

October 2022

Volume 75

Number 10



South Dakota
medicine

THE JOURNAL OF THE SOUTH DAKOTA STATE MEDICAL ASSOCIATION

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WHY INDEX FUNDS DON'T WORK FOR SOME PEOPLE

MARCUS IWIG CFP®, CPA, MACC *Lead Advisor*

Index funds are popular investment tools for good reason. They are low cost, effective ways to capture market return. Choosing to use index funds is only half the battle though; you must use them correctly to truly benefit. It's kind of like buying exercise equipment. In theory, it will make you healthier but if you use it incorrectly, you can injure yourself and become worse off than before you owned it.

When individuals or institutions choose to use index or other "passive" products but make active decisions with them they may negate the benefits of that type of product. These active decisions don't often feel like they are active decisions, but they are. And, they can potentially detract from your ultimate return. Here are a couple examples:

Chasing Return – changing your allocation to put more weight in a fund that did better during the most recent period and reducing the allocation to a fund that didn't do as well in that same period.

Market Timing – trying to time when to be in or out of the market based on predictions about how the market or segments of the market will perform in the near future.

These two examples of active decisions with index, or passive, funds can lead to underperformance for the investor.

Here are some tips on how to avoid these mistakes:

- Pick an allocation based on your financial plan, something that allows you to stay invested in good and rough market cycles.
- Avoid looking at your investments too often. Be educated about the investments, and review your account. Set specific times to review it and stick to that plan. The more often you look, the more likely it is to create emotion. Here's a hint: Everyday might be too often.
- Partner with an advisor to help make investment decisions, monitor, and maintain your allocation. At Foster Group we build financial plans first and then build portfolios that support that plan. We help clients make decisions about when and why to change their investments. And when they come up, we are there to talk through fears and concerns, ultimately helping clients avoid mistakes and achieve better outcomes.

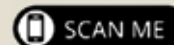
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Gun Violence – a Challenge to Public Health

Lucio N. Margallo II, MD
President, South Dakota State Medical Association

At the June annual meeting of the American Medical Association (AMA) in Chicago, the House of Delegates adopted a policy on firearm violence. In his speech, former AMA President General Gerald Harmon, MD, stated that gun violence is out of control. Enough is enough, he declared.

As physicians, we honor our oath of medical ethics (the Hippocratic Oath) which dictates and stipulates our responsibility from keeping medical confidentiality to guarding against professional corruption and maleficence that today are covered by statutes of various jurisdictions, violations of which may carry criminal and liability issues.

It behooves in this regard, that the AMA, the South Dakota State Medical Association, and individual physicians should be proactive through clinical strategies, goals, and advocacy, starting with our patients (and families), within our hospitals and clinics, as well as our community, to uphold the noble pursuit of our profession to take care of those we heal so that “they suffer no hurt or damage.”

For these reasons, we should applaud the bipartisan congressional action on firearm safety and education, and the continuing search for a greater understanding of various associated issues such as the identification of relevant risk factors, early intervention, or the epidemiology of domestic violence, mass shootings, suicides, and mental health.

The following statistics demand our serious and sober attention:

- There were 19,329 gun-violence deaths recorded in the U.S. in 2022 (the highest in more than 20 years).
- America's gun suicide rate is 10 times higher than many European countries.
- There are more than 875 million firearms in the world, according to the Global Policy Institute.
- The U.S. ranks second in terms of gun-related deaths, according to World Population Review.
- America accounts for one-third of the world's total number of gun suicides.

- There are 316 people shot in America per day.
- There were 118 school shootings in the U.S. in 2019, the highest since 1970, according to Statista.
- Black Americans are killed in gun homicides at a rate 10 times more than White Americans.
- States with stricter gun control laws have fewer gun-related deaths, according to Everytown for Gun Safety.

In June 2022, the Supreme Court allowed the carrying of firearms in public in a ruling that expands upon a 2008 decision. The new decision is certain to affect the ability of state and local governments to impose firearms regulations.

In 2019, a law was implemented in South Dakota to carry handguns without a concealed weapons permit, a move in which law enforcement agencies expressed concerns.

A recent survey of South Dakota voters found that 60 percent of registered voters favor establishing a two-week waiting period to purchase an AR-15, an 54 percent support expanding the age limit to 21 years for AR-15 purchases. The survey also found that 55 percent of South Dakota adults have guns in their homes, the ninth highest among U.S. states, according to Pew Research Center.

An ad hoc committee of the SDSMA is studying gun violence in South Dakota using a fact-driven, evidence-based approach to identify ways to help prevent injuries and deaths. In South Dakota, suicide accounts for 87 percent of firearm deaths. The committee intends to have a policy recommendation for consideration in time for the Policy Council's November meeting.

It is a fundamental Hippocratic credo that very aptly calls attention to our duty to respect and uphold our responsibilities to public health, humanity, country, and God.

Beyond Read More

Jason J. Kemnitz, EdD

It is no secret that medical students are among some of the academically smartest students in the education community. Most premed students are driven to a level not achieved by the average college student. Once the students matriculate into medical school that drive for knowledge is expected to exponentially increase, and for most students, the consumption and retention of knowledge occur naturally. Medical students at the University of South Dakota Sanford School of Medicine (USD SSOM) are among the best as evidenced by the class of 2022's STEP 1 and STEP 2 scores. USD SSOM students achieved a mean score of 240 on STEP 1 and 252 on STEP 2 as compared to the national average of 233 and 245, respectively.

The reality is that even with an above-average score a large majority of learners struggle at some point. Unfortunately, the common response to struggling students is that they need to "read more", as though consuming more knowledge will help apply that knowledge clinically. Experience tells us that reading more is only one part of a myriad of items that may help a student when they are struggling either clinically or with a knowledge base.¹ The true question is what can a busy clinician do to help a student that appears to be struggling in their clinic?

The first step is to have a conversation with your student to see what is going on in their life. If the students relate that they don't understand a concept, probe a bit deeper. You could ask if they have difficulty having time to study or having difficulty focusing on what they need to study, or even if they are anxious or lack confidence about being in clinical. Most of these issues have simple fixes. Things like creating a study plan or organizing study materials can help increase confidence dramatically.

If you think the student may have a knowledge deficit a quick verbal quiz can be helpful. Ask the student four or five fact-based questions that a student should know to be in your clinic. If they can answer them easily it may be more of a clinical reasoning deficit. If they have difficulty answering your questions, you know it's more than likely a knowledge deficit and then they do need to "Read More."

In any of these instances, you will want to offer specific feedback, rather than telling a student "Go home and read", help the student identify what their educational gap is and find a way to address that gap using a specific goal and timeframe. One of the easier ways to do this is to use



the reflective feedback conversation which can be found on our faculty development page (<https://bit.ly/3RZPTtE>). This method will help you empower the student to take control of their learning, which is the goal when developing lifelong learners.

The second step is to help the student identify a reliable source to help them close their knowledge gap. Gone are the days that you could tell a student to go read a specific textbook. A 2021 University of Michigan study² reveals that 74.9 percent of M1 Students and 85.7 percent of M3 students used some form of electronic study aid that does not include e-textbooks as a primary source of information. While this is not a problem in and of itself, the sheer volume of material available makes it difficult to identify what a reputable source may be for your specialty. The SSOM provides some assistance for a Pillar 1 knowledge bank (Kaplan) and completely provides an online resource (Online Med ED) for Pillar 2 students. Referring students to these resources is a good start.

The third step, or maybe it should be the first, is to reach out to the Office of Academic Development and Faculty Affairs, we are versed in the academic issues that both students and faculty face. Perhaps the student would benefit from a brief conversation with our full-time medical learning specialist, Paula Hawks (phawks@usd.edu) to help work through their specific situation. Perhaps you would like some information on other learning resources students can use, we are more than willing to help.

There is no doubt that our students are incredibly smart, driven, and high achievers but sometimes everyone needs a little help. As faculty, let's prepare to help students in the way that they learn best, even if that means coming out of our comfort zone. Remember, if it doesn't challenge you, it doesn't change you.

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A Survey of Eye Care Needs Among Community Health Center Patients in Western South Dakota

Derek Rohlf, MS IV; Adam Bleeker, MD; H. Carson Eisenbeisz, MD; and Ryan Scarborough, OD

Abstract

Background: Community health centers (CHCs) provide healthcare to underserved communities, including the uninsured and underinsured. Ocular disease and visual impairment affect individuals of all ages, race, and socioeconomic standing, but are disproportionately detrimental to individuals with limited access to care. The purpose of this study is to assess the need for and potential utilization of an on-site eye care clinic at a CHC in Rapid City, South Dakota.

Methods: A 22-question survey was distributed to patients 18 years and older at Community Health Center of the Black Hills (CHCBH) to gather demographic, socioeconomic, medical, and subjective interest data.

Results: A total of 421 surveys were included in the analysis. Of these, 364 respondents (87 percent) indicated being “Very likely” or “Somewhat likely” to use an on-site eye clinic at CHCBH (95 percent CI 83-90 percent). A total of 217 respondents (52 percent) endorsed a diagnosis of an existing eye condition and/or diabetes, and 215 respondents (51 percent) rated their vision as “Poor” or “Very poor.” Less than half of respondents indicated having any form of health insurance (191, 45 percent) but showed a comparably high likelihood of using an on-site eye clinic when compared to uninsured respondents, 90 percent and 84 percent, respectively. Finally, 50 (12 percent) respondents indicated being referred to an eye doctor in the past, with affordability as the most commonly cited reason for not following through with the referral.

Conclusions: Survey data indicate a medical and socioeconomic need for eye care services among CHCBH patients and a high likelihood patients would seek care at an on-site clinic.

Introduction

Vision is foundational to emotional, educational, and financial well-being. Compromised vision has social and economic implications for individuals, communities, and healthcare systems. The annual burden of vision loss in individuals under 40 is estimated to be \$38.2 billion and is significantly higher in older demographics.¹

Most causes of visual impairment are preventable and treatable.^{2,3} Routine adult eye exams help to detect ocular complications of prevalent, high morbidity diseases such as hypertension, diabetes, Graves’ disease, and multiple sclerosis.⁴ Screening in pediatric populations can reveal potentially reversible conditions such as strabismus and amblyopia.^{3,5} A 2015 screening study of children ages 6 months to 12 years in Rapid City, South Dakota, found a referral rate of 11.9 percent for ocular diseases and related risk factors.⁶

Economic, political, and geographic barriers prevent patients from accessing basic eye care services.⁷⁻⁹ Multiple studies demonstrate disproportionate rates of preventable vision loss in individuals of lower socioeconomic status and those in rural and nonwhite communities.¹⁰ In 2019, only 26 percent of privately insured individuals had access to vision care benefits, primarily through add-on, unsubsidized plans.¹¹

CHCs are federally funded outpatient facilities that function to serve the healthcare needs of the uninsured and underserved communities.¹²⁻¹⁴ To expand offerings beyond primary care, services must be made available to patients free of charge or on a sliding fee scale. Optometric services are offered by only 19-20 percent of CHC facilities.^{15,16} Those without eye care services provide off-site referrals for patients, introducing new challenges such as transportation, scheduling, and decreased Medicaid reimbursement.^{16,17} The purpose of this survey was to assess the need and potential

utilization of comprehensive eye care services by patients at CHCBH.

Methods

This multi-site, cross-sectional study consisted of a self-administered survey used to assess the importance of optometric care in CHCBH patients. The study received IRB approval from the University of South Dakota in August 2020. Prior to participation, all patients were required to provide informed consent. Data collection was conducted in accordance with the principles outlined by the Declaration of Helsinki.

Surveys were distributed to all adult patients checking in for their scheduled office visits at CHCBH and the General Beadle Community Satellite Clinic in Rapid City, South Dakota, from October 2020 through June 2021 (Figure 1). Patients who had already participated were excluded. The survey was available in English or Spanish, in “standard” or “large” font, and on paper or online via a QR code.

Figure 1. Needs assessment survey flier provided to patients when checking in for appointments.



The survey was developed by a team of University of South Dakota medical student researchers in conjunction with Northern Plains Eye Foundation and CHCBH leadership. The survey consisted of 22 questions assessing (1) basic demographics, (2) healthcare access and affordability, (3) visual and ocular health, and (4) the potential utilization of an on-site eye clinic at CHCBH (Supplemental material).

Ocular health questions were developed based upon data collected during the annual National Health Interview Survey.¹⁸ Needs assessment questions covered past medical diagnoses, subjective impression of visual quality, and limitations attributed to poor eyesight. Questions about past optometric referrals, accessibility of optometric services, and the likelihood of using an affordable eye clinic were used to gauge demand. No formal measurements of validity or reliability were performed due to the custom nature of the survey.

A single author collected and consolidated paper and online responses for data analysis. All surveys with complete demographic information and at least one additional response were considered eligible. Respondents were stratified by demographic, economic, and health metrics. A high-risk sub-population was established based on the definition by Zhang et al. This included patients that (1) were 65 years or older, (2) self-reported a diagnosis of diabetes, or (3) self-reported having an ocular disease or condition such as age-related macular degeneration, cataract, diabetic retinopathy, glaucoma, or eye injury.²

Statistical Analysis

Analysis was performed using Microsoft Excel for Windows 10 Pro (v. 21H1, Microsoft Corporation). Comparison of survey responses with 2020 CHCBH data was performed using chi-square test of independence. A p-value less than 0.05 was considered significant. A 95 percent confidence interval was calculated for key statistics.

Results

A total of 421 eligible surveys were submitted by patients over the nine-month period. The number of ineligible surveys was negligible (estimated as fewer than five). The majority of respondents identified as White or Caucasian (344, 82 percent) followed by American Indian or Alaskan Native (32, 8 percent). Race data was not available for 10 percent of CHCBH patients, which showed a smaller proportion of white patients (75 percent, $p < 0.01$) but comparable proportions of American Indian/Alaskan Native (8 percent) and Hispanic/Latino (6 percent) patients ($p = 0.78$ and $p = 0.68$, respectively). CHCBH data for patient age was comparable to survey results, with the majority between the ages 18 to 44 ($p = 0.45$) (Table 1).

While a comparable proportion of white and non-white respondents endorsed an eye condition (40 percent and 35 percent, respectively; $p = 0.41$), a significantly larger proportion of non-white respondents endorsed having diabetes (36

percent and 20 percent, respectively; $p < 0.01$). Approximately 75 percent of both white and non-white respondents said they were “Very likely” to use an eye clinic at CHCBH.

Regarding employment and income, 208 (49 percent) respondents indicated they were employed, 103 (25 percent) unemployed, and 54 (13 percent) “Unable to work.” Survey respondents unable to work indicated the strongest interest in eye care services, with 94 percent (51) responding “Very likely” or “Somewhat likely” to use an eye clinic at CHCBH compared with 82 percent (171) of employed respondents. The majority of respondents (354, 84 percent) reported annual take-home income of \$50,000 or less, most frequently between \$10,001 and \$30,000 (40 percent). Respondents with income of \$10,000 or below indicated the highest likelihood of utilizing an eye clinic at CHCBH (101, 83 percent).

Over half of survey respondents (230, 55 percent) indicated no insurance, while CHCBH data indicated only 43 percent of patients were uninsured ($p < 0.01$). Of uninsured respondents, 50 percent reported they had never had an eye exam or that it had been longer than two years since their last eye exam, as compared to only 29 percent of those with insurance. Of those without insurance, 90 percent said they were somewhat or very likely to use an eye clinic at CHCBH, compared to 83 percent of those with insurance ($p = 0.04$).

The majority of respondents rated their eyesight as “Poor” (178, 42 percent) or “Very poor” (37, 9 percent). Over half (219, 52 percent) indicated a need for new corrective lenses in the last year, but 147 (67 percent) of these indicated they could not afford corrective lenses. Of all respondents, 164 (39 percent) endorsed a history of an eye condition(s) (Table 3). Of those with previous or existing eye disease, 56 percent reported daily limitations due to eyesight. Over one-third of all respondents (150, 36 percent) met the criteria for being at high-risk of vision loss.

Only 25 (6 percent) respondents indicated they had never been examined by an eye

doctor, while 50 (12 percent) reported they had been previously referred to an eye doctor from their CHCBH provider. Regarding prior referrals, only 23 (46 percent) indicated they attended their appointment. Of those that did not schedule or attend the referred appointment, affordability was the most commonly cited reason (14, 52 percent).

Of all 421 respondents, 364 (87 percent) said they were “Very

Table 1. Characteristics of adults 18 years or older depicted by the needs assessment survey and 2020 CHCBH patient demographic data.

Variable	Needs assessment survey respondents (n= 421)	CHCBH 2020 demographic data (n= 6,498)	p-value ^a
Sex			<0.01
Male	28%	42%	
Female	71%	58%	
Prefer not to say	1%	NA	
Age, y			
18-44	54%	52%	0.45
45-64	38%	35%	0.10
≥65	8%	13%	<0.01
Race/ethnicity			
White or Caucasian	82%	75%	<0.01
American Indian or Alaskan Native	8%	8%	0.78
Hispanic or Latino	6%	6%	0.68
Unreported	NA	10%	-
Other ^b	4%	1%	-
Employment status			
Employed	49%	28%	<0.01
Unemployed	25%	24%	0.91
Unable to work/disabled	13%	6%	<0.01
Other ^c	13%	9%	0.01
Unknown	NA	33%	-
Income			
\$10,000 and below	29%	51%	<0.01
\$10,001 - \$50,000	55%	14%	<0.01
\$50,001 and above	8%	2%	<0.01
Unknown / Unreported	8%	33%	<0.01

^a calculated using Chi-square test of independence

^b Asian, Black or African American, Hawaiian or Pacific Islander, more than one race, or “Other”

^c Retired, Student, or “Other”

Table 2. Health insurance data from needs assessment survey respondents and 2020 CHCBH patient demographic data.

Variable	Needs assessment survey respondents (n=421)	CHCBH 2020 demographic data (n=6,498)	p-value ^a
Insurance			<0.01
None /uninsured	55%	43%	
Insured	45%	57%	
Insurance type	(n=191) ^b	(n=3,736)	<0.01
Private	42%	54%	
Medicare	25%	24%	
Medicaid	38%	18%	
Other ^c	12%	4%	

^a calculated using chi-squared analysis

^b The needs assessment survey permitted multiple responses to the health insurance inquiry from a single respondent. Of the 191 respondents that indicated some form of health insurance, 230 total responses were recorded.

^c State Children's Health Insurance Program (CHIP), Indian Health Service, Military, Other public or government, Other non-federal

Table 3. Existing eye disease, diabetes, and subjective eyesight and limitations among needs assessment survey respondents.

Variable	Needs assessment survey respondents (%)
<u>Existing ocular disease or previous injury^a</u>	
Yes	164 (39)
No / Unknown	257 (61)
<u>Diagnosis of diabetes</u>	
Yes	97 (23)
No / unknown	324 (77)
<u>Family history of blindness</u>	
Yes	96 (23)
No / unknown	325 (77)
<u>Subjective evaluation of eyesight</u>	
"Good" or "Very Good"	202 (48)
"Poor" or "Very Poor"	215 (51)
Did not respond	4 (1)
<u>Subjective eyesight limitations</u>	
Yes	194 (46)
No	223 (53)
Did not respond	4 (1)

^a Includes cataracts, diabetic retinopathy, eye injury, glaucoma, macular degeneration, refractive error, or "Other"

Table 4. Reported affordability and accessibility of eye care among needs assessment survey respondents.

Variable	Needs assessment survey respondents (%)
<u>Self-reported need for corrective lenses</u>	
Yes	219 (52)
No	138 (33)
Unknown / did not respond	64 (15)
<u>Affordability of corrective lenses</u>	
Yes	73 (17)
No	154 (37)
Not applicable / did not respond	194 (46)
<u>Last eye exam by an eye doctor</u>	
Less than 1 year ago	111 (26)
Between 1 and 2 years ago	137 (33)
Greater than 2 years ago	146 (35)
Never	25 (6)
Did not respond	2 (<1)
<u>Previous CHCBH referral to an eye care professional</u>	
Yes	50 (12)
Attended	23 (46)
Did not attend ^a	27 (54)
No	348 (83)
Unknown / did not respond	23 (5)
<u>Primary reason for not attending/scheduling appointment per se</u>	
Could not afford	14 (52)
Could not secure transportation	1 (4)
Skipped	4 (15)
Other or did not respond	8 (29)

^a Includes "Did not schedule an appointment" and "Scheduled appointment but did not attend"

likely" or "Somewhat likely" to use an eye clinic at CHCBH (95 percent CI: 83-90 percent), with personal eye exams and obtaining corrective lenses as the most likely services they would use. One-third of respondents (144, 34 percent) reported they would utilize a community-based eye clinic for their childrens' eye exams. Of these, nearly half (47 percent) indicated they had no insurance, and a quarter (24 percent) reported an annual take-home income of \$10,000 or less. Only 27 (6 percent) respondents indicated they were "Somewhat unlikely" or "Very unlikely" to use an on-site eye clinic at CHCBH. Only 13 (3 percent) indicated they would not use an on-site eye clinic at CHCBH (Figure 2).

Discussion

Survey respondents indicated a need for eye care services consistent with the needs of underserved populations in the U.S. Over half reported dissatisfaction with their vision, and a comparable number reported limitations in their activities of daily living due to eyesight. Over one-third endorsed a diagnosis of an eye condition, and over a third were considered at high risk for vision loss. Only a third of survey respondents with diabetes reported an eye exam in the previous year, despite the American Diabetes Association's recommendation for an annual eye exam.¹⁹ Two-thirds of those who indicated a need for corrective lenses said they could not afford them, and over half of those with a prior referral from CHCBH to an eye doctor said they did not go because they could not afford the appointment.

Survey respondents indicated an existing demand for eye care services at CHCBH. Respondents endorsing some form of health insurance, employment, and comparatively higher income indicated a strong likelihood of utilizing an on-site eye clinic. Respondents reporting having seen an eye doctor in the last year indicated a strong likelihood of using an eye clinic. Because CHCBH does not yet offer on-site eye exams, this suggests a potential preference of these respondents for receiving eye care from CHCBH, perhaps for the convenience of comprehensive care at a single location or the affordability of CHCBH services. Respondents that reported never having seen an

Figure 2a. Likelihood of utilizing an on-site eye care clinic at CHCBH among needs assessment survey respondents.

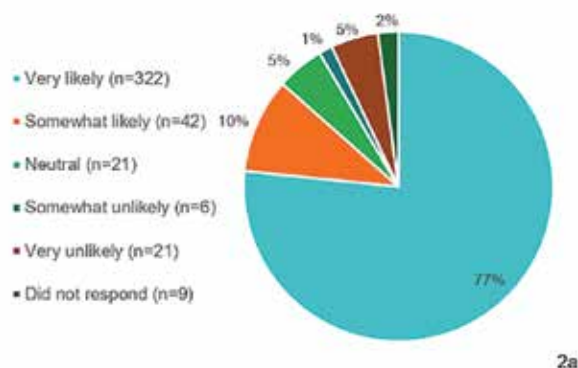
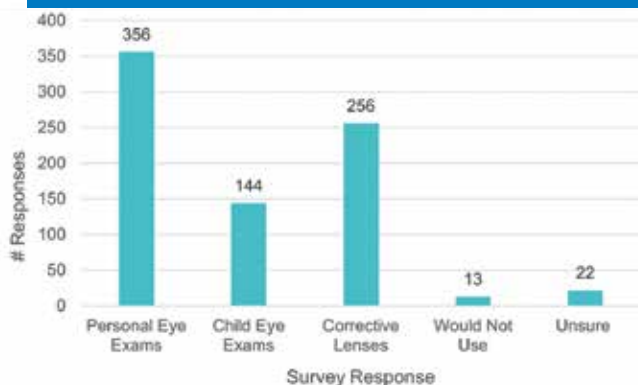


Figure 2b. Preferred services at potential eye care clinic at CHCBH among needs assessment survey respondents.



eye doctor also endorsed a high likelihood of using eye services if made available. Given these respondents were more likely than not to be uninsured, it's possible that insurance, rather than interest, is the primary deterrent to these patients receiving eye care services. Finally, the survey likely underestimates the potential utilization of visual health services for children if they were made available at CHCBH. Children and adolescents comprised an estimated 33 percent of CHCBH patients in South Dakota in 2019; however, individuals under the age of 18 were excluded from the needs survey.²⁰

Given the well-established relationship among literacy, employment, and socioeconomic status, lower income individuals are perhaps less likely to be able to complete a written survey. This could explain why a significantly larger proportion of survey respondents endorsed being employed and in higher income brackets compared to the CHCBH data. Similarly, patients with eye disease or impaired vision are perhaps more likely to engage with a survey inviting them to discuss eye care needs than those without pertinent

concerns. Conversely, a survey only offered in print or online may have limited participation from those with vision loss. Uninsured/underinsured patients are perhaps more motivated to encourage expansion of medical services that cannot be obtained elsewhere in comparison to their insured counterparts. A majority of insured patients still indicated they would utilize the services of an eye clinic if it were available at CHCBH.

This survey demonstrates that CHCBH patients have a need for eye care services and a high likelihood of using an on-site clinic provided through the existing physical and financial framework of CHCBH. Socioeconomic findings of the survey indicate a CHC is appropriate for providing these services. Expansion of the CHCBH's services to include an eye clinic is supported by the survey findings and warrants serious consideration.

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

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Facing breast cancer *as a Team*

Identifying appropriate breast cancer screening options

As a fellowship-trained breast radiologist at Sanford Health, Jamie Williams, MD, works to detect breast cancer as early as possible. Her patients sometimes react with bewilderment at their diagnosis because cancer doesn't run in their family.

"That's a myth we fight against," Dr. Williams said. "Many women who get diagnosed with breast cancer don't have a strong family history."

One in eight women will get breast cancer in her lifetime. That's what makes regular screenings vital for all women.

Breast cancer screening options

Mammograms are the most common type of screening. Women at average risk for breast cancer should have yearly mammograms starting at age 40.

Breast MRIs are the most sensitive screening option. While they're a valuable resource for high-risk women, they aren't feasible for all women due to cost and capacity.

Whole breast ultrasounds are an option for women with dense breast tissue as a supplement to their yearly mammograms.

Mobile mammography units bring 3D mammograms to women in rural areas.

"Our Edith Sanford 3D mobile mammography units that travel to rural communities have the same technology and equipment we have in our Sioux Falls breast center, so patients do not need to drive far to get the screening they need," said Dr. Williams.

Genetic testing for breast cancer

Larissa Risty, CGC, is a certified genetic counselor and helps women determine their breast cancer risk. She works with patients at Sanford Health who have a personal or family history of cancer.

Only 5 to 10% of breast cancer is hereditary and a higher portion of cancer is familial. Familial cancer isn't linked to a single gene but causes more instances of cancer in a family than expected. Genetic testing can help identify which category a cancer case falls into. This allows family members to consider appropriate breast cancer screening and risk reduction options for them.

"The best candidate for genetic testing is a woman with a personal history of breast cancer and those test results will impact testing recommendations for all her family members," said Risty.

Determining personal risk

Breast cancer risk assessments use models to determine a woman's personal risk of developing breast cancer in her lifetime. It combines several factors - her breast history, hormone history, family history and more - into one risk estimate.

The average woman has a 13% lifetime risk to develop breast cancer. Women who are calculated at 20% or above are considered at an elevated risk. These women get mammograms and breast MRIs alternating every six months.

"When patients are afraid or concerned about cancer, it can be so helpful to put their risk into perspective with a number and then develop a personalized screening plan for them," Risty said.

Getting screened

Women interested in getting a breast cancer screening should make an appointment through My Sanford Chart or by calling the Edith Sanford Breast Center at (605) 312-3455. Those interested in breast cancer risk assessments should receive a referral to the Edith Sanford Breast Specialty Clinic.

Refer your patients at sanfordhealth.org/referral-center.

Sponsored by Sanford Health.



Complex Coronary Intervention – When Time Is of Essence: Ping Pong Technique

Aditya Singh, MBBS, MD; Jackson Shriver, MD; Kevin Coy, MD; Tomasz Stys, MD, FSCAI, FACC; and Adam Stys, MD

Abstract

Coronary artery disease (CAD) continues to be a significant cause of morbidity and mortality in the U.S. The prognosis and treatment of which is dependent on various factors including type, size, localization and extent of the coronary plaque and severity of the stenosis. Management of critical ostial left main CAD poses peculiar challenges. The present case report demonstrates a unique percutaneous coronary intervention technique helpful in the management of such complex left main coronary lesions.

Introduction

Coronary artery disease (CAD) continues to be a significant cause of morbidity and mortality in the U.S. and is only expected to rise.¹ Prognosis and ultimately treatment of CAD often varies depending on the localization of the disease. In particular, ostial left main (LM) CAD occurs in approximately 1 percent of coronary angiograms² and requires specific clinical consideration given its poor prognosis and high complication risks. When performing LM interventions, it is important to consider patient comorbidities, lesion morphology (location, presence of calcification, angulation, size), and need for hemodynamic support.² The present case report describes an 83-year-old patient presenting acute coronary syndrome and critical ostial left main lesion, managed with a unique percutaneous coronary intervention (PCI) technique and hemodynamic support.

Case Report

An 83-year-old female presented to an outside hospital emergency department with the complaint of intermittent retrosternal chest pain radiating to her left arm and jaw over the past few days. This was associated with dyspnea, diaphoresis, and palpitations. On presentation, the blood pressure was 189/103 mmHg with a heart rate of 90 beats/min. The rest of the cardiovascular exam was unremarkable. Electrocardiogram (EKG) revealed ST-segment elevations of 1mm in aVR and V1 along with reciprocal ST-segment depressions in leads II, III, aVF and V4-V6. Initial troponin was 0.04 ng/ml (peak of 11 ng/ml). The patient was started on aspirin, intravenous heparin and nitroglycerin with the resolution of her chest pain and transferred to our facility for invasive management.

Upon arrival she was taken urgently for left heart catheterization, which revealed critical stenosis of the ostial LM and moderate disease of the right coronary artery (Figure 1). To unload the left ventricle, increase coronary perfusion and provide hemodynamic support an intra-aortic balloon pump (IABP) was placed via right femoral access. Echocardiography revealed a mildly reduced ejection fraction (EF) of 47 percent. Cardiothoracic surgery was subsequently consulted and the patient was deemed to be a high-risk (Society of Thoracic Surgeons score ≥ 8) candidate for coronary artery bypass grafting (CABG), hence high-risk PCI of ostial LM was performed.

Procedural Details For Percutaneous Coronary Intervention

A 6F Judkins left 3.5 (JL) coronary guide catheter via a right radial approach was used to partially engage the LM avoiding complete occlusion of the ostium. Balanced Middle Weight (BMW) and Runthrough NS guidewires were used to cross the lesion with the intent of wiring the BMW to the left circumflex artery (LCx) and the Runthrough to the left anterior descending (LAD) artery. Due to the calcification and tortuosity of the LAD neither Runthrough nor BMW could not be easily passed into this vessel, thus Prowater wire was tried with no success. Then both guidewires were positioned in the LCx. The BMW was loaded with a 4.0 x 18mm drug-eluting stent and the Prowater with a 2 x 12 mm balloon which were both parked inside the JL guide (Figure 2). The balloon was advanced into the lesion and inflated to 26 atmospheres (atm). The Prowater and balloon were rapidly withdrawn into the guide (ping) and simultaneously the stent was advanced into the lesion over the second wire (BMW) and was successfully deployed (pong), saving the time for

Figure 1. Diagnostic angiogram using Judkins left diagnostic catheter (blue arrow) demonstrating critical ostial left main occlusion (red arrow).

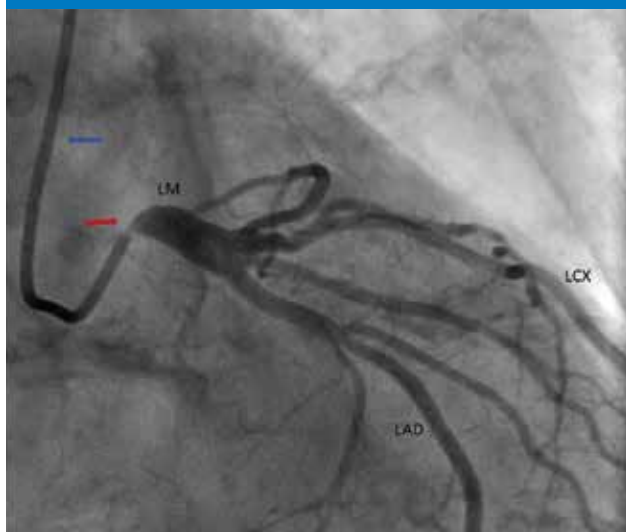


Figure 2. Demonstrating the position of coronary balloon (yellow arrow) and stent (blue arrow) within the guide catheter with corresponding coronary wires.



Figure 3. Coronary stent (blue arrow) being deployed at ostial left main, with hour glass waist demarcating the site of ostial narrowing (red arrow).

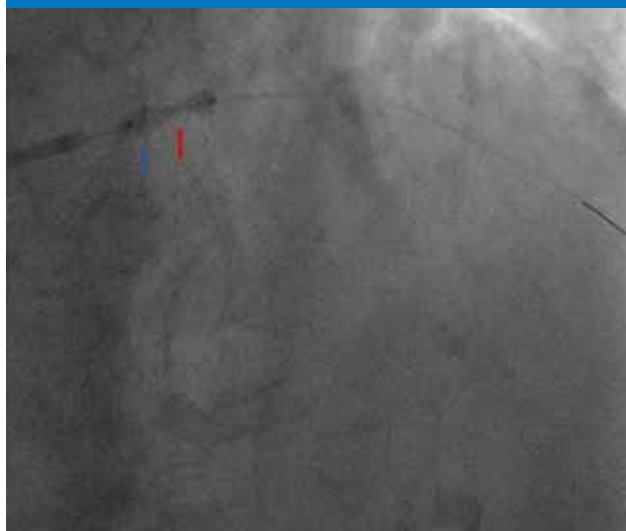


Figure 4. Final result following successful deployment of coronary stent at the ostial left main with coronary wire in circumflex artery (yellow arrow).



balloon and stent exchange (Figures 3 and 4). Postoperatively the IABP was removed in the cardiac intensive care unit and the patient was discharged home in stable condition.

Discussion

Untreated LM CAD poses a significant threat to patients with a three-year mortality approaching 50 percent.³ Revascularization is recommended in patients with greater than 50 percent stenosis with either PCI or CABG.⁴ Current ACC/AHA/SCAI guidelines consider CABG as the preferred management option for unprotected LM

CAD with a class I recommendation however PCI may be considered in patients with a high surgical risk (STS ≥ 8)⁵

With advancements in healthcare, we are frequently faced with an older and more medically complex patient for which CABG is often not feasible.⁶ Percutaneous approaches have rapidly evolved in efforts to meet this demand; however, it remains essential that a multidisciplinary heart team approach is used to establish the best modality of treatment for these complex patients. High-risk features of PCI include interventions on an unprotected LM, last remaining patent

vessel, large supplied vascular territory, on those with severely reduced ejection fraction, and on those in cardiogenic shock.⁵

Another rapidly evolving element surrounding the percutaneous management of coronary artery diseases is the use of hemodynamic support devices. Patients with the severe LM disease are at risk for rapid hemodynamic collapse during interventions as catheters and equipment may completely occlude the vessel.⁷ These devices assist in augmenting cardiac output, improving coronary perfusion and ultimately increasing the likelihood of a successful intervention.⁶

Current hemodynamic support options include the IABP, Impella, Tandem Heart, and extracorporeal membrane oxygenation (ECMO).⁸ IABP's and Impellas are the most commonly used devices largely due to their ease of use and widespread availability. Current ACC/AHA guidelines give a Class IIb recommendation for the use of hemodynamic support devices in carefully selected high-risk patients undergoing PCI.

In routine coronary intervention, the plaque modification is done with balloon angioplasty, which is followed by stent deployment, however, to do so, the balloon is exchanged for the stent over the same wire balloon angioplasty is performed. This exchange is typically benign; however, when applied to a critically narrowed LM the risk of complications is higher. Every moment spent manipulating equipment within the ostium results in an increased risk of coronary complications such as hemodynamic collapse, dissection, wire dislodgement, guide catheter displacement and exacerbation of myocardial

ischemia. The two-wire balloon stent ping pong technique is an effective means to reduce the time between balloon angioplasty and stent deployment, potentially decreasing the PCI related complications.

Conclusion

The two-wire balloon-stent ping pong technique along with the mechanical circulatory support helps limit the procedure-related myocardial ischemia and likely complications while performing complex ostial LM coronary interventions.

Find additional figures at sdsma.org.

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Safe sleep practices can save lives.



Here's how you can help:

7 OUT OF 10
INFANT DEATHS
OCCURRING
AFTER HOSPITAL
DISCHARGE were
in an **UNSAFE SLEEP**
ENVIRONMENT.

- 1** Talk to parents of newborns about the American Academy of Pediatrics' "Recommendations for a Safe Infant Sleeping Environment" before discharging them from the hospital. ForBabySakeSD.com/training/healthcare-provider-training
- 2** Every infant should have a safe place to sleep. If a family is unable to afford an approved crib, contact the **South Dakota Department of Health** at 1-800-305-3064.
- 3** To reduce the risk of suffocation and SIDS, infants should be placed on a firm sleep surface (e.g., mattress in a safety-approved crib) with a fitted sheet and no other bedding, bumper pads, or soft objects.
- 4** Soft objects and loose bedding should be kept away from infants' sleep area to reduce risk of SIDS, suffocation, entrapment, and strangulation.
- 5** Infants should sleep in parents' room, close to the parents' bed, but on a separate safe surface, ideally for the first year, but at least for the first six months of life.

2022 Scholars' Research Symposium Abstracts

Paul A. Thompson, PhD, PSTAT; Valeriy Kozmenko, MD, CHSE-A; Benjamin Aaker, MD, FACEP; Sherri D. Koch, MD, FAAFP and Candace N. Zeigler, MD, FACP

The Sanford School of Medicine (SSOM) at the University of South Dakota (USD) continues to achieve recognition in medical education. SSOM offers a rigorous and challenging curriculum to help prepare students for a medical career. Students are expected to attain academic excellence, maintain high standards of honesty, integrity, and perseverance. Students in the Scholarship Pathways Program (SPP) have the opportunity to pursue research during their four years in medical school as well as complete their academic training.

Research during medical school continues to be an area of emphasis in SSOM. A good understanding of evidence-based medicine is required for physicians in today's medical environment. Research is considered a key component of the education of the medical student, and is a subject of discussion during the interviews for residency.

SPP, now in its 15th year, gives approximately 15 students in each class the opportunity for hands-on, self-directed project experience, with the help of a mentor to provide guidance. Students design and propose a project in the areas of research, education, or service. Students work closely with mentors and the SPP administrative staff, who provide vital and important support for SPP participants. The project is completed over the course of the students' four years of medical school, then presented as a poster, an abstract (which we publish here today), and as a manuscript. Participants are encouraged to present their work in one or more medical

conferences, regionally, nationally, or internationally. SPP participants have had much success in the publication of the projects in peer-reviewed journals.

The annual Scholars' Research Symposium event is the culmination of the students' work over four years. This year was the fifth year it was held in conjunction with the Alpha Omega Alpha medical honorary society. In addition to the posters from the SPP Class of 2022, all medical students performing research were invited to apply to present other research projects.

Four outstanding SPP students were invited to present their projects formally. Nathan Blaseg (mentor: Valeriy Kozmenko, MD) implemented an interprofessional intensive care bedside rounding course. Maria Ludens (mentor: Susan Anderson, MD) created a digital initiative to improve patient health literacy. Lauren Van Hove (mentor: William Mayhan, PhD) explored cerebral arteriolar responses to a cannabinoid receptor agonist in type 1 diabetes. Hanna Wiley (mentor: Robert Santella, MD) examined kidney transplant outcomes in indigenous people.

We are again pleased to share this year's Scholars' Research Symposium abstracts and thank *South Dakota Medicine* for giving us this opportunity. If you have a research idea or would like to mentor a Scholarship Pathways student please contact Benjamin Aaker, MD at Benjamin.Aaker@usd.edu.

Vitamin D Levels and Sperm DNA Fragmentation

Elise Blaseg, MS IV | Mentor: Keith Hansen, MD

Introduction: Intracytoplasmic sperm injection (ICSI) has revolutionized the treatment of couples with male factor infertility but results remain suboptimal, suggesting the need for further investigation into the molecular biology of spermatozoa. Limitations to traditional semen analysis have brought new methods to the forefront like Sperm Chromatin Structure Assay (SCSA), which uses flow cytometry to measure sperm DNA fragmentation. Increased DNA damage in semen has been correlated with failed IVF cycles and decreased fertilization. Hypovitaminosis D has been associated with abnormal testicular function, including elevated sperm DNA fragmentation in a murine model. The objective of this study was to elucidate the possible corollary relationship between serum vitamin D

levels and sperm DNA fragmentation in males seeking infertility treatment.

Methods: This study was conducted using a prospective cohort of consenting males seeking infertility treatment at a medium sized Midwest infertility clinic. Serum vitamin D levels and semen samples were collected from each patient. Sperm samples were analyzed by semen analysis according to World Health Organization current guidelines. The SCSA was used to measure acid-induced DNA fragmentation. The relationship between dichotomous variables: alcohol use, tobacco use and BMI were examined using a chi-square test of independence. The relationship between deficient, insufficient and sufficient Vitamin D levels and sperm parameters were analyzed using an analysis of variance.

Results: Serum vitamin D levels were categorized as deficient (<20 ng/mL), insufficient (20-30 ng/mL), and sufficient (>30 ng/mL). Of the 111 patients participating, 9 were excluded leaving 102 total patients. The patients were stratified by vitamin D levels: deficient (n=24), insufficient (n=43), and sufficient (n=35). No significant relationship was found between serum vitamin D levels and sperm DNA fragmentation in males seeking infertility treatment. A lack of alcohol consumption was correlated with increased high DNA stainability, a measure of nuclear immaturity (p=0.0042). There was a significant relationship between increased BMI and deficient/insufficient serum vitamin D levels (p=0.0012).

Conclusions: Serum vitamin D levels did not have a statistically significant impact on sperm DNA fragmentation. This study further solidifies the known associations between BMI and serum vitamin D levels. Limitations of the study included number of participants, insufficient power, and time constraints. Further examination of the correlation between seminal and serum vitamin D levels as well as the impact of alcohol on sperm DNA should be explored.

Simulation-Based Interprofessional ICU Bedside Rounding Course

Nathan A. Blaseg, MS IV | Mentor: Valeriy Kozmenko, MD

Introduction: Medical schools are beginning to implement courses in interprofessional education (IPE) to prepare students for the interprofessional team-based patient care model which is becoming the standard of practice in many healthcare facilities. Students often have little exposure to multidisciplinary rounds prior to residency, and fast-paced low-capacity healthcare environments such as operating rooms and intensive care units (ICUs) necessitate providers be competent and efficient in working within interprofessional teams.

Methods: The University of South Dakota Sanford School of Medicine has developed an innovative, simulation-based ICU bedside rounding course that uses a custom-designed simulated electronic health record system that is a hybrid desktop/web-based application. After they have had the opportunity to review the simulated patient's health records on their own, healthcare students of different backgrounds complete the simulated ICU rounding with a standardized patient at the Parry Simulation Center. This activity includes students from nursing, pharmacy, respiratory therapy, physical therapy, and occupational therapy alongside medical students. Students educate one another about their scope of practice, roles and responsibilities, strengths and limitations, as well as treatment goals and associated challenges. Students receive a formative assessment based on the clinical aspects of the curriculum. In addition, their IPE skills are assessed with the use of a 360-degree assessment instrument designed to measure core IPE competencies: (1) information sharing, (2) team support, (3) learning, (4) teaching, and (5) role clarity. The course consists of two-hour sessions that include a simulation-based encounter followed by a post-activity debriefing.

Results: Average medical student IPE competency score varied significantly based upon grader, with standardized patients grading more harshly. Several common clinical pitfalls were also identified, including indwelling line status and code status. Satisfaction surveys from students showed high satisfaction and requests for including more specialties.

Conclusions: A simulation-based IPE course implemented at an appropriate time in a healthcare curriculum, with applied principles in effective teamwork and communication, will better prepare health professional students to work within the dynamic interprofessional healthcare environment.

The Effects of Regular Light Strength Training and Flexibility Training on Physical and Mental Health in Senior Citizens

Jack DeMoss, MS IV | Mentor: Fredric Thanel, MD

Introduction: Frequent exercise is known to be associated with better physical and mental health outcomes in all age groups. Vermillion, South Dakota, has no easily accessible way for senior citizens to exercise in groups safely. Clinical observations suggested the hypothesis that senior citizens living independently would benefit both physically and mentally from a tri-weekly chair-based exercise program.

Methods: Twenty-three individuals between the ages of 58-88 from Vermillion were enlisted in this study. Each participant was part of a chair-based exercise class for senior citizens that focused on strengthening the legs, back, and core. Various measurements were taken upon entry into the class and every three months following entry, with the final measurement being six months from the first. Measurements included blood pressure, heart rate, weight, handgrip strength, Tinetti Balance and gait scores, and geriatric depression scale. Data were divided into three groups: Period 1 (measurements on initial entry into the class), Period 2 (measurements three months after an individual has entered the class), and Period 3 (measurements six months after an individual has entered the class). Tukey's multiple comparison test and single factor ANOVA were used for analysis.

Results: There were no statistically significant differences in any measurements over time. This is true both when comparing all values for each period to one another and when comparing values only of participants who completed all three measurement periods. For participants that attended the class long enough to have all three measurements, there was an average weight loss of 8.56 lbs. Geriatric depression scale scores were also trending toward improvement, with the initial mean score being 1.2 and the final score being 0.8. Any score above 4 is concerning for depression so the closer to zero the better.

Conclusions: The data failed to support the hypothesis. The study shows no statistically significant change in measurements taken at initial visit, three months, or six months into the exercise course. Out of 23 participants, only 16 joined early enough to take the three-month measurements, and only five joined early to take the six-month measurements. The trend of participant weight loss and improved Geriatric depression scale scores suggests that if a larger sample size were to participate in the course and stay for all measurements, there might be statistically significant results. Future studies looking to replicate should incentivize increased duration of participation, and they should also track each individual participant's number of sessions attended to use as another variable.



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Our legacy of expert, faith-based care means your patient's well-being is our priority. Delivering the best care in a resident-centered environment has always been our focus.

"We align our nursing care to the most updated evidence in health care," says Rochelle Rindels, vice president of nursing and clinical services for the Good Samaritan Society. "We work with leaders to ensure these best practices and policies can be implemented in their centers."

Strengthened by resources

As an affiliate of Sanford Health, one of the largest health systems in the U.S., the Good Samaritan Society has a unique advantage in the long-term care industry. Sanford Health gives the Society access to a vast wealth of educational training and resources.

"We partner with the education team and many content experts to deliver high-quality care," Rindels says.

Care plans support health

Each Society location has an interdisciplinary team that puts together a safe care plan for each resident while preserving their dignity and encouraging their independence.

"The care plan gives staff members direction to provide residents with the best quality of life while they're here," says Alena Goergen, director of nursing at Good Samaritan Society – Miller Pointe in Mandan, North Dakota.

"We have a very good physicians group. I have providers that come in five days a week."

Each care plan is reviewed regularly and all team members, family members, providers and residents can view it at any time.

"This plan really drives clinical care for each resident," Rindels states.

"It's based on a resident's medical, emotional, nutritional and spiritual assessments and combines goals for care and specific interventions to help a resident maintain their health and function."

Care plans outline daily strategies for staff and they are especially helpful in supporting residents who have multiple health conditions.

"We have acute care plans that are constantly changing," Goergen says.

"We have a lot of discharges and admissions, so the staff do a good job of getting to know the residents quickly."

The Society is known for its compassionate caregivers who make sure residents' needs are met no matter what health challenges they're facing.

"Their role is to know as much about the resident and their chronic conditions as possible," Goergen states. "We care for the resident in the most quality way we can."

With residents at the heart of our organization, the Society meets your patient's needs no matter what health challenges they're facing.

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Integrating Standardized Multimedia to Supplement Physical Examination Curriculum: An Assessment of Medical Student and Evaluator Perspective

Rebecca Patrick, MS IV; Sarah Lehmann, MS IV | Mentors: Brian Wallenburg, NRP; Roy Mortinsen, MD

Introduction: As a new generation enters the realm of medical education, so do their preferences for technology integration into didactic curricula. An analysis of 106 LCME-accredited medical schools found that 97 percent of programs utilize supplemental e-learning to enhance traditional, face-to-face education in their physical examination curricula. Of these programs, 71 percent produced their multimedia internally. Existing literature indicates medical students benefit from the utilization of multimedia tools and the standardization of the instruction process in the learning of physical examination techniques. However, no studies were found that outline a detailed, reproducible integration model for other institutions to follow. Current literature also fails to assess the effect of multimedia tools on student well-being and largely ignores the educator perspective. This study aims to demonstrate a practical approach to integrating supplemental videos into an existing curriculum and to assess first year medical student and evaluator perspectives at strategic points throughout the process.

Methods: A video curriculum tailored to the Sanford School of Medicine's Objective Structured Clinical Examination (OSCE) requirements was created. The curriculum contained four videos, each designed for a specific examination component – musculoskeletal, head and neck, thorax/abdominal, and neurology examinations. First-year medical students participated in a pre-video integration survey as well as a post-video-integration and OSCE survey assessing student confidence, anxiety reduction, education standardization, and video quality. The OSCE evaluators completed a survey assessing the ability of the video curriculum to standardize the education and evaluation process. All surveys administered were based on a 5-point Likert scale format.

Results: Of survey respondents, 63.5 percent (n = 52) utilized at least one of the videos in the series. Prior to implementation of the video series, 30.2 percent of students agreed with the statement, "I am confident in my ability to demonstrate the skills needed to complete the following exam." After implementation, 100 percent of video-users agreed with this statement compared to 94.2 percent of non-video-users. A reported 81.8 percent of video-users agreed that the video series decreased anxiety when performing the neurologic, abdomen/thorax, and head and neck exams, whereas 83.8 percent agreed in the use of the musculoskeletal video series. A reported 84.2 percent of video users agreed the video curriculum standardized the instruction process. OSCE evaluator participation in the survey was 68.8 percent (n=11), and 90.9 percent of these evaluators agreed the videos standardized the education and evaluation process.

Conclusions: Overall, this study outlines the process of augmenting traditional didactic physical examination curricula with multimedia and the support of this process from medical student and OSCE evaluators. Video users report decreased anxiety and increased confidence in performing physical examination skills for the OSCE after integration of the video series. Students and OSCE evaluators found the video series to be a useful tool in the educational process and evaluation standardization.

A Digital Initiative to Improve Patient Health Literacy

Maria Ludens, MS IV | Mentor: Susan Anderson, MD

Background: The U.S. is in the midst of a health literacy crisis. The National Center for Education Statistics and the U.S. Department of Education indicate 36 percent of adults have only “basic” or “below basic” health literacy, and 43 percent of adults were either at or below basic reading literacy. Since pamphlets require comprehension of written material, providers’ reliance on this medium may be contributing to low health literacy. This project seeks to assess (1) providers’ and patient’s perception of patients’ health literacy, (2) the type and accessibility of educational materials clinics provide, and (3) whether videos or pamphlets are more effective in conveying information. The hypotheses are (1) both providers and patients will rank patients’ health literacy low, (2) clinic-provided material is mainly pamphlets with limited accessibility, and (3) videos will be more effective in improving retention than pamphlets.

Methods: Phase-1 involved disseminating an online survey to 100 obstetrics and family medicine providers. This survey assessed providers’ perspectives of patients’ health literacy, the type and accessibility of educational resources providers offer. Phase-2 involved creating Maria’s Medical Minutes videos and pamphlets with identical perinatal health information. Participating clinics provided patients with a randomly chosen business card with access to either the pamphlets or videos. After consulting the resource, patients took a survey that assessed (1) patients’ perception of their health literacy, (2) their opinions of the accessibility of clinic-provided resources, and (3) their retention of the Maria’s Medical Minutes resource.

Results: The provider survey had a 32 percent response rate with 100 surveys sent. Twenty-five percent of providers classified patients’ health literacy as “below average,” while only 3 percent indicated that patients’ health literacy was “above average.” Seventy-eight percent of providers offer pamphlets in clinic, while 25 percent provide videos. When ranking the accessibility of clinic resources, providers’ responses averaged 6 on a 10-point scale. No patient indicated their health literacy as “below average,” while 50 percent indicated “above average” or “far above average” knowledge of pediatric health. When ranking clinic resource accessibility, patients’ responses averaged 7.63 on a 10-point Likert scale. Patients assigned pamphlets answered 53 percent of the retention questions correctly, while video viewers answered 88 percent correctly.

Conclusions: This study validated the hypotheses that more providers offer written resources than videos, and videos appear to improve comprehension of information compared to pamphlets. This study found a substantial discrepancy between providers’ and patients’ assessments of patients’ health literacy with most providers ranking patients’ health literacy either at or below average. The providers themselves identified accessibility concerns with clinic resources.

A Retrospective Study of the Utilization of Vasopressors in Midline Catheters

Ethan Matthew, MS IV | Mentor: Matthew Anderson, MD

Background: The midline catheter has gained popularity in the critical care setting as an alternative route of infusion to central venous catheters in recent years. This shift in practice is secondary to their ability to remain in place for up to 28 days and emerging evidence of their ability to safely infuse high-risk medications including vasopressor medications. Midline catheters are peripheral venous catheters between 10 and 25 cm in length inserted into the basilic, brachial, and cephalic veins of the upper arm and terminate in the axillary vein. This study sought to further define the safety profile of midline catheters as a route of infusion of vasopressor medications in patients and observe

for potential complications.

Methods: A retrospective chart review of patients receiving vasopressor medications through midline catheters in a 33-bed intensive care unit over a period of nine months was conducted utilizing the EPIC EMR. The study utilized a convenience sampling method to collect data regarding demographics, midline catheter insertion data, length of vasopressor infusion, and presence or absence of extravasation of vasopressor medications, and other complications during time of administration and the period following discontinuation of vasopressor medications.

Results: 203 patients with midline catheters met inclusion criteria for the study over the nine-month period. Data collection yielded a total of 7,058 hours of vasopressor administration through midline catheters among the cohort with an average of 32.2 hours per patient. Norepinephrine was the most common vasopressor infused through midline catheters accounting for 5,542.8 midline hours (78.5 percent). There was no evidence of extravasation of vasopressor medications for the duration during which vasopressor medications were administered. 14 patients (6.9 percent) experienced complications prompting removal of midline catheters between 38 hours and 10 days after pressor discontinuation.

Conclusions: Due to the low rates of extravasation in midline catheters found in this study, midline catheters may serve as viable alternatives to central venous catheters for the infusion of vasopressor medications and should be considered by practitioners as a route of infusion in critically ill patients. Due to the inherent risks and barriers associated with the insertion of central venous catheters, which may delay treatment in hemodynamically unstable patients, practitioners may consider midline catheter insertion a first line route of infusion with minimal risk of vasopressor medication extravasation.

Training Standardized Patients to Provide Effective Feedback: Development, Implementation, and its Effect on the Efficacy of Medical Students' Education

Gavin Nelson, MS IV | Mentors: Julie Swenson, BA, NRP; Valeriy Kozmenko, MD

Introduction: Standardized patient (SP) encounters are a pivotal part of medical student training and provide essential feedback on student performance. Feedback has been shown to develop interpersonal skills and alter motivation levels, reducing anxiety and increasing students' confidence in skills. Therefore, optimizing the quality of SP feedback will allow educators to provide students with more focused comments on performance, leading to personal development and better patient care. This project hypothesis states SPs receiving feedback training have greater confidence and offer feedback that is more effective during student encounters.

Methods: SPs were taught to give quality feedback through a training workshop. Training consisted of a presentation centered on a structured feedback model, allowing each SP the opportunity to practice both giving and receiving feedback. Evaluations were conducted using surveys administered immediately prior to and after training to determine training efficacy. Data gathered included demographics along with questions broadly relating to comfort/confidence in providing feedback and knowledge of communication skills. Performance of required feedback tasks was evaluated by observing SPs during encounters with students using a standardized checklist.

Results: Attitude assessment between pre- and post-training surveys demonstrated statistical significance for the following items: I have strong knowledge base regarding giving feedback. ($p=0.0006$), I can easily identify learners' areas that need improvement. ($p=0.0007$), I am comfortable reading and interpreting learners' nonverbal messages

(i.e., body language). ($p=0.0152$). Knowledge assessment between pre- and post-training surveys showed statistical significance with a p -value of <0.0001 . Evaluation of SP performance demonstrated over 90 percent completion for six out of 10 required feedback tasks. The lowest mean completion was for the following items: gave at least one constructive comment (70.2 percent); tied constructive comment to feeling (57.2 percent); and gave recommendation for next time regarding constructive comment (55.0 percent).

Conclusions: SPs gained knowledge from the training course implemented. Attitudes and self-confidence when providing feedback also improved after training. Some SPs complete specific feedback tasks easier than others do during student encounters and may require additional training for tasks associated with constructive criticism. Feedback performance also improved over subsequent days.

Breaking Bad News: Integrating the Spikes Model into Medical School Curriculum

Michelle Olson, MS IV | Mentor: Michelle Schimelpfenig, DO

Introduction: Breaking bad news to patients is a daunting yet inevitable task for most physicians. When done poorly, physicians can cause further pain to the patients while creating great distress for themselves; therefore, it is important medical students learn effective and compassionate techniques. The SPIKES model was created as a guiding framework for providers to use when breaking bad news. The objective of this project was to create a sustainable method to integrate use of the SPIKES model for giving bad news to patients into the curriculum for the University of South Dakota Sanford School of Medicine (SSOM).

Methods: The changes to the curriculum occurred in three phases – one for each Pillar of the University of South Dakota SSOM's curriculum. The first session was a lecture format introducing and defining the SPIKES model for the first-year students. The second lesson was both didactic and interactive, as students were able to practice the SPIKES model through role-playing with colleagues. Prior to COVID, the final lesson was planned to be a standardized patient encounter for the graduating students; however, this lesson ended up in a virtual lecture format. A pre- and post-survey was given for each lesson to determine the usefulness of the SPIKES model in preparing students for handling these challenging conversations.

Results: 197 students completed the pre-test survey, and 157 students completed the post-test survey. Overall, a statistically significant improvement was found in students' self-reported confidence ($p < 0.001$), preparedness ($p < 0.001$), and comfort ($p < 0.001$). When the data was broken down based upon year of training, not all cohorts had statistically significant improvement in all three categories.

Conclusions: The SPIKES model serves as a good framework for students to use and tailor to the specific patient encounters. It was evident these lessons greatly improved the student's confidence, comfort, and plan of action. The next step would be to study whether improvement is noted from a patient's perspective and what mode of instruction was most effective.

Retrospective Analysis of Vaccination Coverage Among Rural American Indian Children Admitted With Lower Respiratory Tract Infection

Claire Porter, MS IV | Mentor: Santiago Lopez, MD

Background: Lower respiratory tract infections (LRTIs) have shown the greatest rate disparity between US infants for hospitalizations, with rates for American Indian (AI) twice the rate for non-AI infants. Vaccination coverage disparity has been hypothesized as one cause for this disparity. Vaccination disparities between AI and non-AI pediatric patients hospitalized for LRTIs were investigated.

Methods: The study was done using data collected by Palmer et al during a retrospective cross-sectional analysis of children less than 24 months of age admitted with an LRTI to Sanford's Children's Hospital from October 2010 until December 2019. Patients in each racial group had the dates of their vaccinations recorded and were labeled as up-to-date or not up-to-date as determined by the CDC's schedule. Vaccine compliance was recorded at time of hospital admission for LRTI and at present day.

Results: Of the 643 patients reviewed in this study, 114 were AI and the remaining 529 were non-AI. At the time of admission for a LRTI, a significantly lower proportion of AI patients were up-to-date on vaccines (42 percent of AI vs. 70 percent non-AI, $p < 0.0001$). Rates of vaccination coverage in AI children continued to decline from initial admission for LRTI to present day (25 percent present day vs. 42 percent at admission for AI) in contrast to the non-AI group, which maintained consistent coverage (69 percent present day vs. 70 percent at admission for non-AI).

Conclusions: Vaccination disparities between AI and non-AI patients hospitalized for LRTIs persist from time of hospitalization to present day. There is a continued need in the Northern Plains region for vaccination intervention programs for this uniquely vulnerable population.

UBXN2A, a Ubiquitin-Like Protein, Alters Proteins in mTORC2 Pathway

Casey Reihe, MS IV | Mentor: Khosrow Rezvani, PhD

Introduction: Colorectal cancer (CRC) is the third leading cause of cancer death in the United States causing approximately 50,000 deaths annually. Metastasis is a characteristic feature of CRC tumors, and is dominantly responsible for the high mortality of CRC patients. Thus, an urgent need exists for new therapies for patients with metastatic CRC. Recent studies indicate that the mTORC2 signaling pathway plays a fundamental role in formation and progression of CRC. The mTORC2 complex contains mTOR, mLST8 (GβL), mSIN1, deptor, protor-1, and Rictor. The aim of this study was to investigate whether UBXN2A, a known tumor suppressor protein, regulates protein turnover within the mTORC2 complex and suppresses the mTORC2 downstream signaling cascade.

Methods: A set of biological assays including western blot was used to determine the turnover of proteins in the mTORC2 complex in the presence and absence of overexpressed UBXN2A. Western blot of human colon cancer cells was used to determine the relationship between UBXN2A levels and members of mTORC2 complex, including Rictor. xCELLigence software was used to measure cell migration, an important component of tumor metastasis. Flow cytometry analysis was used to determine the level of colon cancer stem cells in the presence and the absence



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*Truth Initiative Survey, January 2021

A PUBLIC HEALTH MESSAGE FROM THE SOUTH DAKOTA DEPARTMENT OF HEALTH



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of veratridine (VTD), a natural plant alkaloid known to upregulate UBXN2A.

Results: This study revealed that overexpression of UBXN2A protein decreases Rictor protein levels in a human metastatic cell line. Consequently, SGK1, a protein located downstream of mTORC2 pathway, decreases in the presence of UBXN2A induced by VTD. VTD was also shown to decrease migration of colon cancer and downregulate CD44+ and LgR5+ cancer stem cell populations. Furthermore, UBXN2A induction increases the turnover of Rictor protein, an effect that is reversed by inhibition of the proteasome complex. These results suggest that upregulation of UBXN2A downregulates a key protein in the mTORC2 complex, resulting in decreased tumorigenic and metastatic functions of CRC cells.

Conclusions: This study demonstrated that VTD-dependent upregulation of UBXN2A targets mTORC2 by targeting Rictor protein, a critical member of mTORC2 complex. By targeting mTORC2 complex, UBXN2A suppresses mTORC2 downstream pathway as well as cancer stem cells essential for tumor metastasis. VTD's anti-migration and anti-cancer stem cell functions can be turned into a potential new-targeted therapy in patients with colon cancer.

A Cannabinoid Type 2 (CB2) Receptor Agonist Augments NOS-Dependent Responses of Cerebral Arterioles During Type 1 Diabetes

Lauren Van Hove, MS IV | Mentor: William Mayhan, PhD

Introduction: While activation of cannabinoid (CB2) receptors has been shown to be neuroprotective, no studies have examined whether this neuroprotection is directed at cerebral arterioles and no studies have examined whether activation of CB2 receptors can rescue cerebrovascular dysfunction during a chronic disease state such as type 1 diabetes (T1D). The goal was to test the hypothesis that administration of a CB2 agonist (JWH-133) would improve impaired endothelial (eNOS)- and neuronal (nNOS)- dependent dilation of cerebral arterioles during T1D.

Methods: *In vivo* diameter of cerebral arterioles in nondiabetic and diabetic rats was measured in response to an eNOS-dependent agonist (adenosine 5'-diphosphate; ADP), an nNOS-dependent agonist (N-methyl-D-aspartate; NMDA), and an NOS-independent agonist (nitroglycerin) before and 1 hour following JWH-133 (1 mg/kg IP). In a second series of experiments, to determine the role of CB2 receptors, rats were injected with AM-630 (3 mg/kg IP). AM-630 has been shown to be a specific antagonist to CB2 receptors. After 30 minutes, the nondiabetic and T1D rats were treated with JWH-133 (1 mg/kg IP). One hour after the injection of JWH-133, responses of arterioles to the agonists were again examined. In a third series of experiments, a potential time-dependency in reactivity of cerebral arterioles to the agonists was examined. Initially responses of arterioles to ADP, NMDA and nitroglycerin were examined. Then, one hour after injection of vehicle (ethanol) for JWH-133 and AM-630 responses of arterioles to the agonists were again examined.

Results: Baseline diameter of cerebral arterioles was similar in nondiabetic and T1D rats across all groups of rats. In addition, treatment of the rats with JWH-133, JWH-133 and AM-630 or vehicle (ethanol) did not produce a change in baseline diameter in either nondiabetic or T1D rats. Dilation of cerebral arterioles to ADP and NMDA was greater in nondiabetic than in diabetic rats ($p < 0.05$). Treatment with JWH-133 increased responses of cerebral arterioles to ADP and NMDA in both nondiabetic ($p < 0.05$) and diabetic rats ($p < 0.05$). Responses of cerebral arterioles to nitroglycerin were similar between nondiabetic and diabetic rats, and JWH-133 did not influence responses to nitroglycerin in either group. The restoration in responses to the agonists by JWH-133 could be inhibited by treatment with a specific inhibitor of CB2 receptors ($p < 0.05$).

Conclusions: This study showed that acute treatment with a specific activator of CB2 receptors could potentiate dilation of cerebral resistance arterioles to eNOS- and nNOS-dependent agonists in both nondiabetic and T1D rats. In addition, the influence of activation of CB2 receptors on cerebral vascular function could be attenuated by treatment with a specific antagonist of CB2 receptors (AM-630). Based on these findings, one could speculate that treatment with CB2 receptor agonists may have potential therapeutic benefits for the treatment of cerebral vascular disease that can contribute to the pathogenesis of stroke.

Improvement of Medical Terminology Education With Interactive Learning Module

Brendan Wechsler, MS IV | Mentor: Steve Waller, PhD

Introduction: Early in their first year, medical students at USD Sanford School of Medicine (SSOM) must pass a short-course in medical terminology. Taught using simple PowerPoint presentation, learning has been very dependent on rote memorization. In reviewing the literature, a study examining the effects of teaching medical terminology using mnemonics and imagery showed higher test scores with increasing exposure to this experimental learning method. Another study looked at the effects on learning with the use of an online interactive multimedia learning module to teach students about a common medical condition and showed increased test scores in the students using this experimental module. The focus of this project was to improve the quality of study materials for the Medical Terminology course at SSOM by using these experimental learning methods. The hypothesis was that using enhanced learning modules, including the addition of pictures, images, mnemonics, word association tools, practice questions, and video lectures would facilitate learning and improve test scores and retention of the material compared to depending mainly on rote memorization.

Methods: Learning modules were created, including modified PowerPoint slides with pictures/images, mnemonics, word associations, practice questions, and recorded video lectures. In this study, students self-selected a learning technique. The experimental group of students used the modified PowerPoint slides and/or video lectures to aid in their studies for the Medical Terminology exam. The control group of students did not use these resources, and instead used the PowerPoint presentations normally given out to students as per the curriculum. One month after students took the Medical Terminology final exam, they took a retention exam which contained 20 questions from the final exam. The scores for each question were tabulated and compared to the original score. A survey was also sent out via email to SSOM classes of 2023 and 2024 to assess their perceptions regarding the experimental modified PowerPoint slides and video lectures.

Results: The group using the experimental learning method had average score decrease of 12.1 percent (SD=0.9 percent) on retention exam, compared to control group average decrease of 16.2 percent (SD=12.3 percent). 42 survey responses were collected. Survey responses showed n=21 from the class of 2023 and n=21 from the class of 2024. 38.1 percent of students reported using both the modified PowerPoints + lectures recorded on Panopto, and 23.81 percent of students reported using only the modified PowerPoints. 97.62 percent of students agreed Pictures/Images help learning, 90.48 percent agreed mnemonics help learning, and 100 percent agreed practice questions help learning. Notably, 16.7 percent of respondents agreed that large blocks of descriptive text help learning.

Conclusions: No statistically significant differences were found between the two student groups on retention exam. However, over 90 percent of students agreed that the addition of modified materials helped learn medical terminology terms, and that the modified learning materials adequately prepared them for the final exam. These results support the inclusion of enhanced learning tools for medical terminology education, including images of disease processes, mnemonics, and practice questions. Limitations include student self-selection of study method, small sample size of students taking the retention exam, and response bias with survey dissemination.

Kidney Transplant Outcomes in Indigenous People of the Northern Great Plains of the United States

Hanna RL Wiley, MS IV | Mentor: Robert N. Santella, MD

Introduction: Indigenous people experience higher rates of end-stage renal disease as well as negative predictive factors such as medical comorbidities, lower socioeconomic status, greater waitlist time, and fewer pre-emptive transplants that undermine kidney transplantation success. In addition, Indian tribal reservation-dwelling Indigenous people may also be disproportionately affected by poverty, geographical disadvantages, limited physician availability, lower health literacy and cultural beliefs that further reduce access to care. Historically, all racial minority groups have experienced higher rates of rejection events, graft failure and mortality relating to these inequalities. Recent data suggests that short-term outcomes in Indigenous people are comparable to other racial groups, but few studies have examined this effect in the northern Great Plains region.

Methods: A retrospective database review was performed to determine outcomes of kidney transplantation in Indigenous people of the Northern Great Plains region. White and Indigenous people receiving a kidney transplant, between 2000 and 2018, at a single center, Avera McKennan Hospital in Sioux Falls, South Dakota, were included. Outcomes assessed between one month and 10 years post-transplant included estimated glomerular filtration rate, biopsy-proven acute rejection events, graft failure, patient survival, and death-censored graft failure. All transplant recipients had a minimum of one year of follow-up after transplant.

Results: A total of 622 kidney transplant recipients were included (117 Indigenous and 505 White). Indigenous recipients were more likely to smoke, have diabetes, have higher immunologic risk, receive fewer living donor kidneys, and have longer wait-list times. In the five years following kidney transplant, there were no significant differences in renal function, rejection events, cancer, graft failure or patient survival. At 10 years post-transplant, Indigenous recipients had twice the all-cause graft failure (OR 2.06; CI 1.25-3.39) and half the survival (OR 0.47; CI 0.29-0.76), however this effect was not maintained once the effect of race was adjusted for sex, smoking status, diabetes, pre-emptive transplant, high panel reactive antibody status and transplant type.

Conclusions: This retrospective study found that, despite differences in baseline characteristics, a population of Indigenous kidney transplant recipients at a single center in the Northern Great Plains region had no statistically significant differences in transplant outcomes in the first five years after transplant compared with their White counterparts. Racial differences emerged in graft failure and patient survival at 10 years after renal transplant, with Indigenous individuals more likely to experience negative long-term outcomes, but once covariates were adjusted for, this effect became insignificant. A number of these covariates are potentially modifiable, and a greater focus on addressing risk factor disparity could help extend the excellent five-year kidney transplant outcomes into long-term success in Indigenous people.

SOUTH DAKOTA

Childhood Lead Poisoning Prevention Program

The South Dakota Department of Health received funding from Centers for Disease Control and Prevention (CDC) for a Childhood Lead Poisoning Prevention Program (SD CLPPP). The Program provides lead exposure prevention education and support to the families of children younger than six that are exposed to lead.

The CDC recently updated its blood lead reference value (BLRV) from 5 µg/dL to 3.5 µg/dL in response to the Lead Exposure Prevention and Advisory Committee (LEPAC) recommendation made on May 14, 2021.

SD CLPPP Recommends Confirmation and Follow-up Schedule for Pediatric Blood Lead Levels ≥ 3.5 µg/dL

Confirm all capillary blood lead level ≥ 3.5 µg/dL with a venous sample, according to the following schedule.

Capillary Blood Lead Level	Confirm test with venous within*
3.5 - 9 µg/dL	3 months
10- 44 µg/dL	1 month
45 - 59 µg/dL	48 hours
60 - 69 µg/dL	24 hours
≥ 70 µg/dL	Immediately as an emergency test

*The higher the capillary test result, the more urgent the need for a confirmatory venous test.

Venous Lead Test Follow-up Schedule

For all venous blood lead levels ≥ 3.5 µg/dL, conduct follow-up venous blood lead tests, according to the following schedule.

Venous Blood Lead Level	Follow-up Venous Test Schedule	Long-Term Follow-Up**	South Dakota Response
3.5 - 9 µg/dL	3 months	6-9 months	Educational materials sent to family's home
10- 19 µg/dL	Within 3 months	3-6 months	Case management by phone Referrals to community resources
20 - 44 µg/dL	2 weeks-1 month	1-3 months	
≥ 45 µg/dL	Repeat venous blood test Immediate Chelation therapy Consider consult with South Dakota Poison Center: 800-222-1222 or Rocky Mountain Pediatric Environmental Health Line 877-800-5554	Based on chelation protocol	

**Long-term follow-up should only begin after blood lead is declining and child is living in a lead-safe environment

Find more information at DOH.SD.GOV/BloodLead/

LEAD EXPOSURE TESTING for CHILDREN

The SD Childhood Lead Poisoning Prevention Program recommends **testing ALL CHILDREN** for lead exposure regardless of risk factors.

SURVEY

A survey for pediatric medical providers was created to understand when and how providers discuss lead screening and testing with parents of young children. Findings from the anonymous survey can help inform SD CLPPP of current practices and will be shared in aggregate.

Scan to take the Survey



NATIONAL LEAD POISONING PREVENTION WEEK is Oct. 23-29



Antibiotic Prescribing Practices in Group B Streptococcus Positive Obstetric Patients with Penicillin Allergy

Schae Hanson, MD; Gavin Nelson, MD; Matthew Preszler, MD; Brad Laible, PharmD; Jawad Nazir, MD; and Annette Siewert, MD

Abstract

Introduction: Group B Streptococcus (GBS) positive patients with penicillin allergies receive intrapartum antibiotics for neonatal sepsis prophylaxis based on recommendations from the American College of Obstetricians and Gynecologists (ACOG). The objective of this study was to determine which antibiotics are used in GBS positive patients with documented penicillin allergies and evaluate for antibiotic stewardship improvements at a tertiary hospital in the Midwestern U.S.

Methods: Retrospective chart review identified GBS positive patients with and without penicillin allergies admitted to the labor and delivery floor. EMR-documented penicillin allergy severity, results of antibiotic susceptibility testing, and all antibiotics administered from admission to delivery were recorded. The study population was divided based on penicillin allergy status with antibiotic choice analyzed using Fisher's exact test.

Results: 406 GBS positive patients underwent labor between May 1, 2019, and April 30, 2020. Penicillin allergy was documented in 62 (15.3 percent) patients. Of these patients, cefazolin and vancomycin were prescribed most frequently for intrapartum neonatal sepsis prophylaxis. Antibiotic susceptibility testing was performed on the GBS isolate in 74.2 percent of the penicillin allergic patients. Between penicillin allergy and no penicillin allergy groups, the frequency of ampicillin, cefazolin, clindamycin, gentamicin, and vancomycin use showed statistical differences.

Conclusion: The study results suggest that antibiotic choice for neonatal sepsis prophylaxis in GBS positive patients with penicillin allergy at a tertiary Midwestern hospital follows current ACOG guidelines. Cefazolin was used most frequently in this population followed by vancomycin and clindamycin. Our results identify room for improvement regarding regular antibiotic susceptibility testing in GBS positive patients with penicillin allergy.

Introduction

In the U.S., there are 30,800 cases of Group B Streptococcus (GBS) disease in all age groups annually.¹ GBS is the leading cause of neonatal sepsis in infants. Risk for Group B Streptococcal infection by *Streptococcus agalactiae*, the offending bacteria, is higher in infants born to women with prolonged rupture of membranes, GBS colonization, preterm labor, those who are African American, and younger in age.²

Standard testing for GBS colonization in pregnant women occurs at weeks 35-37. If they test positive, intrapartum penicillin is administered prophylactically. In patients with a known penicillin allergy, American College of Obstetricians and Gynecologists (ACOG) guidelines recommend first-generation cephalosporins, clindamycin, or vancomycin depending on the allergy severity and antibiotic susceptibility of the colonizing GBS organism.² First-generation

cephalosporins (i.e. cefazolin) are preferred as an alternative to penicillins in GBS positive women who have a low risk of anaphylaxis. In those with a higher risk of anaphylaxis, clindamycin is recommended, particularly if the colonizing organism is susceptible to it. Vancomycin is recommended in GBS positive patients with penicillin allergies that show clindamycin-resistant cultures. These recommendations help to guide physicians based on susceptibility testing, allergies to certain antibiotics, and time of presentation of GBS positive laboring patients.

Guidelines from the American Academy of Pediatrics (AAP) recommend choosing antibiotics based on the timing of placental delivery. Cefazolin is detectable in amniotic fluid and cord blood within 20 minutes of maternal administration and is recommended for those with low risk of anaphylaxis to penicillin. Clindamycin is recommended for high-risk anaphylaxis, but because it undergoes rapid

hepatic metabolism, reaching the levels meant to achieve prophylaxis in infants requires multiple doses and may require four or more hours of administration. Vancomycin is another suitable option for high-risk anaphylaxis in patients as it has been found to cross the placenta within 30 minutes after maternal administration.³ While data suggests two to four hours is sufficient for penicillin, ampicillin, or cefazolin to cross the placenta (and is better than no antibiotics at all), the standard of care is at least four hours of antibiotic administration prior to delivery. This ensures adequate GBS sepsis prophylaxis for the infant.³

There have been many studies regarding antibiotic stewardship for penicillin-allergic patients in both outpatient and inpatient settings. However, less data is available for the obstetrics patient population testing positive for GBS and having a documented penicillin allergy. Paccione and Wiesenfeld studied the adherence to CDC guidelines for perinatal GBS infection prevention in patients with penicillin allergies. Their results showed that adherence was “suboptimal”.⁴

The tertiary hospital included in this study has CDC-recommended procedures in place to test for susceptibility of GBS isolates in pregnant patients and recommended antibiotic prescription based on penicillin allergy status and severity.⁵ However, there is currently no published data on which antibiotics are being prescribed for GBS sepsis prophylaxis at this hospital.

Methods

Study Design

This cross-sectional study looked at antibiotic prescribing practices in GBS positive obstetric patients at a tertiary hospital in the Midwest. This subset of patients was chosen following a previous study performed by University of South Dakota Sanford School of Medicine students and supports a similar priority for antibiotic stewardship based on ACOG and AAP guidelines.⁶ Three non-blinded medical students independently collected patient data from the hospital’s electronic medical record (EMR) through retrospective chart review. Each student reviewed 10 randomly selected patients from the other students’ subsets to confirm collection accuracy. Data was stored on a password-protected Microsoft Excel spreadsheet and de-identified immediately after completion of data collection.

Patients that have a GBS positive or unknown status (lack of testing and preterm labor) admitted to the labor and delivery floor between May 1, 2019 and April 30, 2020 were included

in the study. These patients were divided into a penicillin allergy group and no penicillin allergy group based on EMR-listed allergy status. No exclusion criteria were applied.

Data Collection

Patient records were obtained from the EMR. They were included if the patient was admitted for labor within the study period and coded as GBS positive. There were 2,287 deliveries during the study period and a total of 417 patients met these criteria. Data collection included demographic information (age, DOB, and race), admission and discharge dates, type of delivery (vaginal vs. cesarean), documented allergies, GBS positivity, antibiotic susceptibility testing, and antibiotic administration. During data collection, 11 patients were found to be incorrectly coded as GBS positive and were excluded from the study population leaving 406 patients in the final study group.

The study group was divided into a penicillin allergy cohort and no penicillin allergy cohort. Patients with an allergy to any type of penicillin were included in the penicillin allergy group. All antibiotics given from admission to delivery were recorded for each patient as well as whether susceptibility testing was performed. Each antibiotic used was counted once (i.e. multiple doses administered to a single patient contributed once to the overall total). Four patients in the study group did not receive antibiotics and were denoted with “NA.”

At the hospital studied, allergies are specified in the EMR with reaction type and severity by the patient’s healthcare providers. The penicillin allergy group was subclassified according to the severity of the allergic reaction defined as high, intermediate, low, or unknown. For consistency, allergies documented in the EMR as “severe” or “mild” were recorded as high or low severity respectively.

Measures

The primary measure for this study was to determine the distribution of antibiotics prescribed in obstetric patients for neonatal sepsis prophylaxis with and without penicillin allergy. This study included any antibiotics used in GBS positive women from hospital admission to delivery. This was assessed through post hoc analysis of obstetrical patient charts during the study period. The study group included all GBS positive patients who delivered during the study period and was subdivided into two cohorts based on EMR-listed penicillin allergy or no penicillin allergy.

Secondary measures included antibiotic choice for a given

delivery method (vaginal or cesarean section) and the presence of documented antibiotic susceptibility testing.

Analysis

The distribution of antibiotics used was calculated as a percentage of the total number of antibiotics prescribed to GBS positive obstetrical patients from hospital admission to delivery. The same process was also used to calculate the antibiotic distribution in the penicillin allergy subset. Statistically significant differences in antibiotic selection between penicillin allergy and no penicillin allergy groups were determined using a Fisher's exact test. A two-tailed α value was set at 0.05 for all tests of statistical significance. Microsoft Excel (Version 2011) was used for all statistical analyses.

Results

As seen in Table 1, the patient population (n=406) had a mean age of 29.9 years (SD $\pm$ 5.3) and was primarily of White race (74.4 percent). The delivery method was vaginal in 302 (74.4 percent) patients and cesarean in 104 (25.6 percent). Penicillin allergy was documented in 62 (15.3 percent) patients and severity was described as high (50, 80.6 percent), intermediate (7, 11.3 percent), low (one, 1.6 percent), and unknown (four, 6.5 percent). Susceptibility testing was performed in 65 (16.0 percent) patients. Most susceptibility testing was performed on isolates cultured from patients with a penicillin allergy as 46 of the 65 patients tested had a penicillin allergy. However, 16 (25.8 percent) patients with a penicillin allergy had no GBS isolate susceptibility testing to inform antibiotic prophylaxis selection.

Antibiotic selection was compared between the documented penicillin allergy group and no penicillin allergy group (Table 2). In total, the study group received 491 unique administrations of an antibiotic. Administrations according to the penicillin allergy and no penicillin allergy cohorts totaled 77 and 414 respectively. Four patients received no antibiotic due to precipitous labor and were included in the total as "NA." Ampicillin and cefazolin were administered most frequently in the no penicillin

Table 1. Characteristics of GBS positive patients.

	GBS+ patients (n= 406)
Age, years (SD)	29.9 ($\pm$ 5.3)
Race, no. (%)	
American Indian	21 (5.2)
Asian	12 (3.0)
Black	36 (8.9)
Pacific Islander	1 (0.2)
White	302 (74.4)
Unable to determine	34 (8.4)
Delivery method, no. (%)	
Vaginal	302 (74.4)
Cesarean	104 (25.6)
Penicillin allergy, no. (%)	
Yes	62 (15.3)
No	344 (84.7)
Allergy severity, no. (% of total penicillin allergies)	
High	50 (80.6)
Intermediate	7 (11.3)
Low	1 (1.6)
Unknown	4 (6.5)
Susceptibility testing performed, no. (%)	
Yes	65 (16.0)
No	341 (84.0)
Susceptibility testing performed, no. (% of total penicillin allergies)	
Yes	46 (74.2)
No	16 (25.8)

Table 2. Comparison of antibiotic choice in GBS positive patients with and without penicillin allergy.

	All antibiotics (n=491)	Penicillin allergy (n=77)	No penicillin allergy (n=414)	P value
Antibiotic, no. (%)				
Ampicillin	276 (56.2)	1 (1.3)	275 (66.4)	<0.00001
Azithromycin	32 (6.5)	4 (5.2)	28 (6.8)	0.8026
Cefazolin	119 (24.2)	34 (44.2)	85 (20.5)	0.0021
Ceftriaxone	2 (0.4)	0 (0.0)	2 (0.5)	1.000
Clindamycin	15 (3.1)	12 (15.6)	3 (0.7)	<0.00001
Gentamicin	15 (3.1)	7 (9.1)	8 (1.9)	0.004
Penicillin G	7 (1.4)	0 (0.0)	7 (1.7)	0.6029
Piperacillin -tazobactam	2 (0.4)	0 (0.0)	2 (0.5)	1.000
Vancomycin	19 (3.9)	19 (24.7)	0 (0.0)	<0.00001
NA	4 (0.8)	0 (0.0)	4 (1.0)	1.000

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allergy group at 66.4 percent and 20.5 percent respectively. Cefazolin was used most frequently in the penicillin allergy group at 44.2 percent and vancomycin was second at 24.7 percent. Statistical significance regarding antibiotic choice between penicillin allergy and no allergy groups was reached for ampicillin ($p<0.00001$), cefazolin ($p=0.0021$), clindamycin ($p<0.00001$), gentamicin ($p=0.004$), and vancomycin ($p<0.00001$).

Among those with a penicillin allergy, antibiotic administration was further analyzed according to allergy severity (Table 3). While there were 62 patients with a penicillin allergy, some received multiple antibiotics. Ultimately, there were 77 unique antibiotic administrations in this group. Of the 50 patients with high allergy severity, 27 received cefazolin, 16 received vancomycin, and 10 received clindamycin. The remaining 12 patients had a penicillin allergy of intermediate, low, or unknown severity. Of these patients, seven received cefazolin, three received vancomycin, and two received clindamycin.

Antibiotic use was also found to vary according to delivery method (Table 4). Among patients who delivered vaginally, the three most commonly administered antibiotics were ampicillin (76.7 percent), cefazolin (10.2 percent), and vancomycin (5.3 percent). Among patients who delivered via cesarean section, the three most commonly administered antibiotics were cefazolin (50.9 percent), azithromycin (18.9 percent), and ampicillin (17.2 percent).

Discussion

Antibiotic stewardship initiatives are increasingly being implemented in all areas of healthcare. With recent changes in guidelines, ACOG has recommended improvement in measures for obstetric patients with penicillin allergies. Patients with a reported penicillin allergy have an increased risk of adverse events (i.e. cutaneous reaction, anaphylaxis, death) affecting both the patient and fetus. Therefore, appropriate antibiotic selection is important when considering patients for neonatal sepsis prophylaxis. In GBS-positive patients without penicillin allergies, Penicillin G is considered first-line pharmacotherapy for intrapartum neonatal sepsis prophylaxis; alternatively, ampicillin may be used with similar efficacy. Current guidelines from ACOG

Table 3. Comparison of antibiotics administered according to allergy severity.

Allergy severity (n=patients, antibiotics administered)	High (n=50, 62)	Intermediate (n=7, 9)	Low (n=1, 1)	Unknown (n=4, 5)
Antibiotic, no. (% of patients*, % of administrations)				
Ampicillin	1 (2, 1.6)	0 (0, 0)	0 (0, 0)	0 (0, 0)
Azithromycin	3 (6, 4.8)	1 (14.3, 11.1)	0 (0, 0)	0 (0, 0)
Cefazolin	27 (54, 43.5)	5 (71.4, 55.6)	0 (0, 0)	2 (50, 40)
Ceftriaxone	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
Clindamycin	10 (20, 16.1)	1 (14.3, 11.1)	0 (0, 0)	1 (25, 20)
Gentamicin	5 (10, 8.1)	1 (14.3, 11.1)	0 (0, 0)	1 (25, 20)
Penicillin G	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
Piperacillin-tazobactam	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
Vancomycin	16 (32, 25.8)	1 (14.3, 11.1)	1 (100, 100)	1 (25, 20)
NA	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)

*Total may be >100 percent due to some patients receiving multiple antibiotics.

Table 4. Antibiotic administration according to delivery method.

Delivery method (antibiotics administered*)	Vaginal (n=322)	Cesarean Section (n=169)	P value
Antibiotic, no. (%)			
Ampicillin	247 (76.7)	29 (17.2)	<0.00001
Azithromycin	0 (0.0)	32 (18.9)	<0.00001
Cefazolin	33 (10.2)	86 (50.9)	<0.00001
Ceftriaxone	0 (0.0)	2 (1.2)	0.118
Clindamycin	7 (2.2)	8 (4.7)	0.1651
Gentamicin	5 (1.6)	10 (5.9)	0.0115
Penicillin G	7 (2.2)	0 (0.0)	0.1016
Piperacillin-tazobactam	2 (0.6)	0 (0.0)	0.5485
Vancomycin	17 (5.3)	2 (1.2)	0.0261
NA	4 (1.2)	0 (0.0)	0.3039

*N=491 due to some patients receiving multiple antibiotics.

recommend that patients with a documented penicillin allergy receive an appropriate antibiotic after susceptibility testing has been performed.² Guidelines also call for allergy testing in all suspected penicillin allergy cases to verify the allergy and direct appropriate antibiotic prescription. The health center in this study does not typically order allergy testing due to the other antibiotic options providers have at their disposal. However, it is available if the patient should request it.

Our study sought to characterize antibiotic administration for GBS prophylaxis in those with a recorded penicillin allergy. Seventy-seven instances of an antibiotic were prescribed to 62 patients with a penicillin allergy. Of those, cefazolin (44.2 percent), vancomycin (24.7 percent), and clindamycin

(15.6 percent) were prescribed most frequently. One patient did not have a previously documented penicillin allergy and developed lip swelling after receiving ampicillin; they subsequently received cefazolin. Statistical significance was demonstrated between penicillin allergy and no penicillin allergy groups regarding use frequency for ampicillin, cefazolin, clindamycin, gentamicin, and vancomycin. These differences were expected given the current ACOG guidelines and appropriate prescribing practices for neonatal sepsis prophylaxis.

If we further evaluate the antibiotics administered to those with penicillin allergy according to allergy severity (Table 3), we see some other interesting trends. ACOG recommends clindamycin for penicillin allergy patients with a high risk of anaphylaxis and cefazolin for low risk of anaphylaxis.² However, among those with an allergy of high severity, cefazolin was given to over half (54.3 percent) while clindamycin and vancomycin were given to 20 percent and 32 percent, respectively. Some patients received multiple antibiotics. The higher use of vancomycin in this population may be explained by the antimicrobial susceptibility antibiogram¹ at this particular hospital showing high resistance to clindamycin, therefore favoring the use of vancomycin. (Figure 1).⁷

Cephalosporins are known to have cross-reactivity in patients

with penicillin allergies. However, more recent studies suggest this cross-reactivity between penicillin and cefazolin may be less than 3 percent. According to Sousa-Pinto et al., this low frequency of dual allergy suggests patients should receive cefazolin regardless of allergy status.⁸ In our cohort, cefazolin was prescribed to 54.3 percent of patients with a high allergic reaction severity. This high number may also be attributed to the indication for cesarean section, where cefazolin is recommended prior to the procedure.

Women that delivered vaginally or via cesarean section were noted to have differences in antibiotic administration, which is as expected since routine cesarean sections do not require neonatal sepsis prophylaxis. Among patients who delivered vaginally, the three most common antibiotics administered were ampicillin, cefazolin, and vancomycin. Among patients who delivered via cesarean section, the three most common antibiotics administered were cefazolin, azithromycin, and ampicillin. ACOG guidelines do not recommend intrapartum neonatal sepsis prophylaxis for planned cesarean or in absence of labor and rupture of membranes.² This is due to very low rates of GBS early onset disease that occur in cesarean section.⁹ guidelines recommend a single dose of cefazolin (or other first generation cephalosporin) within 60 minutes of the procedure start with the option of adding azithromycin for women undergoing a nonelective cesarean

Figure 1. Nineteen possible gametes derived from the segregation of a balanced reciprocal translocation following meiosis.

2020 cumulative antimicrobial susceptibility summary	Ampicillin	Ampicillin/Sulbactam	Cefazolin	Ceftriaxone	Ceftriaxone (meningitis)	Ceftazidime	Cefepime	Clindamycin	Daptomycin	Erythromycin	Gentamicin	High Level Gentamicin	Ciprofloxacin	Levofloxacin	Linezolid	Meropenem	¹ Nitrofurantion ¹	Oxacillin (Methacillin)	Penicillin-G	Piperacillin/tazobactam	Tetracycline	Tobramycin	Trimeth/Sulfa	Vancomycin
Values represent % susceptible																								
Gram-negatives:																								
Citrobacter freundii (64)				86		85	100				100		98	98		100				89		100		
Enterobacter aerogenes (92) includes 1 CRE						75	99				100		100	100		99				75		100		
Enterobacter cloacae (156) includes 1 CRE						77	96				99		97	97		99				78		98	92	
Escherichia coli (2254)	66	71	92	99		99	100				95		90	90		100	99			97		95	83	
Escherichia coli ESBL (120)		24									76		42	40		100	92			93		69	46	
Klebsiella oxytoca (119+7 ESBL)		63	44	93		96	96				96		98	98		100	91			97		96	94	
Klebsiella pneumoniae (382)		89	97	100		100	100				99		99	99		100	26			97		99	95	
Klebsiella pneumoniae ESBL (26)		7									42		73	73		100	36			68		27	12	
Proteus mirabilis (209)	83	89	81	94		100	96				90		79	83		100				99		90	84	
Pseudomonas aeruginosa (340)						90	90				96		94	89		94				87		100		
Serratia marcescens (77)				95		99	99				95		100	100		99						90		
Haemophilus influenzae (77)	68			100																			60	
Gram-positives:																								
Enterococcus faecalis (461)	100											82			100		100		100		31			100
Enterococcus faecium (31)	52										87				100	27		48		18				98
Enterococcus faecium-VRE (56)	4										91				100	32		4		24				0
MRSA (384)								72		11					100		0	0		91		99	100	
Staphylococcus aureus (730)						83		73							100		100	19		84		97	100	
Staphylococcus lugdenensis (82)						83		83							100		88	18		89		100	100	
Streptococcus agalactiae (121)	100			100		41	24												100					100
Streptococcus pneumoniae (104)				97	100 (1)	83	47						99	100					100		66		76	
>5% decrease in %S												> 5% increase in %S												

() Denotes number of isolates tested

¹Urinary Isolates Only

delivery.¹⁰ Therefore, it is likely that the women who received ampicillin and other common antibiotics for neonatal sepsis prophylaxis had been planning vaginal delivery but required conversion to cesarean section. Alternatively, GBS positive women who received only cefazolin and azithromycin had a planned cesarean delivery that did not require antibiotics for neonatal sepsis prophylaxis.

Azithromycin was administered to patients for pre-operative prophylaxis in those laboring or who had ruptured membranes at the time of cesarean delivery who did not require GBS prophylaxis. Cefazolin use in patients who delivered vaginally was limited only to those who had a penicillin allergy and required an alternate antibiotic regimen. There was one exception but that patient had precipitous labor with significant vaginal laceration and was administered cefazolin in the operating room. Therefore, cefazolin use can be characterized as falling into one of two use scenarios: 1) neonatal sepsis prophylaxis in patients with penicillin allergy, 2) infection prophylaxis related to cesarean delivery.

Penicillin G, the preferred antibiotic for neonatal sepsis prophylaxis, was used in only seven patients. Ampicillin, an acceptable alternative, was chosen more frequently when considering neonatal sepsis prophylaxis. The reason for this is multifactorial. Antibiotic selection at the hospital studied is ultimately driven by formulation and stability. Penicillin G requires mixing in the pharmacy and can take up to 90 minutes to receive making ampicillin more practical. Furthermore, ampicillin can be stored on the labor and delivery floor allowing for easier access when needed. Another consideration is patient satisfaction. There are reports of intravenous penicillin G causing a burning sensation when administered which may be mitigated with ampicillin.

Susceptibility testing was performed for 65 of the 406 patients included in our study. Susceptibility testing for the penicillin allergy group was performed in 46 of 62 patients. Most susceptibility tests showed the colonizing GBS organism to be pan-sensitive to ampicillin, penicillin, vancomycin, cefotaxime, ceftriaxone, and clindamycin. The second most common result showed the GBS infection to be clindamycin-resistant. Our results suggest that providers did prescribe antibiotics based on susceptibility testing, which supports the implementation of antibiotic stewardship for laboring patients. However, there is room for improvement since not all patients with a penicillin allergy underwent susceptibility testing.

Strengths and Limitations

This study had several limitations. First, our sample size was small with 62 patients reporting a penicillin allergy. Second, our study was a single-center, retrospective cross-sectional analysis limiting generalizability. Third, since the EMR lists no associated diagnosis with drug administration, all antibiotics administered from admission to delivery were included but may not have been intended for neonatal sepsis prophylaxis.

Conclusion

The results of this study suggest that antibiotic choice for neonatal sepsis prophylaxis in GBS positive patients with penicillin allergy at a tertiary hospital in the Midwest follows current guidelines from ACOG. Our results suggest that cefazolin is the most commonly used agent in this population with vancomycin or clindamycin as common alternative agents based on penicillin allergy severity and antibiotic susceptibility testing results. Furthermore, our results suggest improvements can be made by performing antibiotic susceptibility testing before initiating neonatal sepsis prophylaxis in patients with penicillin allergy per ACOG guidelines.

Based on the results of this study, the authors recommend that antibiotic susceptibility testing be performed on all GBS positive patients with penicillin allergy to guide antibiotic selection. This would heighten antibiotic stewardship and promote a stronger culture of safety for patients. While not covered in this study, ACOG guidelines also recommend that allergy testing be performed on all patients to verify the presence of penicillin allergy. Future directions for research would include evaluating the current implementation of penicillin allergy verification and performing a cost-benefit analysis on this protocol.

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A Practical Guide to Trauma Resuscitation – Recommendations for Managing Hemorrhagic Shock in the Rural Healthcare Setting

Rebekah Wood, MD; Keith Bernis, MD; Sara Marroquin, MD; Rebecca Patrick, MD; and John Weigelt, MD, FACS

Abstract

Traumatic injury is the leading cause of death in individuals under the age of 45 and hemorrhage is the leading cause of preventable death within hours of presentation. This review article on adult trauma resuscitation is intended to be a practical guide for critical access centers. This is accomplished by discussing the pathophysiology and management of hemorrhagic shock.

Introduction

Traumatic injury is the leading cause of death in individuals under the age of 45 and the fourth overall cause of death in the U.S.¹ More specifically, hemorrhage is the leading cause of preventable trauma deaths and often occurs within hours of presentation.^{2,3} The pathophysiology of hemorrhagic shock is complex and involves the activation of multiple compensatory mechanisms in an effort to regain hemostasis and adequate tissue perfusion. Initial hemorrhage leads to inadequate perfusion of tissues with a cellular transition to anaerobic metabolism, functioning as a metabolic signal to increase cardiac output and ultimately, perfusion. Baroreceptor-led activation of the sympathetic nervous system serves to increase peripheral vasoconstriction to improve tissue perfusion. This compensatory vasoconstriction eventually increases diastolic blood pressure and narrows the pulse pressure resulting in impaired ventricular filling which results in decreased cardiac output, systolic blood pressure, and an exacerbation of metabolic acidosis.

As these physiologic changes progress in hemorrhagic shock, a lethal triad of coagulopathy, acidosis, and hypothermia propagates. Acute coagulopathy initially develops due to physical loss of blood products through hemorrhage and is exacerbated by excessive fluid resuscitation further depleting the concentrations of clotting factors, fibrinogen, and platelets necessary to initiate the clotting cascade. Acidosis and hypothermia further impair the activation of and functioning of the coagulation system. An understanding of the basic pathophysiology of hemorrhagic shock helps identify key principles in resuscitation including hemorrhage control, permissive hypotension, and hemostatic resuscitation.⁴ This

review article aims to discuss the key principles of trauma resuscitation and specific recommendations for managing hemorrhagic shock in rural settings with limited access to resources. A collaborative approach among all providers is essential to improve safety, efficacy, and outcomes in trauma patients.

Initial Management

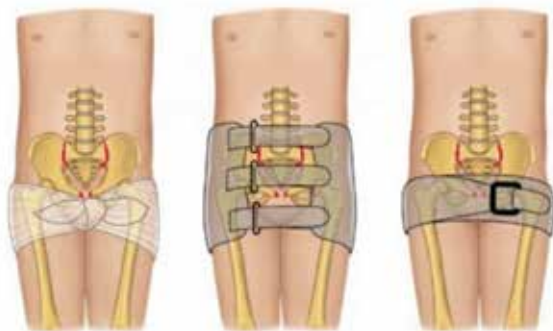
Initial management starts with a primary survey to assess airway, breathing, circulation, disability evaluation, and exposure of the patient. Intravenous (IV) access should be obtained as the primary survey is being completed with large bore IV catheters, preferably in the upper extremity. With the proper training, intra-osseous fluid administration is also feasible with current devices.⁵ When the patient is hypotensive, it is recommended to initiate fluid bolus administration with any ongoing intubation efforts in order to prevent further hypotension or cardiac arrest during rapid sequence intubation. A hypotensive trauma patient is in hemorrhagic shock until proven otherwise, but suspicion for other causes of hypotension must be maintained. Neurogenic shock, cardiogenic shock, and tension pneumothorax can cause hypotension in the injured patient. Early recognition or exclusion of these causes through assessment of vital signs and clinical examination is essential to successful management. One of the earliest signs of ongoing blood loss in hemorrhagic shock is tachycardia. It is important to note that this sign is unreliable in patients on beta-blockers and athletes.⁶ Blood pressure can be normal in Class I and Class II hemorrhage making it an unreliable reference point (Table 1).

Table 1. Classifications of hemorrhage.

Class I hemorrhage	Blood volume loss up to 15%. Heart rate can be minimally elevated, but without change in blood pressure, pulse pressure, or respiratory rate.
Class II hemorrhage	Blood volume loss of 15-30%. Manifests with tachycardia (100-120), tachypnea (20-24), decreased pulse pressure. There is no change in systolic blood pressure. On examination, patients may be cool and clammy with delayed capillary refill.
Class III hemorrhage	Blood volume loss of 30-40%. At this point there will be a significant drop in blood pressure, pulse greater than 120 and changes in mental status.
Class IV hemorrhage	Blood volume loss >40%. Pulse pressure is narrowed (<25mmHg). On exam, the skin is cold and pale with delayed capillary refill and the patient is confused/lethargic.

Initial treatment strategies aim to stop the bleeding. Direct pressure is preferred to control external bleeding. Extremity tourniquets are used when bleeding is not controlled with direct pressure. Occult bleeding must be considered in hypotensive patients. Findings suggestive of occult pelvic blood loss include abnormal positioning of lower extremities, flank, perineal or scrotal ecchymosis, tenderness over the bony pelvis, and hematuria. Findings of occult chest and abdominal blood loss include diminished breath sounds, a history of blunt trauma, and abdominal tenderness. Placement of a pelvic binder or pelvic sheet is essential when a hemodynamically abnormal patient has evidence of pelvic injury. A pelvic X-ray will confirm the pelvic fracture during the initial assessment. When placing a pelvic binder or sheet, ensure the binder or sheet is centered over the greater trochanters for proper placement (Figure 1). Improper

Figure 1. Placement of pelvic binder.



Copyright. Mahoney H. Management of major pelvic trauma. Aliem. July 2017.

positioning fails to control and may further exacerbate pelvic bleeding.⁷

Fluid Resuscitation

Fluid resuscitation restores intravascular volume, increases tissue perfusion, and maintains adequate oxygen delivery to vital organs. Multiple studies compare crystalloids vs. colloids for fluid resuscitation including the SAFE and CRISTAL trials which demonstrated equivalent efficacy and no difference in 28-day mortality between the two.⁸ In clinical practice, fluid resuscitation for patients presenting in hemorrhagic shock usually begins with a 1-liter bolus of lactated ringers, an isotonic crystalloid. This 1-liter volume includes cumulative fluid administered in the prehospital setting and any fluid provided in rural health centers before arrival to a higher level of care.⁹

If possible, all IV fluids should be obtained from a fluid warmer or administered through a warming device to help prevent hypothermia.¹⁰ An additional 2 liters of crystalloids to a hypotensive trauma patient is no longer recommended as it may lead to worsening acidosis and coagulopathy.^{10,11} Current practice suggests the practice of “permissive hypotension” implying that a normal systolic blood pressure is not the goal. Achieving a systolic blood pressure of 90 mm Hg through judicious fluid administration can help avoid further dilution coagulopathy. This lower blood pressure may also avoid disturbing ongoing clot formation.¹⁰ In settings where access to a blood bank is limited, arrangements should be made for emergent transfer to a larger trauma facility as soon as possible. A practical consideration for the hypotensive patient when blood is not available is to limit crystalloids and allow permissive hypotension. However, permissive hypotension is contraindicated in the setting of a traumatic brain injury where a mean arterial pressure of greater than 80mmHg is needed to maintain cerebral perfusion pressure¹⁷.

Another strategy to decrease mortality when transit to larger facilities is required is the administration of antifibrinolytic tranexamic acid (TXA). TXA is most commonly used within the first three hours of resuscitation for patients meeting criteria for massive transfusion protocol. The CRASH-2 and MATTERS trials demonstrated decreased mortality when TXA was given in this manner.^{12, 13} In the setting of a deteriorating patient that fails to respond to initial fluid resuscitation, a course of TXA administration should be considered with a dosing of 1 gram intravenously over 10 minutes, followed by infusion of 1 gram over eight hours. In contrast, a hemorrhagic shock patient that responds well to

an initial fluid bolus with improvement of vital signs and clinical examination would not have an indication for TXA administration.

When blood is available in a rural healthcare setting, hemostatic resuscitation in a 1:1:1 ratio of plasma, platelets, and RBCs can be added as a supplement to fluid resuscitation efforts. When a patient has received a 1-liter bolus of fluid yet continues to be hemodynamically unstable, it is appropriate to administer blood and blood products if available. The combination of fluid and blood products is referred to as balanced or hemostatic resuscitation.^{8, 9, 14} The benefits of early hemostatic resuscitation were tested in the PROMMTT and PROPPR trials. These trials tested various ratios of packed red blood cells (PRBC), plasma, and platelets in patients receiving multiple units of PRBCs. The data suggests a ratio of 1:1:1 is helpful in achieving early hemostasis in the bleeding patient.^{15,16} A benefit of balanced resuscitation using crystalloid and blood products is avoiding excessive crystalloid administration. This approach is most appropriate for trauma patients in Class III or IV hemorrhage as these patients are at greatest risk of coagulopathy if only crystalloids are used as they require rapid replenishment of lost coagulation factors.^{8,9}

Conclusion

In the rural setting with limited access to resources, management of hemorrhagic shock can be challenging and requires ongoing collaboration with higher level trauma centers. Early recognition, timely transfer, and knowledge of the key management principles will promote the best outcomes for patients. Key principles include controlling compressible and extremity bleeding as well as obtaining vascular access with two short, large bore (16-gauge) peripheral IVs if possible. It is prudent to minimize the use of IV crystalloid fluids during resuscitation. Hemostatic resuscitation efforts should be practiced if blood products are available in a 1:1:1 ratio. If ongoing blood loss is appreciated, the administration of TXA within the first 3 hours has shown to have mortality benefits. Importantly, initiating transfer of patients should not be delayed by efforts to obtain blood products, obtain further IV access, or assess fluid status.

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More Than Meets the Eye

Dallas Soyland MS IV; Hunter O'Connor MS III; and Jerome W. Freeman, MD, FACP

The phrase “more than meets the eye” originated in the early 19th century. At the time, that which was easily observed was said to “meet the eye.” The phrase therefore represents that which is not easily observed, or may even be obscured. In modern context, it is also used to describe a situation that is more complex than originally believed. In medicine, this idiom may refer to a particularly challenging diagnosis. In every patient encounter, the clinician asks questions to try and bring more information into the diagnostic line of vision. The details that “meet the eye” vary with each patient. For example, a patient who has come in to discuss abdominal pain may omit mention of aspirin use out of a perception that the fact is irrelevant. In this way, the scope of “what meets the eye” depends both on the information the patient offers as well as the clinician’s ability to glean and synthesize that information into meaningful conclusions.

A 60-year-old professor initially presented to a neurologist six years ago with episodes of lapses in awareness. These episodes, which started in his mid-40s, included decreased awareness, unresponsiveness and automatisms such as picking at his clothing and rubbing his nose. One episode occurred while conducting a job interview for a secretarial position. His colleagues described him as appearing “spaced out” and assumed he was disinterested in the remaining portion of the interview. Another episode occurred while the patient was delivering a lecture. He suddenly stopped talking and was unresponsive for 10 minutes. Often his episodes seemed to occur at times of conflict, leading the patient’s colleagues and students to believe that he was rudely declining to respond in conversation. Occasionally, his spells were preceded by an electric shock-like sensation in his left leg, arm, and face. For years, the patient minimized the significance of the spells when they were described to him. He finally sought medical attention after he had been working at his home office doing corrections on student papers and realized that a considerable length of time had passed and he had not completed any work.

The patient’s primary physician aptly identified seizures as part of the differential diagnosis and referred him to neurology. Importantly, the patient stressed that these spells had only come on as an adult. Specifically, he denied any

history of seizures in childhood, adolescence or as a young adult. His evaluation showed no major abnormalities including a normal electroencephalogram and magnetic resonance imaging of the brain. Levetiracetam was initiated for presumed complex partial seizures (focal seizures with impaired awareness according to the latest updated terminology). He immediately ceased to have any lapses of alertness or “electric shock” sensations on the left side of the body. His response to medication “met the eye” in terms of his physicians’ expectations. His seizures had stopped.

All was going well, but at a recent clinic visit he reported new historical details not previously disclosed. Since childhood, he had difficulty differentiating left and right. This had caused some serious issues and even resulted in some special tutoring in elementary school. He recalled that he later had significant trouble when learning to drive because of his left-right confusion. He noted that in recent years his mother also recalled that he had always struggled with left-right confusion. Furthermore, she had told him that she was not surprised by his seizure diagnosis. Apparently when he was a child his parents observed him “staring off” and assumed that he was simply an aloof child. Curiously, for a few weeks after his anticonvulsant was started, he recalled having the strange feeling that everything in his field of vision was labeled “left” or “right.” Thereafter, he stopped having any left-right confusion. He noted that he no longer needed directional cues, such as intentionally looking at his watch to remind himself which side of his body was left. Indeed, he stressed that his left-right confusion had seemed to completely and permanently abate.

Left-right disorientation is generally associated with Gerstmann’s syndrome. First described in 1940 by Dr. Josef Gerstmann, an Austrian American neurologist, the eponymous syndrome includes a tetrad of symptoms: left-right disorientation, acalculia (inability to conduct simple arithmetic), agraphia (inability to write), and finger agnosia (inability to identify one’s own fingers).¹ The typical clinical context of this diagnosis is in a patient who has suffered a stroke of the parietal lobe in the dominant hemisphere (the left in 90 percent of the population). However, it has rarely been described in cases of tumors, multiple sclerosis, and subdural hematomas affecting the same anatomical

region. Epileptic seizures causing Gerstmann's syndrome are exceedingly rare, with only 4 reported cases to our knowledge.^{2,5} Furthermore, the described patients only exhibited the tetrad of symptoms while actively seizing.

Although our patient did not exhibit all the elements of Gerstmann's, his report of profound left-right disorientation is very suggestive of an important element of this syndrome. It is difficult to postulate why his left-right disorientation resolved with an anticonvulsant. This response was dramatic and unexpected. Of course, one can conjecture that for decades some form of subclinical seizure activity played a role. It is intriguing that his mother recalled him "staring off" at times, but certainly no definite seizures were observed or diagnosed in his childhood or young adult years. And he stipulates that his left-right disorientation was present his entire life. This phenomenon was persistent for him, not episodic.

Clearly, there is "more than meets the eye" here. It is disconcerting to lack definitive answers in clinical medicine.

Clinicians rightly eschew postulates that seem flimsy or are fabulously speculative. That makes us hesitant to advance a declaration as to why his left-right disorientation abated with an anticonvulsant. Sometimes clinicians need to metaphorically just shrug their shoulders and accept a mystery when they encounter one.

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Sacubitril/Valsartan – A Review

Holly Flynn, PharmD; Jessi Henter, PharmD; and William Hayes, PharmD, BCACP

Sacubitril/valsartan (Entresto) received Food and Drug Administration (FDA) approval in 2015 for patients with chronic New York Heart Association (NYHA) class II to IV heart failure with reduced ejection fraction (HFrEF).¹ In 2021, the FDA indication for sacubitril/valsartan was broadened to include adult patients with chronic heart failure, regardless of left ventricular ejection fraction (LVEF). Following this change to the FDA indication, the 2022 AHA/ACC/HFSA Guidelines updated their guidance and now suggest that sacubitril/valsartan should be considered in all patients with heart failure.² This article will briefly review sacubitril/valsartan and focus on the evidence for use in adult patients.

Sacubitril is an oral prodrug that ultimately blocks the effects of neprilysin, causing increased levels of natriuretic peptides.¹ Valsartan antagonizes the angiotensin II receptors directly. Sacubitril/valsartan is available in three different dosage forms and the starting dose is dependent on the patient's current dose of an angiotensin-converting enzyme inhibitor (ACE-I) or angiotensin receptor blocker (ARB), if they were previously taking an ACE-I or ARB. The dose may be doubled, as tolerated, after two to four weeks, to a target maintenance dose of 200 mg twice daily, with or without food. Patients with severe renal impairment (creatinine clearance ≤ 30 mL/min) require the initial dose to be adjusted, but the dose can be increased if tolerated. Sacubitril/valsartan is not recommended for use in patients with severe hepatic impairment. Common adverse effects include hypotension, hyperkalemia, impaired renal function, and angioedema. Contradictions to sacubitril/valsartan include a history of angioedema related to previous ACE-I or ARB therapy, hypersensitivity to sacubitril, valsartan, or any component of the formulation, concomitant use or use within 36 hours of ACE-I, and concomitant use with aliskiren in patients with diabetes.

The PARADIGM-HF trial is a randomized, double-blind, multicenter trial comparing sacubitril/valsartan to enalapril in patients with HFrEF.³ The study examined 8,442 patients with HFrEF and NYHA class of II, III, or IV heart failure for the first occurrence of either cardiovascular death or

heart failure hospitalization. Patients who tolerated the active run-in period were randomized into a double-blind treatment of enalapril 10 mg twice daily or sacubitril/valsartan 200 mg twice daily. The groups were balanced with respect to baseline characteristics, with an average LVEF of 30 percent and 70 percent of patients having NYHA class II symptoms. Sacubitril/valsartan 200 mg twice daily demonstrated benefit when compared to enalapril 10 mg twice daily, with death from cardiovascular cause or first hospitalization for worsening heart failure lower at 21.8 percent versus 26.5 percent. The median follow up was 27 months. Patients in the sacubitril/valsartan group had significantly more symptomatic hypotension compared to enalapril. PARADIGM-HF is criticized for capping the enalapril arm at 10 mg twice daily, as 20 mg twice daily is the target dose suggested by guidelines.^{2,4} Furthermore, the active run-in period eliminated nearly 10 percent of patients, as they were unable to tolerate enalapril or sacubitril/valsartan, potentially limiting applicability to real-world practice.

The LIFE trial is a randomized, double-blind, multicenter trial comparing sacubitril/valsartan to valsartan in patients with HFrEF and NYHA class IV symptoms who met criteria for advanced HF.⁵ The study included 335 patients who were randomized to sacubitril/valsartan with a target dose of 200 mg twice daily or valsartan with a target dose of 160 mg twice daily. The groups were balanced with respect to baseline characteristics, with an average LVEF of 20 percent. Sacubitril/valsartan failed to show benefit over valsartan for the primary outcome of area under the curve of NT-proBNP through 24 weeks of therapy. There were no differences regarding symptomatic hypotension between arms, but there was significantly more hyperkalemia in the sacubitril/valsartan arm. The LIFE trial suggests that there is no significant difference between sacubitril/valsartan and an ARB at reducing NT-proBNP in patients with the more severe heart failure symptoms associated with NYHA class IV. Findings from the LIFE trial contradict the findings of another trial, PIONEER-HF, which concluded that treatment with sacubitril/valsartan led to a reduction in circulating NT-proBNP in patients with HFrEF stabilized after hospitalization.⁶ It is important to note that PIONEER-

HF's active control was again the restricted dose of enalapril 10 mg twice daily, while the LIFE trial allowed patients in the control arm to titrate to the full target dose of valsartan. Also, the use of NT-proBNP in both the LIFE and the PIONEER-HF studies is a surrogate endpoint that may not directly correlate to patient outcomes. Importantly, the LIFE trial is the first trial investigating sacubitril/valsartan to include a more robust number of HF patients with NYHA class IV, as less than 1 percent and 9 percent of the patient populations in the PARADIGM-HF and PIONEER-HF study, respectively, were NYHA class IV.

The PARADISE-MI trial is a randomized, multinational, double-blind trial evaluating the efficacy of sacubitril/valsartan in reducing a composite of cardiovascular death or incident heart failure compared to ramipril.⁷ The study included 5,661 clinically stable patients without a previous diagnosis of heart failure who were within seven days of a myocardial infarction (MI) and had an LVEF ≤ 40 percent or pulmonary congestion. Patients were randomized to sacubitril/valsartan with a target dose of 200 mg twice daily or ramipril with a target dose of 5 mg twice daily. Baseline characteristics were balanced between groups, with an average LVEF of 37 percent. The vast majority of patients were initiated on guideline-directed medical therapy after an acute coronary syndrome event. Sacubitril/valsartan failed to prove superiority over ramipril in the primary outcome of cardiovascular death or incident heart failure. The PARADISE-MI trial suggests sacubitril/valsartan is similar to an ACE-I in reducing cardiovascular death and incident heart failure in patients without a previous heart failure diagnosis after an MI.

The PARAGON-HF trial is a randomized, multinational, double-blind trial evaluating sacubitril/valsartan and valsartan monotherapy in 4,796 patients with heart failure and an LVEF ≥ 45 percent.⁸ The study examined rates of a composite outcome of total hospitalizations for heart failure and death from cardiovascular causes in patients ≥ 50 years old with NYHA class II, III, and IV HFpEF and structural heart disease. The PARAGON-HF trial included a screening and run-in phase similar to the PARADIGM-HF and LIFE trials, in which patients were eliminated from the study if they demonstrated intolerance to either treatment option. Treatment groups were balanced at baseline, with an average LVEF of 57 percent and the majority of patients having NYHA II heart failure. At 35 months, sacubitril/valsartan did not reduce the composite outcome of hospitalizations for heart failure and cardiovascular death when compared to valsartan.

The sacubitril/valsartan group had modest improvements in NYHA class and less renal adverse outcomes compared to the valsartan group; however, there was no difference in overall mortality. Sacubitril/valsartan was associated with more hypotension and angioedema than valsartan. Because of the extensive run-in phase, which eliminated 20 percent of eligible patients due to intolerance to the study drugs, generalizability of these results may be difficult and may not apply to high-risk patients. Despite no additional benefit over valsartan in patients with a LVEF ≥ 45 percent, PARAGON-HF is the only published trial involving clinical outcomes that the FDA cited in the approval of sacubitril/valsartan for HFpEF in 2021.

Sacubitril/valsartan is FDA indicated for adult patients with heart failure, regardless of ejection fraction. Based on the results of the five clinical trials reviewed above, the evidence for sacubitril/valsartan is strongest in patients with NYHA class II HFpEF. Clinical trial data does not suggest sacubitril/valsartan is more beneficial than ACE-I or ARB therapy for patients with NYHA class IV HFpEF, patients with reduced LVEF post-MI, and patients with HFpEF. Therefore, providers are urged to weigh the risks versus benefits when considering sacubitril/valsartan for patients with heart failure in order to ensure patient tolerability and affordability, particularly for patients who are less likely to truly obtain benefit from the use of the medication.

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Member News

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The SDSMA is in need of volunteers willing to spend a day to serve as Doctor of the Day.

The SDSMA's Doctor of the Day program is a huge success every legislative session. During session, the SDSMA commits to providing a physician member to serve as Doctor of the Day for the State Legislature in Pierre.

This volunteer commitment involves one day at the State Capitol by providing basic medical assistance to legislators and staff as needed.

- See a listing of available dates, and learn more about the program, at sdsma.org.

Doctors of the Day have the unique opportunity to interact with legislators on the House and Senate floors and get a first-hand look at the legislative process and how it affects the practice of medicine. Your presence at the Capitol shows legislators not only your expertise, but also your concern for the health of South Dakotans.

It is critical that volunteer physicians are serving each day of session. Every year we receive requests from PAs and NPs who wish to participate in the program.

South Dakota's 2023 Legislative Session opens Jan. 10. If you are interested in volunteering, please contact Justin Ohleen, Director of Advocacy and Policy, at 605.336.1965 or johleen@sdsma.org.

SDSMA urges Congress to reform Medicare pay now

The SDSMA along with more than 120 state medical associations and national specialty societies are urging Congress to institute Medicare payment reforms in order to maintain patients' access to care. Congress must act in order to ensure that patients have access to care.

But that access is being threatened by two decades of stagnant Medicare payment rates for physicians.

The letter tells congressional leaders that reduced Medicare physician payment rates are being outweighed by the rising cost of running a practice plus the administrative and financial burdens associated with participating in Medicare, which is causing market consolidation and threatens access to health care services.

"This instability is being driven by a confluence of fiscal uncertainties physician practices face related to statutory payment cuts, perennial lack of inflationary updates, significant administrative barriers, and the cumulative impact of the pandemic," the letter adds. "The Medicare payment system remains on an unsustainable path threatening beneficiaries' access to physicians."

While payment rates for hospitals, nursing homes and the like are adjusted for inflation, rates for physicians are not. This is shown in the chart below, developed by the American Medical Association.

The organizations who signed the letter call on congress to:

- Provide relief from the scheduled 4.42 percent budget-neutrality cut in Medicare physician fee schedule payments.
- End the statutory annual freeze and provide a Medicare Economic Index inflation update for the coming year.
- Prevent a scheduled 5 percent payment cut for APMs and the corresponding impossible-to-meet revenue threshold increase at the end of 2022.
- Waive the 4 percent pay-as-you-go sequester triggered by passage of the American Rescue Plan Act.

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SDSMA visits to District Medical Societies underway

SDSMA President Lucio N. Margallo II, MD, has begun his travels to District Medical Societies. These meetings are opportunities for physicians to discuss issues facing practices, the challenges faced in health care in South Dakota and nationwide, and the ways physicians can work together toward common goals.

Dr. Margallo is also giving updates on the SDSMA's plans for the 2023 state

legislative session and how physicians can get involved.

Please consider attending your district's meeting. Dr. Margallo and SDSMA staff want to hear your concerns about challenges that affect care for patients and gather ideas on how to work together to represent physicians both at the state and federal levels.

AMA report: trends on overdose deaths require specific actions, all-hands approach

With a recent report issued detailing the toll of the nation's overdose and death epidemic, SDSMA and AMA are calling for an all-hands approach -- policymakers, public health experts, educators, faith leaders, and employers -- to help save lives.

While opioid prescribing has been reduced in every state -- by nearly 50 percent nationally -- the trend of drug-related overdose deaths continues. For the first time, in 2021 drug-related overdose deaths exceeded 100,000-- primarily due to illicitly manufactured fentanyl, methamphetamine and cocaine.

In South Dakota, opioid prescriptions have decreased by 37.8 percent between 2012-2021; prescription drug monitoring programs were used more than 445,457 times in 2021; and there have been strong increases in naloxone prescriptions and prescriptions for medications to treat opioid use disorder. Drug-related mortality, however, remains a major concern.

The report calls for a campaign to include:

- Policymakers, health insurance plans, national pharmacy chains and other stakeholders to change their focus and remove barriers -- such as prior authorization -- to evidence-based care. States should require health insurance companies and other payers to make non-opioid pain care alternatives more accessible and affordable.
- Medical and other health care professional licensing boards to help patients with pain by reviewing and rescinding arbitrary restrictions on opioid therapy--as now recommended by the Centers for Disease Control and Prevention.
- State officials to remove punitive policies against pregnant individuals and parents who have a substance use disorder. State departments of corrections and private jails and prisons need to ensure that all

individuals with an opioid use disorder or mental illness receive evidence-based care while incarcerated -- and are linked to care upon release. This includes ensuring access to medications for opioid use disorder (MOUD).

- Employers to review their health insurance and benefits plans to ensure employees and their families have access to pain specialists and affordable access to comprehensive pain care, physicians who provide MOUD, and psychiatrists who are in the employer's network.
- Public health officials to help control infectious disease spread through supporting comprehensive syringe services programs, reduce overdose through widespread, community-level distribution of naloxone and fentanyl test strips and pilot projects in support of overdose prevention centers.
- Faith leaders to help destigmatize substance use disorders and harm reduction by educating their members and holding overdose awareness events.

The use of prescription drug monitoring programs (PDMPs) also continued its upward trajectory with physicians and other health care professions surpassing the 1 billion mark for the first time. PDMPs are electronic databases that track controlled substance prescriptions and help identify patients with uncoordinated care who might be receiving multiple prescriptions from multiple prescribers.

State-by-state data for opioid prescriptions, MOUD, naloxone and PDMP use can be found within the report at ama-assn.org.

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

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

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

- Improving health and access to care in rural areas;
- Increasing Medicaid reimbursement;

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

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

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

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PATIENT EDUCATION:

Keeping on the Sunny Side of Life

Andrew Ellsworth, MD

After a visit about aches, pains and various medical issues, a patient was commenting on getting older. Similar to other patients, I expected him to say something like, “It’s no fun getting older.” To my surprise, the patient said, “I’m 85. That means I have a lot to be thankful for.”

Some people are almost always positive, and some are usually negative. Those that are positive have been found to have better outcomes and seem to enjoy themselves more while unfortunately, those that tend to be more negative do not do as well. Granted, factors such as poor health and misfortune can diminish anyone’s attitude. Thankfully, with a little effort, anyone can change their mindset. It really is amazing how much gratitude and a positive demeanor can improve your health.

There are many small ways to brighten your outlook. To start with, begin and end your day listing what you are grateful for.

Stop comparing yourself to others. This is one of the reasons social media has been shown to make people unhappy. If one is constantly looking at how others are doing, dressing, and where they are traveling, one cannot resist comparing themselves and thinking they are missing out.

Exercise helps you feel better. Getting fresh air, some sun, and getting that heart pumping creates endorphins in your brain that can help improve your mental health in addition to the benefits to your physical health.

Look to build lasting relationships. Studies have shown that people who have satisfying relationships with friends and family are happier, have fewer health problems, and live longer. Start building those relationships now. It takes time to gain trust, to listen, and show you care.



As we get older, our world tends to get smaller. The places we go may decrease, the people we see may become fewer, and our daily activities may become more limited. However, that does not need to lead to less happiness. In fact, quite the contrary.

There is a poem that starts with “When I am an old woman I shall wear purple,” It draws on the wisdom of being yourself. When the pressure to perform and impress has passed, it can be liberating to know more about yourself, what you like, and what you do not like. Then you will be free to just enjoy your day, and maybe wear purple with a red hat, if you feel so inclined.



Andrew Ellsworth, MD is part of The Prairie Doc® team of physicians and currently practices family medicine in Brookings, South Dakota. Follow The Prairie Doc® at www.prairiedoc.org and on Facebook featuring On Call with the Prairie Doc® a medical Q&A show based on science, built on trust for 21 seasons, broadcast on SDPB and streaming live on Facebook most Thursdays at 7 p.m. central.



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