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Number 8



# *South Dakota* **medicine**

THE JOURNAL OF THE SOUTH DAKOTA STATE MEDICAL ASSOCIATION

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Cover art: "Hygieia or Allegory of Healthcare" by Oleg Gotchev. The art appears as a mural on a stairway wall of the Alexander University Hospital in Sofia, Bulgaria. As described by Dobrin A. Svinarov, MD, PhD, Dr. Med Sc, of Alexander University Hospital and Medical University of Sofia, Bulgaria, "The work is a symbol of the successful health care and the unity of its fundamental elements. Mankind is depicted as a family in which the younger child falls ill – his father hugs him anxiously, his sister cheers him up by giving him a white swallow, pets help with their compassion and love. In the image of the mother-wife is embodied the goddess of pharmacology Hygia, protecting the boy with her left (closer to heart) hand, and holding triumphantly her symbol - the bowl with the snake with her right hand. The natural (nature-wise) way of life is depicted allegorically through the snow-capped alpine mountain shrouded in storm clouds, symbolizing the dangers of life, which under the arm of the goddess are arranged in calm, horizontal layers. The flying stork is a symbol of health, luck, and longevity. Gotchev's works can be found in many countries around the world."

A special thank you to Henry Travers, MD, for securing permission from the artist to publish the artwork on the cover of this month's issue.

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# DIVIDING FINANCES IN DIVORCE

**BRITTANY HEARD** CFP®, CKA®, CFT-I™, CDFA *Lead Advisor*

Divorce is not a fun topic to think about or discuss, but it is a common occurrence. When someone decides to file for divorce, the first step is to hire a family law attorney. The second step is to hire a fiduciary financial advisor who has a good understanding of how to answer the many financial questions that might arise. Without knowledgeable legal and financial partners, either spouse could make serious and costly mistakes during the divorce process. Following is a brief overview of possible solutions to dividing what are typically the largest assets.

## The Home

One spouse could retain the home, both parties might sell it, or one party could sell the home after the divorce is complete. It is important to consider if the retaining spouse can afford to continue living in the home. If one removes his or her name from the title of the house, they will still be liable for mortgage payments, unless the retaining spouse refinances the house under their own name only. Selling the home before or after the divorce could have significant tax implications, based on the cost basis and capital gains of the property sale. It is important to review this prior to finalizing the divorce.

## Retirement Plans

When dividing assets in divorce, it may be easy to assume all assets are equal. However since retirement accounts are taxable as ordinary income upon distribution, they are not equal to after-tax accounts, which are taxable based on capital gains rates. The net distributions of retirement accounts will be less

than after-tax accounts. It may be better to divide all assets in half versus dividing specific accounts between spouses. If a couple is dividing a 401(k), the receiving spouse also has special allowances to receive a taxable distribution before 59 ½ without the 10% penalty, but only if the distribution is prior to the account being moved into the new alternate payee account.

## Future Income and Pension Plans

If one spouse has pension income that they will receive in retirement at a future date, he or she can calculate the future income as a current asset. The future salary and pension income all must be accounted for when determining the division of assets, as well as alimony payments if made from one spouse to another. It is essential to review all pieces of financial data before finalizing the divorce.

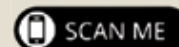
There are many other important financial considerations: separate property verses marital property, providing for children, and caring for children. If one or both spouses own a business, this is an added level of complexity during the divorce process. In addition, an equitable distribution of assets is not necessarily an equal distribution of assets.

If you or someone you know is going through the divorce process, make sure they have the right team in place to guide them throughout the entire process. As a Certified Divorce Financial Analyst (CDFA), I can help walk through the complexities. Give me a call.



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### Meeting the Medical Needs in Shortage Areas

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

According to Association of the American Medical Colleges (AAMC) projections, the U.S. will face a potential physician shortage of close to 39,000 to 120,000 over the next 12 years.

During the past 50 years, I have volunteered and devoted considerable hours to help educate and train medical students and residents, physician assistants, nurse practitioners, nurses, athletic trainers, and medical assistants coming from colleges and universities all over the world including the U.S. Many of them have moved on to become successful practitioners in their fields in rural South Dakota and all over the country. It was a small contribution that was made in the hope also of helping to solve the shortage of healthcare professionals.

American Medical Association (AMA) Past President Gerard Harmon, MD, during an interview in April, said that because it can take up to a decade to properly educate and train physicians, we need to act now to ensure that we have enough doctors to meet the needs of tomorrow. Indeed, the health of our nation depends on it. AAMC projections indicate that by 2034, the shortfall will be 17,000 to 17,800 in primary care and 21,000 to 97,000 in non-primary care. It has also been projected that during the next 10 years, the U.S. population will grow 10.6 percent, and the 65-plus population will grow up to 47 percent; whereas about one-third of actively practicing physicians will be more than 65 years old and reaching retirement age.

The physician shortage is also confirmed by data from the U.S. Health Resources and Services Administration (HRSA) and the U.S. Census Bureau. The current U.S. population of 331.5 million is projected to grow to 364 million by 2034. On the other hand, the total physician supply would increase from 808,400 in 2019 to 857,700 by 2034 – a 6.1 percent increase, which is below the approximately 10.6

percent projected growth in the U.S. population over the same period, thus contributing to a 4 percent decline in the physician-to-population ratio (declining from 246 to 236 physicians per 100,000 population by 2034). The shortfall could cost thousands of lives per year. On a positive note, increase in primary care physicians is associated with lower cause-specific mortality.

Major contributing factors to the shortage issues are:

1. Growth of U.S. population
2. Aging population
3. Aging physicians, retirements, and burnouts
4. Medical education and residency quota
5. Immigration laws relating to exchange students and J1 visa requirements (could the problem in shortage areas be addressed by international medical graduates?)

Therefore, as citizens and physicians, we should strongly support certain solutions to overcome the physician shortage as advocated by AMA, such as:

1. Physicians' wellbeing and awareness of their mental health
2. Removal of obstacles to care such as prior authorization
3. Easing the financial burdens and debts of young doctors
4. Bipartisan resident education (Deferred Interest Act)
5. Increasing the number of residencies
6. Wider use of medical technologies
7. Supporting physician-led team-based care.

The South Dakota State Medical Association and the AMA are our strong and powerful allies. Let's work together.

## A Case for Empathetic Teaching

Jason J. Kemnitz, EdD



It is not a stretch to say that we live in a tumultuous world. Snap on a TV, open a browser, or simply look at a news feed on your phone and you are exposed to geopolitical war, vitriolic rhetoric, and plain and simple anger. The voices have become so loud that I am left wondering what has happened to compassion and empathy. Unfortunately, the fervor cannot be confined to the devices we use as it spills into everyday life and affects the way we teach, learn, and communicate. The true test is how we let it affect our daily lives and what are we modeling for our students? Perhaps if we modeled more empathy in our teaching, communication, and interactions with students, patients, and staff we could calm the fervor.

Safran, 2003 revealed the growing concern that physicians are becoming increasingly detached from their patients and teaching. This feeling is further reinforced by the alarming perception that medical students' empathy deteriorates during medical school (Chen et al. 2007; Hojat et al. 2009). Place this in tandem with the knowledge that the expression of empathy by a physician has a significant effect on patient care (Mercer et al. 2016) and physician job satisfaction and decreased burnout (Krasner et al., 2009, Thiriroux, et al., 2016) it behooves us to recommit helping our clinical students how to employ empathy in the clinical setting.

It should be noted that we are not talking about shaping values or thought, but simply the ability to understand and share the feelings of another. This can be accomplished using affective empathy, or the sharing of another person's emotions, or through cognitive empathy, which is the ability to put yourself in another's situation. I would argue helping our students find a balance between the two would be most effective. How we do this is more difficult, but here are some ideas to help you out on this journey.

**Model empathetic behaviors:** If I am starting to sound like a broken record it is because I find that all quality education has its basis in modeling. If a student sees you be more empathetic with a patient, resident, your staff or even them, they are more likely to see empathy as acceptable behavior. When I chat with students I often hear "I like the way Dr.

X approaches patients, I'd like to be like that someday." It is worth repeating. Our actions have consequences so if we make the best of them, we can affect change in our daily life. We choose whether it is a positive or negative charge.

**Teaching from a point of view:** If you see a student struggling with empathy skills, reach out to them. Share a moment in your education or career where you learned how to effectively employ empathy or a time when you could have done better. We all have these experiences, they only become helpful if we let others learn from them.

**Listen actively:** One of the most common conversational mistakes is that we do not listen to one another and often struggle to block out external or internal noises. We suggest employing the acronym H.E.A.R. (Wilson, Conyers, 2017).

**Halt** – stop what you are doing and end your internal dialogue.

**Engage** – focus on the speaker. **Anticipate** – look forward to hearing the conversation and try to learn something new.

**Replay** – think about what the speaker is saying or has said. After employing this strategy and genuinely thinking about what the speaker has said you will be better equipped to offer an empathetic suggestion or answer.

**Be metacognitive:** Right now, stop and take stock of how you feel about employing empathy. Where are you strong, and what could you do better by taking the perspective of your preconceived notions you will be better able to change them.

Do I think that these simple ideas will be the panacea to all the noise that surrounds us daily? No. But it is a start and if we do not start somewhere we will never get anywhere.

Congratulations to David Withrow, MD, who teaches on our Yankton campus. Dr. Withrow was selected as this year's faculty inductee to the Gold Humanism Society. Dr. Withrow embodies the ideals of putting interests, values, and dignity at the core of his teaching. It was clear by his letters of nomination that he fully employs empathetic teaching.

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# Impact of Emergency Medical Service Provider Training and Institutional Volume Experience on ST-Elevation Myocardial Infarction Patient Outcomes in Rural Setting

Thomas Vierhout, MD; Nathan Blaseg, MD; Travis Moodie, MD; Robert McCauley, BSN, RN, PCCN; Aditya Singh, MD; Eric Larson, MD, FACP; Adam Stys, MD; and Tomasz Stys, MD, FSCAI, FACC

## Abstract

**Introduction:** Rural sites provide management challenges for ST-elevation myocardial infarction (STEMI) patients. The impact of emergency medical service (EMS) training and institutional volume experience on STEMI outcomes was examined.

**Methods:** All STEMI patients transferred to Sanford from 32 sites in rural South Dakota from 2010-2019 were analyzed. "Time to electrocardiogram (EKG)" ( $T_{\text{EKG}}$ ) and "Time from EKG to Thrombolytics" ( $T_{\text{Throm}}$ ) were calculated. Sites were compared based on EMS training (advanced life support (ALS) vs. basic life support (BLS)) and institutional volume experience ( $\leq$  five vs.  $>$  five STEMI).

**Results:** 514 STEMI patients from 32 sites in South Dakota were analyzed. Average  $T_{\text{EKG}}$  was 20 ( $\pm 15$ ) and 14 ( $\pm 10$ ) minutes for ALS and BLS trained services, respectively ( $p=0.25$ ). More experienced sites had an average  $T_{\text{EKG}}$  of 26 ( $\pm 15$ ) minutes, while sites with  $\leq$  five STEMI patients had an average time of 15 ( $\pm 13$ ) minutes ( $p<0.05$ ).  $T_{\text{Throm}}$  did not differ significantly between sites based on our metrics.

**Conclusion:** The present study concludes that EMS provider training (BLS vs ALS) and institutional volume experience do not significantly impact patient-related outcomes when treating STEMI patients. This result is possibly attributed to increased educational efforts for rural health care providers in general and the establishment of the South Dakota statewide STEMI Network "Mission: Lifeline" which standardized STEMI care and improved connectivity between remote responders and the larger PCI-capable facilities.

## Introduction

Myocardial infarction is the number one cause of death in the U.S., with an estimated 550,000 new cases each year.<sup>1</sup> ST-elevation myocardial infarction (STEMI) results from an ischemic myocardial injury that produces a transmural infarction, appearing as an ST elevation on the surface electrocardiogram (EKG). Timely management of this occluded artery is crucial, as myocardial injury begins as soon as blood flow is interrupted.<sup>1</sup> The time from symptom onset to reperfusion therapy is termed "total ischemic time," and it is a strong indicator of prognosis in patients with STEMI.<sup>2</sup> The preferred method of reperfusion is primary percutaneous coronary intervention (PCI), which has been shown to be superior to fibrinolysis.<sup>3,4</sup> International guidelines recommend that PCI be performed so that total ischemic time is less than 120 minutes.<sup>5</sup> If PCI cannot be

performed within 120 minutes of first medical contact, fibrinolysis is recommended.<sup>6,7</sup> In rural settings, such as the sites of interest in this study, PCI may not be available at the site of first medical contact and the pharmaco-invasive approach may be employed. This approach involves the administration of fibrinolysis followed by transport to a PCI-capable facility. This practice has been shown to be superior to fibrinolysis therapy alone.<sup>8,9</sup>

Although the guidelines for fibrinolytic therapy and the pharmaco-invasive approach in the treatment of STEMI are well-defined, rural settings face several unique challenges. These factors include the need for training of rural emergency physicians in lysis therapy, communication challenges between nearby PCI-capable facilities and emergency medical services, and prolonged transfer intervals.<sup>10,11</sup> Due to these issues and others, some rural locations have demonstrated

increased rates of prehospital delay, delay in the first EKG, thrombolytic therapy, and other in-hospital treatment.<sup>12</sup> Standardized protocols, such as the Mission: Lifeline program, have been produced to guide the organization and evaluation of regional STEMI networks. Their aim is to improve the logistics of patient transfers between rural and urban medical sites and reduce disparities that may exist in the rural setting.<sup>13</sup> Regionally, proper organization and usage of these networks have resulted in reduced total ischemic times, and increased use of PCI.<sup>10</sup> Robust quality control and continuous improvement is essential to the success of these networks.<sup>13</sup>

One potential avenue for improvement in rural settings is the level of training of the ambulance services that are responsible for transferring patients to larger PCI-capable facilities. The ability of these services to obtain an EKG in a timely manner and get the correct results to the larger facility may have important implications on the preparedness of the staff receiving the transfer and initiating STEMI treatment. The training level of ambulance services can be classified according to the treatment levels the service is allowed to administer. Prehospital care is classified into advanced life support (ALS) and basic life support (BLS). The difference between these services is the training completed and the methods of life support they use. ALS is allowed to use more sophisticated and invasive methods of support, including intubation and intravenous fluids or medications.<sup>14</sup> Both levels of care, however, utilize EKG. Does the expanded training and skillsets of the ALS-certified service translate into faster recognition of potential myocardial infarctions and EKG utilization?

In this study, we analyzed the “Time to EKG” ( $T_{\text{EKG}}$ ) and “Time from EKG to Thrombolytics” ( $T_{\text{Throm}}$ ) of chest pain ambulance calls in rural America. We compared these metrics between ambulance services with ALS certification and those with BLS certification in order to determine if additional training could lead to better outcomes for patients in rural settings. Additionally, we used these same metrics to compare the volume experience of the service. Sites that received more than five STEMI over the studied time frame were compared to sites that received fewer than five.

## Methods

This project was reviewed and granted exemption by the University of South Dakota Institutional Review Board for purposes of quality improvement limited to the specific sites in this study. Data was acquired from the Sanford Cardiovascular Institute (SCI) in Sioux Falls, South Dakota.

A retrospective data analysis was performed evaluating all STEMI patients transferred to SCI from other sites in South Dakota’s statewide STEMI network from 2010 to 2018. Data was originally entered and stored in the National Cardiovascular Data Registry: Chest Pain-MI registry. This database has been described previously and is widely used for purposes of quality improvement.<sup>15-17</sup> From here, data was de-identified and retrieved by SCI for use by the authors. This data did not include any patients under the age of 18. Relevant collected data included the name of the transferring medical facility, as well as the date and time of the following events: first medical contact with the patient, patient arrival at the outside facility, patient transfer and arrival to SCI, first EKG, and thrombolytic therapy. First medical contact was defined as the time at which an ambulance crew member or a hospital staff member first made direct contact with the patient, whichever came first.

From these recorded measures, several timeframes were calculated for analysis in this study.  $T_{\text{EKG}}$  was calculated as the difference in time between the first EKG and the time of first medical contact.  $T_{\text{Throm}}$  was calculated as the difference between the time the patient received thrombolytic therapy (if applicable) and the time of the first EKG. Median and mean times were calculated and used to analyze differences between transferring sites.

This study analyzed transferring medical facilities based on their affiliated EMS’s level of certification and volume experience. First, transferring sites were separated into one of two groups based on the highest level of ambulance service certification: ALS/BLS or BLS only. Additionally, transferring sites were compared based upon the number of STEMI each site cared for over the 10-year course of the study. The number of STEMI cared for was used as a metric for volume experience, or the experience a site gains from seeing more patients. Sites were separated into one of two groups: those that cared for greater than five STEMI over the timeframe of the study or those that cared for fewer than five STEMI. This number for volume experience was calculated using the recursive partitioning program “rpart” in R, which allowed for the determination of an optimal cutoff value to reveal statistically significant differences between the two groups.<sup>18</sup> An unpaired t-test was performed for the determination of statistical significance.  $T_{\text{EKG}}$  and  $T_{\text{Throm}}$  were then used to compare sites based on their level of EMS certification and their volume experience.

## Results

A total of 32 sites across South Dakota’s statewide STEMI

network were included in this study (Figure 1). Combined, these sites cared for 514 STEMI patients during the studied timeframe. A comparison of sites by the training level of their prehospital ambulance service revealed no significant differences in the measures of  $T_{\text{EKG}}$  or  $T_{\text{Throm}}$  (Figure 2A and 2B; Table 1). The average  $T_{\text{EKG}}$  for ALS trained services was 20 ( $\pm 15$ ) minutes and 14 ( $\pm 10$ ) minutes for BLS trained services ( $p=0.252$ ). The average  $T_{\text{Throm}}$  for ALS-trained services was 62 ( $\pm 28$ ) minutes and 64 minutes for BLS-trained services ( $p=0.924$ ).

Additional comparison based upon the volume experience of each site did reveal a significant difference in the studied time frames (Figure 2C; Table 1). This comparison revealed that those sites that cared for fewer than five STEMI patients over the time course of this study had significantly lower mean  $T_{\text{EKG}}$  than those that cared for greater than five STEMI patients; 15 ( $\pm 13$ ) minutes and 26 ( $\pm 15$ ) minutes, respectively ( $p=0.045$ ). The volume experience of sites did not have a significant difference on  $T_{\text{Throm}}$  (Figure 2D; Table 1). Sites caring for more than five or fewer than five STEMI patients had an average  $T_{\text{Throm}}$  of 65 ( $\pm 21$ ) minutes and 60 ( $\pm 35$ ) minutes, respectively ( $p=0.670$ ).

An ungrouped comparison of the relationship between

Figure 1. A map of the 32 sites included in this study.



Table 1. Comparisons of  $T_{\text{EKG}}$  and  $T_{\text{Throm}}$  between sites of different EMS training and institutional STEMI volume experience.

| Variable           | Group    | N  | Mean | SD | p-value |
|--------------------|----------|----|------|----|---------|
| $T_{\text{EKG}}$   | ALS      | 26 | 20   | 15 | 0.252   |
|                    | BLS      | 6  | 14   | 10 |         |
| $T_{\text{Throm}}$ | ALS      | 26 | 62   | 29 | 0.924   |
|                    | BLS      | 6  | 64   | 33 |         |
| $T_{\text{EKG}}$   | >5 STEMI | 12 | 26   | 15 | 0.045   |
|                    | ≤5 STEMI | 20 | 15   | 13 |         |
| $T_{\text{Throm}}$ | >5 STEMI | 12 | 65   | 22 | 0.670   |
|                    | ≤5 STEMI | 20 | 60   | 25 |         |

Unpaired t-tests comparing the relevant time frames between the site groups.

Figure 2. The impact of prehospital care and STEMI volume on Time to EKG and Time from EKG to Thrombolytics. Box and whisker plots of site comparisons of Time to EKG and Time from EKG to Thrombolytics based upon level of prehospital care training (2A, 2B). Box and whisker plots of site comparisons of Time to EKG and Time from EKG to Thrombolytics based upon STEMI volume (2C, 2D).

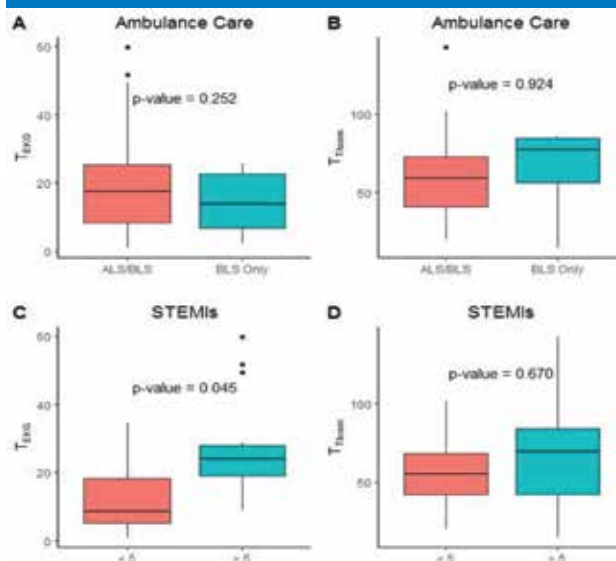
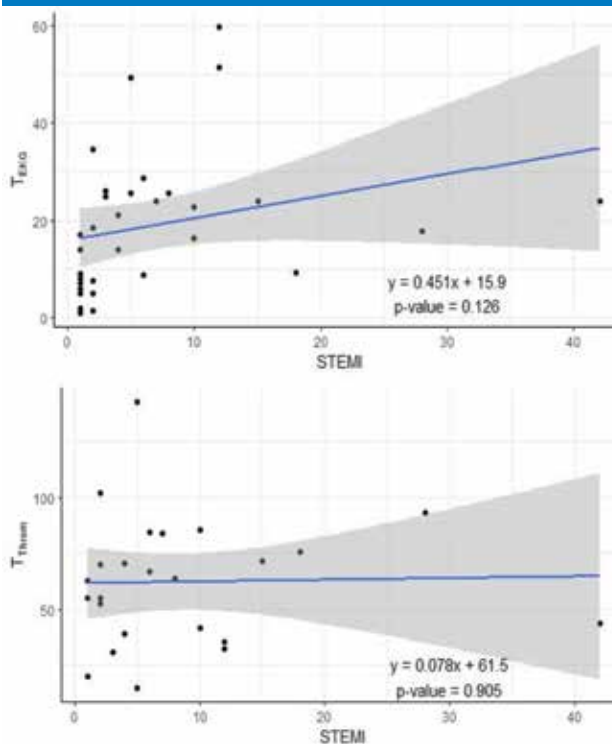


Figure 3. Scatter plot of the average "Time to EKG" of each site plotted against the number of STEMI's reported at that site (3A). Scatter plot of the average "Time from EKG to Thrombolytics" of each site plotted against the number of STEMI's reported at that site (3B). Line of best fit calculated via linear regression. The gray band represents a 95% confidence interval.



STEMI frequency and  $T_{\text{EKG}}$  or  $T_{\text{Throm}}$  revealed no significant correlation between the studied variables (Figure 3A and 3B). The data was graphed without regard to the statistically derived cut-off value used above. Without this cut-off value, there is no significant correlation between our metrics and volume experience. The care received at any site in this study is non-inferior to care at any other site.

## Discussion

With a large rural population and long transfer times, South Dakota presents unique challenges for the management of chest pain patients. With these challenges, it is necessary to shorten times to diagnosis wherever possible and give the PCI-capable facility as much time as possible to prepare for the incoming patient. South Dakota has taken steps to improve time to diagnosis by utilizing the South Dakota STEMI Network. The network has worked to improve EKG access and connectivity between remote responders and the larger PCI-capable facility. These improvements have consistently resulted in good outcomes for the state of South Dakota even when some of the recommended time frames are not always met. With these improvements already in place, another potential avenue to maximize the time to prepare is by focusing on the training of the ambulance services.

The ambulance services' training can be thought of in two ways: the certification the ambulance receives and the volume experience that comes from seeing more patients. We hypothesized that higher levels of certifications and increased exposure would result in quicker  $T_{\text{EKG}}$ . We compared both the level of certification and STEMI frequency with the  $T_{\text{EKG}}$ . We found no statistically significant difference in  $T_{\text{EKG}}$  between the BLS group and the ALS group.

Our study also showed the sites that had cared for fewer than five STEMI patients over the course of the study actually had a lower mean  $T_{\text{EKG}}$  when compared to sites that had cared for greater than five STEMI patients over that time. Assessing this data via the categorical variables of greater than or less than five STEMI patients over the course of the study, the mean  $T_{\text{EKG}}$  was significantly different, as determined via t-test. However, this analysis was also done using a linear regression model, accounting for all data points in a continuous manner. When this analysis was repeated in an ungrouped fashion utilizing linear regression, no statistically significant relationship between STEMI frequency and  $T_{\text{EKG}}$  was detected. The linear regression model determines significance by calculating a slope and, in the case of our data, this slope was not a significant factor in explaining the variance in  $T_{\text{EKG}}$  for all data points. This data demonstrates rural communities with

lower levels of certification for ambulance crews and hospitals with less volume experience are non-inferior in identification and management of STEMI patients as compared to the sites with higher levels of certification and more experience. The role of additional training of ambulance crews has been studied before in the context of cardiac arrests. While some studies show at least a short-term benefit of ALS-certified crews on patient outcomes,<sup>20-22</sup> others determined that there was no difference in outcomes when BLS-certified crews were involved.<sup>23-25</sup>

Our results are in agreement with previous studies that demonstrate higher certification levels do not necessarily translate into better outcomes. Our analysis of  $T_{\text{Throm}}$  showed no statistically significant difference between ALS-certified crews and BLS-certified crews. The patients received the treatment they were going to receive in the same amount of time independent of the training level of the ambulance crew.

Additional certifications may not be the answer for improving patient outcomes. Instead, training in a specific area of care may allow for better coordination and preparation. In South Dakota, where transfer times are often the deciding factor for management, systematic training for all ambulance crews emphasizing timely EKG performance may allow for quicker decision making and determination of transfer status. Additionally, the continued development of infrastructure that provides equipment and the means to transmit the data quickly may impact patient care more than the emphasis on certifications.

Our study supports the current and past work done by the Mission: Lifeline program in South Dakota. The implementation of standardized order sets across the state, regardless of the level of certification or volume experience, has resulted in non-inferior care for the state's more rural populations.

This study has several limitations. First, some sites had a very low number of patients who had presented with a STEMI in the previous ten years. This limitation is inherent to the rural nature of many of these clinical sites. Our study also did not account for patient characteristics and risk factors that may have complicated the patient's initial presentation or diagnosis. Additionally, our method of the study did not provide specific information regarding the level of training of the provider that responded to each individual STEMI case. Since many rural sites that have ALS-trained personnel often lack the adequate staffing necessary to continually provide

ALS services, it is possible that some of these patients were being cared for by personnel without ALS training. Lastly, this study lacks the ability to evaluate external factors including hospital preparedness, provider training, patient census, long EMS commute time, and adequate availability of supplies and personnel, which may have contributed to the delay in time to EKG.

Future studies seeking to improve STEMI care in rural settings may focus on other factors relevant to patient outcomes both in the prehospital and in-hospital setting. In the prehospital setting, these could include a variety of variables such as STEMI network organization and logistics, the distribution and utilization of satellite or cell phone network-enabled EKG transmission devices, or the organization and communication of STEMI protocols. In

the rural in-hospital setting, potential future areas of study include the proper identification of myocardial infarctions, physician availability, and transfer protocols.

## Conclusions

Our results show that the focus on rural medicine and low-volume institutions adopted in South Dakota is making an impact on patient outcomes in those areas. Our data demonstrate that rural sites with lower levels of certification and less volume experience are performing in a non-inferior manner to sites with higher levels of certification and higher volume experience when comparing “Time to EKG” and “Time from EKG to Thrombolytics.” South Dakota’s effort to provide equal quality of healthcare in both rural and urban settings is affirmed by this study.

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# BREAKING GROUND ON THE FUTURE OF ORTHOPEDIC CARE AT SANFORD HEALTH

To the tune of 205,000 square feet, Sanford Health is growing its ability to provide the best in orthopedic care. A \$160 million orthopedic and surgical services expansion broke ground in June with an anticipated opening date set for the fall of 2025.

“Our patients are going to be impacted by the advances in technology and technique,” said Joshua Crabtree, MD, president of Sanford Clinic in Sioux Falls. “We’re committed to taking care of people here.”

The new hospital, consisting of 161,000 square feet of new space and 44,000 square feet of remodeled space, will live to the south of the Sanford Children’s Hospital and to the west of the surgical tower on the main Sanford Health campus in Sioux Falls, South Dakota.

## More room, more helping patients

Designed collaboratively by physicians, staff, administrators and patients, the hospital will have 12 new operating rooms, 35 additional prep and recovery rooms, and 56 medical suites. As outpatient surgeries increase, the medical suites will give patients and their families a comfortable place to stay before or after a procedure.

“The addition of these medical suites is a testament to how far we’ve advanced recovery, drastically decreasing the length of stay for total joint procedures from four overnights to same-day discharges in many cases,” said Mike Wilde, MD, vice president and medical officer for the Sioux Falls region.

Meanwhile, added room will allow for more patients and providers too, said president of Sanford Health in Sioux Falls, Paul Hanson.

## Enhancing care by advancing technology

When the orthopedic hospital opens, it will transform how both current and future physicians deliver care – from how they treat conditions to how they further research and education.

“We’re almost in our fourth year of our orthopedics and sports medicine residency program, and this

building is going to make that program even more competitive,” said Kristofer Kimber, MD, an orthopedic surgeon at Sanford Health.

Technology additions to the hospital will include cutting-edge surgical spaces and an intraoperative MRI machine, which will provide near real-time imaging during procedures.

***“Enhanced care doesn’t come without enhanced technology, and we’re just as committed to bold innovation,” said Jared Daniel, MD, an orthopedic surgeon at Sanford Health.”***

## Investing in rural health care

The decision to build the hospital was made with patient’s best interests in mind, said Dr. Crabtree. In addition, expanding orthopedic and surgical services in Sioux Falls will also enhance access for patients across the region.

“We want to make sure that we are providing top-notch health care no matter what your zip code is,” said Dr. Crabtree. “I think when we put a building like this in place and we make a commitment like this, it solidifies our intention to be the premier rural health care provider in the country.”

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# Training of Physical Therapists in Pelvic Floor Techniques: Is Care Available in the Rural Midwest?

Victoria Biach, MD; Annika van Oosbree, MS IV; Nicole Cookson PT, DPT, WCS; and Matthew A. Barker, MD, FACOG

## Abstract

**Introduction:** The number of patients affected by pelvic floor dysfunction is predicted to continue to grow in the future. Pelvic floor physical therapy (PFPT) is a benign, first-line treatment for a variety of pelvic disorders. There is currently a failure rate estimated at 19.8 percent for this conservative therapy. The present study aims to investigate if the high failure rate of conservative treatment is due to a lack of training and availability of therapists in the rural health care setting.

**Methods:** An anonymous survey was distributed to 53 physical therapists who practice within a targeted rural healthcare setting. Questions were designed to determine training received in graduate and post-graduate courses in PFPT while gauging level of involvement of PFPT within their practice. Proportions were calculated and then analyzed independently for standard deviation, standard error, and 80 percent confidence intervals.

**Results:** This project had a 45 percent response rate. 58 percent of these therapists received less than 2 hours of didactics in PFPT, and only 29 percent of the participants had a lab included in their graduate school curriculum. 95 percent of the participants attended additional post-graduate training in PFPT. The average number of courses attended was 3.33. Participants who stated that their training included hands-on training in female and/or male external and internal physical exam was 91.6 percent.

**Conclusion:** This study identified only 53 providers in this rural healthcare region who are not receiving adequate training in PFPT during graduate school. Therapists have to seek post-graduate courses in order to be prepared to provide these services to patients.

**Impact statement:** An investigation into if there is paucity of training in PFPT during graduate school that could be contributing to a lack of therapists practicing PFPT.

## Introduction

The prevalence of urinary incontinence in women is between 13 percent and 46 percent.<sup>1,2</sup> 2.9 percent of women experience pelvic organ prolapse, and uterovaginal prolapse accounts for 20 percent of major gynecological surgery in developing countries.<sup>3,4</sup> Pelvic floor physical therapy (PFPT) is a benign, first-line treatment for a variety of pelvic disorders that offers a safe, cost-effective approach to treating these pelvic floor dysfunctions, improving the women's quality of life. PFPT has also been shown to improve dyspareunia and other sexual symptoms such as decreasing urine leakage during sexual activity.<sup>5</sup>

PFPT must be delivered in a proper manner by skilled providers with the optimal intensity and frequency to achieve

significant effects.<sup>6</sup> PFPT is ideally performed by physical therapists who are not only licensed by the American Physical Therapy Association (APTA) but who have completed specific PFPT training.<sup>6</sup> There is no specific standard plan of care. Through internal pelvic floor muscle assessment and neuromuscular re-education, a physical therapist can ensure correct technique during Kegel exercises.<sup>7</sup> It is crucial that PFPT be monitored to verify that it is completed with proper form and intensity; however, a review of 43 RCTs showed that only 15 mentioned verifying that subjects were exercising proper PFMT contraction technique.<sup>8,9</sup> Another study identified that verbal guidance alone does not provide the patient with adequate instruction to properly complete Kegel exercises.<sup>10</sup> Despite the evidence suggesting PFPT's effectiveness in a multitude of disorders, 19.8 percent of

women currently fail conservative treatment – including noninvasive methods such as PFPT, behavioral therapy, and bladder training – forcing them to either return to physicians for surgical intervention or to continue to live with the disorder.<sup>11</sup> These findings may suggest a lack of standardization of PFPT, whether that be due to inadequate training of physical therapists or patients living so far away from qualified physical therapists that they do not complete the prescribed regimen.

The present study aims to investigate if there is a lack of access to training in PFPT during graduate school that could be contributing to a lack of therapists practicing PFPT. To accomplish this goal, this study seeks to investigate the availability of physical therapists who are adequately trained in PFPT in a rural midwestern health system across a five-state region. The null hypothesis is that PFPT for pelvic floor disorders is available for patients within a Midwestern rural health system footprint and that the available physical therapists have adequate training in PFPT. This was tested by surveying physical therapists across a major health system in South Dakota, Iowa, Nebraska, North Dakota, and Minnesota about their education and training in PFPT, interest in helping women with PFPT, techniques and pelvic floor disorders treated, and percentage of practice focused on PFPT.

### Materials and Methods

The survey was designed with the help of a board certified and fellowship-trained urogynecologist and was then reviewed for accuracy and completeness by two physical therapists who perform and teach PFPT, one of which is board certified in women's health. The survey focused on the participants demographics including age, gender, credentials, graduate school, and clinical practice setting. It then focused on training in PFPT during graduate school and post-graduate continuing education course work. The questions focused on the number of hours of training during graduate school and if it included a lab. The participants were asked about what post-graduate courses they attended and what percent of these courses was didactics versus clinical exam. The physical therapists were then asked about the percent of their patients they see for PFPT and about their interest in PFPT. Lastly, it asked providers to select from a list of 19 diagnoses and 31 techniques that can be treated by PFPT based on a list from the APTA. The survey and project were approved by the University of South Dakota Institutional Review Board. The survey was created using an online platform called SoGo Survey.

The anonymous survey was distributed to physical therapy providers who practice within a multi-state Midwestern health system footprint. Possible participants were identified through a brochure resource that is provided to patients receiving urogynecology care within the health system when PFPT is recommended for treatment. The resource provides patients with providers who are located throughout South Dakota, Northeast Nebraska, Northwest Iowa, and Southwest Minnesota who provide PFPT. Providers were contacted via phone to ask if they would be willing to participate in the survey. If willing, providers were asked to provide an email. The survey was active from Nov. 4, 2019 through Jan. 17, 2020. The funders played no role in the design, conduct, or reporting of this study.

The data was downloaded from SoGo Survey to a Microsoft Word and Excel file. The data was checked to ensure the question list and response number were accurate. After taking into account non-responses, proportions were calculated when appropriate. Each of the proportions was analyzed independently for mean and standard deviation. Then the standard error and 80 percent confidence interval (CI) were calculated.

### Results

Fifty-three providers were identified through a provider brochure distributed by the health system to patients and lists of PT practices that advertise PFPT. All 53 providers were willing to provide an email for the participation in the survey. From the 53 identified providers, 24 providers responded to the survey, yielding a 45 percent response rate. The survey respondents were 100 percent female with an average age of 39. Participants were trained at 12 different graduate programs, 11 of which are located within the Midwest (Figure 1). At least one provider from the five states in the hospital footprint responded. Forty-two percent practice in a rural setting (less than 10,000 people), and 29 percent of respondents practice in a small town (10,000-30,000 people).

Figure 1. Demographic information of survey respondents.

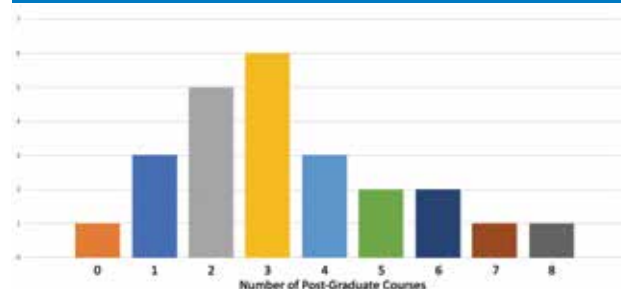


The remaining 29 percent of respondents practiced in a city (more than 30,000).

Forty-six percent of participants received a doctorate in physical therapy (DPT), while 37.5 percent received a Master's in physical therapy (MPT). The remaining 12.5 percent are licensed physical therapists (PT) but did not receive a masters or doctorate degree. One participant is a physical therapy assistant (PTA). During graduate school, 25 percent of participants received no training in pelvic floor therapy, and 33 percent only had 1-2 hours of training. Only 4 percent received 10+ hours. 38 percent, received 3-5 hours. Twenty-nine percent of the participants had a lab included in their training during graduate school. The average was 2.42 (SD 2.3) hours of training (80 percent CI 1.62-3.22).

Out of the 24 participants, 23 had attended additional post-graduate training in PFPT. The mean number of post-graduate training courses taken by participants is 3.33 (SD 2) (2.68-4.04) with a range between 0-8 courses (Figure 2).

**Figure 2. Number of post-graduate courses reported by survey participants.**



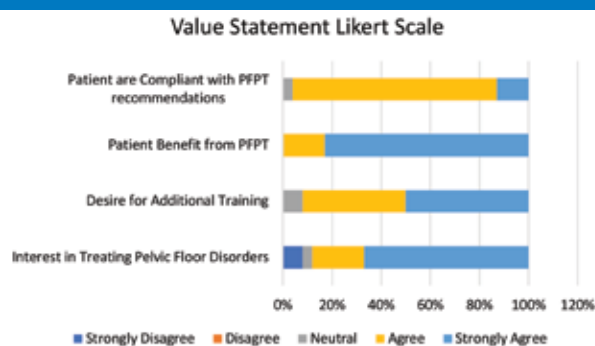
The courses with the highest percentage of participation was the APTA Pelvic Health Physical Therapy Level 1 with 45.8 percent participation. Twenty-one percent of participants went on to complete the Level 2 course in pelvic pain and 16.7 percent completed the level 2 course in bowel dysfunction. Twelve and a half percent of participants attended the Level 3 course and subsequently achieved CAPP in pelvic health. Twenty-five percent of survey participants completed the Fundamental Topics of Pregnancy and Postpartum Physical Therapy. Forty-two percent of the physical therapist completed Pelvic Floor Level 1. Thirty-three percent of participants attended level 2A and 16.7 percent attended level 2B.

Within these post-graduate courses, the average percentage of time during the course dedicated to didactics is 48 percent (SD 13.6, CI 42.9-53.13) with the remainder of time in

hands-on lab. The average percentage of time during the course dedicated to physical exam is 47 (SD 16.5, CI 40.9-53.3). Only one of the courses had no physical exam aspect. Their training included hands-on training in female and/or male external and internal physical exam for 92 percent of participants.

Providers were asked value statements to gauge interest and feeling about PFPT on a 5-point Likert Scale (Figure 3). Providers were asked about their interest in treating pelvic floor disorders, which received a 4.38 weighted score. Next they were asked about desire for additional training in treating pelvic floor disorders, which received 4.42 weighted score. Providers were asked about patient benefit and compliance with their treatment recommendations, which received 4.83 and 4.08 weighted scores respectively.

**Figure 3. Likert scale distribution**



The cohort of 24 providers estimated their current case load referred to them for pelvic floor dysfunction, which averaged at 39.2 percent (SD 32.2, CI 27.92-50.42). The majority of providers, 87.5 percent, estimated that these appointments last 60 minutes. However, 37.5 percent of surveyed physical therapists recommended 7-9 treatment sessions and 29 percent recommending 4-6 treatment sessions and another 29 percent recommending 10-12 treatment sessions there is little consensus on number of treatment sessions.

The cohort selected what disorders they treat within their practice with PFPT from a list of 19 diagnoses. The average study participants are treating 14.33 (SD 3.7) disorders out of the 19 (CI 13.03-15.63). Of note, 100 percent of the survey participants selected urinary stress and urge incontinence (Table 1). The physical therapists were also asked about techniques they employ in the treatment of these disorders. A list of 31 techniques were listed for providers to choose from (Table 2). The mean number of techniques in PFPT offered by providers is 16.35 (SD 4.9, CI 14.61-18.09).

Table 1. Pelvic floor disorder treated with PFPT.

| Pelvic floor disorder                                    | Percent of participants offer treatment |
|----------------------------------------------------------|-----------------------------------------|
| Stress urinary incontinence                              | 100%                                    |
| Urgency/urge incontinence                                | 100%                                    |
| Mixed urinary incontinence                               | 96%                                     |
| Pre/Post-natal musculoskeletal pain                      | 96%                                     |
| Diastasis recti                                          | 96%                                     |
| Pelvic organ prolapse                                    | 92%                                     |
| Pelvic pain                                              | 92%                                     |
| Urinary frequency                                        | 92%                                     |
| Fecal incontinence                                       | 83%                                     |
| Constipation                                             | 83%                                     |
| Sexual dysfunction (dyspareunia, vulvodynia, vaginismus) | 83%                                     |
| Coccydynia                                               | 83%                                     |
| Pelvic floor dyssynergia                                 | 75%                                     |
| Interstitial cystitis/painful bladder syndrome           | 75%                                     |
| Non-neurogenic urinary retention                         | 67%                                     |
| Bloating and gas pain                                    | 54%                                     |
| Abdominal bloating/ Abdominophrenic dyssynergia          | 38%                                     |
| Pediatric pelvic health                                  | 29%                                     |
| Transgender pelvic health (pre/post gender reassignment) | 0%                                      |

Table 2. PFPT technique used to treat pelvic floor disorders.

| Techniques used for women's health issues and PFPT                  | Percentage of providers trained in technique |
|---------------------------------------------------------------------|----------------------------------------------|
| Behavioral bladder retraining                                       | 100%                                         |
| Diaries bowel and bladder                                           | 96%                                          |
| Soft tissue mobilization/myofascial release/ trigger point external | 96%                                          |
| Biofeedback therapy surface EMG: vaginal                            | 96%                                          |
| Prescriptive exercises                                              | 96%                                          |
| Dynamic lumbar stabilization exercises                              | 96%                                          |
| Diaphragmatic breathing/breath work                                 | 91%                                          |
| Assessment of trigger points externally                             | 91%                                          |

Table 2 cont.

|                                                                                       |     |
|---------------------------------------------------------------------------------------|-----|
| Soft tissue mobilization/myofascial release/ trigger point (intravaginally, rectally) | 87% |
| Behavioral bowel care (fibers, abdominal massage, positioning, fluid)                 | 78% |
| Dilators                                                                              | 78% |
| Self-manual therapy                                                                   | 74% |
| Biofeedback surface EMG rectally                                                      | 65% |
| Electrical stimulation external                                                       | 65% |
| Instrument assisted soft tissue mobilization (Hawk grip, Graston, cupping)            | 61% |
| Vaginal weights                                                                       | 48% |
| ILU abdominal massage                                                                 | 43% |
| Electrical stimulation intravaginal                                                   | 43% |
| Visceral mobilization                                                                 | 39% |
| Yoga                                                                                  | 30% |
| Pilates                                                                               | 20% |
| Electrical stimulation rectally                                                       | 17% |
| Theille's massage                                                                     | 17% |
| Low level light therapy                                                               | 9%  |
| Pessary                                                                               | 4%  |
| Realtime ultrasound imaging abdominals                                                | 4%  |
| Rectal balloon                                                                        | 0%  |
| Pressure biofeedback: perionometer                                                    | 0%  |
| Real time ultrasound imaging pelvic floor                                             | 0%  |
| Anorectal manometry                                                                   | 0%  |

## Discussion

Only 53 trained providers were identified in the sampled Midwest healthcare system, which spans rural communities across five states and over 72,000 square miles. This shows the lack of urogynecologists in rural communities across the U.S. Muffy, et. al (2015) identified that urogynecologists tend to cluster in certain areas of the country, usually urban areas, creating a disparity in access to care for many women. This issue is amplified in the upper Midwest, where there are 100 to 1000 or more miles from an American Urogynecologic Society (AUGS) member. North and South

Dakota exhibit this trend, with North Dakota housing zero AUGS members and South Dakota housing only six clustered in two towns. This leaves much of South Dakota and all of North Dakota as urogynecologic deserts, complicating the ability of women to seek care for a relatively common disorder. The distribution of PFPT providers could be similar to that of urogynecologists. A future study could explore the distribution of PFPT providers in the rural Midwest to investigate the dynamics and connections behind these disparities in both urogynecologists and PFPT providers.<sup>12</sup> The present study identified that there is limited access to this specialized care, especially in this rural region. With one study estimating a 70 percent increase in pelvic floor dysfunction, the lack of providers will only become more of an issue in the future.<sup>13</sup> Physical therapists should receive more training during graduate school, and the training should include labs for external and internal physical exam.

Since over 50 percent of these providers had two hours or less of lectures focusing on pelvic floor disorders and only 29 percent had a lab in PFPT training is mostly dependent upon post-graduate work. There are a wide variety of training programs attended by survey participants. This study focused on national continuing education programs offered to license physical therapist. The two largest national programs offering continuing education in Women's Health are taught by APTA and Herman Wallace. Each of these offer multiple levels of training. These courses are offered in 5-14 locations around the country and are two to three days long. The course involves labs and lecture. The closest offering of these course to this rural region is Chicago, Illinois, which is over 500 miles away.

One participant is certified in Women's Health. To qualify for a Women's Health certification, physical therapist needs either 2,000 hours of direct patient care in the specialty area over the past ten years with 25 percent of which must occur within the past three years or completed an American Physical Therapy Association (APTA) accredited post professional clinical residency.<sup>14</sup> They must then pass a written examination. There are 12 accredited Women's Health residency programs with the closest to this rural region being located in Omaha.

While the majority of the surveyed providers attended multiple national post-graduate courses many of the therapist are not treating all of the conditions that have been shown to provide significant improvement in quality of life and symptoms. Wallace et al.<sup>6</sup> suggested there is strong evidence

supporting the use of PFPT to treat SUI, pelvic organ prolapse, and pelvic floor myofascial pain and moderate evidence to use it to treat overactive bladder syndrome, anal incontinence, postpartum urinary incontinence, dyspareunia, vaginismus, vulvodynia, and postpartum sexual dysfunction.<sup>14</sup> 100 percent of the providers used PFPT for stress urinary incontinence (SUI) and 92 percent treat pelvic organ prolapse and pelvic pain; however only 83 percent used PFPT for sexual dysfunctions (dyspareunia, vulvodynia, vaginismus) and fecal incontinence and 75 percent of the physical therapists used PFPT for pelvic floor dyssynergia.

The techniques employed in PFPT treatment vary from provider to provider. This could be due to the lack of training in PFPT during graduate school. However, the small sample size prevents from analyzing this data to extrapolate if the number and specific post-graduate courses attended dictated the techniques providers would employ and the disorders they would treat, but this does point to a lack of consensus about PFPT. This highlights a potential issue that could be seen in urban areas as well, as a lack of post-graduate training is not necessarily unique to a rural setting. Lastly, this study identified a lack of consensus on the number of appointments necessary to treat pelvic floor disorders.

A strength of this study was identifying and surveying providers who practice PFPT versus all physical therapists in the region. This allows for the study to better assess if these well-trained professionals do provide standardized PFPT. If the survey had been open to all physical therapists, it would have skewed the results regarding PFDs treated, techniques employed, and post-graduate training performed.

A limitation to the study is the small sample size. Only 53 providers who offer PFPT were identified within this region and 24 of the therapists completed this survey. In a study that examined 1607 response rates of surveys the average response rate was 52.7 percent for individuals and 35.7 percent from organizations.<sup>15</sup> The response rate for this survey was 45 percent, falling between these averages. The required response rate to meet "liberal conditions," 10 percent sampling error and 80 percent confidence interval, for a survey population of this size between 17-18 participants needed to respond or 31-35 percent. This project met this "liberal condition".<sup>16</sup> In order for this project to meet "stringent conditions," 3 percent sampling error and 95 percent confidence level, at this sample size, the survey would need a 95-96 percent response rate which is very high considering the average external survey response rate.<sup>16</sup>

## Conclusion

This study identified physical therapists in a large rural Midwest healthcare system are not receiving adequate training in PFPT during graduate school and have to seek post-graduate courses in order to be prepared to provide these services to patients. Future studies that target all physical therapists in this region could be helpful to determine factors that limit providers seeking these post-graduate opportunities. This could be helpful because this study identified only 53 providers in this rural healthcare region that spans 72,000 square miles. This shows a lack of provider availability in many of these rural communities. The providers surveyed offered treatment for a wide variety of pelvic floor disorders, and the majority attended multiple post-graduate courses to be able to provide comprehensive care for these patients. Still, no consensus was found regarding number of sessions and technique employed for the treatment of these disorders. More research is necessary to help determine a standardization of care to help ensure patients are receiving the best possible conservative care in an effort to decrease failure rates.

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# Unusual Hand Deformity in Parkinson's Disease

Matthew Preszler, MD; McKenna Fischer, MD; and Jerome W. Freeman, MD, FACP

## Abstract

We describe two patients with prominent hand deformities attributable to Parkinson's disease. This uncommon condition, which mimics inflammatory arthritis, can be hard to diagnose and is disabling. As these two cases illustrate, hand deformities attributable to Parkinson's can be a late complication of the disease or present in the early stage as initial symptomatology.

## Introduction

Although hand deformities in Parkinson's disease (PD) were first recognized as early as 1877 by Charcot,<sup>1</sup> this condition is uncommon and can pose diagnostic challenges. Frequently, these finger and hand deformities are suggestive of rheumatoid arthritis. This condition is not responsive to Parkinson's medications and can be disabling. Many clinicians are unaware that PD can cause prominent hand deformities and we discuss two illustrative cases of this condition.

## Case Reports

### Patient 1

This woman was first evaluated by neurology at the age of 46. She had developed gait change over eight months and had signs of left hemi-parkinsonism. She had decreased arm swing and diminished dexterity in the left hand. Twelve years

later, when she was evaluated at a major regional Parkinson's center, she was noted to have bilateral findings of Parkinson's disease which had slowly progressed over the intervening years. When she was reassessed 25 years after her initial diagnosis, she had progressed to significant gait disturbance, had a resting tremor of the left arm and soft speech. She was also noted to have deformities of the fingers of the left hand with the fingers fixed in flexion. Seven months later, after a prolonged stay in a nursing home following throat surgery, she manifested deformities of the right hand as well as the left. She was unable to extend either hand at the wrist and had marked flexion deformities of the fingers. Radiographs of the hands showed no evidence for inflammatory arthritis. Tests for inflammatory arthritis were negative including rheumatoid factor, cyclic citrullinated peptide antibody and antinuclear antibody. An erythrocyte sedimentation rate was normal at 18. Her hand X-rays did demonstrate her flexion

Figure 1. Hand X-rays demonstrate flexion contractures and showed mild degenerative arthritic changes of the finger joints.



contractures and showed mild degenerative arthritic changes of the finger joints (Figure 1). She was diagnosed to have a bilateral “striatal hand” related to her PD.

#### Patient 2

This woman had tremulousness for many years and a strong family history for essential tremor. When she was evaluated by a neurologist at age 61, she was deemed to have an essential tremor and a magnetic resonance imaging (MRI) scan of the brain was normal. She was noted to have a “trigger finger” of the fourth digit of the left hand. Around this time, she was evaluated by a local rheumatologist who tried methotrexate briefly, but this was discontinued after a skin reaction. Four years later she was assessed by neurology at a major tertiary center. A resting tremor of the right leg and occasionally in the left hand was noted as well as decreased facial expression. She was described as having “swan-type deformities” in the third, fourth and fifth digits of the left hand (Figure 2). Initially, underlying arthritis was postulated and she was referred to another rheumatologist who queried “atypical inflammatory arthropathy.” A rheumatoid factor was normal as was an immunology antigen panel. An MRI of the left hand showed minimal enhancing synovitis which was felt to be nonspecific. A NM Brain DaT SPECT scan showed a marked decreased tracer within the right putamen and caudate in the left putamen. This was felt to be compatible with PD. When a neurologist saw her again in follow up eight months later, note was made that rheumatology had decided that her deformity of the left hand was on a neurologic rather than inflammatory basis. The neurologist concluded that she had a parkinsonian disorder including a “striatal hand” on

the left. A trial of carbidopa/levodopa was initiated. When reassessed some months later, she had difficulty rising from a seated position and had a slow, laborious gait. Her speech was soft and rapid. The dexterity in her left hand had continued to decline and her deformities of the fingers of the left hand were again noted.

#### Discussion

Both of our patients had well established PD and developed prominent arthritic-type deformities of the hands. Their clinical courses varied considerably. Patient 1 did not develop her hand deformities until she had PD for some 25 years. Patient 2, on the other hand, initially developed a hand deformity felt to be “trigger finger” even before PD was queried. Both patients were considered to have rheumatologic conditions and indeed patient 2 was eventually evaluated by two rheumatologists, one of whom briefly treated her for inflammatory arthritis. However subsequent evaluation showed no evidence of rheumatoid arthritis or other inflammatory arthritic conditions.

Although hand deformities in PD have long been described, they are uncommon. Published data regarding this condition’s prevalence varies considerably from 3 cases during a year in a “busy” neurology practice<sup>2</sup> to rates of 8.4 percent,<sup>3</sup> 11.5 percent,<sup>4</sup> and 40 percent.<sup>5</sup> It is our belief and experience that the true prevalence of striatal hand is much lower than these cited references. The classic striatal hand deformity is defined by metacarpophalangeal (MCP) joint flexion, proximal interphalangeal (PIP) joint extension, distal interphalangeal (DIP) joint flexion, and ulnar deviation.<sup>6</sup>

Figure 2. Hand X-ray of patient 2.



However, other variations of “striatal hand” exist<sup>2,4,7-9</sup> and are diagnoses of exclusion like the two cases we present here.

As the hand photographs of our patients demonstrate, the prominent finger deformities are suggestive of a severe rheumatologic condition. Often, rheumatoid arthritis is initially queried. While striatal hand deformities in PD may have a similar appearance to rheumatologic conditions, the underlying pathology is different. Unlike rheumatological hand deformities, striatal hand deformities lack local joint inflammation, erosion on radiograph, and associated lab markers (erythrocyte sedimentation rate, C-reactive protein, rheumatoid factor, and antinuclear antibodies) are negative.<sup>7,10,11</sup> Striatal hand deformities are believed to be dystonic in nature<sup>2,7</sup> although there is no consensus on the underlying mechanism. The term *striatal* is a reference to presumed pathology in the neostriatum (composed of the putamen and caudate nucleus).<sup>9</sup> The dystonic nature is demonstrated by observational data revealing that stimulation of the ulnar nerve can produce a similar deformity in healthy individuals and anesthetizing the nerve can improve it in those affected.<sup>2</sup>

Some commonalities in the presentation of striatal hand deformity have been identified. In their study of 86 patients with PD, Ashour and Jankovic found that patients with striatal hand deformity were younger (60.4 vs 68.6 years) and had earlier age at symptom onset (54.7 vs 62.5 years) than those without the deformity.<sup>3</sup> These findings were supported in a subsequent study by Baizabal-Carvallo et al.<sup>4</sup> However, as our two cases demonstrate, considerable variation is possible and the hand deformity can present at any time during the course of the illness.<sup>2,9</sup> With time, the deformity may become fixed and result in significant functional impairment.<sup>12</sup>

Various management options have been evaluated with limited success. Of these, botulinum toxin injections into the lumbricals were shown to have significant benefits in pain and muscle relaxation.<sup>13</sup> Additionally, physical and occupational therapies have been shown to be beneficial for regaining function.<sup>7,8</sup> In particular, one case report described dramatic benefit from daily use of a video flight simulator controlled with a joystick controller over six months.<sup>8</sup> Overall, therapies for striatal hand have shown limited benefit.

### Conclusion

As our cases illustrate, striatal hand deformities in PD can be difficult to recognize and require careful workup to rule out similar-appearing diagnoses such as rheumatoid arthritis. While classic striatal hand deformity with MCP flexion, PIP

extension, DIP flexion, and ulnar deviation of the digits is often described, other presentations are possible, as with our Patient 2. In the face of arthritic changes in a person with PD, a clinician should consider the possibility of a non-arthritic process like striatal hand syndrome.

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# A Unique Case of Community Acquired *Proteus mirabilis* Meningitis

Khizar Hamid, MD; Muhammad Hamza, MD; Touba Naim, MD; Mahum Shahid, MD; and Jennifer L. Hsu, MD

## Abstract

*Proteus mirabilis*, a gram-negative bacterium commonly known for causing urinary tract infections (UTI) can rarely present with central nervous system (CNS) infections. *Proteus mirabilis* CNS infections are usually encountered in the neonatal and infantile period and occasionally cause brain abscesses. It is an uncommon cause of adult CNS infection. We report the first case of a community-acquired *Proteus mirabilis* meningitis (PMM) in a patient with *Proteus mirabilis* UTI, urolithiasis, and bacteremia. Risk factors for gram-negative bacillary meningitis (GNBM) include extremes of age, cancer history, diabetes mellitus, UTI, and nosocomial exposure, with the latter being a more prominent cause of PMM. Compromise of the anatomical defense against CNS infections whether accidental or neurosurgical is another important cause, and approximately two-thirds of reported cases of PMM have occurred after neurosurgical procedures. PMM patients develop fever, altered consciousness, and have an acute clinical course. Antimicrobials that can be used for treatment include third-generation cephalosporins, ciprofloxacin, imipenem/cilastatin, aztreonam, and intraventricular aminoglycosides. Despite appropriate antibiotic therapy outcomes are poor with severe neurological deficit and death commonly resulting. Nosocomial infections can be drug-resistant and multiple antibiotics should be started while awaiting culture results. Literature review reveals that treatment with intraventricular aminoglycosides when attempted has shown bacteriological cure indicating this can be an important treatment approach. Due to the acute clinical course and high morbidity and mortality, we recommend starting multiple antibiotics with different mechanisms of action as soon as the disease is suspected. Our patient was initially started on ceftriaxone, vancomycin, acyclovir, and ampicillin for UTI and meningoencephalitis. The antibiotics were later consolidated to cefepime based on blood, urine and, cerebrospinal fluid cultures growing pan-sensitive *Proteus mirabilis*. Her clinical condition continued to worsen and ciprofloxacin was added. However, due to the progressive decline in her condition, the family elected for inpatient hospice care and intraventricular aminoglycosides were not attempted.

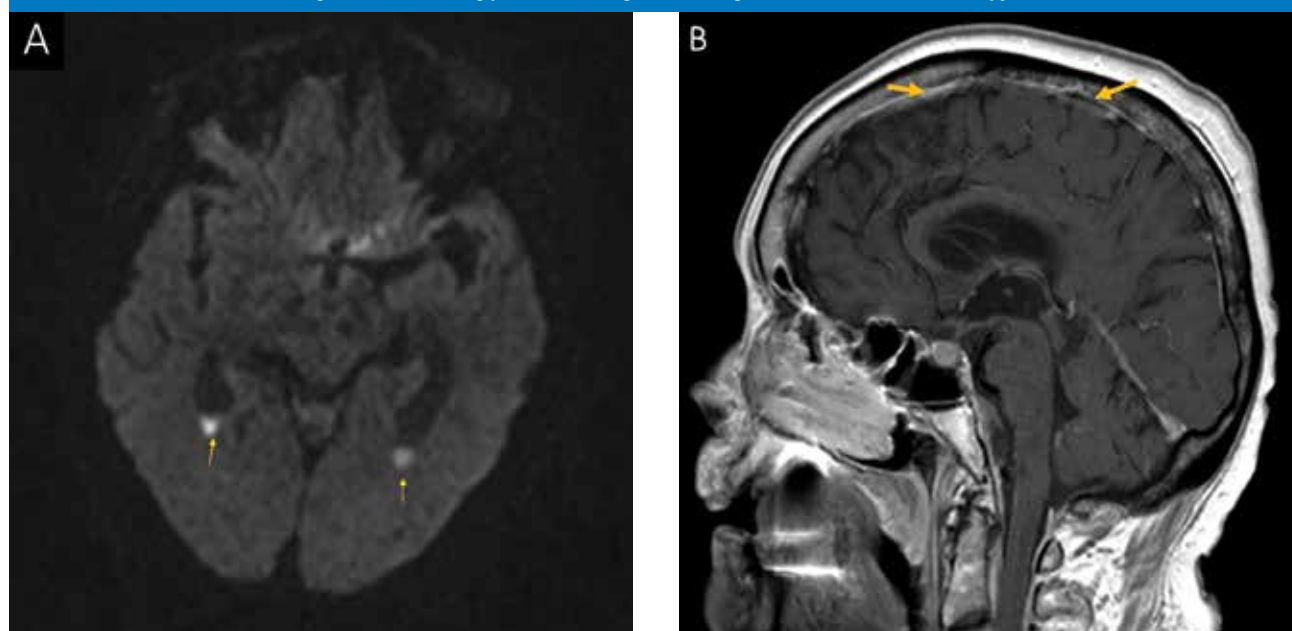
## Introduction

The incidence of spontaneous aerobic gram-negative bacillary meningitis (GNBM) in the U.S. has been reported to be 4 percent amongst all cases of community-acquired bacterial meningitis, excluding *H. influenzae*.<sup>1</sup> *Proteus mirabilis*, a gram-negative bacterium is a common cause of urinary tract infections (UTI) known for its robust swarm across surfaces.<sup>2</sup> However, meningitis due to *Proteus mirabilis* is rare with only a handful of cases reported, primarily in patients with preceding neurosurgery.<sup>3,4</sup> Several cases reported in the neonatal period resulted in the development of cerebral abscesses.<sup>5</sup> We present a case of community-acquired *Proteus mirabilis* meningitis (PMM) in a patient without any known risk factors.

## Clinical Course

A 79-year-old Caucasian woman with a past medical history of chronic obstructive pulmonary disease, hypertension and osteoarthritis presented to the emergency department with a seven-day history of emesis, diarrhea, joint pain, headache, generalized weakness and subjective fevers. On presentation, she was mildly confused, and vital signs were notable for an irregular heart rate of 150 beats per minute and temperature of 102.2 degrees F. Physical examination revealed nuchal rigidity and a positive Babinski sign. Labs showed white blood cell count (WBC) of 16.4 K/uL and elevated creatinine of 1.6 mg/dL. Urinalysis revealed WBC of 21-50/hpf and many bacteria. The patient was empirically started on ceftriaxone, ampicillin, vancomycin and acyclovir for suspected meningoencephalitis and UTI. Cerebrospinal

**Figure 1. Diffusion-weighted magnetic resonance imaging (DWI) of the brain: 1A: axial view showing purulent material in both lateral ventricles (arrows). 1B: sagittal view showing purulence along dorsal margin of clivus and subdural empyema (arrows).**



fluid (CSF) analysis showed a white cell count of 888/ $\mu$ L, glucose 36 mg/dL and protein 4,014 mg/dL. Within 12 hours urine, blood and CSF cultures grew pan-susceptible *Proteus mirabilis* and antibiotics were consolidated to cefepime. Computed tomography (CT) scan of the abdomen/pelvis showed a 2 mm calculus within the distal left ureter at the ureterovesical junction (UVJ). Magnetic resonance imaging (MRI) brain demonstrated changes of purulent meningitis and ventriculitis as well as subdural empyema (Figure 1). MRI of the spine revealed multiple areas of infection with a dorsal epidural abscess, right paraspinal musculature abscesses, and extensive leptomeningeal enhancement throughout the cervical, lumbar spine and cauda equina nerve roots (Figure 2 and 3). Despite aggressive therapy, the patient's mental status deteriorated. Repeat lumbar puncture revealed thick, purulent CSF which required aspiration. CSF analysis revealed a WBC count of 60,873/ $\mu$ L with neutrophilic predominance, glucose of <20 mg/dL and protein 4,304 mg/dL. CSF culture again grew *Proteus mirabilis* with similar susceptibilities. Given clinical deterioration, ciprofloxacin was initiated for additive antibiotic activity through a different mechanism. Unfortunately, the patient did not respond to treatment. The patient's family declined further invasive therapy, favoring inpatient hospice care. The patient died nine days after admission.

### Discussion

*Proteus mirabilis* is the most important clinical species in

the tribe of Proteae and usually resides in the intestines of healthy humans and animals. *Proteus mirabilis* often cause UTI, wound infections and septicemia.<sup>3</sup> UTI is usually thought to occur from the ascension of bacteria from the gastrointestinal tract or person-to-person transmission.<sup>2</sup> *Proteus mirabilis* central nervous system (CNS) infections usually present as neonatal and infant meningitis, and can lead to brain abscess especially with otogenic infections, however it is an uncommon pathogen of adult bacterial meningitis.<sup>3</sup> The mortality rate of GNBM is higher compared to other bacterial meningitides. Factors associated with the development of GNBM include extremes of age, cancer history, diabetes mellitus, nosocomial exposure, and urinary tract infections.<sup>6</sup> The nosocomial acquisition is particularly important as reported by Chang et al. as all cases of PMM they encountered was in this setting.<sup>3</sup> Compromise of the anatomical defenses against CNS infections such as cranial trauma, whether neurosurgical or accidental is another important predisposing factor. Approximately two-thirds of all reported cases have occurred after neurosurgical procedures.<sup>7</sup> The only risk factor which our patient had was a UTI. Her UVJ calculus likely served as a nidus for pyelonephritis leading to hematogenous seeding. *Proteus mirabilis* UTIs account for 1-10 percent of all cases of UTI. They can cause urolithiasis and can cause UTIs progressing to life-threatening bacteremia as noted in our patient.<sup>2</sup> Moreover, thorough history taking is needed to determine



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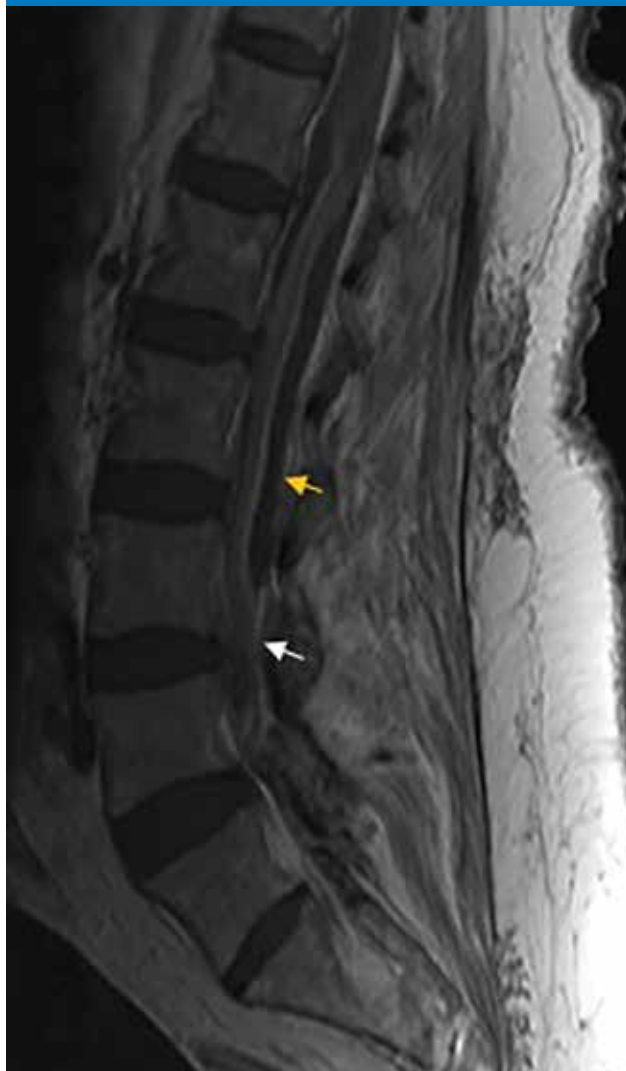
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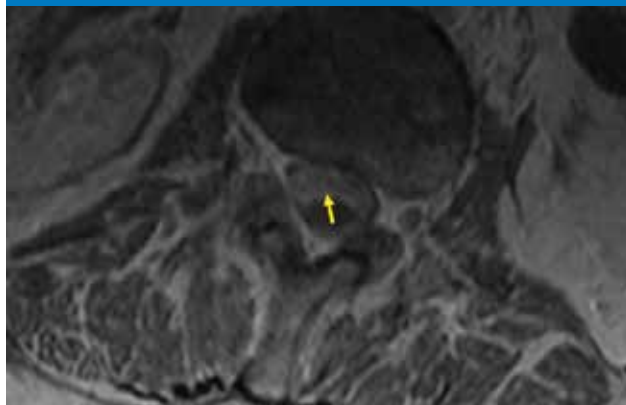


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**Figure 2. MRI of the lumbar spine: sagittal post contrast view showing extensive leptomeningeal enhancement (yellow arrow) with clumping of cauda equine nerve roots (white arrow).**



**Figure 3. MRI of the lumbar spine: axial post contrast view showing extensive leptomeningeal enhancement.**



whether any head trauma in a patient with *Proteus mirabilis* sepsis and urolithiasis could lead to the development of PMM. In our case, there was no complaint of any recent trauma.

PMM has an acute clinical course with most patients having fever and altered consciousness. Outcomes from this infection are poor despite appropriate antibiotic therapy, with severe neurological deficit or death commonly resulting.<sup>3</sup> Third-generation cephalosporins are effective against GNB, however nosocomial cases can be drug-resistant and should be treated with other antibiotics before waiting for culture results due to the high mortality. Other antimicrobials which can be used include ciprofloxacin, imipenem/cilastatin, aztreonam and intraventricular aminoglycosides.<sup>4</sup> Kaiser et al. reported a bacteriological cure of all six episodes of GNB treated with an intraventricular aminoglycoside, indicating this can be a significant treatment approach.<sup>8</sup> This was not attempted in our patient as the family had elected to go to hospice care. PMM cases reported by Chang et al. were also sensitive to third-generation cephalosporins; however, patients treated with it still had unfavorable outcomes.<sup>3</sup> Due to the high morbidity and mortality of PMM, multiple antibiotics with different mechanisms of action such as ciprofloxacin, cefepime and intraventricular aminoglycosides should be started as soon as this disease is suspected. Having reviewed the literature, to our knowledge this is the first case of community-acquired PPM reported and further research regarding the cause of community acquisition and treatment needs to be conducted.

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# Delayed Presentation of Inferior STEMI Complicated by Ventricular Septal Rupture: An Indirect Consequence of the COVID-19 Pandemic

Muhammad Hamza Saad Shaukat, MBBS; Melissa Pham; Veronica Stys; and Naveen Rajpurohit, MD

## Abstract

The COVID-19 pandemic has adversely impacted healthcare delivery. An indirect consequence of the rational fear of contracting the virus is delayed medical attention for life threatening conditions. We present the case of inferior ST elevation myocardial infarction leading to the rare complication of a ventricular septal rupture reflecting transmural infarction. COVID hesitancy caused a 48-hour delay in seeking medical attention after symptom onset. We also discuss the use of MRI to guide decision for timing of VSD repair in an otherwise asymptomatic patient post-revascularization.

## Introduction

Ventricular septal rupture, papillary muscle rupture and left ventricular free wall rupture are known mechanical complications of myocardial infarction. In the era of early reperfusion with percutaneous coronary intervention, mechanical complications are exceedingly rare (less than 0.5 percent). The optimal timing of ventricular septal repair in patients who survive the index myocardial infarction is unclear.

COVID-19 pandemic has impacted healthcare in many ways, one of which is patient hesitancy to seek medical attention for symptoms which would have prompted them to visit the emergency department/urgent care before the pandemic. The hesitancy is linked to the fear of exposure to the virus and has impacted healthcare across the world.<sup>1</sup>

In addition to describing COVID hesitancy leading to delayed presentation of ST elevation myocardial infarction and transmural infarction-mediated ventricular septal rupture, we briefly discuss the use of cardiac MRI to help determine timing of ventricular septal repair in stable patients.

## Case Presentation

### *History of Presenting Complaint*

In August 2020, a 54-year-old man noted chest pain at work which improved with rest. Any subsequent exertion reproduced symptoms. To avoid going to the hospital and minimize COVID-19 exposure, he reduced exertion to a

minimum in order to keep symptoms at bay. About 48 hours later, he noted nocturnal chest discomfort preventing him from sleep. On a family member's insistence, he went to the emergency department. The patient is an active smoker (three packs per day since the age of 17). No history of diabetes, or prior cardiovascular events (myocardial infarction or stroke) was reported. There was no family history of premature coronary artery disease (age <55 in men, age <65 in females).

ECG was consistent with inferior q-waves and ST elevation. Urgent coronary angiogram showed severe single vessel disease: complete thrombotic occlusion of distal RCA – treated successfully with percutaneous coronary intervention (mechanical thrombectomy and drug-eluting stent). He remained hemodynamically stable (BP 105/72 mmHg; HR 72 bpm). A systolic murmur was auscultated on cardiac exam.

Transthoracic echocardiogram showed preserved left ventricular ejection fraction (55-60 percent) and a 13 mm inferior muscular ventricular septal defect (VSD) with left-to-right flow. Given resolution of chest pain, absence of exertional limitations and hemodynamic stability throughout the hospitalization, cardiothoracic surgery recommended follow-up in four to six weeks to allow myocardial healing before attempting VSD repair.

### *Differential Diagnosis*

Mechanical complication of myocardial infarction; ventricular septal rupture.

*Investigations/Management*

Transthoracic echocardiogram six weeks later re-demonstrated a 13 mm mid-inferoseptal muscular VSD. Right and left ventricle dimensions were within normal limits. Transesophageal echocardiography was performed to accurately assess the size of VSD and quantify left-to-right shunt. However, a postero-superiorly angulated VSD jet directed at the tricuspid valve made that difficult (Figure 1).

Cardiac MRI showed mid-inferior muscular VSD (Figure 2), mildly depressed left ventricular ejection fraction (55 percent: reference 59-83 percent) and transmural mid inferoseptal necrosis. Pulmonary (Qp) to systemic (Qs) shunt fraction of 1.67 was calculated (reference: 1.0).

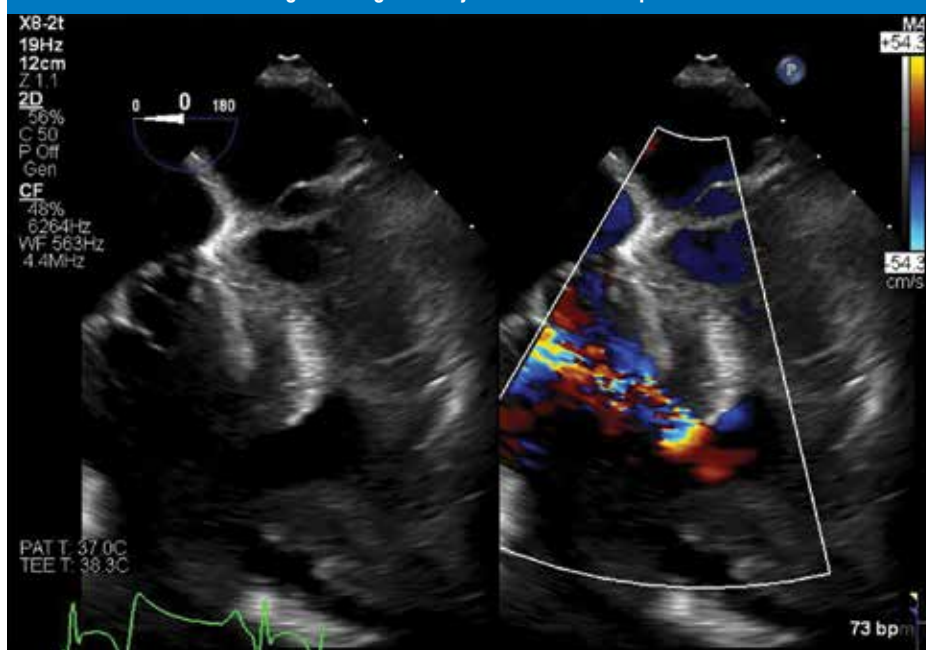
Oxygen saturation increased from 66 percent in the right atrium to 77 percent in the right ventricle on right heart catheterization. Pulmonary artery systolic pressure was 31mm Hg and systemic systolic arterial pressure 88mmHg: pulmonary/systemic systolic pressure ratio = 0.35; Qp/Qs 1.56. The patient underwent

successful percutaneous VSD repair at quaternary center. On three-month follow up after VSD repair, the patient remained asymptomatic and reported to have quit smoking.

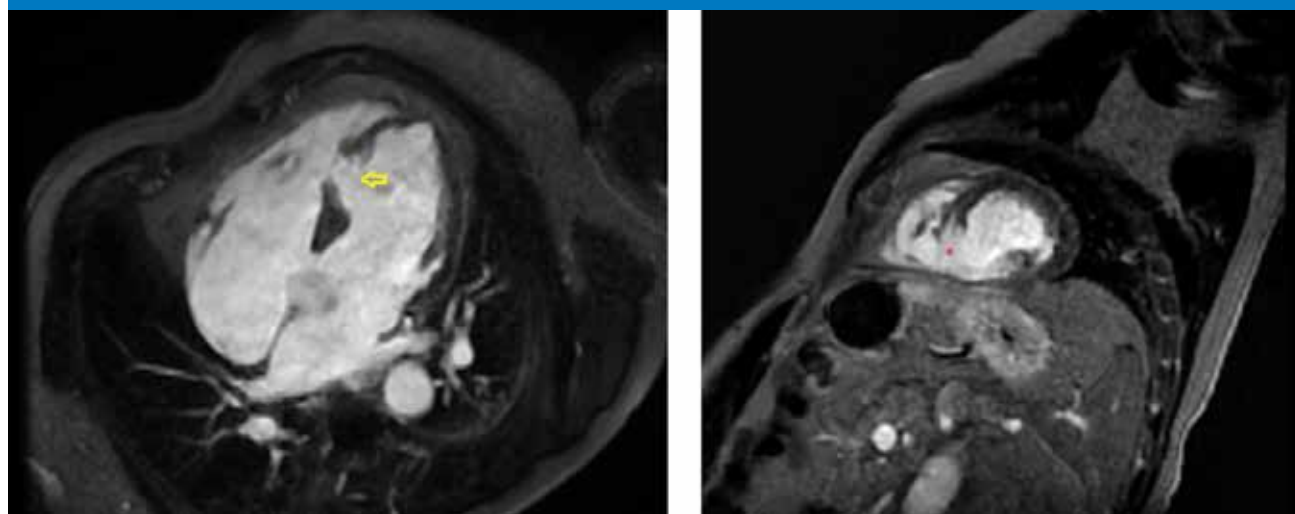
**Discussion**

Ventricular septal rupture, mitral papillary muscle rupture and left ventricular free wall rupture are known mechanical complications of myocardial infarction. Ventricular septal rupture is the rarest of the three, especially in era of early

**Figure 1. Mid-esophageal 4 chamber view on transesophageal ECHO: Color doppler (right) showing left-to-right shunt jet directed at tricuspid valve.**



**Figure 2. Cardiac MRI: mid inferoseptal muscular ventricular septal defect on cross-sectional (yellow arrow) and vertical short axis (red asterisk) views.**



reperfusion. The estimated incidence is 0.17-0.31 percent.<sup>2</sup> Late reperfusion, (suggested by q-waves on ECG at the time of presentation indicating transmural ischemia) is associated with increased likelihood of mechanical complications. COVID-19 infection has known cardiovascular complications including myocarditis, acute coronary syndromes and hypercoagulability.<sup>3</sup> The burden of cardiovascular illness has been exacerbated by psychological (and not unfounded) fear of contracting the virus in healthcare settings, causing patients to seek medical attention much later than they previously would. This has led to a resurgence of post-myocardial infarction complications seen mostly before the availability of percutaneous coronary intervention.<sup>4</sup>

Unrepaired post-myocardial infarction VSD is fatal in hemodynamically unstable patients. In stable patients, registry data show a mortality rate as low as 6 percent in patients with VSD who survive the first three weeks post-myocardial infarction.<sup>5</sup> Therefore, the optimal timing for post-myocardial infarction VSD repair in stable patients is unclear.

In addition to highlighting a rare mechanical complication of myocardial infarction as an indirect consequence of COVID-19 pandemic, this case illustrates the use of MRI as a reliable, noninvasive tool to quantify VSD shunt - pulmonary/systemic shunt fraction ( $Q_p/Q_s$ ) equal to, or greater than 1.5, indicates shunt volume sufficient to cause left-sided heart failure from chronic volume overload.

Given the  $Q_p/Q_s$  ratio of 1.6 on cardiac MRI, and absence of pulmonary hypertension (pulmonary/systemic systolic pressure ratio less than 0.5), early VSD repair was preferred over watchful waiting in this otherwise asymptomatic patient.

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# Adherence Rate of Pediatric Lipid Screening at a Rural, Independently Owned Primary Care and Multispecialty Clinic

Sarah Lehmann, MD; Michelle Olson, MD; Lauren Van Hove, MD; and April Willman, MD

## Abstract

**Background:** In 2011, the AAP endorsed the recommendation of National Heart Lung and Blood Institute (NHLBI) for universal lipid screening in children 9-11 and 17-21 years old given the increasing prevalence of pediatric obesity. In 2017, a study conducted by the AAP showed low adherence with universal pediatric lipid screening. The purpose of this retrospective chart review is to assess the adherence rate for pediatric lipid screening at a rural, independently owned primary care and multispecialty clinic.

**Methods:** Patient data were compiled from the electronic medical record. Inclusion criteria include patients 9-11 or 17-21 years of age between Jan. 1, 2014-Dec. 31, 2019, with an appointment indication of well-child examination or annual physical.

**Results:** A low percentage of patients underwent a fasting lipid panel in both the 9-11 (n = 663) and 17-21 (n = 118) years age group, 3.3 percent and 4.2 percent respectively. Of those who underwent a **fasting lipid panel**, 59.0 percent in the 9-11 age group and 80.0 percent in the 17-21 years age group had at least one abnormal lipid level. Of the population classified as overweight and obese, 6.3 percent (16 out of 255) of the 9-11 years age group and 6.1 percent (three out of 49) of the 17-21 years age group underwent a lipid panel screen.

**Discussion:** The data show low adherence with universal lipid screening for patients ages 9-11 and 17-21 years old. Poor adherence may be due to inconsistent endorsement by professional medical societies and incongruent recommendations in the EMR. Further studies are required to determine the national adherence rate with the NHLBI recommendation.

## Background Significance

Currently, the American Academy of Pediatrics (AAP) recommends that all children have lipid screening done between 9-11 years old and again between 17-21 years old.<sup>1</sup> This lipid panel screen includes levels of total cholesterol, triglycerides, high-density lipoprotein, and low-density lipoprotein. Fluctuating lipid levels during puberty and variable pubertal timeline among ethnic groups are linked to reduced sensitivity and specificity in predicting adult lipid levels; therefore, universal screening is not recommended for children 12-16 years old.<sup>2,3</sup> However, screening is indicated for high-risk individuals such as those with a new cardiovascular family history.<sup>1</sup>

In 2013-2014, the AAP surveyed practicing pediatricians to better understand their knowledge, practices, attitudes,

and barriers regarding cholesterol screening and treatment practices. The study found that nearly two-thirds of pediatricians were aware of the NHLBI guidelines, yet few pediatricians conducted universal screening at ages 9-11 years old (18 percent) and 17-21 years old (31 percent). As for selective screening, 67 percent of physicians for the 9-11 years age range and 78 percent of physicians for the 17-21 years age range screened patients with risk factors such as obesity or a positive family history of stroke, heart attack, or high cholesterol.<sup>4</sup>

## Objective/Hypothesis

The purpose of this retrospective cross-sectional study is to analyze the adherence rate with universal pediatric lipid screening at a rural, independently owned primary care and multispecialty clinic for patients between the ages of 9-11

OF DRUG  
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**97%** are Accidental.

**56%** are Opioid Related.

**Emergency room overdose cases are increasing at an alarming rate,**  
*especially among young people (15-34), according to the latest SUDORS\* data.*

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If your patients are taking prescription opiates or are at risk for overdose, encourage them to keep **naloxone** on hand and to learn how to use it. Family and friends who have naloxone on hand have helped many overdose victims survive.

### Help your patients understand:

- The risks of taking opiates (prescription or illicit)
- The dangers of mixing them with other substances
- How to recognize the symptoms of an overdose

*And, encourage them to take advantage of the State Standing Order and get naloxone. It may save a life.*

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\*2020 State Unintentional Drug Overdose Reporting System (SUDORS)

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and 17-21 in accordance with the 2011 National Heart, Lung and Blood Institute (NHLBI) guidelines adopted by the American Academy of Pediatrics. We hypothesize that the pediatric population is being inadequately screened for lipid abnormalities especially in patients who lack other identifiable risk factors such as elevated BMI.

## Methods

IRB approval was waived as this project did not meet the regulatory definition of research as the data were intended to contribute to assessment and improvement of a specific clinic. All encounters coded as “well child visit”, “preventative care”, “general physical”, “sports physical”, “establish doctor”, or “initial visit” for patients 9-11 or 17-21 years old between Jan. 1, 2014-Dec. 31, 2019 were extracted from the electronic medical record by running an internal report. This included visits to pediatric, family medicine, and obstetrics and gynecology providers. If a patient had multiple visits within the period of study, all encounters were reviewed. If a patient underwent a lipid screening at any appointment, it was deemed as adherence to the universal pediatric lipid screening guidelines.

The password protected EMR report included evidence of a lipid panel or cholesterol screen, results of the screen, date of birth, race of the patient, BMI on date of encounter, age of the patient on date of encounter, number of clinical encounters during the pertinent age ranges, encounter visit type and if documented, the indication for screening; whether the screen was offered and/or reason patient declined. If the provider note did not document a lipid screening being offered, it was assumed it was not recommended. If the screening was ordered by the provider and the patient never underwent the screening, it was defined as patient declined. If there was no indication for screening listed, the indication was assumed to be for primary screening purposes. For patients who did not receive a lipid screening, the largest BMI from the visits during the time frame was used in our analysis. Abnormal lipid result was defined as one or more of the following: total cholesterol  $\geq 200$  mg/dL; LDL  $\geq 130$  mg/dL; HDL  $\leq 40$  mg/dL; or triglycerides  $\geq 130$  mg/dL.<sup>5</sup>

## Results

Of the original 671 patients that met inclusion criteria in the 9-11 years age group, eight were excluded because the visit did not fit criteria for a well-child visit or annual physical. Of the final sample of 663 patients, 87.5 percent self-identified as Caucasian or White, 3.8 percent as American Indian, 1.5 percent as Hispanic, 1.1 percent as African American or

Black, 0.8 percent as Asian, 2.4 percent as multi-racial, and 2.4 percent were unspecified.

Of the original 121 patients that met inclusion criteria in the 17-21 years age group, three were excluded because the visit did not fit criteria for a well-child visit or annual physical. Of the final sample of 118 patients, 93.2 percent self-identified as Caucasian or White, 3.4 percent as American Indian, 0.9 percent as Hispanic, 0.9 percent as Asian, 0.9 percent as African American or Black, and 0.9 percent as unspecified.

Table 1 details the percentages of patients who underwent either a lipid panel screen or a total cholesterol screen in the 9-11 years age group and 17-21 years age group. The percentage of patients that underwent a lipid panel screen was very low in both age groups at 3.3 percent for the 9-11 years age group and 4.2 percent for the 17-21 years age group. However, the percentage of patients that underwent a total cholesterol screen was higher for the 9-11 years age group at 13.7 percent compared to 3.4 percent for the 17-21 years age group. The total percentage of patients that underwent either screen was higher in the 9-11 years age groups at 17.0 percent compared to 7.6 percent in the 17-21 years age group. Of the patients that did receive a lipid screening, 31.8 percent in the 9-11 years age group and 80.0 percent in the 17-21 years age group had at least one abnormal lipid level.

Table 2 details whether a lipid panel screening was offered to the patients that did not have a lipid panel or cholesterol level on file and the reason for decline if the screening was offered. Both age groups had similar percentages of patients not offered screening with 98.9 percent for the 9-11 years age group and 99.1 percent for the 17-21 years age group. Both groups also had similar percentages of patients who were offered a screening but declined with 1.1 percent for the 9-11 years age group and 0.9 percent for the 17-21 years age group. Of note, one encounter resulted in a lipid panel order, but the patient never underwent the screening. Parental request for postponement was listed as reasoning for declined screening in one case, otherwise all other reasoning was unspecified.

In accordance with historical pediatric lipid screening recommendations, this study also assessed adherence to a risk-based stratification model based on body mass index (BMI) with obesity defined as BMI greater than the 95th percentile, overweight as greater than the 85th percentile but less than the 95th percentile, and normal BMI defined as less than the 85th percentile. 25.4 percent (n = 118) of the 17-21 years age group versus 21.7 percent (n = 663) of

Table 1. Patients screened in the 9-11 and 17-21 years age groups.

|                       | Prevalence of patients that underwent lipid panel screen | Prevalence of patients that underwent total cholesterol screen | Prevalence of patients that underwent either lipid panel or cholesterol screen | Prevalence of lipid screens which resulted in at least one abnormal lipid level |
|-----------------------|----------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 9-11 years age group  | 3.3%<br>(22/663)                                         | 13.7%<br>(91/663)                                              | 17.0%<br>(113/663)                                                             | 31.8%<br>(7/22)                                                                 |
| 17-21 years age group | 4.2%<br>(5/118)                                          | 3.4%<br>(4/118)                                                | 7.6%<br>(9/118)                                                                | 80.0%<br>(4/5)                                                                  |

Table 1 details the prevalence of lipid screening rates in both the 9-11 and 17-21 years age groups. For the purpose of this study, lipid abnormalities were defined by the following: total cholesterol  $\geq 200$  mg/dL; LDL  $\geq 130$  mg/dL; HDL  $\leq 40$  mg/dL; or triglycerides  $\geq 130$  mg/dL.<sup>5</sup>

Table 2. Was a lipid screen offered to those who did not have a documented lipid screen or cholesterol level?

|                       | Patients with no lipid panel or cholesterol level performed | Patients not offered screening | Patients offered screening but declined |
|-----------------------|-------------------------------------------------------------|--------------------------------|-----------------------------------------|
| 9-11 years age group  | 83.0%<br>(550/663)                                          | 98.9%<br>(544/550)             | 1.1%<br>(6/550)                         |
| 17-21 years age group | 92.4%<br>(109/118)                                          | 99.1%<br>(108/109)             | 0.9%<br>(1/109)                         |

Table 2 details the prevalence of lipid screenings offered by clinicians versus screenings declined by the patient for both the 9-11 and 17-21 years age groups. Evidence of offered screening was assessed by reviewing the order history of each patient in addition to reviewing the documentation for each encounter.

the 9-11 years age group fell into the obese category. Of those obese patients, 13.3 percent in the 17-21 years age group underwent either a lipid panel screening or total cholesterol screen compared to 11.1 percent in the 9-11 years age group.

Of the 9-11 years age group (n = 22) who received a lipid panel screen, indications for screening included primary screening (45.5 percent), elevated BMI (31.8 percent), elevated total cholesterol screen (4 percent), and additional unspecified risk factors (4.6 percent). Of the 9-11 years age group (n = 91) who received a total cholesterol screen, indications for screening included primary screening (90 percent) and elevated BMI (1 percent).

Of the 17-21 years age group (n = 5) who received a lipid panel, indications for screening included primary screening (60 percent), fatigue (20 percent), and per parental request (20 percent). Of the 17-21 years age group (n = 4) who received a total cholesterol screen, indications for screening included primary screen (50 percent) and acne (50 percent).

## Discussion

The main focus of our study was to determine the adherence rate with universal lipid screening in pediatric patients ages 9-11 and 17-21 years old. The data show low adherence with universal screening for both age groups, 3.3 percent and 4.2 percent, respectively. This prompted the question

whether physicians at the clinic were instead performing risk-based screening in accordance with the 2008 AAP lipid screening recommendations. However, the data also show low adherence with BMI-based screening for high-risk individuals, 6.3 percent for overweight children and 6.3 percent for obese children.

One thing of note, some providers ordered the “cholesterol only” lab as their preferred lipid screening. If this number was abnormal, then providers ordered a lipid panel. This method of lipid screening was noted separately on the tables as it was an attempt at screening but did not completely satisfy the NHLBI criteria.

Out of the total sample size (n= 781), only 27 patients underwent a lipid panel. Of those 27 patients, the number of patients who had at least one lipid abnormality was 31.8 percent in the 9-11 years age group and 80 percent in the 17-21 years age group. This was greater than expected as compared to a survey done from 1999 to 2006, in which the CDC reported 20.3 percent of children 12-19 years old had at least one lipid abnormality.<sup>6</sup> The prevalence of at least one lipid abnormality in the obese group was similar to the prevalence reported in the study, 41.7 percent and 42.9 percent, respectively. However, the overweight group showed a significantly greater prevalence of at least one lipid abnormality compared to the study, 71.4 percent and

22.3 percent, respectively. In patients with a normal BMI only 12.5 percent had at least one abnormal lipid level as compared to 14.2 percent as the survey reported.<sup>6</sup>

Furthermore, our sample displayed greater prevalence of elevated total cholesterol (18.5 percent), elevated triglyceride (44.4 percent), decreased high-density lipoprotein (25.9 percent) and elevated low-density lipoprotein (14.8 percent) compared to 7.1 percent, 10.2 percent, 12.1 percent, and 6.4 percent, respectively, as outlined in a study assessing lipid levels in individuals aged 6-19 between 1999 and 2016.<sup>5</sup> However, low adherence with lipid screening overall limited our sample size therefore likely skewing these prevalence values.

Multiple factors may contribute to the low adherence with the AAP lipid screening guidelines. The first being a lack of awareness of the guidelines. Multiple updates were made to the AAP guidelines in the last decade given the increasing prevalence of pediatric obesity. Further, not all professional medical associations have fully endorsed the recommendations of the National Heart, Lung, and Blood Institute. For example, the US Preventative Services Task Force (USPSTF) does not endorse universal pediatric lipid screening because there is insufficient evidence to assess the balance of benefits and harms of screening for lipid disorders in children and adolescents 20 years or younger. Additionally, a great amount of uncertainty and insufficient evidence surrounds pediatric dyslipidemia therapy. Given this information, especially in a practice without clinic-wide policy on this topic, providers may adhere to the USPSTF guidelines more closely than AAP and conduct lipid screenings based on a risk-assessment model. However, our findings also show this clinic has low adherence with risk-based assessment models. Lastly, lipid screening is not included in the anticipatory guidance section of the electronic medical record; therefore, it may not be considered during routine patient visits.

Limitations of this study include low sample size, low power, and lack of generalizability. This study reflects the practices of a specific group of providers in a community with a relatively homogenous patient population. Further investigation is required to ascertain the impact of early lipid screening on patient outcomes and health care cost savings. A higher-powered and longitudinal study are required to assess the efficacy of universal lipid screening on health outcomes in pediatric patients.

In conclusion, the AAP pediatric lipid screening practices at this clinic are inadequate. No single indication was clearly associated with inadequate screening. We postulate that the most effective strategy for improved screening would be to update the clinic EMR to include the lipid screening in the anticipatory guidance sections. We hope this study calls attention to the variability in lipid screening guidelines and practices. Given the increasing prevalence of childhood obesity, this survey should be replicated in communities across the state and nation to assess overall adherence rate with universal pediatric screening.

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# Description and Evaluation of a Multilevel Intervention for Improving HPV Vaccination Rates in a Rural South Dakota Clinic

Carl Lang, MD; Riley J. Schaap, MD; Hilla Sang, PhD; Tess L. Weber, MPH; and Garrett A. Weber, MD

## Abstract

**Background:** This study describes an education-based, multilevel intervention and its impact on human papilloma virus (HPV) vaccination rates in a rural South Dakota clinic.

**Methods:** At a clinic-level, nurses and clinicians were provided education on HPV vaccination guidelines and opt-out communication techniques. At a community-level, parents/guardians attended an educational session at the local middle school orientation. Surveys assessed subjective and objective knowledge pre- and post-intervention. Electronic medical records were used to examine HPV immunization rates for adolescents (aged 9-13 years), 2016-2020. These figures were compared to the number of vaccinations given across the healthcare system footprint.

**Results:** 72.7 percent of nurses and providers in the clinic utilize opt-out communication when discussing vaccinations. Increases in self-reported and objective knowledge among participants were noted. EMR review revealed the percent of adolescents vaccinated for HPV increased post-intervention.

**Conclusion:** Implementation of multiple community interventions correlated with increases in community knowledge and HPV immunization in adolescents in the service area.

## Introduction

Human papilloma virus (HPV) is the most common sexually transmitted infection in the world.<sup>1</sup> HPV is a double stranded DNA virus that is primarily asymptomatic but can be associated with warts, papillomas, and numerous cancer types, most notably cervical and head and neck cancers.<sup>2,3</sup> HPV is estimated to cause over 35,000 cases of cancer each year.<sup>4</sup>

Current guidelines recommend that all males and females between the ages of 11 or 12 to 26 should receive HPV two- to-three dose series immunization,<sup>5</sup> as vaccinations can significantly limit viral-mediated pathology, including cancer.<sup>5</sup> Despite an increase in vaccination rates in recent years, vaccination status for the completed series of the HPV vaccine remains low at 54.2 percent of those eligible in 2019.<sup>6</sup> Furthermore, a disparity exists between vaccination rates in rural communities when compared with adolescents living in urban areas.<sup>7</sup>

Research continues to elucidate the reasons for this disparity in rural HPV vaccination status. Family medicine

practitioners are common in rural communities, but their broad scope may not provide the specific skillset required for educating and administering vaccinations to the adolescent population.<sup>8</sup> Other reasons for lack of vaccination in the recommended age group include concerns for safety and lack of education on the topic,<sup>9,10</sup> as well as parents' distrust of government, religious beliefs, and conservative regional communities.<sup>11</sup> Because parental consent is required for minors to obtain the HPV vaccine, parents and guardians are important stakeholders when considering HPV vaccination rates.<sup>12</sup>

The COVID-19 pandemic has posed an additional challenge for vaccine administration. Routine vaccination coverage for pediatric patients has declined at both state- and national-levels since the onset of the pandemic.<sup>13,14</sup> It is likely that a decrease in HPV immunization status among eligible participants in South Dakota has also occurred; however, this data is not yet available.

There are many strategies used to increase vaccine uptake. One technique often implemented is utilization of an

opt-out method of communication. In this practice, providers treat the vaccine as standard-of-care, but do not remove the option to opt-out. This technique has previously been shown to result in higher influenza and HPV vaccination rates.<sup>15,16</sup>

This paper describes a multilevel education-based intervention that was carried out in a Sanford Health clinic in rural South Dakota. Sanford Health is one of the nation's largest health systems spread across South Dakota, North Dakota, Minnesota, and five other states.<sup>17</sup> The clinic is located in a rural town with a population of approximately 2,800 people (population density 3.5 people/square mile). The goal of this project was to increase the HPV vaccination rates in eligible patients in this rural South Dakota clinic (46.6 percent in 2019) by providing education at the clinical- and community-level.

## Methods

### *Study Design*

This study was developed as a healthcare quality improvement project in conjunction with the Frontier and Rural Medicine Program at the University of South Dakota Sanford School of Medicine and was conducted at a rural outpatient clinic in South Dakota, and was conducted between July and August, 2020. Surveys were conducted at nurse-, provider-, and community-levels. Electronic medical records (EMR) were utilized to determine rates of HPV vaccinations over time and before/after the intervention.

### *Clinic-level Intervention: Educational Literature*

Educational materials were strategically placed throughout the clinic. Posters listing necessary school vaccinations for sixth grade students were gathered from the South Dakota Department of Health (SDDOH)<sup>18</sup> and placed in a visible location in each patient room at the clinic. A CDC flier about the HPV vaccine was placed in a transparent wall file<sup>19</sup> in the clinic lobby and in each patient room. The purpose of these materials was to enable patient-provider discussions about the HPV vaccine.

### *Nursing-level Intervention: Formal Educational Lecture*

Nursing staff attended a one hour lecture on the HPV vaccine. The content presented included information about HPV epidemiology, diseases caused by HPV, and efficacy of the HPV vaccine. The opt-out method of communicating the need for vaccination to patients was recommended. A brief discussion session followed the lecture. Tactics for responding to objections presented by patients was a prominent topic of discussion during the question-and-answer portion. The web-based learning tool *Kahoot!* was also

used by the research team to emphasize the salient points of HPV vaccination. A one-question (Do you more frequently utilize an opt-out technique, or an opt-in technique?) paper survey was administered to determine whether nurses were utilizing opt-in or opt-out communication styles. The full survey is available as a supplement.

### *Provider-level Intervention: Informal Educational Discussion*

Providers participated in a one-on-one educational session about HPV vaccination. The sessions consisted of a brief overview of the current HPV vaccination recommendations, HPV vaccine efficacy, objections that patients might have to the HPV vaccine, and tactics for encouraging vaccination. The research team encouraged all providers to counsel patients on the importance of HPV vaccination in accordance with CDC and United States Preventive Services Taskforce (USPSTF) recommendations. The same one-question survey was administered to determine whether providers were utilizing opt-in or opt-out communication styles.

### *Community-level Intervention: Town Hall & Survey*

A community intervention occurred as part of the local middle school orientation for parents/guardians. This intervention consisted of two parts: (1) a brief PowerPoint presentation about HPV epidemiology, the HPV vaccine, and vaccination administration locations; and (2) three schoolboard-approved informational sheets that were included in each parent folder. The informational sheets included the South Dakota Department of Health list of sixth grade vaccinations,<sup>18</sup> the CDC's HPV vaccine fact sheet,<sup>19</sup> and a brief letter from the research team sharing possible locations for vaccination.

The HPV Vaccine Awareness Survey<sup>20</sup> was administered to parents/guardians in attendance prior to the presentation. The HPV Vaccine Awareness Survey is a 16-question survey used to assess participants' knowledge of, and attitude towards, HPV and the HPV vaccine. Participants were also asked to rate their level of understanding of the HPV vaccine from 1-10, with 10 being the highest level, to yield a subjective measure of knowledge. Lastly, participants' knowledge was objectively assessed using nine true/false questions about the prevalence of HPV in the U.S., the relationship between HPV and cervical cancer, and the HPV vaccine's efficacy. The survey was administered again at the conclusion of the presentation to measure HPV knowledge gained from the presentation and any changes in the participants' attitude and intent to vaccinate. Participants reported their age by indicating the age group to which they belong.

Completed HPV Vaccine Awareness Surveys were analyzed to compare level of knowledge and attitude towards HPV vaccination among community members pre- and post-intervention. A paired sample t-test was used to quantify the difference in self-reported knowledge of the HPV vaccine pre- and post-intervention. Chi-square test were used to assess differences in self-reported intent to vaccinate, and McNemar's Change Test was used to measure differences in the number of incorrect responses to questions about HPV and the HPV vaccine pre- and post-intervention.

#### HPV Vaccination Rate and Intervention Effectiveness

The rate of HPV vaccination was determined through EMR review using SlicerDicer and OneReport. SlicerDicer and OneReport are self-service reporting tools within the EMR system that allow for de-identified data analysis in a population-based format. Yearly HPV vaccination rates among adolescents (aged 9-13 years) serviced by the clinic from 2016-2020 were gathered. HPV vaccination rates among adolescents aged 9-13 serviced by the clinic during 2019 were compared with HPV vaccination rates among adolescents aged 9-13 post-interventions during 2020. The project was deemed non-human subjects research by the University of South Dakota Institutional Review Board because only aggregate data was used and no personal health information was obtained.

## Results

#### Nurse and Provider Utilization of Opt-out Technique

The majority (13 out of 18) of nurses and providers utilized the opt-out method of providing vaccinations. Two individuals stated they implement both opt-out and opt-in techniques, and three report using opt-in communication.

#### Community Knowledge and Attitude Toward HPV Vaccination

Fifty-six participants completed the questionnaire, of whom 64.3 percent were females. The age of participants ranged from under 14 years (n=12, 21.4 percent) to over 55 years (n=2, 3.6 percent). The largest participants age group was for those between 40 and 44 years (n=14, 25.0 percent).

Participants reported higher level of HPV vaccine knowledge after the presentation ( $8.25 \pm 1.8$  points; Table 1) compared to before the presentation ( $6.91 \pm 2.5$ ), a statistically significant increase of 1.34 points (95 percent CI, .73 to 1.95).

Nearly two-thirds (n=36, 64.3 percent) of participants indicated that they have a child that has already received at least one HPV vaccination (Table 2). Fifteen (26.8 percent) participants did not have a child that received at least one

**Table 1. Self-reported understanding of HPV vaccine on a scale of 1-10.**

|                                                     | Pre-intervention | Post-intervention | mean of differences | p-value |
|-----------------------------------------------------|------------------|-------------------|---------------------|---------|
| Rate your current understanding of the HPV vaccine. | 6.91             | 8.25              | 1.34                | 0.00    |

**Table 2. What is your stance on vaccinating your child with the HPV vaccine?**

| Participant has a child that has already received at least one HPV vaccination | I do not plan to vaccinate |       | I am considering vaccination |       | I plan to vaccinate my child |       |
|--------------------------------------------------------------------------------|----------------------------|-------|------------------------------|-------|------------------------------|-------|
|                                                                                | Pre-                       | Post- | Pre-                         | Post- | Pre-                         | Post- |
| Yes (n=36)                                                                     | 1                          | 1     | 2                            | 4     | 4                            | 9     |
| No (n=15)                                                                      | 4                          | 1     | 5                            | 6     | 4                            | 4     |
| N/A (n=5)                                                                      | 0                          | 1     | 0                            | 0     | 2                            | 2     |
| Total                                                                          | 5                          | 3     | 7                            | 10    | 10                           | 15    |

**Table 3. HPV and HPV vaccine knowledge pre- and post-town hall intervention (n correct/n total (%))**

| Question                                                                                              | Pre-intervention Correct/Total (%) | Post-intervention Correct/Total (%) |
|-------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|
| There are about 6 million new HPV cases in the US each year                                           | 44/49 (89.8)                       | 47/49 (95.9)                        |
| HPV can be found in 99% of cervical cancer cases                                                      | 45/52 (86.5)                       | 50/52 (96.2)                        |
| Half of cervical cancer cases between ages 35-50 were exposed to HPV in their teens or early twenties | 39/45 (86.7)                       | 40/45 (88.9)                        |
| HPV infection is not treated by healthcare professionals                                              | 11/49 (22.4)                       | 37/49 (75.5) **                     |
| The prevalence of HPV among females age 20-24 is greater than 50%                                     | 39/50 (78.0)                       | 47/50 (94.0) *                      |
| The prevalence of cancer-causing HPV types in females age 20-24 is less than 15% <sup>a</sup>         | 26/45 (57.8)                       | 24/45 (53.3)                        |
| Even persons with one lifetime sex partner are at risk for HPV infection                              | 45/49 (91.8)                       | 47/49 (95.9)                        |
| HPV vaccine efficacy is between 80% and 90% <sup>a</sup>                                              | 7/49 (14.3)                        | 9/49 (18.4)                         |
| HPV vaccines are most effective when administered before exposure to HPV                              | 46/50 (92.0)                       | 47/50 (94.0)                        |

<sup>a</sup> Correct response was "false".

\* p<0.05

\*\* p<0.001

**Table 4. Completed vaccination status among patients age 9-13 serviced by the clinic.**

| Year | Vaccination (n) | Population (n) | %     |
|------|-----------------|----------------|-------|
| 2020 | 147             | 271            | 54.2% |
| 2019 | 157             | 337            | 46.6% |
| 2018 | 141             | 335            | 42.1% |
| 2017 | 182             | 318            | 57.2% |
| 2016 | 181             | 302            | 59.9% |

HPV vaccination, and five (8.9 percent) participants did not provide an answer.

Overall, post-intervention responses indicated a trend toward vaccination uptake. The number of participants who do not plan to vaccinate reduced from five pre-intervention to three post-intervention. The number of participants who will consider vaccination increased from seven to 10 participants and the number of participants who plan to vaccinate increased from 10 to 15. Notably, the increase in number of parents who reported that they "consider" or "plan" to vaccinate post-intervention was higher among parents who already have a child that received at least one HPV vaccination than among parents who do not.

Table 3 lists the differences in participants' objective knowledge of HPV and the HPV vaccine pre- and post- intervention. Compared with the pre-intervention responses, the number of correct responses increased post-intervention in seven out of the nine True/False questions. The two questions for which the number of correct answers decreased were (a) The prevalence of cancer-causing HPV types in females age 20-24 is less than 15 percent, and (b) HPV vaccine efficacy is between 80 percent and 90 percent. Results of McNemar's Change test revealed statistically significant changes for two of the nine True/False questions: (a) HPV infection is not treated by healthcare professionals ( $p = 0.000$ ) and (b) The prevalence of HPV among females age 20-24 is greater than 50 percent ( $p = 0.039$ ).

#### HPV Vaccination Outcomes

HPV vaccination rates varied at the clinic over the last 5 years (Table 4). Trends are shown in Figure 1. Vaccination rates were 59.9 percent in 2016 and trended downward, hitting a low of 42.1 percent in 2018. They then increased in 2019 and 2020, peaking at 54.2 percent.

Vaccination rates were compared before (2019) and after (2020) the intervention in order to further assess intervention success (Figure 2). Among patients aged 9-13, 585 clinical encounters were recorded in 2019, while 434 clinical encounters were recorded in 2020, likely due to the COVID-19 pandemic. Overall, only the months of March and April demonstrated lower percentage of fully vaccinated individuals at clinical encounters in 2020 compared to 2019. Excluding the months of March and April due to the low sample size, the vaccination rate was an average of 11.16 percent greater in 2020 than 2019.

Across the Sanford Health footprint, a decrease in the number of HPV vaccinations in patients age 9-26 occurred from 2016 to 2020. The decrease in vaccinations between 2019 ( $n=24,144$ ) and 2020 ( $n=20,135$ ) was 4,009. This decrease was larger than the previous three years (Figure 3).

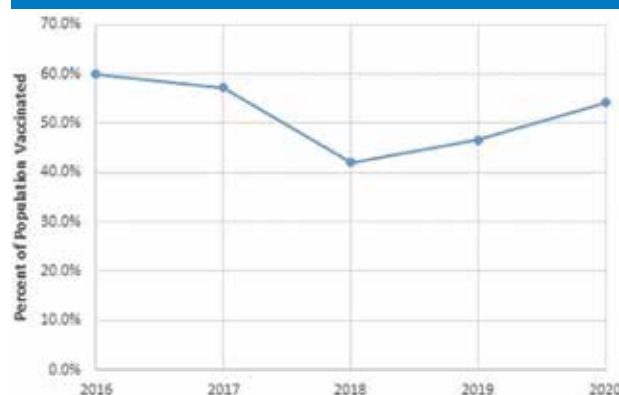
#### Discussion

The goal of this multilevel intervention was to increase the HPV vaccination rate among patients served by the participating clinic in rural South Dakota by providing education at the nurse-, clinician- and community-levels. Vaccination rates were greater the year following the intervention, which may indicate that these interventions were successful.

#### Nurse and Provider Utilization of Opt-out Technique

This measure was an attempt to understand and present a psychosocial mechanism for increasing HPV vaccination. We determined that most nurses and providers utilize the opt-out technique, which has been shown to be effective in eliciting an increased vaccination rate.<sup>16,21</sup> Anecdotally, clinic staff showed interest in this communication style and were eager to share this method with co-workers after survey completion. This suggests that, in addition to querying

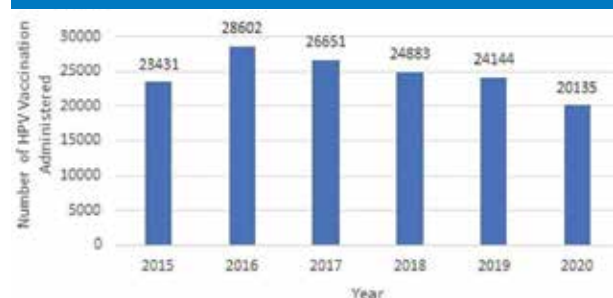
**Figure 1. Percent of vaccinated adolescents (aged 9-13) from the rural service area from 2016-2020.**



**Figure 2. Comparison of percent vaccinated adolescents (aged 9-13) between 2019 (blue) and 2020 (orange) in the rural service area.**



**Figure 3. Number of adolescents (aged 9-13) vaccinated against HPV in the Sanford healthcare system between 2015 and 2020.**



the use of communication style, the educational session and survey may have also encouraged information sharing among clinical staff, potentially resulting in more articulate and refined vaccination communication.

#### *Community Knowledge and Attitude Toward HPV Vaccination*

Findings from the community intervention (PowerPoint presentation, Question & Answer session, and informational sheets from the CDC and SDDOH) showed an improvement in community self-reported knowledge, intent to vaccinate, and objective knowledge of HPV and the HPV vaccine (Tables 1-3). The most notable change, though not statistically significant, was the difference in intent to vaccinate pre- and post- intervention, which suggests a connection between knowledge of HPV vaccine and action towards vaccination. This could indicate that when parental concerns about the HPV vaccine were addressed, parents were able to make a favorable and informed decision about their child's healthcare. Findings of several studies report that one of the largest barriers to HPV vaccination is a lack of parental knowledge.<sup>22,23</sup> This study shows that education of parents/guardians may aid in overcoming this barrier.

#### *HPV Vaccination*

The main goal of these interventions was to increase HPV vaccination rates in the rural region serviced by the clinic. Recent data shows that rates of individuals with up-to-date HPV vaccination is 9.8 percent higher among those living in a metropolitan statistical area (MSA) compared to those living in non-MSA regions.<sup>6</sup> The participating clinic lies in a non-MSA region. The percent of patients served by the clinic who were up-to-date on HPV vaccination in 2020 was 54.2 percent (Table 4). This is notably higher than the average rate nationally in non-MSA regions (47.3 percent).

A vaccination rate of 54.2 percent at the clinic is greater than what was noted at the clinic in previous years (Table 4). This is a stark contrast to the national and regional trend for 2020 (Figure 3). The health care system, which encompasses large portions of South Dakota, North Dakota, and Minnesota, saw a dramatic decrease in the number of HPV vaccinations administered in 2020 (Figure 3). Of note, vaccination rates at the participating clinic increased while other areas of the country decreased. This further supports that the interventions were successful at increasing HPV vaccination rates in the area.

Monthly data of HPV immunization status in patients of the participating clinic also showed encouraging results. While HPV immunization status among 9-13 year-old individuals

during March and April was lower in 2020 compared to 2019, later months showed similar or increased HPV vaccination percentages (Figure 2). The decrease in March and April may be due to fewer patients being seen to administer their HPV vaccine during COVID-19 shutdowns. Most of the interventions were implemented in July and August of 2020, which are months that have increased immunization rates when compared to 2019. Months thereafter also show increased vaccination percentages in 2020 (Figure 2).

The average number of patients age 9-13 served by the clinic during the previous four years is 323. Notably, there is a decrease in the number of patients served in 2020 (271 patients; Table 4). The research team anticipated this result because the data was collected prior to the end of the year. However, even if there are more patients who decided to seek care at the clinic during the latter part of December, the number of patients served would still likely be lower than the previous four-year average (n=323). The current global coronavirus pandemic may be an explanation for this as many people are hesitant to seek non-urgent medical care.

#### *Recommendations for future research and clinical practice.*

Our results suggest that implementation of multilevel education-based interventions in a rural community may improve HPV vaccination rates. Although our results were found to be encouraging, we also recognize that the interventions may not have had direct impact on the HPV vaccination rates in 2020. Thus, future research should evaluate potential facilitators of HPV vaccine uptake at the community- and clinic-level. Furthermore, the participating clinic is encouraged to continue education of both their healthcare professionals and their community on current guidelines for the HPV vaccine.

As findings of this study indicate, an increase in HPV vaccination rate and intent to vaccinate was observed, and a decrease in HPV incidence will likely subsequently occur. Therefore, implementing multilevel interventions, like the one discussed in this paper, may have multilevel effects on the rural communities in which they are implemented. On the individual level, fewer HPV-related disease manifestations will occur, and cost-effective primary prevention on the community level will result from fewer individuals carrying HPV.

#### **Conclusion**

HPV vaccination rates in rural regions are disproportionately lower than urban or metropolitan communities.<sup>6</sup> To reduce this disparity and provide a framework for other

rural vaccination campaigns, our aim was to increase HPV vaccination rates through implementing multilevel, clinical and community interventions. Findings from this study indicate a high use of opt-out communication style among clinical staff and increased subjective and objective understanding of HPV vaccination among parents/guardians in the community. These results are correlated with a significant increase in HPV vaccination rates within the clinic service area during a year where national immunization rates

significantly declined. If interventions like those described in this study are implemented among other rural communities, an increase in HPV vaccination may be achieved and the effects of the HPV virus may be reduced.

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## IMAGES IN MEDICINE:

## Linitis Plastica

Khizar Hamid, MD; Muhammad Hamza, MD; Laura Rezac, MD; and Anup Shrestha, MD

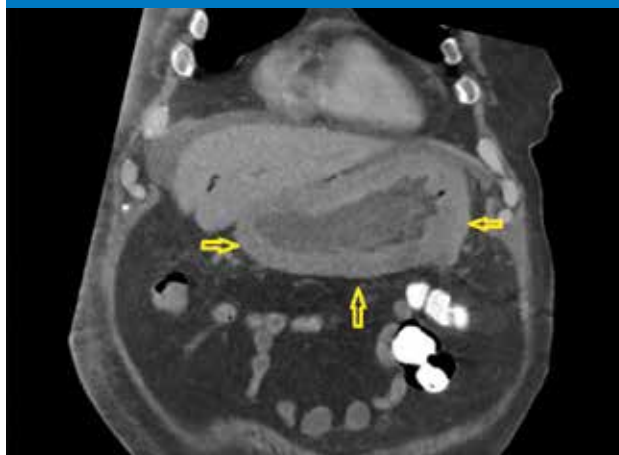
An 84-year-old man presented to the emergency department with vomiting, hematemesis, and abdominal pain. He had been having symptoms of early satiety and progressively worsening vomiting for two months. He had an esophagogram earlier notable for presbyesophagus and delayed gastric emptying. His examination was unremarkable. Computed tomography (CT) scan of the abdomen and pelvis with IV contrast (Figures 1 and 2) showed marked diffuse thickening of the gastric wall along with new gastrohepatic lymphadenopathy suggestive of linitis plastica (LP). Soft tissue nodularity within the omental fat along the greater curvature of the stomach was also noted which was suspicious for a neoplastic process. He also underwent an esophagogastroduodenoscopy which revealed an infiltrative nonulcerated tumor extending from the middle third of the esophagus to the proximal duodenal bulb, involving the entire stomach. Multiple biopsies were indicative of poorly differentiated infiltrative adenocarcinoma.

LP is a phenotype of gastric adenocarcinoma and has other synonymous terms such as Schirrous carcinoma, Lauren carcinoma, or signet cell carcinoma. The term “linitis” originates from the linen-like appearance of the bands of microfilaments seen on microscopy.<sup>1</sup> Macroscopically it is identified by a thickened stomach due to the diffuse infiltration of tumor into the submucosal and muscular layers (Figure 1 and 2).<sup>2</sup> Patients usually present with dyspepsia, vomiting, dysphagia, and regurgitation of food from the esophagus. A high-resolution CT scan with contrast is the gold standard initial test for diagnosis and helps with staging. Endoscopy with superficial biopsies can be inconclusive as cancer spares the mucosa.<sup>1</sup> Endoscopic ultrasound with fine-needle aspiration allows sampling of the submucosa for diagnosis but negative results are still reported.<sup>3</sup> LP has an extremely poor prognosis due to the advanced stage of the disease at presentation, hence most oncologists recommend palliative management only.<sup>1</sup> The five-year survival rate found in different studies ranges from 3-10 percent.<sup>1</sup> Definitive cure is surgery, but despite surgical intervention, the median survival ranges from 15-17 months.<sup>2</sup>

Figure 1. CT scan of the abdomen. Transverse section showing a diffuse thick stomach wall (yellow arrows).



Figure 2. CT scan of the abdomen. Coronal section showing a diffuse thick stomach wall (yellow arrows).



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## Mitigating the Risk of Overbasalization in Patients with Type 2 Diabetes Mellitus

Emily Van Klompenburg, PharmD, BCACP; Ellie Balken; and Alexandra Bladhon

Overbasalization is a clinical inertia phenomenon that can occur during the treatment of patients with type 2 diabetes mellitus. It can occur when a patient's basal insulin dose continues to be up titrated despite minimal progress in meeting glycemic goals. Overbasalization may increase the risk for hypoglycemia and weight gain, increase time to achieve glycemic goals, and subsequently increase micro- and macrovascular complications of diabetes. Strategies that can be employed to reduce the risk of overbasalization include identifying risk factors for overbasalization, utilizing systematic basal insulin titration, prescribing additional pharmacotherapeutic agents, and discussing lifestyle modifications with the patient.

Numerous factors may prompt clinicians to evaluate a patient for overbasalization, and identifying risk factors for overbasalization requires clinical judgement. Generally, patients with basal insulin doses greater than 0.5 IU/kg/day are at risk for overbasalization, but the dose may be higher or lower doses depending on patient response. Overbasalization may also occur when a patient's hemoglobin A1c (HgA1c) is above goal, and basal insulin is increased without accessing the fasting blood glucose. An example is if the patient's HgA1c is elevated (greater than 8 percent), and the morning fasting blood glucose is at goal of 80 to 130 mg/dL, but basal insulin is increased without other therapeutic considerations. Other risk factors include high daily glycemic variability, high postprandial to pre-prandial glucose differential, and morning and evening glucose differences of greater than 50 mg/dL.

The clinical presentation and risk of overbasalization are patient specific; therefore, it is crucial to critically evaluate the entire clinical picture as opposed to solely seeking specific laboratory criteria. It is also important to note that basal insulin can have a "ceiling effect," where the extent of glucose reduction is less with larger basal insulin doses. While titrating basal insulin to greater than 0.5 IU/kg/day is common practice, it is important to note that increasing basal insulin doses will have diminishing returns on glucose reduction. Continuous glucose monitoring and regular clinic

visits can aid in regular re-evaluation of patients who may be at risk for overbasalization.

Systematic basal insulin titration is the primary strategy to prevent overbasalization. Initial basal insulin dose ranges are 0.1 to 0.2 IU/kg/day. There are several evidence-based methods to titration basal insulin beyond initial dosing. One method entails the patient to self-titrate their basal insulin by two units every three days until fasting blood glucose is between 80 and 130 mg/dL. Another method is the clinician titrating by a set number of units after a set amount of time if blood glucose remains above goal. A titration method should be based on patient specific factors such as patient comprehension, compliance, and side effects. The upper basal insulin dose limit is 0.5 IU/kg/day. However, basal insulin can be titrated further under the observation of a clinician if morning fasting blood glucose remains above goal and the titration occurs slowly to avoid hypoglycemia.

Additional pharmacotherapeutic agents should be considered in patients already injecting higher doses of basal insulin, especially if there are diminishing decreases in glucose reduction with basal insulin increases. The two classes of medications that should be considered in patients failing to reach HgA1c goals are Glucagon-like peptide-1 (GLP-1) agonists and sodium-glucose cotransporter-2 (SGLT-2) inhibitors. GLP-1 agonists have additional benefits beyond glycemic control including weight reduction and cardioprotective benefit. One drawback of GLP-1 agonists is the administration of additional injections. One oral GLP-1 agonist is available currently on the market; however, it has only demonstrated non-inferiority to placebo for cardiovascular benefit, not reduction in cardiovascular events like the injectable formulations. SGLT-2 inhibitors may also be considered in addition to basal insulin due to their ability to decrease postprandial glucose, reduce HgA1C, and reduce weight. In specific patient populations, cardiovascular benefit may be experienced as well. Neither GLP-1 agonist nor SGLT-2 inhibitors pose a risk of hypoglycemia when used alone. There is less hypoglycemia risk when used in combination

with basal insulin in comparison to only further increasing basal insulin. The use of SGLT-2 inhibitors or GLP-1 agonists are not the only pharmacotherapeutic options for aiding in the reduction of overbasalization risk.

Other pharmacotherapeutic options include metformin, thiazolidinediones, dipeptidyl peptidase-4 (DPP-4) inhibitors, or the addition of prandial insulin. All of which are available as oral options apart from prandial insulin. Metformin and thiazolidinediones are both highly efficacious and offer low hypoglycemia risk compared to increasing basal insulin doses. Both options are also more cost-effective. Sulfonylureas, while also a more cost-effective and a highly efficacious option, present a high risk of hypoglycemia and weight gain, and thus are often less desirable for glycemic control. DPP-4 inhibitors also offer low hypoglycemia risk and are weight neutral. Prandial insulin is highly effective but can be costly and requires multiple daily injections. Generally, a GLP-1 agonist should be considered before the additional prandial insulin due to the increased risk of hypoglycemia and weight gain associated with prandial insulin. All risks and benefits must be weighed when making patient-specific pharmacotherapeutic interventions. Beyond pharmacologic treatment options, several non-pharmacologic options can aid in the prevention of overbasalization and increase overall glycemic control.

Non-pharmacological options to aid in prevention of overbasalization include dietary interventions, regular daily exercise, and appropriate sleep hygiene. Low calorie and low carbohydrate diets not only aid in metabolic control but also promote weight loss in patients with type 2 diabetic mellitus. The Mediterranean diet is one such diet. It emphasizes increased intake of vegetables, fruits, legumes, nuts, whole grains, and fish and decreased intake of cholesterol and sodium as found in processed meats and sweetened beverages. Another dietary intervention patients can utilize is carbohydrate counting which helps optimize prandial insulin dosing. However, carbohydrate counting is only appropriate given the patient's comfort level with the concept. Regular exercise is also a key component for glycemic control. Patients with diabetes mellitus should engage in at least 150 minutes of moderate to high intensity exercise per week. This regular exercise should be spread over a minimum of three days. Patients should strive to avoid more than two days without

exercising because exercise-induced insulin sensitivity only lasts 24-72 hours on average. Lack of sleep can also impact insulin sensitivity and other metabolic functions. Less than six hours of sleep per night results in altered hormonal regulation and can increase the risk for insulin resistance and weight gain. Patients should strive for at least seven hours of sleep per night.

In conclusion, clinicians should be aware of the potential risk of overbasalization when caring for patients with diabetes. While overbasalization in literature is basal insulin dose of greater than 0.5 IU/kg/day, this phenomenon may occur at variable doses and is highly individualistic. When patients are failing to meet HgA1c goals at their current basal insulin dose, clinicians should be mindful of overbasalization potential, use higher basal insulin doses cautiously, and consider the addition of other pharmacotherapeutic agents such as GLP-1 agonists or SGLT-2 inhibitors, and encourage the addition of nonpharmacological therapy. With implementing these strategies, overbasalization can be thwarted, avoiding hypoglycemia and weight gain, as well as achieving glycemia goals fasting, and preventing further complications of diabetes.

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Avery D. Franzen

*Your SDSMA PAC membership is very important in order to elect political candidates who understand the practice of organized medicine in South Dakota. To contribute to SDSMA PAC, please visit [sdsma.org](http://sdsma.org).*

# Pompe (Glycogen Storage Disease Type II)

## ADDED TO SOUTH DAKOTA NEWBORN SCREENING PANEL

In consultation with the South Dakota Newborn Screening Advisory Committee, the South Dakota Department of Health has added Pompe (Glycogen Storage Disease Type II) to South Dakota's newborn screening panel.



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**EFFECTIVE SEPTEMBER 1, 2022, ALL NEWBORNS BORN IN SOUTH DAKOTA WILL BE SCREENED FOR POMPE.**

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*Early treatment of babies with infantile-onset Pompe is needed to avoid progressive, fatal cardiomyopathy. Without treatment, the infantile form of Pompe disease typically leads to death within the first two years of life.*

Newborn Screening is a program coordinated by the South Dakota Department of Health in collaboration with the State Hygienic Laboratory at the University of Iowa, birthing hospitals and their laboratories, health care professionals, and families.

The goal of newborn bloodspot screening is to identify newborns at risk for life-threatening and debilitating conditions that would otherwise not be detected until damage has occurred, and for which intervention and/or treatment can improve the baby's outcome.

**99%**  
of all South Dakota newborns are screened by the SD Newborn Screening Program



<https://doh.sd.gov/family/newborn/Screening/AdvisoryCommittee.aspx>

# Member News

Visit [www.sdsma.org](http://www.sdsma.org) for the latest news and information.

## SDSMA health leadership courses begin in October – enroll today!

The SDSMA Health Leadership Institute (HLI) is now accepting participants for its 2022-23 cohort! The HLI helps physicians balance life and work, sharpen their skills in practice management, and train for future leadership positions.

The program offers current and future leaders the opportunity to gain an in-depth knowledge of the role leadership plays in medicine. It prepares participants for roles within their practice location or health system, and provides professional development, community engagement and leadership skills training. Learn more about the SDSMA HLI at [sdsma.org](http://sdsma.org).

Six monthly sessions will be held with courses beginning in October, from 5:30 p.m. to 9:30 p.m. CT on Fridays and 8 a.m. to 12 noon on Saturdays.

- October 14-15, 2022
- November 18-19, 2022
- December 16-17, 2022
- January 20-21, 2023
- February 24-25, 2023
- March 24-25, 2023

**How to enroll** – Those interested in participating may contact:

- Barb Smith – [bsmith@sdsma.org](mailto:bsmith@sdsma.org)
- Justin Ohleen – [johleen@sdsma.org](mailto:johleen@sdsma.org)



## New state laws in effect

Most of the new laws passed during the 2022 legislative session went into effect on July 1. Among the new laws, those associated most closely with the SDSMA advocacy agenda are the following:

- Minors are allowed to consent to a sexual assault kit without consent of a parent or guardian.
- Physicians have been added to the list of those who can access the patient registry for medical cannabis.
- Elimination of the need for a medical cannabis cardholder to obtain a prescription from a physician to grow their own medical cannabis, with a cap of two flowering and two non-flowering plants.
- It is unlawful for anyone to knowingly sell or distribute a product intended for human consumption containing delta-8 THC to a person under age 21.

In addition, the U.S. Supreme Court ruling in *Dobbs v. Jackson Women's Health Organization*, which overturned *Roe v. Wade*, resulted in the application of South Dakota Codified Law 22-17-5.1, also known as the "trigger law." Abortion is now illegal in South Dakota except for cases in which the mother's life is in peril. Under the law, any person who performs an abortion or who "prescribes or procures" medicine, drugs, or instruments used for an abortion is guilty of a class 6 felony. The SDSMA has a legal brief available to members at [sdsma.org](http://sdsma.org).

## Optometry rules change

Last month, a legislative committee voted 3-2 to approve proposed rules of the state optometry board. The SDSMA spoke before the committee and asked that a void be filled with respect to the proposed rules.

During the 2022 legislative session, ARSD 20:50:04:12 and Appendix A were repealed, which in part laid out the procedures which optometrists may perform. Although the SDSMA did not object to the repeal of the procedural codes, the association is concerned with the failure to include a suitable replacement.

Codified law sets out the scope of practice of optometry and specifically carves out "surgery" from that scope of practice. After the legislative changes, the prohibition on the practice of surgery by optometrists still remains; however, the term "surgery" is not defined. The SDSMA believes the code should be amended to add a definition of "surgery" which would be consistent with the legislative intent. The legislative committee, however, did not agree and thus the law has been implemented as initially proposed.

Those testifying in opposition to the rules change included the South Dakota State Medical Association and the South Dakota Academy of Ophthalmology. The associations will continue to monitor the implementation of these rules.

## Legal Brief Highlight: Medical Record Privacy – Disclosure With Patient Consent

For the release of protected health information, valid written authorization of the release of records is necessary. Protected health information may be released by patient, and must include written authorization that contains certain provisions in order to be valid. Personal representatives and parents of minors may execute such an authorization as well. The authorization must be in writing and contain the following:

- A description of the information to be used or disclosed.
- The person, or class of persons, authorized to make the requested use or disclosure.
- The name or other specific identification of the person, or class of persons, to whom the covered entity may make the requested disclosure.
- A description of each purpose of the requested use or disclosure. The statement, “at the request of the individual” is a sufficient description when an individual initiates the authorization and does not provide a statement of the purpose.

- An expiration that relates to the individual or the purpose of the use or disclosure. The statement “end of the research study,” “none,” or similar language is sufficient if the authorization is for the use or disclosure of protected health information for research, including for the creation and maintenance of a research database or research repository. “End of case” or “end of lawsuit” is also acceptable.
- The signature of the individual and date. If the authorization is signed by a personal representative, a description of his or her authority to act for the individual must also be provided.

More information is available in the SDSMA legal brief *Medical Records Privacy – Disclosure with Patient Consent* at [sdsma.org](http://sdsma.org). The SDSMA provides legal briefs for member physicians on a variety of rules and regulations that apply to the medical profession.

## COPIC – SDSMA’s endorsed medical liability insurance provider

COPIC is SDSMA’s endorsed medical liability insurance provider. And, their dedication to improving health care in South Dakota extends beyond just offering trusted coverage. That’s why the SDSMA is proud to share the COPIC 2021 Annual Report. It highlights a company that is driven by a mission to “improve medicine in the communities it serves.” You can find the annual report at [sdsma.org](http://sdsma.org).

While there are many reasons why the SDSMA endorses COPIC, a few key examples stand out:

- A leadership team and board of directors led by physicians.
- Direct access to experts that includes physicians, attorneys, claims

staff, and other medical professionals, as well as a 24/7 risk management hotline staffed by physicians.

- Frequency of claims among COPIC insureds is 30 percent less than the national average.
- Eligible SDSMA members can receive a 10 percent discount with COPIC.

Please take the time to review the annual report and learn more about COPIC. Their commitment to build strong relationships with SDSMA members demonstrates why we partner with them and how they support improved health care across the state.

## South Dakota Medicine historical archives available

Did you know *South Dakota Medicine* has historical issues archived and publicly accessible as part of a collaborative among some of the world’s leading medical libraries? You can view and download full issues from the year 2000 and earlier in several online locations. The links are posted at [www.sdsma.org](http://www.sdsma.org):

- Medical Heritage Library – a digital curation collaborative among some of the world’s leading medical libraries which promotes open access to historical resources in medicine. The group of collaborating libraries is dedicated to enabling access to historical medical resources.
- American Libraries – a collection that includes material contributed from across the U.S and brings holdings that cover many facets of American life and scholarship into the public domain.
- State Medical Society Journals on the Internet Archive – the State Medical Journals Collection encompasses nearly 50 state medical

journals collectively held and digitized by the members of the Medical Heritage Library.

The resources above include access to the *Journal-Lancet* going back to 1927 (an early combined journal of the South Dakota, North Dakota Minnesota and Montana medical associations), the *South Dakota Journal of Medicine and Pharmacy* (1948-1965), and the *South Dakota Journal of Medicine* (1965-2000).

In addition, members of the South Dakota State Medical Association can use their member login to view the latest full issues at [www.sdsma.org](http://www.sdsma.org).

*South Dakota Medicine* article titles and abstracts are indexed and can be viewed on PubMed, part of the U.S. National Library of Medicine/National Institutes of Health. This is updated regularly with the latest titles.

## Delegate Report: 2022 Annual Meeting of the American Medical Association

By Mary S. Carpenter, MD, SDSMA Delegate to the AMA; Robert L. Allison, MD, SDSMA Delegate to the AMA; and Robert J. Summerer, DO, SDSMA Alternate Delegate to the AMA

Members of the South Dakota State Medical Association joined approximately 1,200 delegates and alternates from around the country for the American Medical Association Annual Meeting in Chicago June 10-15. The gathering, which was held in-person for the first time since the COVID-19 pandemic, was filled with policy debate that will help shape the future of health care in the nation. Some policies adopted by the AMA House of Delegates (HOD) include:

**Physician wellness** – The AMA is pushing for legislative, regulatory and health system changes to support the mental health needs of medical students, residents and practicing physicians—including laws to ensure confidentiality for seeking care for burnout, advocacy to urge state medical licensing bodies, and health systems and credentialing bodies to remove questions on their applications that may deter physicians from seeking treatment for a mental illness or substance use disorder and reducing administrative burdens that contribute to physician burnout.

**The true cost of unsupervised nonphysician care** – Building on a study published in the *Journal of the Mississippi State Medical Association*, delegates took action to better support physician-led team-based care and more effectively push back against the inappropriate unsupervised practice of nonphysician health providers. Centers for Medicare and Medicaid Services 2017-2019 cost data on the operation of their organization's Accountable Care Organization revealed care provided by nonphysician health professionals working on their own patient panels was more expensive than care delivered by doctors. Delegates directed the AMA to support studies to determine the cost and quality impact of nonphysician unsupervised practice on all patients and develop model state legislation that opposes enactment of legislation and supports reversal of such legislation, if present, that would authorize the independent practice of medicine by any individual who is not a physician.

**Pushing back on the criminalization of care** – Delegates adopted policy recognizing that it is a violation of human rights when government intrudes into medicine and impedes access to safe, evidence-based reproductive health services. The AMA will seek expanded legal protections for patients and physicians against the criminalization of reproductive health services. New policy also calls for AMA to seek legal protections for patients who cross state lines to receive reproductive health services, as well as legal protections for physicians and others who support or provide reproductive health services or referrals to patients who cross state lines.

**Steps to prevent gun violence** – The House of Delegates declared firearm violence a public health crisis at the 2016 Annual Meeting, which convened in the aftermath of the mass shooting at the Pulse nightclub in Orlando where 49 people were killed. The 2022 AMA Annual Meeting was preceded



Robert J. Summerer, DO, alternate delegate, and Lucio N. Margallo II, MD, SDSMA president



Robert L. Allison, MD; and Mary S. Carpenter, MD, delegates

by mass shootings at a school in Uvalde, Texas, and a grocery store in Buffalo, New York. Delegates adopted new policy to support regulating homemade weapons known as "ghost guns," research warning labels on ammunition packages, and considering the mental health of schoolchildren as they engage in active-shooter drills. Physicians themselves have not been spared in the recent carnage. Recently, two physicians were shot and killed at their offices in Tulsa, Oklahoma. Read more at [ama-assn.org](http://ama-assn.org) about steps outlined by delegates to prevent gun violence.

**Finding new ways to help medical students, residents get child care** – The House of Delegates adopted policy to address the cost of child care for medical students, residents and fellows. Delegates supported policy that calls for on-site or subsidized child care to medical students and residents during training to help alleviate some of the financial burden they face.

**Next stop:** The 2022 Interim Meeting of the AMA House of Delegates is Nov. 11-15 in Honolulu.



## Enhancing Awareness of PTSD

Veronica Radigan, MD

**S**ummertime. For most, this signals thoughts of warm weather and good times with family and friends. Sadly, what brings happiness for some can trigger stress and sorrow for others. In the words of a Vietnam War veteran, "The fourth of July was once my favorite holiday with friends and family...but now it is a day I wish never existed."

Now ask, what could this veteran, a victim of a farming accident, a female sexual abuse victim, a child who lost his mother to domestic violence and a survivor of a tornado all have in common? The answer is post-traumatic stress disorder or PTSD.

As defined by the CDC, PTSD is an intense, uncontrollable emotional and physical reaction to a reminder of a traumatic event or distressing memories. Though most people associate this disorder with service members and war, the reality in our society is that PTSD is diverse and far reaching. It is estimated that 70 percent of the population will experience at least one traumatic event in their lifetime and current research shows that about six percent of American adults will suffer from PTSD.

The privilege of talking with hundreds of patients has opened my eyes to the variation of PTSD symptoms and its commonplace in our society.

Some PTSD symptoms are intrusive such as distressing memories, dreams, or flashbacks. Others experience intense psychological or physiological reactions to triggers. The need for avoidance causes some suffering from PTSD to shut out memories of the event and evade reminders such as people, places, situations, or objects. PTSD can alter mood and thoughts which can lead to feelings of blame, fear, horror, anger, guilt, or shame and inability to experience positive



emotions. Common symptoms also include irritability and angry outbursts; reckless or self-destructive behaviors such as substance use; hypervigilance; and problems with concentrating and sleep.

The reality is that PTSD is complex and affects everybody differently, so a treatment that works for one person may not work for another. Currently, the main treatments for PTSD are medications and/or psychotherapy. Support from family, friends and groups are crucial to recovery.

It can be difficult to take that first step to ask for help but with time and treatment PTSD can be managed and controlled. Research shows that the symptoms of PTSD last much longer for those not receiving treatment versus those that receive treatment. By creating more awareness and discussing the diverse nature of PTSD more people will be inspired to get help or give help to those suffering. If you are unsure where to start, ask your family doctor or search for local mental health providers.



Veronica Radigan, M.D., a psychiatrist in Sioux Falls, South Dakota is a contributing Prairie Doc® columnist and a guest this week on the Prairie Doc® Q&A show. Follow The Prairie Doc® at [www.prairedoc.org](http://www.prairedoc.org) and on Facebook featuring On Call with the Prairie Doc® a medical Q&A show celebrating its twentieth season of truthful, tested, and timely medical information, broadcast on SDPB and streaming live on Facebook most Thursdays at 7 p.m. central.



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Board News is a monthly feature sponsored by the South Dakota Board of Medical and Osteopathic Examiners. For more information, contact the Board at [SDBMOE@state.sd.us](mailto:SDBMOE@state.sd.us) or write to SDBMOE, 101 N. Main Avenue, Suite 301, Sioux Falls, SD 57104.



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A man with dark hair and a beard, wearing a white lab coat, is shown in profile, looking towards the right. In the background, a computer monitor displays several medical scans, including what appears to be a PET scan of a human figure and cross-sectional images. The scene is set in a clinical or laboratory environment.

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