with a busy practice. So how did I happen to be driving to an SDSMA Council meeting?

Two weeks into my new job of being named dean of clinical faculty for the University of South Dakota Sanford School of Medicine, Dean Rod Parry, MD, called me into his office and needed a favor. He represented the medical school on the SDSMA Council of Physicians, and could not be present for the upcoming meeting. He kindly asked if I would attend in his absence. How could I say no? I was new to the job, and like everyone starting a new job, was simply eager to please. So there I was, driving to Mitchell, truly not knowing what to expect.

I walked into the meeting room, looked around, and saw a number of individuals sitting in a huge semicircle, their gaze toward the front of the room. I knew, or at least had some acquaintance with, approximately one-half to two-thirds of the people. As I looked around at the name cards in front of them, I was finally able to put a face to names I had heard of previously. What ensued the next three to four hours was something I remember to this day. Here were physicians from every corner of the state – rural, city, primary care, subspecialty, and yes, even a few administrators! Their discussion, however, focused very little on their individual practices and needs, but rather on the needs of their patients and the health of all individuals within the state of South Dakota. There was energy in the room that day, an energy I carried with me driving home and through the ensuing weeks. My initiation to the SDSMA was truly a memorable one, and here I am today speaking to you as the 134th president of the association.

So how did I get to this point in my life? I was raised on a farm in South Dakota near Ravinia. My exposure to medicine began at an early age, when my grandfather was chronically ill and in need of frequent medical care. The two family physicians caring for him were larger than life to me. I witnessed them, caring not only for him, but for our entire family. The manner in which they communicated with him and us was truly special. My interest in medicine was born.

I graduated from the University of South Dakota School of Medicine, completed a transitional internship at McKennan Hospital, and then completed a residency in internal medicine and fellowship in gastroenterology at the Mayo Clinic. I have been employed by two multispecialty clinics, a major health system, and most recently by the federal health system (VA) and the state of South Dakota (school of medicine).

I owe many thanks to Dr. Mary Milroy, our outgoing president, Dr. Dan Heinemann, who will be leaving our Executive Committee, and many of our former presidents who I have come to know and respect. I will seek and rely on their wise counsel during the upcoming year and beyond.

Throughout the years, I have experienced our SDSMA membership speak and act passionately about the greater good – that being the welfare of their individual patients and the health of all South Dakotans. I invite you to take a chance – perhaps step out of your comfort zone – and become active in the association. My sincere hope is that you too can experience the exhilaration I felt after attending that first Council meeting – the exhilaration of realizing you can be a part of something bigger than yourself for the greater good. Our medical association offers a great opportunity for leadership as moral agents, as we can unite physicians in a community dedicated to the welfare of patients. I look forward to meeting and speaking with all of you about what we can do together to achieve this lofty goal.
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State SDSMA Alliance Disbanding; Districts Will Continue

By Cathie Calhoon; Patti Herlihy; and Grace Wellman, Steering Committee Coordinators

Following much discussion and feedback from the membership in general, the SDSMA Alliance has decided to disband the state level of the SDSMA Alliance. The district Alliances and National Alliance will still continue.

This was a tremendously difficult decision; however, as with many other organizations, the commitment of individuals has moved away from structured community organizations. Increasingly limited free time is focused on families and possibly one-time events. The old paradigm of boards, meetings and holding official offices is not in keeping with the new time commitments and philosophy of the potential leadership.

We have had an incredible history of working within our communities, the legislature, and developing supportive relationships among our spouses. We appreciate that our families face an entirely different range of stress factors than the general population. We have dealt with long hours where our spouses were absent, where the needs of the patients took precedence over the need of our families. The new physicians today, thankfully, have looked at those hours and developed new ways of creating balance in their lives. Congratulations! But that also leads to our dilemma.

We need to embrace these changes to modify how we function on the district level in order to be successful. We need to incorporate the new cadre of male spouses and determine what their needs are. We need to change our hours to accommodate working couples. We need to create one-time opportunities where events are more concise to allow for participation from the working spouses.

Where do the SDSMA Alliance districts go from here? The SDSMA Alliance districts are composed of enthusiastic, energetic, hardworking individuals who share common goals as advocates for the future of the family of medicine and medicine in South Dakota. Over the years, the dedication and work for the Alliance began at the local level of the districts. The districts have collected their membership dues, developed and implemented health projects in their communities, raised funds for medical student scholarships, supported legislative issues and developed leaders. With the state Alliance disbanding, this now gives each district the opportunity to focus its resources and energy on growing and to continue with health projects that are important in its community. Your membership in a district can offer friendship, fun, an opportunity to make a difference, and an investment within your community.

The AMA Alliance will also continue. The AMA Alliance will offer valuable tools for the district Alliances of South Dakota to help support health projects, membership, legislation and leadership training. Grace Wellman of Sioux Falls has been appointed by the AMA Alliance as a leadership liaison to work with the South Dakota districts for communication between the Alliance districts and the AMA Alliance. The South Dakota districts will receive monthly AMA Alliance Connection emails to keep them informed. The districts will also be invited to participate in the AMA Alliance webinars.

The districts will have the opportunity for networking, advocacy and education. Resource materials will include leadership conferences, the publication Alliance in Motion that features Alliance events and community health initiatives, and the online newsletter. The South Dakota districts will also have scheduled district leadership calls with the AMA Alliance president and AMA Alliance Committee chairs. The district Alliances will also continue to attend the national annual meeting and the North Central Region meeting.

Disbandment of the SDSMA Alliance does not mean the end for the district Alliances of South Dakota. It is a new beginning and the next stage for the Alliance districts of South Dakota to continue to promote and support the family of medicine within their communities!

We are up to the new challenges. We hope you will help us to refocus the SDSMA Alliance so we can continue our legacy as we strive for many years of success in the future. Our commitment and our friendships will remain strong and guide us as medical spouses in the years ahead, promoting the health and well-being of all South Dakotans. Thank you to all your participation over the past 105 years!
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Polycystic Ovary Syndrome: A Syndrome By Any Other Name

By Keith A. Hansen, MD

The word syndrome is an accepted and often used part of our medical vernacular. A syndrome is a constellation of signs and symptoms that often occur with each other. A disease is due to a specific disruption in structure or function that results in specific signs and symptoms, in which the causative agent may or may not be known. As Dr. Paul McDonough noted, “The less we know about something, the greater the need to constantly redefine it.” Over the years, polycystic ovary syndrome (PCOS) has undergone a number of periods of redefinition which hopefully will improve communication and research into this common condition. In this issue of South Dakota Medicine, the Primers in Medicine article is an up-to-date review of the diagnosis and treatment of PCOS.

PCOS is the most common endocrine abnormality in reproductive aged women affecting approximately 8 percent. PCOS results in a number of endocrine, reproductive and metabolic signs and symptoms. In 1935, Stein and Leventhal described a syndrome of obesity, hirsutism, irregular cycles and infertility. Their studies of women with PCOS included taking a biopsy or wedge resection of the ovaries for pathologic evaluation. Interestingly, a number of the women following wedge resection resumed menstruation and a number of these became pregnant. They reported data on wedge resections in 96 patients. Out of this 96, 71 wanted to conceive and 63 were successful. Ninety-three of the subjects resumed menstruation, presumably due to resumption of ovulatory cycles, while three had continued amenorrhea. One of these three patients had been treated with radiation therapy to the ovaries to try to induce ovulation. Issues related to wedge resection included that it required a major surgical procedure and had the potential of adhesion formation, which could reduce the chances of pregnancy in these subjects.

In the 1960s, clomiphene citrate, a selective estrogen receptor modulator (SERM) and a racemic mixture of enclomiphene and zuclomiphene became available for ovulation induction in patients with anovulation or oligo-ovulation, especially those with PCOS. Clomiphene citrate was successful in ovulation induction in these patients and replaced the ovarian wedge resection as primary treatment for ovulation induction. Potential complications include multiple gestation pregnancies, ovarian cysts, and a possible association with increased risk of ovarian cancer if used over one year (recent studies do not support the increased risk of ovarian cancer). Unusual, but potentially severe complications with Clomiphene include deep venous thrombosis, optic neuritis, retinal thrombosis and pancreatitis (in those with hypertriglyceridemia).

Recently, studies have investigated the use of the aromatase inhibitor, letrozole for ovulation induction. In a prospective, double-blind randomized trial of clomiphene citrate versus letrozole, letrozole had a higher ovulation rate and live birth rate (rate ratio of 1.44, 95 percent CI of 1.10,1.87). In this same study, there was no difference in the rate of congenital anomalies or miscarriage. The most common side effects with clomiphene were vasomotor symptoms, while fatigue and dizziness were more common with letrozole. This study, along with other recent studies, suggest that letrozole may replace clomiphene as first line therapy for women with PCOS who desire pregnancy.

Recent advances in minimally invasive surgery have seen a resurrection of surgical techniques for ovulation induction. In women with PCOS, a minimally invasive technique known as “ovarian drilling” or ovarian diathermy is available and effectively replaced the wedge resection as a surgical option. During this minimally invasive laparoscopic procedure, a needle electrode is used to penetrate the ovarian cortex using a cutting current, then once the electrode is positioned in the medulla a coagulating current is turned on for two seconds to fulgurate ovarian stromal/thecal cells. Each ovary is subjected to between 10 and 15 needle insertions with monopolar electrocautery and then wrapped in an absorbable adhesion barrier. In those patients who undergo ovarian drilling, there is a lowering of serum LH levels and androgen concentrations. Studies have demonstrated similar ovulation rates compared to gonadotropins after ovarian diathermy, with reduced risks of adhesion formation.1

Medical therapy for ovulation induction remains the first line therapy for women with PCOS who desire fertility. Interestingly minimally invasive surgery remains an option especially for women who do not respond to medical therapies.

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“Heart Bone” – The Case for the IHI Open School as Connector: A Model for Integrating Quality Improvement and Patient Safety into Health Professions Curricula

By Ryan J. Miller, MD; and Wendell W. Hoffman, MD, FACP

“The head bone is connected to the heart bone, and don’t let them come apart.”
Alan Alda, aka: Hawkeye Pierce, 1979 Commencement Address, College of Physicians & Surgeons, Columbia University

Abstract
Background: The physician is guardian of the patient and obligated to both the “Science of Medicine” (SOM), defined by the randomized controlled trial, and the “Art of Medicine” (AOM), defined by patient safety (PS) and quality improvement (QI). Historically SOM knowledge has dominated AOM knowledge; however given the frequency of medical harm, a new paradigm is necessary. The Institute for Healthcare Improvement Open School (IHIOS) is accelerating AOM into medical curricula by connecting all stakeholders to the emerging PS and QI sciences, and doing so in an interprofessional manner.

Methods: A South Dakota IHIOS chapter was established in 2011, connecting SOM to AOM knowledge for 600 students from eight schools and thirteen disciplines. Four specific foci included 1) interprofessional pilot project introducing PS and QI into first year curricula, 2) sessions for third-year medical students to assess Open School courses through faculty-facilitated small groups, 3) development of longitudinal quality and safety curricula, 4) integration of OS courses across South Dakota health professions schools.

Results: The interprofessional pilot project demonstrated significant learning in 16 of 16 and 13 of 16 (p=0.05) teaching points. The third-year sessions showed that PS and QI topics are viewed as important especially with faculty-facilitated case studies. Subsequently a longitudinal PS and QI curriculum was implemented. This led to the incorporation of IHIOS courses as core curricula in four South Dakota colleges and eight health disciplines.

Conclusions: Our work was one of the first large-scale efforts to measure learning via the IHIOS through the novel use of the chapter as connector. The model contributes to national efforts for paradigm change through interprofessional education.

Background
It has been 36 years since Alan Alda’s famous challenge to a new generation of physicians. Alda’s short but weighty address demonstrated the power of metaphor and the embarrassingly accurate description of what health care should be. This provocation was for the physician to be the guardian of something almost primordial to our tradition and Hippocratic in tone.

Why might we feel compelled to follow a TV series doctor? Perhaps, while they were Alda’s words, it was Hawkeye’s voice which we hear. Pierce, the highly gifted but irreverent Korean War MASH surgeon, acted as a fierce patient advocate. Hawkeye was the provocateur – and not unlike Dr. William J. Mayo who said to another graduating class of medical students in 1910, “The best interest of the patient is the only interest to be considered, and in order that the sick may have the benefit of advancing knowledge, a union of forces is necessary.” With this most famous broadside, a part of a 3,388 word commencement address, the real Dr. Mayo defined the “heart bone” for all time but it took the fictional Dr. Pierce only 15 words to make it stick.2 The head bone is best characterized as the “Science of Medicine,” where-
as the heart bone is the “Art of Medicine.” Both represent knowledge – acquired and applied to the patient.

The Science of Medicine (SOM) is driven by the demands of progress, restless with unquenchable thirst for new knowledge. Thus it has reigned supreme in terms of knowledge worth, defined by the scientific method and its crowning achievement, the randomized controlled trial (RCT). Reflecting a left brain dominant paradigm, its goal has been to discover truth about specific medical conditions and propose “evidence based medicine” for the individual patient. This breathtaking era has accumulated 13,000 medical conditions, 6,000 drugs and 4,000 procedures. Ominously though and per Gawande, “It is a lot to get right”.

The Art of Medicine (AOM) is driven by the demands of tradition, wrestling with the claims of ancient knowledge. This knowing is an ethical system foundational to all ethical systems and has also been called the Tao of Medicine. AOM evidence is therefore less precise compared to the revered RCT standard of proof. While enormously powerful, AOM addresses the physician more as social scientist; but like the right brain itself, has been historically diminished as a supposedly non-dominant and therefore inferior repository of knowledge. The proof of this is typified by the statement of Pronovost et. al., “For every dollar the U.S. spends finding new genes and new drugs, it spends two pennies ensuring that patients actually receive those therapies. The delivery of health care is viewed too often solely as an art rather than also a science.”

Classically identified with empathy, kindness and bedside manner, the AOM, however, has gained increasing attention in the last several decades, having come to mean the context into which the patient enters, with its goal to see the whole and flawlessly deliver on the SOM promise. Not limited to the traditional caring traits mentioned above, the AOM is now defined by human factors, teamwork/communication, reliable design, just culture, transparency, mindfulness, professionalism and ethics. In other words, the heart bone represents the system of humans caring for the human.

The patient safety movement has brought the heart bone into our consciousness, searing it with the now famous 1999 Institute of Medicine (IOM) report, “To Err is Human,” which estimated that 98,000 die in the U.S. each year from preventable harm. Since then, the realization of medical harm has only intensified, with multiple studies unveiling the iceberg of harm just below the surface. An example in 2009 found that fully one-third of hospital patients experience adverse events and that we are only aware of 10 percent of harm overall.

Another analysis estimates that, “the true number of premature deaths associated with preventable harm to patients was estimated at more than 400,000 per year.” This would make medical errors the third leading cause of death in the U.S. behind heart disease and cancer. We might imagine Hippocrates saying, “This is not what I meant when I said…to help or at least to do no harm.”

Because of this partial collapse of the inviolable “do no harm” principle, we have reached a crisis in medical knowledge. A crisis, because now we know that harm to our fellow human beings frequently comes from our hand, yet national improvement has been slow. Responses are growing however with patient safety (PS) and quality improvement (QI) being given more of a central focus in many health systems. In the Association of American Medical College's (AAMC), “Best Practices for Better Care”, Dr. Claire Pomeroy states, “We understand that if we’re going to create the health care workforce of the future, we need to have students learning in a culture of quality.” Many are calling for change, pointing out “Good evidence exists that educating caregivers about safety science and improving safety culture is the foundation of improvement efforts.”

Culture change of this type has been bluntly defined as follows, “today’s medical schools are producing square pegs for our care system’s round holes.”

The IOM’s 2001 follow-up report, Crossing the Quality Chasm, recommended a restructuring of clinical education to be consistent with principles of 21st century health systems. An early measurement of this found that only 25 percent (n=78) of schools had explicit patient safety curricula. Despite this finding, 72 percent (n=74) of respondents agreed that patient safety instruction should occur during medical school. To this end, in 2008 the Interprofessional Education Collaborative was developed to further promote interprofessional education. The collaborative includes the American Association of Colleges of Nursing (AACN), American Association of Colleges of Osteopathic Medicine (AACOM), American Association of Colleges of Pharmacy (AAPC), American Dental Education Association (ADEA), Association of American Medical Colleges (AAMC), and the Association of Schools of Public Health (ASPH). These organizations worked to create core competencies that should guide all health education programs. An initiative from the AAMC, “Best Practices for Better Care” seeks to support these aims and more than 100 medical schools, teaching hospitals and health systems have signed on. In 2009-2010, an initiative called “Retrofitting for Quality and Safety” of the Josiah Macy Jr. Foundation and the Institute
for Healthcare Improvement (IHI), supported new learning activities for medical and nursing students in six universities.\(^{15}\)

The IHI Open School for Health Professions (IHIOS) was established in 2008 to assist in the formation of a 100-year renewal in medical education. Evidence of its impact is clear, for in a mere seven years, 712 schools of health professions and hospitals in 70 countries have established IHIOS chapters, and 230,000 students are registered on IHI.org.\(^{16}\) The student-led IHIOS movement has therefore become a driving force to “…fill the current gap in the professional preparation of improvement leaders while the educational institutions catch up with the need.”\(^{17}\)

Connecting the SOM to the AOM as the new Flexner moment, is all of our responsibility, but the major driver will lie with the new generation of health care providers. Therefore, the IHIOS is reformational precisely because students are no longer passive vessels, but actively share the driver’s seat around the table of health and health education reform.

Local chapters have recognized that IHIOS courses should be embedded in their education. In the last three years, over 120 schools have integrated these courses into formal curricula ranging from elective approaches to requiring the 16 module IHIOS core certificate, along with QI project completion.\(^{18}\) However, few models currently exist on how to best utilize IHIOS and its online courses. We assert that the IHI Open School, rather than an adjunct, should be at the center - connecting all stakeholders to the emerging PS and QI sciences.

**Methods**

An IHIOS chapter was established in South Dakota in early 2011, to bring students, faculty, and systems together at a time when only a handful of chapters had integrated IHI Open School courses into formal curricula. By design, the chapter approached 21st century health care as an interprofessional team recruiting over 600 students from eight schools and 13 health disciplines, in 42 months (Figure 1). A chapter structure was created in order to reach out to a maximum number of stakeholders and place the chapter, as connector for PS and QI activities around the state (Figure 2). Upon development of a core interprofessional leadership team, the chapter began planning activities. The chapter was founded by one of the authors (RJM) as a “Scholarship Pathways Project,” a program through the University of South Dakota Sanford School of Medicine (SSOM) for selected medical students to complete a longitudinal project. Two major goals included 1) Determine the efficacy of and strategically implement IHIOS as the didactic backbone of a longitudinal quality and safety curriculum named the “Quality Thread” within the new SSOM curricula, 2) enhance PS and QI competencies in all South Dakota health professions’ schools through implementation of
IHIO S courses, engage student and faculty participants in the local IHIO S chapter, and pursue interprofessional collaboration.

Four project foci were key to the development and assessment of IHIO S as connector across South Dakota:

1. Interprofessional pilot project: initiated to introduce basic concepts of PS and QI into existing first-year medical and allied health curricula. Students from the University of South Dakota representing medicine, physician assistant, occupational therapy, and physical therapy programs participated in this study during their anatomy course in the fall of 2011.

2. “First Do No Harm” sessions: Eight IHIO S on-line courses were tested during the internal medicine clerkship from September 2012 to June 2013, using a cohort of 52 medical students from SSOM. Students complete one course per week on their own and gathered in small groups with a faculty facilitator to discuss a related case.

3. SSOM quality and safety curriculum: Results from interprofessional pilot project and “First Do No Harm” sessions supported the development of the Quality Thread at SSOM, implemented in August 2013.

4. Interprofessional collaboration and PS/QI Curricula across South Dakota: A “Deans’ Forum” was established in 2012 in order to facilitate implementation of IHIO S courses across all major health professions schools in the state through collaboration of deans, key faculty, and health system leaders. Pre- and post- surveys were used and quantitative data using a five-point Likert scale was gathered to evaluate student learning in the interprofessional pilot project. Qualitative analysis was used in other aspects of the project, with continuous feedback from faculty and students along the way.

**Results**

The creation of an interprofessional chapter structure across South Dakota health professions schools and major health systems served as connector for students, faculty and health system leaders alike. Core chapter events were developed, including fall kick-offs, face-to-face encounters using interprofessional simulations, expert speakers, online activities through the IHIO S website, quality improvement projects, and development of curricular initiatives. All of these activities were student-driven and utilized student leaders from various schools and health disciplines to connect with faculty and experts who they knew best.

The student-designed interprofessional pilot project testing the efficacy of two IHIO S courses in the context of an interprofessional first year anatomy course, found that students demonstrated definitive learning and that these two courses were efficacious in teaching core QI and PS topics. Significant learning was seen in 16 of 16 and 13 of 16 (p=0.05) points for medical students and allied health students respectively. The study concluded that the open school courses should serve the Quality Thread well and could be easily implemented into existing curricula.19

As results of the pilot project were being shared with core faculty, early adopters in the Department of Internal Medicine at SSOM, created what were called “First Do No Harm” sessions, for third year medical students. Upon consultation with Open School chapter leaders and the faculty advisor, eight Open School courses were used, which students individually completed. This was followed by once a week faculty-facilitated discussions featuring case studies as connectors. While statistical analysis was not done on the data, survey results concluded that third year medical students preferred the addition of case studies to supplement IHIO S courses. Students agreed that PS and QI topics are important to learn prior to residency training and that they got more out of the courses with faculty-facilitated small group discussion, than without.

From these two initiatives a student-designed longitudinal PS and QI curriculum was formed, proposed, and implemented. The content incorporated an introductory lecture utilizing the IHIO S course “Partnering to Heal” session, 10 additional IHIO S courses with small-group discussion, and a scholarly project (Figure 3). The effort supported the new goals to teach the science of improvement and fit nicely within the new “Three Pillar” longitudinal curriculum at SSOM. Small group sessions were led by medicine, pharmacy, performance improvement and nursing faculty. Because of the common platform afforded by the IHIO S, this curriculum design was adaptable to other interprofessional activities and schools within the IHIO S chapter.

Additionally, the establishment of a “Deans’ Forum” collaborative led to the incorporation of IHIO S courses as core curricula in four South Dakota colleges and eight health disciplines, to date (Figure 4). The forum was overseen by the South Dakota IHIO S chapter leadership and served as a way to connect these schools together around the heart bone and influence the adoption of IHIO S courses into formal curricula across South Dakota.

**Discussion**

This project is one of the first large-scale efforts worldwide
to measure learning via the IHIOS and provides an example of a novel use of an IHIOS chapter. We proposed and implemented a model in which the chapter itself is the connector bringing AOM science alongside traditional SOM content — and providing student-led opportunities for other students and faculty to connect to the heart bone. Importantly, the model contributes to national efforts toward Flexner type transformation where the various disciplines grow up together, working off of the same platform, in the same home — instead of the traditional silo approach. These results suggested that IHIOS courses are efficacious as a didactic core in teaching the science of PS and QI and that faculty-led/case centered small group discussion clearly enhanced learning. Furthermore, the longitudinal SSOM Quality Thread curriculum serves as an attempt to use evidence to develop curricula using IHIOS. Finally, the international IHIOS network provides a global connector for spread of this and other innovative curricular models.

We acknowledge that “statistically significant” by RCT-type proof has not been fully achieved in this model. We would argue however that engaging over 600 students from eight schools and thirteen health disciplines in 42 months, to focus on the best interest of the patient — and persuading formal curriculum change in nine disciplines from four of the eight in that time-frame — is transformationally significant, self-evident proof. We consider this three-and-a-half year project therefore a “proof of concept,” wherein the results speak for themselves.

There is an emerging realization that as transformational as the RCT has been, it is simply inadequate to evaluate all knowledge necessary for the best interest of the patient. AOM evidence is more like gravity – not created but discovered — as a powerful force, already out there, which needs no further proof. As a force it takes and drives RCT based discoveries to both intended and non-intended ends. The knowledge of medical harm, through story and transparency has pointedly shown (in fact, “proven”) that when the SOM is disconnected from the AOM, it can both maim and destroy. Therefore, we would ask – which hemisphere of knowledge is more impactful – news of a curative new gene or drug, proving that the RCT is revolutionary for a single diagnosis, or a story about the health care associated death of a little girl – proving that a revolution is necessary for an entire system? Whither proof?

Our challenge is first to admit that “gravity” (human factors, teamwork/communication, reliable design, just culture, transparency, professionalism, ethics) exists and will not yield. Connecting to this force — by educating to it — is step one in the new paradigm, to which the second half of Dr. William J. Mayo’s famous AOM definition is truer now than ever, “…in order that the sick may have the benefit of advancing
knowledge, union of forces is necessary.” The forces of the head bone and heart bone must be joined and per Hawkeye it is the physician who is accountable for this union – as primary advocate. The South Dakota IHIOS chapter’s vision statement, “Together One Voice for the Patient”, resonates both Mayo’s definition and Hawkeye’s call. We contend that the IHIOS as connector holds great promise to establish and perhaps maintain this union of forces.

Acknowledgements
The authors wish to thank the South Dakota IHI Open School chapter leadership and faculty, the IHI Open School team in Cambridge, Massachusetts, Dr. Matt Bien, Dr. Candace Zeigler, and Dr. David Zeigler for their leadership in the Scholarship Pathways Program at the University of South Dakota Sanford School of Medicine, and Sheryl Rickett for critical review and preparation of the manuscript.

REFERENCES
1. Mayo, WJ. Commencement address at Rush Medical College, 1910.
8. Hippocrates: Epidemics, Book I, Section XI.

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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Anti-Hu Positive Antibodies and Small Cell Carcinoma: A Single Center Review

By Mark List, MD; Fady Jamous, MD; Amit Gupta, MD; and Mark Huntington, MD, PhD

Abstract

Introduction: Small cell lung cancer (SCLC), having properties of neuroendocrine cells, accounts for a small (15 percent) but significant percent of all newly diagnosed lung cancers and is distinguished from non-small cell lung cancer by its rapid doubling time, high growth fraction and the early development of widespread metastases. Therefore, investigation into early diagnosis and treatment is crucial. One sequela of SCLC is a paraneoplastic neurological syndrome usually mediated by a high titer of anti-Hu antibodies, a disease which can present in several variations of paraneoplastic encephalomyelitis. The presence of anti-Hu antibodies in patient serum, even at a low titer, may serve as a diagnostic marker for SCLC and as a model for antibody-based early cancer detection. Furthermore, anti-Hu titers may eventually function as a prognostic indicator and trending titers may be a way to monitor treatment of SCLC and associated paraneoplastic syndromes.

Methods: In this retrospective chart review from a single hospital, we review all patients who had positive anti-Hu antibodies and discuss level of titers at diagnosis, outcomes, and length of survival.

Results: We describe three cases of positive anti-Hu antibodies and document their diagnosis of SCLC and outcomes.

Conclusions: Anti-Hu antibodies can be used as a diagnostic tool for aiding in the diagnosis of SCLC. Anti-Hu antibodies may be able to be followed as a marker of progression of the disease.

Introduction

Lung cancer is the leading cause of cancer death in the U.S. In 2012, an estimated 160,340 Americans were expected to die from lung cancer, accounting for approximately 28 percent of all cancer deaths.1 Small cell lung cancer (SCLC), having properties of neuroendocrine cells, accounts for a small (15 percent) but significant percent of all newly diagnosed lung cancers. SCLC is strongly associated with cigarette smoking, and the risk for development increases as the daily volume and duration of smoking history increases.2,3 A highly malignant tumor, SCLC originates from primitive neuroendocrine cells in the lung. It is distinguished from non-small cell lung cancer (NSCLC) by its aggressive nature, including rapid growth and development of early metastases; therefore, investigations into early diagnosis and treatment are crucial. Currently, there are no effective early detection tools. Approximately 70 percent of patients present with metastatic disease, often to liver, adrenals, bone, bone marrow, and brain.4 Without treatment, SCLC has the most aggressive clinical course of any type of pulmonary tumor, with median survival from diagnosis of only two to four months.5 Although most are highly responsive to chemotherapy and radiotherapy initially, SCLC usually relapses and becomes refractory to treatment within a few months to a year.4 As of 2006, the overall five-year survival rate for all stages of SCLC was 6.4 percent.6

One possible sequela of SCLC is a paraneoplastic neurological syndrome, usually mediated by a high titer of anti-Hu antibodies.7 Paraneoplastic syndromes are the result of a primary tumor or its metastases releasing factors which can produce systemic symptoms.8 While there are a
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number of paraneoplastic neurological syndromes related to SCLC, the type of paraneoplastic syndrome related to anti-Hu antibodies is known as paraneoplastic encephalomyelitis sensory neuropathy and can present with a multifocal encephalomyelitis or a restricted brainstem or limbic encephalitis.7,12 Seventy percent of patients with this specific anti-Hu paraneoplastic syndrome have multiple clinical neurological symptoms and 34 percent of patients have three or more areas of neurological involvement.10 Some SCLC tumors, whether from patients with or without signs or symptoms of a paraneoplastic neurological autoimmune syndrome, express neuronal Hu antigens. However, only 1 percent of SCLC patients develop paraneoplastic encephalomyelitis sensory neuropathy despite the presence of Hu antigens.7,11 The mechanisms that trigger and maintain an autoimmune response in cancer patients are poorly understood.

Previous studies have discovered that a significant percentage (16-25 percent) of SCLC patients without paraneoplastic neurological autoimmune syndromes have detectable titers of anti-Hu antibody in their serum, albeit at much lower levels than those with the syndrome.7,12 Anti-Hu antibodies are not exclusive to SCLC as they are also found in some cases of neuroblastoma; however, they are rarely present in other cancers.11 These uncommon case reports exist for a variety of other cancers, including a single case report of squamous cell carcinoma of the esophagus.10

The presence of anti-Hu antibodies in patient serum, even at a low titer, may serve as a diagnostic marker for SCLC and as a model for antibody-based early cancer detection. Furthermore, anti-Hu titers may eventually function as a prognostic indicator and trending titers may be a way to monitor treatment of SCLC and associated paraneoplastic syndromes.13

Methods

With assistance of laboratory services and through a computerized search, we reviewed the charts of patients who underwent laboratory evaluation with a paraneoplastic autoimmune evaluation panel from a single health care center, Avera McKennan Hospital, over the course of nine years, from 2004-2013. Additionally, we reviewed all charts (n=3) that had positive anti-Hu antibodies from this panel order and documented in a series of brief case reports if there was a current or future diagnosis SCLC. Furthermore, we abstracted data from the patient’s chart including other comorbidities, age, titer of anti-Hu at diagnosis, outcomes and course of SCLC, and length of survival from diagnosis, if applicable. The principal investigators were assisted by the Avera McKennan laboratory services in the collection of data regarding all testing and medical record numbers of charts positive anti-Hu antibodies. Descriptive statistics (mean, range, standard deviations, and percentages) were used to characterize study subjects on demographic and clinical measures including age, titer of anti-Hu at diagnosis, and length of survival from diagnosis. The principal investigators handled all chart review and statistical analysis of data. Institutional Review Board approval was obtained prior to performance of chart review. A waiver for informed consent was obtained due to the retrospective nature of this chart review.

Results

A total of 1,158 laboratory orders were made for a paraneoplastic autoimmune evaluation panel between 2004 and 2013. A total of five positive results for anti-Hu antibodies were found in a total of three patients, with two of those positive results used as titers to follow disease progression. The age of these patients ranged from 58-75 with a mean age of 68. Of these patients, 66 percent were male. All patients were diagnosed at early stages with no distant metastases found on initial workup. Median survival from diagnosis was 12 months.

Case 1

A 71-year-old Caucasian female admitted in January 2013 with recurrent nausea and vomiting with 45 pounds weight loss since earlier in the year. She was previously hospitalized in November 2012 for similar complaints and was found to have gastroparesis of unknown etiology on a gastric emptying study. This patient underwent further evaluation and was found to have a 2.7 cm x 2.5 cm right hilar mass. Endobronchial ultrasound with biopsy and washings which were diagnostic for small cell lung cancer. Anti-Hu antibody (ANNA-1) was positive at a titer of 1:61440. The remainder of her paraneoplastic antibody evaluation panel was negative except for a low total IgG at 525 mg/dL.

The patient was a 40 pack-year smoker that had quit smoking in 2012. She had a history of well-controlled hypertension, COPD and CAD with a history of single stent placement.

A J-tube and Port-a-cath were placed and staging evaluation was performed with an abdominal and pelvic CT, brain MRI and nuclear bone scan. All were negative for metastatic disease, and diagnosis of limited stage SCLC with paraneoplastic autonomic neuropathy in January 2013. She received carboplatin (AUC 5) and etoposide
(100mg/m²) and was initiated on radiation with curative intent. She completed four cycles of this chemotherapeutic regimen and underwent external beam radiation and prophylactic cranial irradiation.

She was re-admitted to Avera McKennan in October 2013 with progressive weakness and decline, as well as ongoing feeding tube dependence. Workup during this admission included a chest, abdominal, pelvic CT scan; cervical, thoracic, and lumbar spine MRI, brain MRI, and nuclear bone scan, which were all negative for signs of malignancy. It was suspected that her symptoms were related to paraneoplastic autonomic neuropathy and orthostatic hypotension. Paraneoplastic antibody evaluation panel remained positive for anti-Hu antibody, but with a lower titer of 1:3840. She was discharged home in stable and improved condition since admission.

At the time of this report, the patient was still alive, nine months from diagnosis.

Case 2
In April 2009, a 58-year-old Caucasian male began developing a four- to five-week history of progressing paraesthesias and weakness in his lower extremities, progressing to truncal ataxia, and finally, began having dysphagia and chest tightness. He was admitted for possible Guillain-Barre and ALS workup. An EMG was non-diagnostic but did demonstrate mild sensory neuropathy and some mild scattered neurogenic changes, according to the report. He had a normal chest and abdominal xray on initial evaluation. Laboratory testing was significant for hyponatremia, but otherwise hematologic and chemistry panels were normal. B12, folate, HIV, Lyme disease IgG and IgM, and RPR were also normal. The patient was started on five days of IVIG and symptoms were reported to improve, allowing the patient to be discharged safely to home. However, following discharge, results of the paraneoplastic antibody evaluation panel returned and anti-Hu antibody (ANNA-1) was positive at a titer of 1:15360.

His only past medical history was insomnia and a remote history of asthma. He had a 38-year history of smoking of unreported quantities.

He underwent CT scan of chest, abdomen, and pelvis which showed mediastinal, right paratracheal and subcarinal adenopathy, but no evidence of metastasis. Additionally, a brain MRI showed no metastatic disease. Bronchoscopy with biopsy confirmed the diagnosis of small cell lung carcinoma in May 2009. He was treated etoposide (100mg/m²) and cisplatin (80mg/m²), undergoing four cycles of chemotherapy. He also received external beam radiation as part of his treatment regimen.

In November 2009, he presented with worsening autonomic neuropathy and intractable nausea and vomiting. Repeat testing of his anti-Hu antibody showed a titer of 1:30,720. Brain MRI during that admission found a solitary metastasis to the brain. He underwent radiation therapy at that time. The patient began a slow functional decline and was readmitted in April 2010 for generalized pain as well as ongoing feeding tube dependence. Imaging revealed metastatic disease to his spine, liver, and adrenals. Palliative chemotherapy and radiation were given at that time, but he was readmitted two weeks later for septic shock and profound functional decline. In May 2010, the patient was placed in hospice care and died, 12 months after diagnosis.

Case 3
The patient was a 75-year-old Caucasian male who developed two months of progressive numbness of all four extremities and gait ataxia initially thought to be Guillain-Barre. Outpatient neurologic evaluation of his complaints in June 2012 revealed a non-diagnostic EMG showing polyradiculopathy of sensory and motor fibers. Five days of IVIG was trialed with no improvement of symptoms. Following this trial of IVIG, he developed respiratory failure from narcotic pain management for his painful neuropathy and was transferred to the Avera McKennan Hospital intensive care unit. Further workup with chest, abdomen and pelvis CT revealed an indeterminate nodule in the left lower lobe and mildly enlarged mediastinal and right hilar lymph nodes. A paraneoplastic antibody evaluation panel was positive for anti-Hu antibody (ANNA-1) at a titer of 1:61440 and a calcium channel P/Q type antibody. The patient underwent bronchoscopy/EBUS and an enlarged mediastinal lymph node was biopsied, but the result was negative for malignancy. Mediastinoscopy was then performed with additional lymph node biopsies, but again results revealed benign lymphoid tissue with no evidence of malignancy. PET/CT scan showed multiple areas of enlarged lymph nodes in the superior mediastinum, anterior mediastinum, and supraclavicular region which were hypermetabolic in nature, suggestive of metastatic disease. A presumptive diagnosis of SCLC was made at that time.

The patient had a 60 pack-year history of smoking, longstanding COPD, but had no other chronic medical conditions on diagnosis.

Following diagnosis of probable SCLC from suggestive PET/CT results and positive anti-Hu antibodies without definitive biopsy results, the patient was offered
chemotherapy and external beam radiation therapy. He declined and returned home with his wife. He was readmitted to his local rural hospital months later for weakness, dehydration and intractable nausea and vomiting. At that time, the patient declined further workup or treatment for his disease and returned home. From review of records, it appears that the patient did eventually move into a nursing home when he became bed-bound and died there in August 2013, which was 14 months after the initial diagnosis.

Study Limitations
This study reviewed a relatively small number of charts, which does certainly prevent any large scale extrapolation with limited numbers of positive anti-Hu antibodies ever returned at Avera McKennan Hospital, a small, single health care center. Additionally, any retrospective chart review obviously is limited in the ability to make firm conclusions about the results, especially in light of lacking controls. This study is also limited by selection bias given the preselected choice of individuals being analyzed in the chart review. Case 3 is not a confirmed case of SCLC, as a probable diagnosis was made since no biopsy-proven source for SCLC was found. Certainly this weakens its usefulness in future discussions regarding anti-Hu antibodies and SCLC.

Discussion
In this retrospective chart review from a single hospital, we reviewed all patients who had positive anti-Hu antibodies and the proportion of these that were related to a confirmed diagnosis of SCLC. Furthermore, we describe these case reports and discuss level of titers at diagnosis, outcomes, and length of survival. Our analysis shows that of 1,158 orders from a single hospital network, a total of five positive results for anti-Hu antibodies were found in three patients, with two of those positive results used as titers to follow disease progression. In two cases, the paraneoplastic antibodies were used in conjunction with imaging and biopsy results to confirm the diagnosis of the disease. In one case, however, the antibody panel was ordered only as a reflection of history and physical examination. In this case, it led to further imaging and biopsies which then confirmed the probable diagnosis of SCLC. Clearly, this case demonstrates the value of anti-Hu antibody laboratory evaluation in the workup of sensory and autonomic neuropathy of unknown origin. However, it is important to note how infrequent positive results are (0.4 percent) in comparison to the total number of tests ordered, although this is confounded by the antibody panel being ordered for a myriad of other symptom and disease evaluations.

Therefore, the presence of anti-Hu antibodies in patient serum, even at a low titer, may serve as a diagnostic marker for SCLC and as a model for antibody-based early cancer detection. In this case report all patients found to have positive anti-Hu antibodies were all diagnosed at early stages.

Furthermore, anti-Hu titers may eventually function as a prognostic indicator and trending titers may be a way to monitor progression of SCLC and associated paraneoplastic syndromes. In one case in the series, we describe titers dropping from 1:61440 to 1:3840 following successful chemo and radiation therapy, correlating with imaging studies negative for recurrence of disease in a patient who is currently stable with minimal symptomatic complaints nine months following diagnosis. In another case, we describe a patient with an initial titer of 1:15360 who did not respond as favorably to chemo and radiation therapy. This patient began having worsening symptoms, imaging consistent with metastatic disease, and was found to have an increasing titer to 1:30,720. More studies into the role of anti-Hu antibodies and their role in the diagnosis and treatment of SCLC are needed.

REFERENCES

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AN OPEN LETTER FROM THE CEO

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As the new CEO of Sioux Falls Specialty Hospital, I wish to express our gratitude and respect to those who have trusted us with their care over the past year. We do not take the responsibility of your health and happiness lightly.

To our staff,
You’ve shown great commitment to our culture of personalized care and innovation through your time, dedication, compassion and hard work. We are proud to say that your efforts have once again earned us the honor of being recognized as a regional leader in patient satisfaction.

Sioux Falls Specialty Hospital received a five-star rating in ten out of eleven patient satisfaction categories in the HCAHPS survey awarded by CMS*, making us the only hospital in the region with this high of a ranking.

Do we like awards? Yes. But we couldn’t ask for a greater reward than the approval of our patients. Thank you.

Sincerely,

R. Blake Curd, M.D.
Chief Executive Officer, Sioux Falls Specialty Hospital

* Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey administered by Centers for Medicare & Medicaid Services (CMS).
Polycystic Ovarian Syndrome: A Primer

By Emily C. Thornton, MSIV; Tiffany Von Wald, MD; and Keith Hansen, MD

"The less we know about something, the greater the need to constantly redefine it."  
PG McDonough

Abstract
Polycystic ovary syndrome (PCOS) affects 8-10 percent of reproductive-aged females, making it the most common state of endocrine dysfunction in women. Patients with PCOS are often treated for the signs and symptoms of the condition without consideration for the underlying syndrome, causing frustration for many affected patients. Abnormal uterine bleeding, endometrial hyperplasia and cancer, hirsutism and other skin changes, obesity, glucose intolerance, hypertension, and hyperlipidemia often accompany the syndrome, making it imperative to address these issues. The keys to diagnosis and treatment are understanding the diagnostic criteria of hyperandrogenism, ovulatory dysfunction, polycystic ovaries and the metabolic syndrome, while aiming at controlling the symptoms and causes of the syndrome. In 2013, the Endocrine Society released its clinical guidelines, Diagnosis and Treatment of Polycystic Ovary Syndrome: An Endocrine Society Clinical Practice Guideline. This gives clear diagnostic criteria, and treatment goals aimed at the etiology of the syndrome: to decrease hyperandrogenic symptoms, management of underlying metabolic abnormalities, prevention of endometrial hyperplasia and carcinoma, and improvement of ovulation.

Introduction
Polycystic ovary syndrome (PCOS) affects 8-10 percent of reproductive-aged females, making it the most common endocrine dysfunctions in women. Patients with signs and symptoms of PCOS often present with complaints of acne, androgenic hair loss, acanthosis nigricans, hirsutism, irregular vaginal bleeding, and infertility. Many of these patients will receive treatments like laser or electrolysis for a period of time before they are further evaluated for potential etiologies of their hirsutism. Patients with evidence of hyperandrogenism and ovulatory abnormalities need a thorough evaluation to determine the cause of their signs and symptoms. The differential diagnosis of hyperandrogenic, anovulation includes PCOS and other PCOS-mimics such as ovarian androgen producing tumors, thyroid dysfunction, hyperprolactinemia, late-onset congenital adrenal hyperplasia, acromegaly and Cushing syndrome.

Diagnosis
Stein and Leventhal first described PCOS in the 1930s as a condition marked by amenorrhea, hyperandrogenism and obesity. To improve communication and consistency in research and clinical practice a number of consensus conferences have been held to develop diagnostic criteria for PCOS. All of the diagnostic criteria involve evaluating for androgen excess, ovulatory dysfunction, polycystic ovaries, and excluding other endocrinopathies which are PCOS-mimics. The Endocrine Society in its clinical practice guidelines supports the continued use of the Rotterdam criteria to diagnose PCOS: The Rotterdam criteria require two of the following three criteria: androgen excess, ovulatory dysfunction, and polycystic ovaries on ultrasound, as well as excluding endocrinopathies that are PCOS-mimics.

Hyperandrogenism can be diagnosed by clinical observation (hirsutism, virilization) or with laboratory tests (testosterone, androstenedione, or Dehydroepiandrosterone sulfate). In most laboratories, testosterone assays are direct or platform-based assays, which allows for automation and ease of use. These direct assays are notoriously inaccurate and lack sensitivity at the lower limits. The lower limits of the testosterone assay are the levels gynecologists are interested in as these levels in hypogonadal males, normal and hyperandrogenic females as well as children. Organic extraction immunoassays or high
pressure liquid chromatography mass spectrometry assays improve the sensitivity of the testosterone assay especially for lower levels, but are more intensive and require longer periods of time to complete. 2,3

Ovulatory dysfunction can vary from anovulation to oligo-ovulation which may result in infertility. A thorough reproductive history can give insight into the ovulatory status of these patients. In a patient who is regularly ovulating, one will expect regular menstrual cycles, while in the patient with oligo- or anovulation the patient will have irregular menses or amenorrhea.

Polycystic ovaries are defined as the “presence of 12 or more follicles in at least one ovary, with follicles measuring 2-9 mm in diameter, and/or increased ovarian volume (greater than10 mL),” 4 measured by transvaginal ultrasound. Sonographically normal ovaries are only found in about 10 percent of PCOS patients.

It is also vital to rule out iatrogenic causes or other endocrinopathies, which can mimic the signs and symptoms of PCOS (Table 1).

Two other diagnostic guidelines have been proposed from the National Institute for Health (NIH) and the Androgen Excess Society. 1,5 Both of these guidelines require androgen excess and are compared to the Rotterdam criteria in Table 2.

Etiology

The etiology of PCOS is not well understood, but it seems to be a combination of reproductive and metabolic abnormalities (e.g., insulin resistance), leading to chronic hyperandrogenism and increased estrogen concentration. These chronic elevations in testosterone and estrogen are associated with loss of normal hormonal feedback resulting in steady state levels of LH, FSH, estradiol and low progesterone levels. 6,7

As part of the constellation of signs and symptoms of PCOS, a number of patients will have other major medical concerns including coronary artery disease 8 and the metabolic syndrome: obesity, glucose intolerance/insulin resistance (approximately 50 percent of these patients), elevated blood pressure, and hyperlipidemia. It is imperative to recognize and treat the medical ramifications of this syndrome including the reproductive symptoms.

Along with the initial diagnostic criteria, it is important to consider clinical mimics of PCOS. A sudden or drastic change from baseline in symptoms or signs should prompt more comprehensive evaluation. Common disorders that may mimic PCOS include thyroid dysfunction, hyperprolactinemia, non-classical congenital adrenal hyperplasia (21-hydroxylase deficiency), and less commonly androgen secreting tumors. 7

Adolescents, peri- and post-menopausal women may be more difficult to diagnose with PCOS due to numerous factors including the lack of testosterone assay standardization for these developmental stages. In adolescents it is often difficult to make the diagnosis because many of the signs and symptoms of PCOS mimic normal pubertal changes. Recent studies suggest that adolescents should only be diagnosed with PCOS if they meet all three Rotterdam criteria, and not two out of three. During menopause, there is a decrease in ovarian size, follicle count, and anti-Mullerian hormone levels. This decrease may be more prominent in patients with PCOS, but the differences are not predictable, thus causing confusion about diagnosis in this population. In menopause, both estrogen and androgen levels fall; however, estrogen decreases relatively more than testosterone, converting into an androgen-predominant environment. This can result in slight increased hirsutism in perimenopausal and menopausal women. There are no specific diagnostic

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<th>Table 1. PCOS Mimics</th>
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<td>Iatrogenic (medications)</td>
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<th>Table 2. Comparison of Diagnostic Guidelines</th>
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<td>Hyperandrogenism (Clinical or Laboratory)</td>
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<td>Rotterdam Criteria (2 out of 3)</td>
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criteria for perimenopausal and menopausal women, but a “presumptive diagnosis of PCOS can be based upon a well-documented long-term history of oligomenorrhea and hyperandrogenism during the reproductive years. The presence of (polycystic) morphology on ultrasound would provide additional supportive evidence.”

**History and Physical Exam**

The history and physical exam remain an integral component in the diagnosis of PCOS. The history and physical examination should be tailored to look for evidence of other endocrinopathies that can mimic PCOS as well as evaluating for potential sequelae of these patients. Make sure to ask about skin dryness, hair and voice changes, menstrual history including menarche, regularity, and characteristics of menses, breast tenderness or nipple discharge, the timing of onset of any symptoms, weight gain, and any other previously diagnosed metabolic or reproductive abnormalities. Also ask about sleep/energy, chest pain or palpitations, and bowel habits. Medications, past medical history, and surgeries are necessary to rule out any other organic causes of hirsutism or anovulation. Family history is also important, given the familial tendencies of this syndrome as well as to rule out other entities.

One’s index of suspicion for an androgen-producing ovarian or adrenal tumor should be heightened by history of rapid onset or progression of hirsutism or virilization. In reproductive age females with a testosterone level greater than 200 ng/dL or in menopausal women with a testosterone greater than 100 ng/dL, one should be suspicious for an ovarian, androgen-producing tumor. A DHEAS level greater than 700 ng/dL should alert one to the possibility of an adrenal tumor.

Another important aspect of the history and physical exam is the patient’s emotional well being. Higher levels of emotional distress have been found in patients with PCOS compared to women without PCOS. The visible features like hirsutism and acne, as well as infertility, diabetes, and obesity are often potential instigators of this emotional distress.

**Evaluation**

In addition to the history and physical examination, a transvaginal ultrasound should be obtained to evaluate for the presence of polycystic ovaries. To rule out clinical mimics, a TSH and free T4, prolactin, fasting glucose, glucose tolerance test, follicular phase 17-hydroxyprogesterone (17-OHP) and testosterone should be drawn. The utility of a serum DHEAS level is open to controversy. If indicated by the history and physical exam, an evaluation for Cushing’s syndrome and acromegaly should be initiated as well.

Concurrent testing to consider revolves around the sequelae of the syndrome and association with the metabolic syndrome.

- If the patient is experiencing abnormal uterine bleeding, especially if over a prolonged period of time, or has endometrial thickening on ultrasound, an endometrial biopsy is often recommended to rule out endometrial hyperplasia or carcinoma.
- Obesity increases risk factors for hypertension, hyperlipidemia, insulin-resistance, type 2 diabetes mellitus, and coronary artery disease, which many patients who have PCOS are at increased risk for concurrently having or developing in the future, and thus should be treated appropriately. To evaluate for the presence of metabolic syndrome in women with PCOS, patients need to have three out of the five criteria below to qualify:
  - Abdominal obesity (waist circumference greater than 35 inches) – obesity is a common factor among

### Table 3. Elements of the History and Physical to Address

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<td>-Ovulation Induction</td>
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<td>-Gestational Diabetes Mellitus</td>
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<td>Menstrual Regularity</td>
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<td>&lt; 10 Menses Per Year</td>
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<td>-skin tags</td>
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<td>-glucose intolerance/Type 2 DM</td>
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<td>Dyslipidemia</td>
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<td>Family History</td>
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<td>Type 2 DM/Metabolic syndrome</td>
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<td>Infertility</td>
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<td>Endometrial Cancer/Cancer Syndrome</td>
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<td>Congenital Adrenal Hyperplasia</td>
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women with PCOS with approximately 50 percent being obese, 30 percent overweight and 20 percent normal weight.

- Blood pressure systolic greater than or equal to 130 and diastolic greater than or equal to 85.
- Triglycerides greater than or equal to 150 mg/dL.
- HDL-C less than 50 mg/dL.
- Fasting glucose 100-126 mg/dL or two-hour glucose tolerance test 140-199 mg/dL. Of all patients with PCOS, up to 40 percent have impaired glucose tolerance and 8 percent have overt type 2 diabetes mellitus.13,6,14,15

**Treatment**

Therapy should focus on decreasing hyperandrogenic symptoms, managing underlying metabolic abnormalities, preventing endometrial hyperplasia and carcinoma, and improving ovulation in those who desire fertility.

In order to decrease hyperandrogenic symptoms (hirsutism, acne, scalp hair loss), the first-line of treatment is combined oral contraceptive agents (COCs). The progestin in COCs suppresses LH levels and thus ovarian androgen production, while estrogen increases SHBG, thus reducing bioavailable androgen.2 There is no significant clinical difference between different COCs, so decisions on which COC to use are completely provider and patient driven.16 Other agents that can reduce ovarian androgen production include progestins such as depo-provera and gonadotropin-releasing hormone agonists (like leuprolide acetate).

Another option for hyperandrogenic symptoms is the addition of androgen blockers like spironolactone, flutamide and finasteride to COCs.16 Finasteride and metformin together have been studied and shown to decrease clinical and laboratory based hyperandrogenism in PCOS, though this has not been compared with COCs.17 It should also be noted that androgen blockers should be used with caution and with an effective form of birth control, since these medications can have a detrimental effect on the sexual development of a male fetus.

Table 4. Treatment Goals

1. Decrease hyperandrogenic symptoms
2. Manage underlying metabolic abnormalities
3. Prevent endometrial hyperplasia and carcinoma
4. Improve ovulation in those who desire fertility

Topical therapies are also viable options for patients to deal with their hirsutism, and are often what a patient seeks out before medical treatment. These therapies include temporary measures such as eflornithine cream (Vaniqua), shaving, waxing, as well as more permanent therapies like laser and electrolysis. Although these treatments do not address the underlying issue, patients often desire fast and definitive treatment for their unwanted hair growth to decrease social stigma they experience, making hirsutism an important aspect of the syndrome to address. This knowledge should prompt the clinician to educate and dialogue with cosmetologists, dermatologists, plastic surgeons and others who deal with hirsutism, encouraging them to evaluate or refer the patient seeking waxing, laser, and electrolysis to further evaluate the cause of their malady.

Another major treatment goal is management of underlying metabolic abnormalities to decrease risk factors for DM type II and cardiovascular disease. These include weight loss, exercise, and metformin, but not inositols or thiolidizones.7 Weight loss should be emphasized in the PCOS patient. Weight loss can significantly reduce insulin resistance, hyperandrogenic symptoms, and cardiovascular risk factors. Weight loss can also improve ovulatory dysfunction. Metformin is one of the primary treatments for glucose intolerance in women with PCOS. Although in years past it has been used for ovulation induction instead of just for insulin resistance, it has been shown to have minimal effect on live births or hirsutism/acne symptoms. It is currently not recommended to use metformin in PCOS for ovulatory or hyperandrogenic symptoms.7

An important treatment consideration in these patients is prevention of endometrial hyperplasia and carcinoma, which may occur due to unopposed estrogen as a result of chronic anovulation. As discussed above, an evaluation for the presence of endometrial hyperplasia should be a part of the initial workup in a patient suspected of having PCOS. The treatment for preventing endometrial hyperplasia usually involves oral contraceptives, cyclic progestins, depot forms of progestins, or the progestrone IUD to protect against the effects of unopposed estrogen exposure.

Adolescents as well as peri-menopausal and menopausal women have similar goals of treatment, but slight differences in approach. In adolescents, treatment goals are aimed at acne control, hirsutism, weight control and ovulatory dysfunction using hormonal contraception, dietary monitoring, and exercise. In peri-menopausal and
menopausal women, ovulation is not included as a treatment goal, but hirsutism, metabolic abnormalities, and endometrial hyperplasia associated with PCOS should be addressed and treated. In menopausal women, preventative management earlier in the course of the patient’s life will reduce the risk of issues during menopause. In highly select patients with PCOS and recalcitrant signs and symptoms, laparoscopic bilateral salpingo-oophorectomy may be an option, which must be approached cautiously, as it will only improve hyperandrogenism, but it will not affect the metabolic consequences of PCOS.

For women considering pregnancy, medical ovulation induction is first line therapy. Selective estrogen receptor modulators (SERMs) (e.g., clomiphene citrate) and aromatase inhibitors (e.g., Letrozole) are commonly used. These have significant benefit in increasing pregnancy rates, though letrozole has recently been shown to be more effective in inducing ovulation, achieving a pregnancy, and producing a live birth when compared with clomiphene citrate. Metformin may also be prescribed as an adjuvant in medical therapy of infertility in PCOS patients resistant to clomiphene and letrozole. Studies on the effectiveness of metformin as solo infertility treatment have not been convincing, but have shown that it increases the effectiveness of Clomid when used as an adjunct. For patients that do not respond to clomiphene citrate or letrozole, second-line therapy is human menopausal gonadotropins or in vitro fertilization. An alternative intervention is a surgical procedure like ovarian wedge resection or laparoscopic ovarian drilling which increased post-operative spontaneous ovulation and increased sensitivity to ovulation induction agents.

Pregnancy in patients with PCOS has an increased risk for specific complications, like gestational diabetes. This should prompt consideration for evaluation of these conditions before and during a pregnancy in a patient with PCOS to provide risk assessment, teaching, and management for these higher risk women.

**Conclusion**

In conclusion, the prevalence of PCOS is increasing in frequency and is an important issue to address in patients with the signs and symptoms, due to the sequelae and co-morbidities inherent to the diagnosis. A physician should be able to identify the clinical manifestations of the syndrome using Rotterdam criteria, and apply therapy based on the patient’s goals to decrease hyperandrogenic symptoms, reduce underlying metabolic abnormalities, eliminate endometrial hyperplasia and carcinoma, and improve ovulation in the patient seeking pregnancy.

**REFERENCES**

1. McDonough PG. How many of the items in the polycystic ovary syndrome can be validated statistically? Fertility and Sterility. 2006. 85: 530-531.

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It does not take long watching the news on television or reading articles on the Internet to come across a story relating to drug abuse. Within the past few months, a HIV outbreak in Indiana was linked to misuse of oxymorphone, a new synthetic cathinone (bath salts) derivative nicknamed “Flakka” has shown up in Florida, and the governor of New York issued an alert highlighting the dangers of new synthetic cannabinoids.

A 2014 study from the National Institutes of Health called Monitoring the Future illustrates that illicit drug use is common in 8.3, 18.5, and 23.7 percent of eighth, 10th, and 12th graders, respectively, which can lead to drug abuse as an adult. Due to the increase in abuse, providers are relying more heavily on urine drug screens (UDS) and state prescription drug monitoring programs (PDMP) to try to stay ahead of the curve and curb drug abuse in their patients. However, due to false positives or false negatives inherent in the testing, this can prove to be complicated, and highly specific tests are often cost-prohibitive.

A false positive occurs when a patient’s UDS shows the presence of a substance when the patient did not actually use that substance. As providers, we often hear patients deny use of illicit substances when they have indeed used, but there are also scientific reasons a true false positive could appear. Most commonly, this is due to either structural similarities between certain agents and the UDS substance or alternate metabolism pathways for certain agents that yield metabolites similar to UDS substances. Several studies have looked at the propensity of certain agents to cause false positives and a summary of the results can be found in Table 1. The table is certainly not an all-inclusive list.

The various potential false positives in Table 1 highlight the necessity of taking a good patient history prior to completing a UDS. This history should not only include the specific prescription agents taken, but also over-the-counter and herbal medications, frequency of use of “as needed” medications, and last use of each agent. False positives have many consequences to patients including loss of trust/prescribing relationship with a provider and inability to obtain prescriptions for legitimate purposes. This can lead to gaps in therapy that may put patients at risk.

In addition to false positives, false negatives are equally problematic. False negatives occur when a patient is using a substance and the UDS does not show positive for this substance. One reason for false negatives is the limit of detection for a substance within the UDS. Each lab has different limits of detection, or the minimum amount of a substance that must be present to detect. If a patient uses one oxycodone 5 mg tablet every day for breakthrough pain, it may be possible the urine concentration reached is below this limit of detection. Thus, if the medication is taken away based on the UDS results, the patient may experience undue pain. Contacting the individual lab that runs the test is the best reference for limits of detection if there is a question.

Additionally, a patient may have taken the medication outside of the window of detection. This is the period of time after a patient uses an agent that it is detectable on the UDS. Unfortunately, the window varies greatly based on the individual agent and the patient’s metabolism. For example, morphine is detectable for 48-72 hours after use. Depending on whether the patient is a normal or rapid metabolizer, the drug may leave the system a day early in some patients. As another example, marijuana is detectable for three days after a single use, five to seven days if the patient is a moderate user (four times per week), or 10-15 days if the patient uses daily. Additionally, in some patients that smoke large quantities for long periods of time, marijuana may be detectable up to 30 days after use. These discrepancies in the windows of detection lead to the possibility of missing certain substances on the drug screen.

Finally, certain agents are just not detectable. A common example is within the benzodiazepine class. We expect all benzodiazepines to trigger a positive result, but in reality, if a patient is using clonazepam or lorazepam, the UDS will commonly be negative. Most UDS test for nordiazepam and oxazepam. This is appropriate as almost...
all other benzodiazepines are metabolized to these products. Clonazepam and lorazepam follow a different metabolism pathway. Thus, even though the patient may be taking their anxiolytic every day, the UDS may still read negative if it is one of these agents. This is especially critical as withdrawal from benzodiazepines can lead to seizures and potentially death.

The above potential confounders with urine drug screens highlight the need for provider evaluation. As mentioned previously, even though a UDS shows positive for an agent and the patient states they have never used the agent, this may be the truth. The converse is true if a screen shows negative even though the patient states he/she has been taking the drug. Thus, it should never be the only item used to adjust a patient’s therapy. The UDS is only a tool and does not take the place of clinical correlation and a thorough patient interview.

### Table 1. Common False Positive Agents for Urine Drug Screens

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Potential False Positive Agent</th>
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<tbody>
<tr>
<td>Amphetamines/methamphetamine</td>
<td>Amantadine</td>
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<td>Brompheniramine</td>
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<td>Bupropion</td>
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<td>Methylenaphenidate</td>
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<td>Phentemmine</td>
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<td>Phenylephrine</td>
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<td>Barbiturates</td>
<td>Ibuprofen</td>
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<td>Naproxen</td>
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<td>Benzodiazepines</td>
<td>Sertraline</td>
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<td>Oxaprozin</td>
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<td>Opiates</td>
<td>Dextromethorphan</td>
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<td>Diphenhydramine</td>
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<td>Fluoroquinolones</td>
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<td>Methadone</td>
<td>Chlorpromazine</td>
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<td>Clomipramine</td>
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<td>Diphenhydramine</td>
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<td>Doxylamine</td>
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<td>Phencyclidine (PCP)</td>
<td>Dextromethorphan</td>
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<td>Diphenhydramine</td>
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<td>Ibuprofen</td>
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<tr>
<td>Tricyclic antidepressants (TCAs)</td>
<td>Carbamazepine</td>
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<td>Cyclobenzaprine</td>
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<td>Cyproheptadine</td>
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<td>Diflunisal</td>
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A tale of one South Dakota physician’s struggle against infectious disease and prejudices both public and collegial encompasses science, politics, concepts of professionalism and public health. While set in Sioux Falls four years before South Dakota became the 40th state, the story has ancient roots which branch through modern technology and two recent centuries of medical progress.

In the winter of 430 B.C., the citizens of Athens were slaughtered by a disease Thucydides claimed emerged from Africa. The historian noted: “...people in good health were all of a sudden attacked by violent heats in the head, and redness and inflammation in the eyes, the inward parts, such as the throat or tongue, becoming bloody and emitting an unnatural and fetid breath... followed by sneezing and hoarseness, after which the pain soon reached the chest...When it fixed in the stomach, it upset it; and discharges of bile of every kind named by physicians ensued, accompanied by very great distress...Externally the body was...reddish, livid, and breaking out into small pustules and ulcers. The body meanwhile did not waste away so long as the distemper was at its height, but held out to a marvel against its ravages; so that when they succumbed, as in most cases, on the seventh or eighth day to the internal inflammation, they had still some strength in them.”

Historically long regarded as viral hemorrhagic fever or typhus, DNA evidence that the Slayer of Athens was, in fact, typhoid fever, emerged in 2006. Like the observant physicians of the last 200 years, modern physicians will quickly see the clinical disconnect between the disease described by Thucydides and the course of the molecular front-runner, typhoid fever, even in epidemics. It is a reminder to physicians that conflicting evidence does not beg for partisan champions, but for careful investigation. The outbreak of typhoid fever in Sioux Falls, South Dakota, in the winter of 1884-1885 well illustrates this axiom.

In the 1880s, Sioux Falls was a growing community of about 5,000, a commercial center boasting several hotels, coal and wood yards, a slaughter-house, two mills, an opera house, a Masonic lodge and numerous supportive businesses from harness makers to butcher shops. The South Dakota Water Company, a private firm with corporate offices in Pittsburgh, Pennsylvania, under contract with the city, erected a water works along the Big Sioux River at the dam and across from the Cascade Mill. The water works began to supply water through 12-inch cast iron mains in November 1884 (Figure 1).

That year, winter began with snow at the end of

Figure 1. Sioux Falls in 1885. Broad single arrow – water works; double arrow – Commercial House (hotel); thin arrows – other hotels in the city (photo courtesy of The Siouxland Heritage Museums, Sioux Falls).

By 1884, it was known that poor sanitation and contaminated water were important elements in typhoid outbreaks. The causative organism, Salmonella enterica, had been described in 1880 and three decades earlier typhoid and typhus, a rickettsial disease, had been definitively established as separate disorders. Not all respected American medical writers accepted the distinction, however. The germ theory of disease had not yet taken general root in American medicine and science was just beginning to supply objective tools to support it.

As typhoid began to spread in Sioux Falls in 1885, Dr. Samuel Augustine Brown had been a physician in the community for only two years. An 1871 graduate of Jefferson Medical College, he arrived in Sioux Falls in 1882 following his discharge from the U.S. Navy. He was a charter member of the Minnehaha County Medical Society (the forerunner of the Seventh District Medical Society) and joined the Dakota Medical Society (the forerunner of the South Dakota State Medical Association). He would become, in 1908, the latter’s 25th president. Brown kept abreast of medical advances, was calm in emergencies, and remained genial even in heated debate. His was a principled life and “…he has ever hewed to the line of his own inherent convictions of right, no matter on which side stood his confreres.”

During the months of January through March 1885, together with Dr. Arthur Henry Tufts, Dr. Charles Adams Gray and other physicians of the city, Brown was so busy with typhoid patients that, “Seldom could [he] find time to make a visit to the country, but sent medicine as best [he] could.” Physicians themselves were not spared the disease: Tufts, who had come to Sioux Falls in 1884 together with Gray, with whom he shared a practice, fell ill and lost 24 pounds before he recovered.

A month after the epidemic began, Brown made a seminal observation about the patients he was treating: he was convinced they had become ill from a common source. On Feb. 3, 1885, Brown submitted a warning to a Sioux Falls newspaper which was published the next day: ‘Winter cholera still prevails’...”

Figure 2. Woodcut illustrating fecal-oral spread of typhoid fever
(Photo: Wikimedia Commons, 1939, public domain.)
following day: "Stop drinking the water furnished by the Sioux Falls waterworks! Typhoid fever of a virulent and malignant type prevails now in the city and is spreading in an alarming manner. Three new cases have been developed within the last twenty-four hours in the practice of the writer, who is one of the sixteen physicians in this city. He is firmly convinced that the disease in these instances is due to poison in that water, because out of ten cases which have come under his notice there is not one in which the patient has not habitually used that water for drinking."

Although the Sioux Falls Daily Press acknowledged its obligation to make Brown's warning public, calling it a "serious matter" and recommending it be "promptly attended to," The Press backhandedly pointed out that it had previously investigated the question of contaminated water and said, "One of the most eminent physicians in the city assured the reporter that the disease prevails as widely among households using well water."

Intent on minimizing the acceptance of Brown's warning, The Press's initial attending to it consisted of a poll of other Sioux Falls doctors to see if they agreed with Brown. On Feb. 5, 1885, The Press reported: "There was not a single physician whose experience or judgment corroborated the conclusions reached in the card which had been printed."

Moreover, the same article suggested Dr. Brown was retreating from his original pronouncement, now stating, "...that he would not attribute the disease primarily to this water..." but rather to the winter cholera leaving patients susceptible to the "special poison" which produces typhoid fever.

It is unlikely Brown had recanted his warning and The Press's reporting was almost certainly a distortion of his remarks. In addition to his other character traits described above, Brown was known as "...active and interested in the welfare of the society," and he plausibly concluded that further debate in the public press was a doubtful path to the truth. His subsequent caseload bore out his original observations: all but nine of the patients he reported "...lived, worked or often visited where the general water-supply was used..." and "No case of this fever could be traced unmistakably to persons who drank only well water." He was a careful observer, but when his warning was published, he had only his conclusion that city water was the source; he was not aware of how the water was contaminated. During the month of February he doubtless expanded his investigations into the origin of the contamination, for the City Council minutes of Feb. 26, 1885 record both his request to the mayor for an investigation and a lengthy and spirited discussion about the water supply. Brown himself, along with Drs. Germain and Morgan and "...about 30 citizens were present." The Press continued to deny – in the face of criticism from other newspapers about its coverage of the epidemic in general – a problem with water works water. It reported "...the agitation of the question of its purity..." increases citizen dread of typhoid and prejudices a fair hearing for the water works "...which justice demands they should have." Newspaper bias was not restricted to defense of the water works, but extended to mocking the establishment by the city of, effectively, a typhoid hospital on "...Tenth street just back of Major Free's house..." (Figure 3).

The disagreement with his medical colleagues, an unsupportive public press, active denials of a problem from the superintendent of the water works and probably embarrassment of the City Council conspired to make Brown's "agitation" quite unpopular. Official resistance to his claims faltered after the death of 32-year old council member, Charles Scarff Bowen, from typhoid fever.

Figure 3. The Commercial House housed 12 people with typhoid and emptied its sewage into the Big Sioux River. (Retouched photograph of an original image. Used with permission of The Siouxland Heritage Museums, Sioux Falls).
QuitLine works even better for spit tobacco users.

In 2013, 300 spit tobacco users signed up for QuitLine services, and 55% reported no tobacco use 7 months after completing our program.

Compare that to 43.2%, the 7-month quit rate for smokers in 2013.

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Just something to chew on, in case you didn’t already know...

Know the facts.
halfway through February, and the City Council began to take Brown much more seriously. On Feb. 27, 1885, the City Council held a special meeting. Brown argued that a general impression that the matter should be investigated thoroughly before condemning the works. While the first public indication that “river water” was the source of the water works’ supply (see Epilogue), it was a critical element in Brown’s epidemiologic work as well as the creation of a safe public water supply in Sioux Falls.

Possibly a reflection of The Press’s continued bias, the newspaper finally shared, on March 1, 1885, a statement made at that same Feb. 27, 1885 special City Council meeting by Superintendent Purdy of the water works, requesting the Council close all private hydrants and “...advised those using the water to stop it until the excitement had subsided.” Less than a week thereafter, the City Council had confirmed not only the mechanism of contamination, but accused the water works of a significant misrepresentation. The City Council, on March 6, 1885, disclaimed: “...any knowledge of the fact that the water furnished by the water-works system was taken from the river near the mill dam, as they contracted for pure water and earnestly request all parties to discontinue the use thereof for domestic purposes at present.”

Brown’s April 1885 description of the epidemic summarizes the evidence he produced that prompted the Council’s action. His observations were confirmed by “...men of the highest standing [who] boldly declared that although the company had published it in the papers that they derived their supply of water from a large well in which there was a living spring of pure water, they found that no water had been taken out of the well belonging to the water-works since winter began, and that there appeared to be no connection between this well and the system whatever. And, finally, the superintendent of the water-works admitted in my presence to the city council that the company was in the constant habit of pumping water into its mains and distributing it for drinking purposes to the unsuspecting people of Sioux Falls, from a point in the river on the same side and a few yards below the open mouth of a sewer which drained a hotel where typhoid fever was raging fiercely...”

Figure 4 is a map of Sioux Falls in 1888 (but the locations of buildings and the course of the river were the same then as they were in 1885). It generally illustrates what Brown had discovered: a municipal water intake downstream from a sewer. In addition to private business sewer lines, city sewer lines emptied directly into the Big Sioux River at both Seventh and Eighth Streets, thus also upstream from the water works intake. The possible location of the line from the Commercial House is suggested because of the close proximity (“a few yards”) of the sewer opening and the water intake indicated in Brown’s report. Other hotels housing typhoid victims and sharing sewer lines were located near the Commercial House: the European Hotel (seven cases) was just across the street; Merchant’s Hotel (eight cases) was one and a half blocks north on the Sioux River.

Figure 4. A section of Sioux Falls in 1888 from Phillips Avenue east including Seventh and Eighth Streets showing the locations of the Sioux Falls Water Company and the Commercial House (dashed rectangle). The black line near the mill pond indicates the dam; the inferred locations of both the water company intake and the Commercial House sewer are indicated. (Photo annotated and digitally modified from the original. Courtesy of The Siouxland Heritage Museums, Sioux Falls.)
same street; and the Cataract House (seven cases) one and
a half blocks south.

The City Council must have still been influenced by those
who maintained typhoid’s origins in general filth, since, at
the same meeting where it denied foreknowledge of the
city’s water source, it recommended removal and abate-
ment of the Jackson & Smith slaughterhouse. Three days
later, the City Council entered into an agreement with
Jackson and Smith to clean up the slaughterhouse property
and discontinue slaughtering there.  

As a sign that Brown’s views were part of a new dawn in
public health, though, the Council adopted an ordinance
forming a Board of Health on March 24, 1885.  

By the end of March, the man responsible for building the
water works, W.S. Kuhn, promised prompt installation of
improved filters and disingenuously declared “...he would
rather shut down the works than give our people
unhealthy water...” The news account of Kuhn’s actions
is somewhat unclear: it describes the water works drawing
water from a well, but says the water is filtered through
several yards of gravel “…between the river and that reser-
voir...” It was, nevertheless, “off color.” It would appear,
then, at the close of the epidemic, the river, and not a
spring-fed well, remained the source of Sioux Falls water.

Although it took two months to gain general acceptance,
Dr. Brown’s dire warnings and epidemiologic conclusions
were shown, in the face of substantial opposition, to be
accurate. They were not heeded in time to thwart the epide-
mic. There remained those who, for reasons that today
remain speculative, would not accept Brown’s work, and
the next year Brown would face a final challenge.

In April 1886, at a meeting of the Minnehaha County
Medical Society, Dr. C.A. Gray “read a paper without
title, which he said was in refutation of statements made
in a paper by S.A. Brown....which paper attributed an out-
break of typhoid fever to the pollution of the supply of the
S.F. Water Company.” Dr. Gray appears to have been at
odds professionally with Dr. Brown.  

Gray denied infectious material was conveyed through the
Water Company pipes citing authorities who asserted that
typhoid was due to “…turning up the earth, and to removing
filth from the surface of the earth, exposing the saturated
soil to the air. “ While acknowledging “germs of typhoid
fever,” he believed they contaminated air and well water
and were the same as those germs responsible for intermit-
tent fevers. He reported that of his typhoid patients,
unlike Brown’s, only 10 percent had consumed hydrant
(water works) water, and, even in those, denied the water
as a source of the disease. Finally, he pointed out – with-
out supporting documentation – that several families had
used hydrant water through the winter and no one in
these families became sick.

Gray’s experience and that of Dr. Morgan (see below)
were offered publicly at the Feb. 26, 1885 City Council
meeting. While typhoid cases independent of a water
works origin unquestionably occurred, only Brown could
document specifically the locations of his cases which
accounted for the vast majority of those in the city.

At the end of Gray’s presentation, Brown asks for accept-
ance of 18 propositions about typhoid, its spread through
contaminated water or food, and the specific details of the
Sioux Falls outbreak, including its source through water
works water. The other five physicians present agreed
with each statement, except that Dr. Morgan reported
typhoid patients without access to hydrant water and
Dr. Gray reiterated that only 10 percent of his patients
drank hydrant water. There was no recorded disagreement
with the proposition that water works water was the
source of the outbreak.

Sioux Falls physicians’ response to the 1884-1885 typhoid
epidemic is a portrait of American plains medicine worthy
of Harvey Dunn, had he chosen to paint the theme. Doctors
cared for patients wherever they fell ill, mostly in
hotels and homes; there were no general hospitals;
scientific advances, largely European, were slow to reach
Dakota Territory; older concepts of “miasmas” and “general
filth” informed the approach to infectious disease; and
notions of disease that guided practice quite often

26. 21 April 1885, Minutes of the City Council, City of Sioux Falls Territory of Dacotah, #2, p. 212. The first Health Officer was Dr. S. Olney, a charter member of the Dakota Medical
Society. Running for the position against Dr. Brown, Olney won 6 to 1 in a City Council vote. Brown was probably later “forgiven” since he served subsequently as Health Officer (see
footnote 9).
27. Sioux Falls Daily Press, 26 March 1885.
28. 5 April 1886, Minutes of the Minnehaha County Medical Society, SDSMA Digital Archive. Gray would soon leave Sioux Falls. His partner, Tufts, would become Brown’s partner after
Gray’s departure.
29. The Minnehaha County Medical Society minutes for 1886 record Gray’s presence through July; thereafter he is not mentioned. Tufts, in his historical sketch of the Minnehaha
Medical Society, erroneously reports Gray’s departure in 1885. Gray never joined the Dakota Medical Society and his partner, Tufts, joined only in 1889.
30. In January 1885, only about half of local physicians were members of the Society. Non-members were either uninterested or sometimes were engaged in open conflict with existing
members so that an invitation to membership was not forthcoming.
31. John C. Morgan came to Sioux Falls in 1873, a 1869 graduate of Rush Medical College. A founding member of the Dakota Medical Society, he was its 4th president at the time of this
meeting. Morgan reported in 1880 five penitentiary cases of typhoid, one fatal, among the inmates (First Biennial Report of the State Board of Charities and Corrections for the State
of South Dakota for the Years 1889-1890, p. 59). Morgan noted, in addition to all penitentiary cases, other cases of typhoid in the city were associated with a stone quarry, but his
investigations went no further.
reflected the unsupported beliefs of the individual practitioner and not objective evidence. Those who understood the evolving ideas of their times were frequently disavowed, while many acknowledged “eminent” doctors held sway, both in the sickroom and in public forums, on the basis of reputation rather than ability.

The epidemic underscored issues of public health involving not only the medical profession, but elected officials charged with a broad public trust and individuals and corporations upon whom promises the public was asked to rely. Samuel Brown’s care for his patients, his community and, ultimately, his colleagues and his profession exposed a hornet’s nest of misinformation, professional conflict, and perhaps even fraud. Brown never wavered, and South Dakota is today the better for it.

Epilogue

The actual contract for municipal water, between the City of Sioux Falls and W.S. Kuhn, signed on April 9, 1884, dealt much more with fire hydrants than with water purity. In the contract itself, the water source is not mentioned and “pure” water is not defined.

According to one history of Minnehaha County, there was general understanding from the beginning that water would be taken from the river, an understanding different from Brown’s report of the epidemic and disavowed by the City Council in March 1885. However, in a letter to the Engineering News and American Contract Journal published Nov. 22, 1884, Kuhn was specific about the origin of the water supplied to Sioux Falls: “Our water supply is pumped from a large well above town, the well is thirty feet in diameter and is supplied by a large living spring: from this well the water is pumped into a large tank or stand pipe that holds one hundred thousand gallons of water and is one hundred and ten feet above the business streets.”

The “general understanding” Bailey reports aside, it appears that the citizens of Sioux Falls were seriously misled about the source of their water. Kuhn was never held accountable for his role in the epidemic or the deaths that resulted therefrom.

Sioux Falls eventually decided to build and maintain its own water works (1901), an action that would involve considerable litigation among the city, Kuhn, banks and even private individuals extending into the early 1900s. The legal wranglings were finally settled by the U.S. Supreme Court in favor of the City of Sioux Falls.

Acknowledgement

The assistance of Kari R. Kohlhoff, Adam Nyhas and Bill Hoskins from the Siouxland Heritage Museums, the staff of the Sioux Falls Public Library, Main Branch, and Ms. Elizabeth Thron of the Center for Western Studies is gratefully acknowledged. The work of Nacolas Gau, MSIV, at the Sanford School of Medicine in digitizing cemetery records of Mt. Pleasant Cemetery in Sioux Falls confirmed the cause of death of City Councilman Bowman.

About the Author:

Henry Travers, MD, FACP Clinical Professor of Pathology, University of South Dakota Sanford School of Medicine.

32. 9 April 1884, Minutes of the City Council, City of Sioux Falls, Territory of Dacotah, #2, p. 114-118. Courtesy of the Siouxland Heritage Museums.
34. Brown contended the water company (probably through Kuhn, its spokesman) published a well-water source in the newspapers. Unfortunately, copies of THE PRESS earlier than January 1885 are not available to confirm this (see also footnote 32).
36. Kuhn communicated with the council or appeared before it between 3 April and 22 April 1885. He repeatedly stated he would honor the contract with the city, but was not further forthcoming. At its meeting on 1 May 1885, the City Council refused to pay a water works bill of some $750 for “failure to fulfill contract” (1 May 1885, Minutes of the City Council, City of Sioux Falls Territory of Dacotah, #2, p. 215). Courtesy of the Siouxland Heritage Museums.
37. Available, but incomplete and unpublished, Sioux Falls cemetery records from 1885 suggest about 5-10% of typhoid victims died during the epidemic, most in February.
38. The Court held that federal courts had no jurisdiction on the issues raised by the plaintiffs that had already been decided by the South Dakota Supreme Court (Sioux Falls v Farmers’ L&T Col, 1905, 136 Fed. 721, 69 C.C.A.).
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MARKETPLACE
As this is written, snow has recently fallen on the western front and high school athletes are braving torrid conditions throughout the state, so my “Happy Spring” opening in last month’s article was obviously premature…but well-intentioned. Hopefully this finds you finally enjoying some nice weather and/or recent vacation opportunity.

Our quality focus topic this month is diabetes, a ubiquitous disease which impacts just about every medical/surgical specialty. The American Diabetes Association (www.diabetes.org/diabetes-basics/statistics) estimates that as of 2012, 29.1 million Americans, or 9.3 percent of the population, had diabetes and another 8.1 million were undiagnosed. For South Dakota, approximately 9.5 percent (~58,000) of adults have been diagnosed with diabetes. In addition, 86 million Americans age 20 and older had prediabetes, up from 79 million in 2010. The South Dakota Diabetes Coalition (www.sddiabetescoalition.org) estimates that of the ~35 percent of South Dakota adults with prediabetes, only 4.8 percent have been told of their prediabetes status. Obviously identification and aggressive education of this population is paramount for both of us.

I would be remiss to not include the most recent (2012) condition-specific cost data for diabetes:

- $245 billion: Total costs of diagnosed diabetes in the U.S.
- $176 billion for direct medical costs
- $69 billion in reduced productivity
- After adjusting for population age and sex differences, average medical expenditures among people with diagnosed diabetes were 2.3 times higher than what expenditures would be in the absence of diabetes.

So knowing this, how have South Dakota physicians been performing in the last year of managing DAKOTACARE members with diabetes? Below are relevant HEDIS measures for Type 1 and 2 diabetes care for the vast majority of our covered lives. Please keep in mind this data relies heavily on claims data, so if we do not receive a properly completed claim form for a diabetic member, the service may not be captured in Table 1 on the following page.

Some points of clarification and observation regarding the analytic in Table 1:

1. Since this data aggregates fully-insured (HMO/individual) and self-insured (including South Dakota State Employee Health Plan members) members covered by DAKOTACARE, it represents a high-level “snap shot” of population health coordination performed by you and your clinic.

2. We don’t have many pediatric diabetics who meet the measure requirement, but with the recent growth of our IND population we expect that to increase over the next year.

3. The National Standard(s) comparators are derived from an aggregate of ~16 million commercial lives.

4. This report does not assess over-utilization of care services, which is an under-studied and less-recognized “health care resource waste” matter which requires additional research. DAKOTACARE plans to study this issue in further detail and report back via this publication with their findings.

5. The design of a group’s plan benefits plays an integral role in improving quality scores. One of our self-insured clients has a robust benefit for encouraging their membership to obtain annual retinal screening exams which increased measure compliance ~40 percent. I am reminded regularly that patients/members sometimes require aggressive incentives to obtain care that their physician recommends, even if there is no cost share on the individual’s part.

6. The bottom five measures, each with less than 100 members, represent a recent pilot project DKC has undertaken to obtain enhanced biometric data in order to better measure quality. It is a relatively small number, but the results appear favorable on the outcome results.
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for this sub-population. This is an early step on our part to look at quality outcomes rather than quantity measures. It is expected as the health information exchange (AKA, HIE) process matures, this type of data will become more readily available to health care providers.

Overall, South Dakota is blessed with a very compliant patient population. I believe this is partly our culture and heritage, but also is related to the trust they have put in you, their physician. I thank you and your staff for your diligence in caring for DAKOTACARE members! As always, I appreciate feedback (negative or positive) from all readers. I can be reached at paul.amundson@dakotacare.com.

Side note for music aficionados: in honor of the legendary B.B. King, consider listening to his collaborative work with Eric Clapton “Riding with the King.” I hope to see you this summer at Jazz Fest July 16-18 at Yankton Trails Park in Sioux Falls.

### Table 1.

<table>
<thead>
<tr>
<th>Rule</th>
<th>Member</th>
<th>Observed</th>
<th>Benchmark</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient(s) 18 - 75 years of age that had a HbA1c test in last 12 reported months.</td>
<td>2,380</td>
<td>95.55%</td>
<td>72.40%</td>
<td>23.1%</td>
</tr>
<tr>
<td>Patient(s) 18 - 75 years of age with a LDL cholesterol in last 12 months.</td>
<td>2,380</td>
<td>81.55%</td>
<td>68.06%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Patient(s) 18 - 75 years of age that had an annual screening test for diabetic retinopathy.</td>
<td>2,380</td>
<td>41.22%</td>
<td>38.63%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Patient(s) 18 - 75 years of age that had annual screening for nephropathy or evidence of nephropathy.</td>
<td>2,380</td>
<td>82.86%</td>
<td>72.36%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Patient(s) 5 - 17 years of age that had a HbA1c test in last 12 reported months.</td>
<td>28</td>
<td>100.00%</td>
<td>68.00%</td>
<td>32.0%</td>
</tr>
<tr>
<td>Patient(s) 18 - 75 years of age with lab results that have evidence of poor diabetic control, defined as the most recent HbA1c result value greater than 9.0%</td>
<td>65</td>
<td>87.69%</td>
<td>88.13%</td>
<td>-0.4%</td>
</tr>
<tr>
<td>Patient(s) 18 - 75 years of age with lab results that have evidence of good diabetic control, defined as the most recent HbA1c result value less than 7.0%</td>
<td>54</td>
<td>57.41%</td>
<td>34.07%</td>
<td>23.3%</td>
</tr>
<tr>
<td>Patient(s) 18-75 years of age with lab results with most recent HbA1c result value less than 8.0%.</td>
<td>60</td>
<td>78.33%</td>
<td>63.98%</td>
<td>14.4%</td>
</tr>
<tr>
<td>Patient(s) 18-75 years of age with lab results with most recent LDL result &lt; 100 mg/dL.</td>
<td>43</td>
<td>74.42%</td>
<td>59.30%</td>
<td>15.1%</td>
</tr>
<tr>
<td>Patient(s) 18-75 years of age with lab results with most recent LDL result &lt; 130 mg/dL.</td>
<td>43</td>
<td>86.05%</td>
<td>80.67%</td>
<td>5.4%</td>
</tr>
</tbody>
</table>

“DAKOTACARE Update” is a monthly feature sponsored by DAKOTACARE, the health care plan of the South Dakota State Medical Association. For more information about DAKOTACARE, visit www.dakotacare.com.

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SDBMOE Board News

By Margaret B. Hansen, PA-C, MPAS, Executive Director,
South Dakota Board of Medical and Osteopathic Examiners

About the Board

The South Dakota Board of Medical and Osteopathic Examiners (SDBMOE) protects the health and welfare of the state’s citizens by ensuring that qualified medical health care professionals are licensed to practice in South Dakota.

The Board licenses and regulates over 9,000 licensees within 13 different medical professions:
- Advanced Life Support Personnel
- Athletic Trainers
- Genetic Counselors
- Dietitians/Nutritionists
- Medical Assistants
- Physician Surgeons
- Medical Corporation or Limited Liability Company
- Occupational Therapists
- Occupational Therapy Assistants
- Physical Therapists
- Physical Therapist Assistants
- Physician Assistants
- Physician Assistant Corporation or Limited Liability Company
- Respiratory Therapists

Advisory Committees to the Board represent the following professions:
- Advanced Life Support Personnel
- Athletic Trainers
- Genetic Counselors
- Dietitians/Nutritionists
- Occupational Therapists
- Physical Therapists
- Physician Assistants
- Respiratory Therapists

The Board supports and promotes the Health Professionals Advocacy Program (HPAP) which administers a program to advocate for, and monitor, the recovery and/or rehabilitation of impaired licensees. Visit www.mwhms.com/hpap.html for more information.

The Board has been authorized by the South Dakota Legislature to establish regulations by proposing legislation or adopting administrative rules. The current proposed administrative rules can be accessed on the Board’s website at http://sdbmoe.gov/ (see screenshot).

The Board meets quarterly, or more often as needed, and the meetings are open to the public. The meeting agenda is posted to the Board website, sdbmoe.gov, and on the front door of the Board office building.

The Board has nine volunteer members: six allopathic physicians, or doctors of medicine (MD), and one osteopathic physician, or doctor of osteopathic medicine (DO), and two non-physician or lay person members (defined in statute as “…users of the services regulated by the board. One lay member may be a nonphysician health care professional licensed by the board”). All of the Board members are appointed by the governor and may serve on the board for a three-year term with the possibility of two reappointments for a nine-year total term limit.

All final decisions are made by the full Board. The Board uses advisory committees, panels, and the board staff to assist with recommendations for final decisions. The advisory committees are approved by, and assist, the full Board. The Board employs a professional staff comprised of an executive director and support staff to assist the Board in the regulation of its licensees.

The Board is an agency administratively assigned to the South Dakota Department of Health. The Board does not receive a general fund appropriation. It is funded solely by the fees collected.

SDBMOE Board News is a monthly feature sponsored by the South Dakota Board of Medical and Osteopathic Examiners. For more information, contact the Board at SDBMOE@state.sd.us or write to SDBMOE, 101 N. Main Avenue, Suite 301, Sioux Falls, SD 57104.
Joe was a middle-aged guy, smart and full of personality. He had developed Hodgkin's lymphoma a number of years back, had chemotherapy and radiation to his chest as part of his treatment, which successfully shrunk the malignant lymph nodes there, and brought him back to a normal cancer-free life.

Recently he had been waking up in the night feeling like he was suffocating. He told me he would go to the window, throw open the sash, and breath in the cool autumn air to get relief. For a week now he found that he was more comfortable sleeping in the recliner. He had also noted that he had been having trouble walking any distance and he got short of breath just coming up from the basement.

On exam, as I listened to his lungs I could hear crackles, and as I listened to his heart I noted it was beating 100 times per minute sounding like a horse galloping. His neck veins seemed distended and there was swelling of his ankles. He wondered if there was something wrong with his lungs.

The problem was not with his lungs, but rather with his heart. Although the name for his condition is called congestive heart failure, I think the word failure sounds too doomed and guilt-ridden. I would rather it be called heart weakness instead, because we have treatment to remove the excess water, ease the load on his heart, and there shouldn’t be doom or guilt about it.

Normally blood returns to the heart from veins into that mighty pump as it fills and dilates during the relaxation phase. When the heart squeezes, the entrance valves slam shut, and the only way out is past the exit valves. Repeating this cycle with relax-then-squeeze past one-way-valves, the heart pump pushes blood out to supply every cell with the oxygen and nutrients needed to flourish.

Causes for heart weakness are myriad including long standing high blood pressure, blockage of coronary arteries, a life-time of excessive alcohol or inadequate nutrition, viral infections of the heart muscle, valves that leak or are too tight, and the list goes on.

Joe's heart was weak partly from radiation injury and probably from a viral infection. Just the right balance of medications gave him relief and hope for a future.
Recently, the Centers for Medicare & Medicaid Services (CMS) released the 2014 Quality Improvement Organization (QIO) Program Progress Report. The report highlights how QIOs are working in collaboration with providers, partners, and stakeholders in meeting the goals of providing high quality health care to Medicare beneficiaries. Highlighted in the report are the recent changes to the QIO program that I’ve mentioned earlier in the year, and more specifically SDFMC’s partnership with Great Plains Quality Innovation Network. If you would like to read the entire report, please visit http://qioprogram.org/progress-report.

Our work remains local, helping local providers, home health agencies, nursing homes, and countless other providers decrease health disparities through quality improvement initiatives. Our efforts are being realized as we have successfully recruited over 600 health care providers across the four-state region of North Dakota, South Dakota, Nebraska and Kansas. Since August 2014 these quality improvement partners have continued to grow, and Great Plains Quality Innovation Network has collaborated to bring 410 community partners and stakeholders together to form a Learning and Action Network. These Learning and Action Network members have made the commitment to join us as we work together to implement data-driven quality initiatives to improve healthcare.

We offer technical assistance, tailored education, best practices, and tools and resources, and intend to improve patient safety, reduce harm, and improve clinical care at the local and regional levels. Our work under the 11th Scope of Work is under way. To learn more, please visit www.greatplainsqin.org.

Recent News

Great Plains Quality Innovation Network was recently awarded a contract with CMS to improve immunization rates in our region. The focus of this task is on improving the assessment and documentation of Medicare beneficiary immunization status, increasing overall immunization rates, and reducing the immunization disparities. This work also supports the National Vaccine Advisory Committee Standards for Adult Immunization Practice and the adult immunization recommendations of the Advisory Committee on Immunization Practices. By 2019, to align with the Healthy People 2020 goals, there will be national absolute immunization rates of 70 percent for influenza, 90 percent for pneumonia and 30 percent for zoster, and reduction of disparities among racial and ethnic minorities, rural Medicare beneficiaries, and dual-eligible Medicaid and Medicare beneficiaries.
**Member Updates Needed for the 2016 Directory**

The SDSMA staff is in the process of developing the 2016 Member Directory. Over 2,500 copies are produced and distributed annually and provided to all members. Directories are also purchased by health-related agencies and referral organizations across the region. This is a widely-used and often-referenced publication with continuous use throughout the year.

Your help is needed to ensure the member profile information listed for you in the directory is accurate and your photo is current. Update your information today by logging onto the SDSMA website at sdsm.org. Select Update My Profile and review and update your contact information for home and office as well as upload a current professional photo or headshot.

Any questions about the directory or updating your information, please contact Laura Olson, Director of Administrative and Member Services at 605.336.1965 or lolson@sdsm.org.

**Source:** SDSMA staff

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**ICD-10: Preparing for Implementation**

A conference call to help prepare physicians for ICD-10 will be held at 12:30 p.m. June 18.

Strategies will be presented and resources will be provided, including information on the ICD-10 Section X for new technologies, which will be used by hospitals. A question and answer session will follow the presentations. The audio recording and transcript will be provided after the session.

Visit www.eventsvc.com/blhtechologies to register for the session.

The ICD-10 implementation begins on Oct. 1. The webinar is presented by the Center for Medicare and Medicaid Services' Learning Network.

In addition, the South Dakota Medicaid website at http://dss.sd.gov/medicaid provides regular ICD-10 updates and answers to frequently asked questions. South Dakota Medicaid is also asking providers to complete its Provider Readiness Survey which can be found at http://dss.sd.gov/medicaid/providers/icd10.aspx. The survey results will be used to assist providers with readiness activities and additional resources. Physicians who wish to receive emails from the South Dakota Medicaid listserv can also sign up on the South Dakota Medicaid website.

**Source:** South Dakota Medicaid and CMS
The Office of the Inspector General (OIG) within the Department of Health and Human Services (HHS) has announced that multiyear audits of physician compliance with the meaningful use program are underway nationwide.

The OIG random selection of physicians is already in progress. The audits probe physicians’ reports of attestation to meaningful use going back to 2011. According to South Dakota HealthPOINT, the audits are aimed at determining whether Medicare and Medicaid incentive payments were appropriately claimed relative to program requirements and to assess the Centers for Medicare and Medicaid Service’s actions to remedy erroneous.

Source: HealthPOINT and Healthcare Informatics

"The Issue Is" is the SDSMA’s monthly update on key policy issues of importance to physicians.

SDSMA Rep Attends the U.S. Pharmacopeial Convention

E. Paul Amundson, MD, represented the SDSMA at the U.S. Pharmacopeial Convention (USP) April 22-24 in Washington, D.C. While at the convention, Dr. Amunson met with and networked with pharmacy and medical colleagues within many disciplines who are passionate about maintaining and preserving the quality of pharmaceutical products manufactured not only in the U.S., but globally. The last convention met in 2010, and since has branched out to develop laboratories for testing in China, India, Ghana and Ireland.

Attendees heard from the U.S. Food and Drug Administration’s (FDA) Howard Sklamberg, who stated that the FDA is working closely with regulators and state boards of pharmacy to adopt USP standards. Robert Wah, MD, president of the AMA, emphasized the importance of working with USP on quality and safety of drugs, biosimilars, dietary supplements, and herbal medicines. He reminded us that global health is threatened by the prevalence of substandard products and many organizations can work with USP on its important activities to fight counterfeits. As drug costs spiral upward – particularly for biologics – Dr. Wah said he looks forward to seeing more discussion on this challenging topic.

In addition to electing new USP leadership for the next five-year cycle and keynote panel discussions on global public health and biologics, 11 resolutions were adopted. The resolutions can be accessed directly at www.usp.org/2015-convention.

Source: SDSMA staff

Legal Brief Highlight: Sterilization

Sterilization may be performed only after receipt of informed consent directly from an adult patient competent to give that consent. Special considerations exist for performing a sterilization procedure on a minor; specifically, the physician should determine if the minor is competent to give consent, obtain consent from the minor’s parent or guardian if the minor is competent and the court if the minor is incompetent, and not perform procedures that are not medically-necessary. Reimbursement by third-party payors depends upon the coverage provided by the payor. Specific rules and timelines apply when seeking reimbursement through Medicaid.

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

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June 2015
Tim M. Ridgway, MD, Sworn in as SDSMA President

Tim M. Ridgway, MD, FACP, became the 134th president of the South Dakota State Medical Association (SDSMA) on May 29, 2015. Dr. Ridgway has been a member of the SDSMA since 1993.

Dr. Ridgway is dean of faculty affairs and associate professor of medicine at the University of South Dakota Sanford School of Medicine (SSOM). His responsibilities include coordination and engagement of the school’s clinical faculty, directing faculty development activities, and serving as the Sioux Falls campus dean. He also maintains an active practice in gastroenterology, serving as director of endoscopy at the Veterans Administration Hospital in Sioux Falls.

Dr. Ridgway has been involved in the leadership of organized medicine in South Dakota for several years. Prior to becoming SDSMA president, he held offices within the SDSMA’s Executive Committee, served as a councilor and alternate councilor on the SDSMA Council of Physicians, was a member of the Committee on Medical Education and Committee on Communications, and served on several task forces. He has also volunteered for the SDSMA’s advocacy efforts during state legislative sessions by participating in the SDSMA Doctor of the Day program.

In addition to the SDSMA, Dr. Ridgway is a member of the American Medical Association, the American College of Gastroenterology, the American Society of Gastrointestinal Endoscopy, a Fellow of the American College of Physicians, and is a Councilor of the Alpha Omega Alpha South Dakota chapter. He was recently named the Dr. Charley F. and Elizabeth Gutch Chair in Medicine.

Dr. Ridgway received his MD from the University of South Dakota School of Medicine and completed his internal medicine residency and gastroenterology fellowship at the Mayo Graduate School of Medicine in Rochester, Minnesota.

He is married to Mary Pat Wright and has three children: Jack, Mariel and Claire.

Read more highlights from the Annual Meeting in the next issue of South Dakota Medicine.

Executive Committee Member Christopher T. Dietrich, MD, Receives AOA Honor

Christopher T. Dietrich, MD, a member of the SDSMA Executive Committee, is a recipient of this year’s Alpha Omega Alpha Honorary Medical Society as an alumnus. Left, Dr. Dietrich receives his cords from 2014-15 President David Brennan.
CME Events

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

| June 2015 |
| June 3 |
| Internal Medicine Grand Rounds |
| AMA PRA Category 1 Credit(s)™ available |
| Register online: usdssom.learningexpressce.com |

June 3

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

June 3

VA Tumor Conference
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June 4

Pediatric Grand Rounds
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June 10

Internal Medicine Grand Rounds
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June 16

Humphreys' Forum for Infectious Disease
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| June 2015 |
| June 17 |
| Internal Medicine Grand Rounds |
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June 17

Surgery Grand Rounds: Rural General Surgery – Workforce, Training and Practice Issues
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June 17

VA Tumor Conference
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June 18

Pediatric Grand Rounds
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June 23

Sioux Falls VA ACLS Course
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June 24

Internal Medicine Grand Rounds
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| June 2015 |
| June 25 |
| Pediatric Grand Rounds |
| AMA PRA Category 1 Credit(s)™ available |
| Register online: usdssom.learningexpressce.com |

June 26

VA Medical Center CME Activity
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DO YOU HAVE A CME EVENT COMING UP?
WOULD YOU LIKE TO HAVE IT LISTED HERE?

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When it Comes to Varicose Veins, Problems Run Deeper Than You Think.

Most people think varicose veins are a cosmetic problem. The blue or purple veins on your legs aren’t attractive, but they’re not serious. Or are they? We’re your team at Physicians Vein Clinics. When it comes to varicose veins, veins you see are often the LAST sign of a deeper issue such as blood clots, heart problems and worse. Early treatment is important and is often covered by insurance. Here are a few common questions:

**Question 1: How can varicose veins be a sign of bigger problems?**
Varicose veins are caused when the valves inside your veins fail. When one valve fails, it puts pressure on the next valve. The results are like a domino effect, causing more valves to fail and more varicose veins to appear. This is why early treatment is important.

**Question 2: How can you tell if there are deeper concerns?**
At Physicians Vein Clinics, our free screening includes an ultrasound to help detect venous disorders below the surface. The ultrasound allows us to see the severity of venous problems.

**Question 3: Are there other symptoms I should know about?**
Many veins lie deep inside the leg so problems can’t be seen — but they can be felt. Here are some common symptoms:

- Leg aching
- Heaviness
- Muscle cramping
- Leg fatigue
- Restless Legs Syndrome
- Ankle swelling
- Itching and burning
- Skin discoloration
- Ulcers of the skin
- Eczema to the lower legs
- Phlebitis (blood clots)

**Question 4: How are varicose veins treated?**
Physicians Vein Clinics performs conservative therapies, laser ablation, phlebectomy and sclerotherapy. All of these methods offer no downtime or hassle. Physicians Vein Clinics is dedicated to only treating vein disorders, so you’ll receive the most experienced care possible.

Schedule a **FREE SCREENING** by calling 1-800-VEIN-DOC or by visiting online at [physiciansveinclinics.com](http://www.physiciansveinclinics.com) for more information.