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South Dakota medicine

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Contents

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WHEN TO REVIEW YOUR ESTATE PLAN

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ANDY MULLAN, CFP®, Lead Advisor

With current estate tax laws to sunset at the end of 2025, conversations about estate planning are more important than ever. Potential changes could impact how your assets will be taxed and distributed, making it essential to review your estate plan sooner rather than later. Estate planning is an ongoing process that requires periodic reviews to ensure your wishes will be honored. The following are examples of events and situations that typically require updates to your estate plan:

- **Life Changes:** Major life events, such as marriage, divorce, the birth of a child, or the death of a loved one, can impact your estate plan. For example, you might need to update beneficiaries, revise guardianship arrangements for minor children, or adjust the distribution of your assets.
- **Legal and Tax Updates:** Estate tax laws and regulations can change. These changes might affect how your estate will be handled or how much your heirs will pay in taxes. For instance, if Congress does not act by December 31, 2025, the estate tax exemption could be reduced by approximately 50%.
- **Balance Sheet Changes:** As your assets change, your estate plan should reflect these changes. Whether you buy a new property, start a business, or add investments, it's important to make sure these assets are properly addressed in your plan.
- **Beneficiary Designations:** Regularly check that beneficiary designations on accounts like life insurance and retirement plans align with your will or trust to maintain consistency with your overall estate plan.
- **Estate Management and Decision-Making Documents:** Regularly review documentation of executors and trustees. Both are vital in managing your estate and fulfilling your wishes. Executors distribute assets as per your will, while trustees handle trust assets. Additionally, review your healthcare directives and power of attorney to ensure the appointed individuals are still appropriate.

Most of our clients ask how often they should review their estate plan regardless of major life and/or financial changes. Each situation is unique, but it is a good practice to review your estate plan every three to five years. Consulting with an estate planning attorney and your financial advisor can help ensure that your plan remains effective with current laws. Being proactive with your estate plan helps to ensure that it will continue to serve your needs and wishes, providing clarity and security for you and your loved ones.

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Consumption vs. Discernment

Jason Kemnitz, EdD

As I write this, I am nestled in my hotel room in the center of our nation's Capital preparing to attend an American Association of Medical Colleges (AAMC) leadership meeting. In the days preceding my travels it seemed the world was afire with the changing of administration; policies being enacted and changes being made (please note this is not a commentary on those subjects or either side's reaction to those subjects). The news was alive with protests and anger. The day before I left our fair hamlet, I received an email warning me of an increased level of danger and heightened security in D.C. So, it was with some trepidation that I boarded the plane and flew to the seat of government. As I was traveling from Reagan National to the hotel I was chatting with my Uber driver, and asked if things were as wild in his city as they appeared to the rest of the world? His response was quick and honest "no more so than any other day in this city."

It was then that I realized that I had forgotten what I had taught so many students to do, discern the information that I was consuming and using to guide my actions. For our students this comes in handy when trying to figure out which resources to use to study for STEP 2 or find sources on what they see in clinic that they may not know about and want to read about. For the rest of us (especially me) it helps to weed out the chaff that often inundates us.

An effortless way to help discern information is to use the CRAAP test as developed by Sarah Blakeslee, a research, instruction and outreach librarian at CSU, Chico. Blakeslee was frustrated with trying to remember the specific criteria to evaluate evidence and coined the moniker. Since that time, fall 2024, the CRAAP test has become the common acronym used in Academia, with her abstract explaining the reasoning for this acronym downloaded over 30,000 times. So, without further ado I offer the CRAAP test to discern information that we may find difficult to digest.

C. Currency – This is the timeliness of the information. This component moves in either direction. The goal is to figure out if the information is so old that it is no longer relevant. Conversely, if the information is innovative you may need to consider if the situation is fluid and will soon change or no longer be valid.

R. Relevance – This is the importance of the information for your needs. Ask questions like who the audience is, is the information at an appropriate level and have you looked at a variety of sources.

A. Authority – Where does the information come from? Is the information sponsored by a group or organization? What are the author's credentials? This becomes particularly helpful when our students turn to Reddit for advice.

A. Accuracy – This step evaluates the reliability, truthfulness, and correctness of the content. This step comes in helpful when I work with students that are studying for their shelves or STEP tests. There is a prevailing thought that one should get through the Uworld question bank a minimum of two times to get a high STEP score. When I inquire about where they found that information it is usually a person on a web board. I question the accuracy of that source!

P. Purpose – What is the reason the information exists? Is it fact, opinion or even propaganda? In the example about I might argue it is propaganda. It would be a new iteration of an old tactic to have a company to propagate bulletin boards (digital in this case) that increase reliance on their product.

Using these steps or some variation of them has proven useful for our students and myself. So, as I sit here, in the center of a city that rarely sleeps, and notice the almost eerie quietness of my surroundings, I wonder, did I miss discerning the information I was taking in before traveling to our fair Capital? Only time will tell.

About the Author:

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SOUTH DAKOTA
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Shaping the Future of Medicine in South Dakota

To the editor:

This is in regard to the article on orf in the October 2024 issue of *South Dakota Medicine*. What an ORFul diagnostic and therapeutic overkill.

Described is a 2 cm (penny sized) finger lesion on an 11-year-old sheep farm boy whose father had a similar "issue" which had resolved without treatments. There's the diagnosis. As is taught in medical school, a thorough history and exam often provides the diagnosis.

My empathy is for the boy and his parents who had to endure this medical excess. I hope he was insured and if so, the insurance company was "overused." If not, his parents ended up with medical bills exceeding $7,000(?), a financial burden for them.

In my early years of practice the cost would have been a $3 office call which in two years (after much debate) was increased 25% to $4 which included an urinalysis. Orf and at times cowpox were diagnosed in my 44 years of practice in South Dakota. Treatment included patient education, cleansing and topical antibiotics to prevent a secondary bacterial infection. I saw lesions larger than 2 cm.

The care delivered to this boy was in a large medical school teaching center. Those involved were a primary care provider, an internal medicine resident, a medical student, a hand surgeon, a pathologist, a radiologist and probably an anesthesiologist. No dermatologist! Where was Dr. Hoffman? He had hospital care to "expedite the management" and received antibiotics. He was taken to surgery for a biopsy. This made the diagnostic journey end, fortunately. This boy did not need further tests or antibiotics.

Besides the trip to surgery and a biopsy an economical (!) MRI was done. A plain X-ray is not reported. The lesion had been there two weeks or more and if osteomyelitis was suspected it may have been seen on a plain X-ray.

An article in *Time* (3/13/2013) is titled "The doctor won't see you now." A news story in the *Aberdeen News* (4/14/2023) is titled "Law makers confront patients' medical debt." Both describe reasons patients are unsatisfied with U.S. healthcare (43% in 2019). In the U.K. it's 22% and 26% in Canada. Patients wait weeks for an appointment, they wait to be seen by a physician for a short time who seems to pay much attention to the computer screen. After that it's to the lab for tests, then to X-ray and perhaps later to a consultant.

Weeks later the bills in large amounts arrive and hopefully their insurance will cover them. This is after hours of haggling with the insurance company both by the physician and patient. A quote from a Harvard professor states "the insurance system is endlessly confusing."

As a disclaimer or to be forthright in my 44 years of practice in South Dakota, patients were unsatisfied with my care and left to find care elsewhere. I also had three malpractice suits against me. I spent 10 days in federal court in Sioux Falls.

This 94-year-old follows the advancements in the medical world and am amazed, much is beyond my comprehension.

An important conclusion is reached in the orf article abstract. "Unfamiliarity with orf may lead to an extended workup." Unfortunately there remain many unfamiliarities.

There is always room for improvement.

Leonard M. Linde, MD
Mobridge

President's Comments

Using Your Voice (and Empowering Others to Do the Same)

Jen Tinguely, MD, MPH
President, South Dakota State Medical Association

Anyone else out there exhausted? Tired of trying to keep up with the breakneck speed at which things are happening in Washington that are impacting your patients? I know that I am. And if you're feeling overwhelmed, please know that you're not alone. Many of us in healthcare are rattled by things that have already happened and are worried about things that may still happen. These could be the changes that are being forced upon the Centers for Disease Control, the threat to Medicare payment reform or the changes to the National Institutes of Health funding stream. There is certainly a lot going on and I would urge anyone who is feeling rattled or concerned to keep using your voice and to make your concerns known...whether that is with your local medical district, the state association at large or with your elected legislators in Pierre and in Washington, DC. Simply vocalizing your concerns might ease some of the stress you are feeling.

Just a few weeks ago, the funding stream that federally qualified health centers rely on for operations through the Health Resources and Services Administration (HRSA) was temporarily halted, seemingly caught up in an Executive Order from the White House. Panic arose within the health center world and I felt so helpless....I didn't know what to do so I sent an email to our two U.S. Senators and one U.S. Representative. The email was sent in the middle of the night because I couldn't sleep, filled with worry and anger. The moment I hit send, though, I felt a small sense of relief. Certainly, I knew an email sent in the wee hours of the night was not going to do much, but it allowed me to share my concerns with people who might actually have some influence in Washington. I was pleasantly surprised the next morning when I got an actual call back from a staffer in one of our Senator's offices. She was friendly and said she appreciated the reach-out. Thankfully, the funding stream opened back up after a judge ordered a temporary pause on the Executive Order and then the Executive Order was rescinded. So, for the moment, my clinic (and thousands of other clinics like mine across the country) are safe. Our patients will continue to have a place to receive their healthcare.

This is just one example of how events in Washington are impacting our ability to provide care and I am aware of just how upsetting some of what is happening might be making you feel. Remember that many of our patients are feeling anxious, too, and giving them encouragement to speak up might empower them in a way that would ultimately help them feel a bit better, too.

I sat with a patient last month who cried through her entire visit because she is terrified for her 25-year-old transgender son. She felt helpless and she came to me to discuss her mental health because she was having a hard time functioning in her day-to-day work. I could have easily looked at her PHQ-9 score of 23 and said, "here's some fluoxetine and I'll see you in three weeks to see how you're doing" but that would not have been adequate. Instead, I sat and listened. I let her cry and said how sorry I was. I encouraged her to send an email, or if she was feeling brave, to call our elected representatives in Washington and let them know how she was feeling and what she was concerned about. I showed her on my computer screen how easy it was to send a message to them and she acknowledged that she had never done anything like that before. I empowered her to take action. And I did prescribe her some fluoxetine.

While some might argue that it's not my place as her physician to be delving into issues in the political realm, I would argue back. Politics has infiltrated our exam rooms, our hospitals and our medical education classrooms. I sincerely wish this wasn't the case, but it is not the reality we work in anymore. In the case of my very sad and scared patient, I did not tell her what she should say to her elected officials, I simply told her how she could put her own thoughts and words into action.

I hope everyone reading this is doing okay in these tumultuous times. I worry so much about our patients, our clinics, our profession and our community at large. Please take good care of yourselves and check in on one another. Until next month, be well.

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Low Grade Laryngeal Chondrosarcoma of the Cricoid Cartilage: A Case Report

Colton D. Carlson, MS III; Gaven Bowman, MS IV; Aaron Amundson, DO; and William C. Spanos, MD

Abstract

Laryngeal chondrosarcomas are a rare class of laryngeal tumor arising from the various cartilages in the larynx. Despite their generally benign nature, removal of laryngeal chondrosarcomas is essential as the tumor often obstructs the larynx resulting in vocal defects and can impede breathing in advanced cases. In this case, we present a 61-year-old male with a low-grade laryngeal chondrosarcoma arising from the cricoid cartilage. The patient presented with a long history of hoarseness accompanied by normal physical exam and lab findings. After CT imaging showed a laryngeal mass, biopsy and histological examination were performed and confirmed a diagnosis of low-grade laryngeal chondrosarcoma arising from the cricoid cartilage. The patient was primarily treated via an anterior commissure laryngoscope with thulium laser resection and further debulking was able to be performed multiple months after the initial procedure during another unrelated neck surgery. The eight-month follow up course resulted in retention of laryngeal function and no recurrence on CT scan. This case provides a thorough look into a chondrosarcoma arising from the larynx with a discussion of workup for these rare airway related tumors.

Introduction

Chondrosarcomas are a rare class of tumor that arise from cartilage anywhere in the body but are most often found in the long bones and pelvis.[1] Chondrosarcomas account for 11% of all primary bone tumors, but they rarely arise in the head and neck and account for only about 1% of all laryngeal tumors.[2,3] The first case of laryngeal chondrosarcoma was described in 1816 by Travers but the clinical investigation of laryngeal chondrosarcomas increased in the 21st century with multiple literature reviews providing clarity on the common clinical features and prevalence of laryngeal chondrosarcomas.[3-6] Laryngeal chondrosarcomas can arise from any of the cartilages of the larynx, the most common being the cricoid cartilage followed by the thyroid and arytenoid cartilages.[6] While the cricoid cartilage is the most common location, it also presents the greatest challenge in treatment as the cricoid cartilage is vital in providing structure to the larynx and must be left intact for the larynx to remain functional. In this case study we present a low-grade laryngeal chondrosarcoma arising from the cricoid cartilage which was treated with a thulium laser resection and eventual open surgery.

Case Presentation

A 61-year-old male presented to the clinic with a chief complaint of hoarseness. The hoarseness had been present for multiple years and would occasionally improve but never completely cease. Physical exams and labs showed no abnormalities, masses, or tenderness in the neck. A CT scan was ordered and showed a 2.7 cm calcified mass in the patient's larynx (Figure 1) prompting the scheduling of a return visit and consultation with otolaryngology. On the return visit an in-office flexible laryngoscopy was performed and showed normal nasopharynx, oropharynx, hypopharynx and endolarynx. There were no lesions of the vocal cords and vocal cords had good bilateral mobility. A raised, dome shaped mass was found in the posterior glottic area extending into the subglottis and partially obstructing the airway resulting in a greater than 50% decrease in lumen area.

Diagnosis

Flexible bronchoscopy was used to retrieve a biopsy of the mass. Gross findings from the flexible bronchoscopy mirrored the findings of the previous laryngoscopy. The mass was measured at 1.5cm and multiple biopsies were taken. Histological analysis of the biopsies (Figures 2) combined with the previous CT scan imaging led to a diagnosis of a low-grade laryngeal chondrosarcoma arising from the cricoid cartilage.

Treatment

Multiple treatment options were discussed with the patient including a total laryngectomy, resection via open laryngeal

Figure 1. Computed tomography (CT) scan of the neck ordered on the patient's original visit showing a 2.7 cm calcified mass in posterior lamina of the cricoid cartilage.

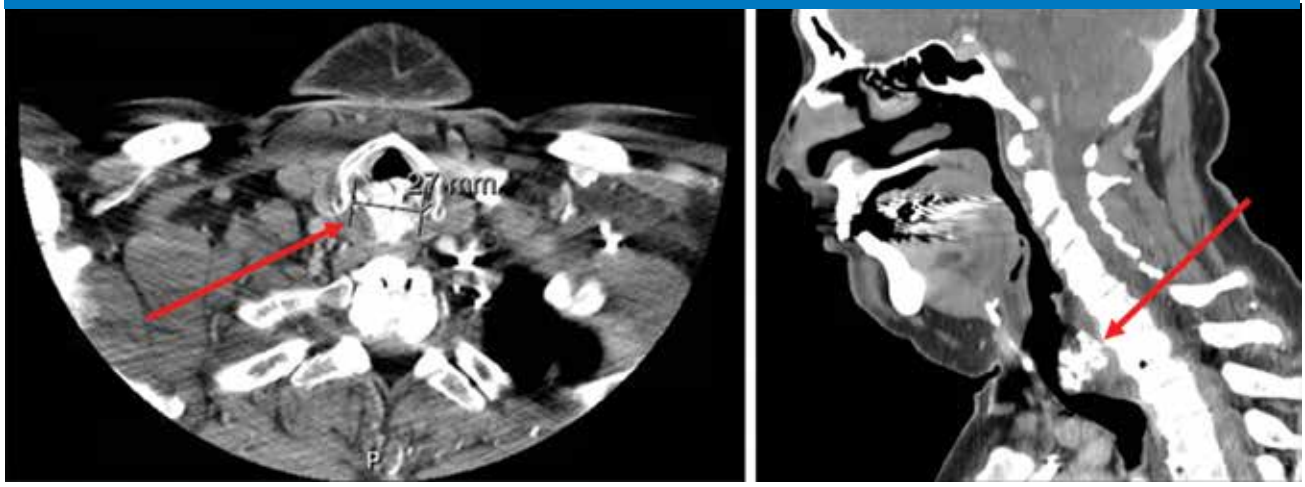
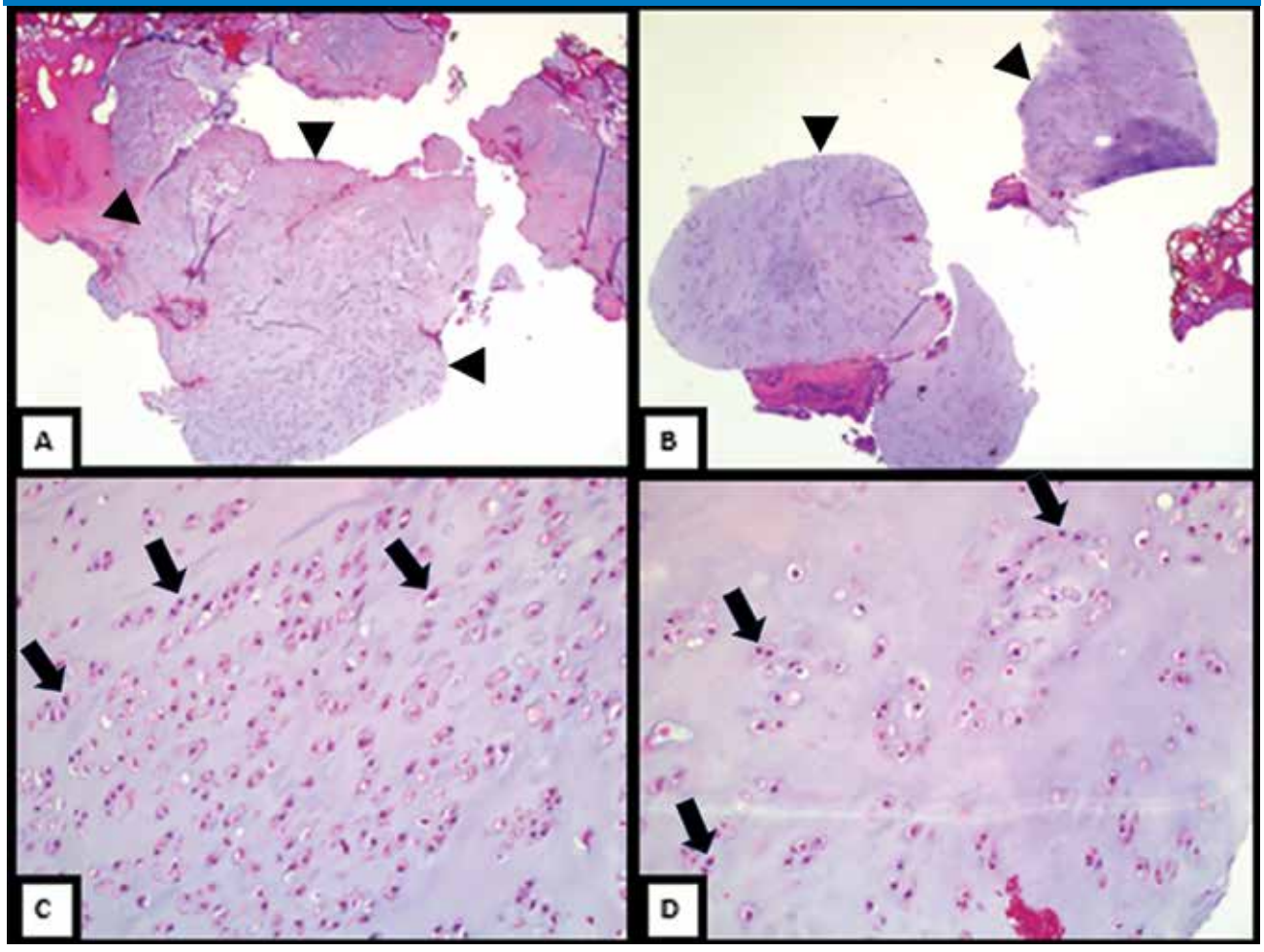


Figure 2. Histological examination of the mass biopsy. A & B: Low power view displays an atypical cartilaginous proliferation with cellular lobules of hyaline cartilage (arrowheads). C & D: High power view displays chondrocytes with mild cytologic atypia (arrows) surrounded by a cartilaginous matrix in varying areas of higher (C) and lower (D) cellularity. The difference in cellularity displays the importance of a thorough biopsy as the areas of lower cellularity could be viewed as less concerning.



fissure and resection via an anterior commissure laryngoscope. The patient chose to pursue endoscopic resection via a rigid scope despite the higher risk of recurrence as it would present the lowest risk of laryngeal dysfunction. A thulium laser was used for the resection as there was concern that a standard CO_2 laser would be unable to ablate the calcification of the mass. The mass was debulked to the point that the rigid Hopkins rod telescope was able to be passed through the airway (Figure 3) but there were secondary thermal changes to the anterior trachea with ablation of the lower part of the mass that, along with a slight angulation of the trachea limited the ability to completely debulk the mass in the posterior tracheal and subglottic regions. The patient tolerated the procedure well and was admitted overnight for observation before being discharged the next day.

Follow Up

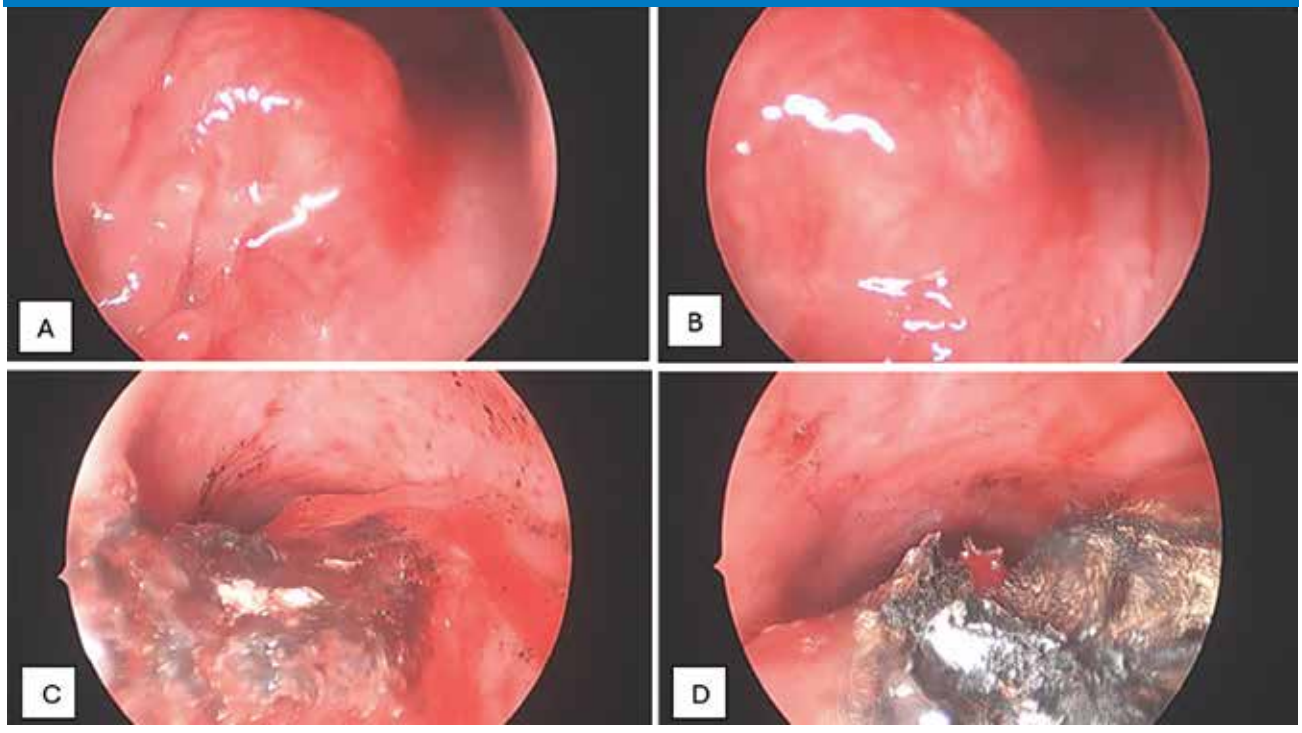
The patient had a follow up appointment one month following the resection. He reported significant improvement in voice quality along with no dyspnea, pain, dysphagia or bleeding. No mass or tenderness was noted in the neck upon inspection.

Eight months after the original debulking procedure the patient elected to have further debulking through an open approach. During the workup for this procedure, he was found to have a Hurthle cell thyroid neoplasm. Because of this, it was decided to perform a total thyroidectomy at the same time as the additional debulking. Debulking of the remaining laryngeal chondrosarcoma was performed around the posterior lamella and wrapping to the left internal lamella of the cricoid cartilage. A flexible laryngoscopy and CT scan were performed eight months following the second debulking procedure. Flexible laryngoscopy at this time displayed hypo mobile left vocal cords with no evidence of mass while CT scan displayed some residual tumor that was improved from prior surgery with no evidence of chondrosarcoma progression. The patient experienced some dysphonia that was stable since the second debulking procedure but otherwise experienced no symptoms. Follow up CT was planned for one year.

Discussion

Chondrosarcomas represent 11% of all primary bone tumors, but only 2.5% of chondrosarcomas arise in the head and neck.[2,3] Laryngeal chondrosarcomas are especially rare comprising only 1% of all laryngeal tumors.[5] While laryngeal chondrosarcomas can arise from any of the cartilages of the larynx, cricoid chondrosarcomas are the most common comprising 72.9% of laryngeal chondrosarcomas followed by thyroid (14.9%) and arytenoid (3.5%) chondrosarcomas.[6]

Figure 3. Laryngoscope images. A & B: Before ablation. C & D: After ablation.



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Laryngeal chondrosarcomas have an average age of onset between 61 and 64 years old and present in males 4 times as often as females.[3,6,7]

Few studies have been published investigating possible risk factors of laryngeal chondrosarcomas although one large scale literature review by Thompson et al. found that, unlike many tumors of the airways, tobacco use does not significantly affect the likelihood of developing a laryngeal chondrosarcoma.[3] Teflon injections and radiation therapy been described as possible risk factors, but no large-scale studies have been performed to back these observations.[7-9]

Laryngeal chondrosarcomas usually present with a narrow set of symptoms. Hoarseness is the most common chief complaint in laryngeal chondrosarcoma patients occurring in 64% of cases. Dyspnea (25%), dysphagia (12%), voice changes (7%) and throat pain (4%) are also common symptoms seen in patients.[3] Original identification may be augmented through flexible fiberoptic laryngoscopy and localization of the tumor is often achieved via CT scan as this is the easiest method of viewing the coarse osseous elements typical in chondrosarcomas.[6,7] After this initial imaging, direct biopsies and histological examination are required to differentiate chondrosarcomas from chondromas and provide grading.

Chondrosarcomas, similarly to other types of neoplasms, are graded based on their cellularity, level of differentiation, and other histological characteristics. The most common grading scale used is described in Evans et al. although the scale described by Lichtenstein and Jaffe is also occasionally used.[7,10,11] High grade chondrosarcomas are considered the most concerning but comprise only 3.8% of all laryngeal chondrosarcomas.[6] Low grade chondrosarcomas conversely comprise the largest section of laryngeal chondrosarcomas but also have the best prognosis.[6]

After identification and grading, surgery is the preferred method of treatment as chemotherapy and radiation therapy have shown to be ineffective in treating laryngeal chondrosarcomas.[7] The exact method of surgical removal varies with the grade of the chondrosarcoma as well as the specific cartilages affected. Local excision is the preferred method of removal in lower grade chondrosarcomas as local excision provides the greatest opportunity for functional retention of the larynx. Limiting to local excision however results in a higher risk for recurrence.[3,6,13] For this reason, total laryngectomies are preferred in more aggressive, high-grade chondrosarcomas.[3]

Chondrosarcomas arising in the arytenoid and thyroid cartilage can often be removed with little risk of functional defect but functional retention becomes more difficult in tumors arising from the cricoid cartilage as the cricoid cartilage forms the only complete cartilaginous ring supporting the larynx.[13] Because of this, limited local resection with a focus on structural retention is often used in low grade cricoid chondrosarcomas.[13] With multiple treatment options available, a thorough conversation with the patient is necessary to properly balance the recurrence risk of a less invasive procedure against the possible functional loss and procedural risk of a more invasive procedure.

Regardless of the grade, laryngeal chondrosarcomas tend to have good prognosis. Less than 1 in 20 patients die with the disease and 5-year survival for patients has been reported to be as high as 88%.[3] Metastasis is rare, but often leads to a very poor prognosis and is more likely in older patients.[7,12] Metastasis most often occur in the lungs and bones and should be considered in the setting of cough, shortness of breath, hemoptysis or bone pain. Initial assessment for metastasis include CT scan for suspected lung metastasis or X-ray for suspected bony metastasis although biopsy is required for definitive diagnosis in both cases.[7] Despite the low rate of metastasis, laryngeal chondrosarcomas have a recurrence rate of approximately 40%.[3,6,13]

Conclusion

Given the non-specific presenting symptoms, laryngeal chondrosarcomas should be considered in the differential whenever a patient presents with chronic hoarseness of unknown cause. Fiberoptic laryngoscopy should be the first line test for unexplained hoarseness lasting more than four weeks although a CT scan could be a valuable adjunct when considering a mass such as laryngeal chondrosarcoma. Following the diagnosis, multiple treatment options are available to the patient and should be weighed while considering the opportunity for functional retention vs the risk of recurrence.

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

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A Rare Case of Pembrolizumab Induced Pericardial Tamponade in a 77-Year-Old

Muhammad Hasan, MD; Melanie LaVoie, DO

Abstract

We report a rare case of pericardial tamponade in a 77-year-old male with metastatic squamous cell carcinoma (SCC) of the head and neck receiving pembrolizumab. Despite pembrolizumab revolutionizing cancer treatment, it can engender a spectrum of immune-related adverse events. Our patient presented with acute dyspnea and chest pain two weeks post pembrolizumab infusion and was diagnosed with pericardial tamponade requiring an emergent pericardial window. Our case highlights the importance of recognizing and managing this life threatening cardiac event that occurs in up to 0.4% of patients on pembrolizumab or other immune checkpoint inhibitors (ICI).

Introduction

Pembrolizumab is a monoclonal antibody targeting programmed death receptor 1 (PD-1) that is used in the management of various cancers including melanoma, non-small cell lung cancer, and Hodgkin lymphoma, that has revolutionized cancer treatment. PD-1 and programmed death receptor ligand 1 (PD-L1) play a vital role in the regulation of immune system. Under normal circumstances, PD-1 is expressed by T cells and pro-B cells and acts to decrease the hosts immune response. Some cancer cells exploit this mechanism by expressing the PD-L1 receptor, allowing them to evade apoptosis. Pembrolizumab, one of the Immune Checkpoint Inhibitors (ICIs), works by inhibiting the interaction between PD-1 and PD-L1, allowing for a more robust immune response in the elimination of cancer cells.[1] The most common side effects associated with pembrolizumab are pneumonitis, colitis, and diarrhea.[2] The cardiovascular system is among the least affected organs by immunotoxicity, with an incidence of 0.5%.[3] We present a rare case of cardiac tamponade in a patient being treated with pembrolizumab for metastatic squamous cell carcinoma.

Case Presentation

We present a 77-year-old male with a history of type 2 diabetes mellitus, hypertension, hypercholesteremia, hypothyroidism, and _metastatic head and neck SCC being treated with pembrolizumab. He was diagnosed with SCC one year prior, failed his weekly cisplatin and radiation therapy, developing metastatic bone disease. and started on pembrolizumab every six weeks for three months prior to his arrival to our hospital.

He presented to the emergency department with 2 days of worsening shortness of breath and chest pain that acutely worsened over the past 3 hours. He did not complain of fever or cough. His chest pain was not worse with inhalation. His last pembrolizumab infusion was 2 weeksprior. Upon presentation he was tachycardic with a pulse in the 90s, hypotensive with blood pressure 81/65, SpO2 92% and temperature 97.2F. On examination, he had distant heart sounds, jugular venous distension, and normal breath sounds. Bloodwork including complete blood count and comprehensive metabolic panel were within normal limits. A comprehensive viral respiratory panel was negative. Chest X ray showed widened mediastinum. EKG (figure 1) showed sinus tachycardia without any Q waves or ST/T wave changes. A transthoracic echo (figure 2) showed a left ventricular ejection fraction of 40-45% with right ventricular collapse due to large fibrinous pericardial effusion with adhesions. Pericardiocentesis was considered but was not amendable due to the multiple adhesions present. Cardiothoracic surgery performed an emergency pericardial window with drain placement. During the procedure 950ml of serosanguinous fluid was drained, which led to prompt improvement in the patients' hemodynamics. A repeat post operative transthoracic echo showed significant decrease in size of pericardial effusion.

After 4 weeks, his pericardial fluid cultures were negative for bacteria, acid fast bacilli, or fungus. His pericardial biopsy showed non specific minimal chronic inflammation without tumor cells or organisms. Given his negative infectious workup and lack of other causes of his significant pericardial effusion, it was deemed that his tamponade was directly related to his pembrolizumab, which was discontinued,

Figure 1. EKG showing sinus tachycardia.

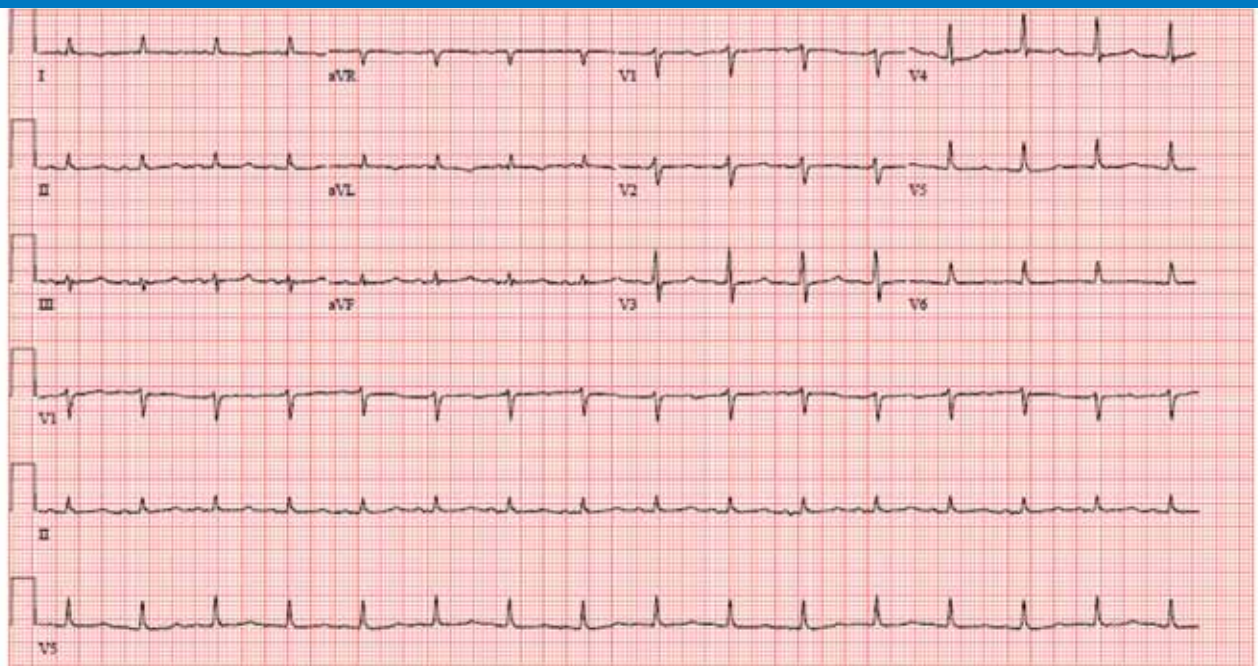

Figure 2. Apical view of echocardiogram showing pericardial effusion (blue arrows) with RV collapse.

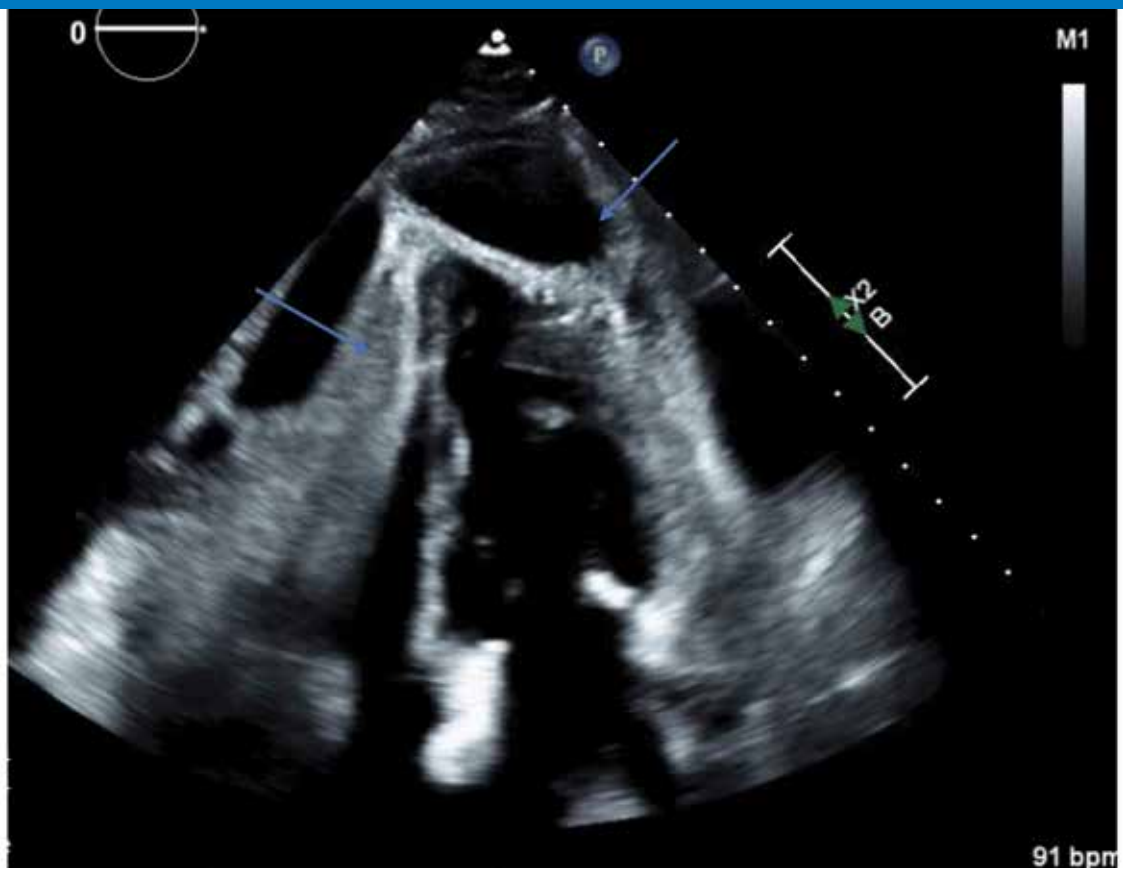

Table 1. Grades of immune checkpoint inhibitor-related adverse events.

Grades	Description
Grade 1	Abnormal cardiac biomarker, including abnormal ECG
Grade 2	Abnormal screening tests with mild symptoms
Grade 3	Moderate abnormal testing or symptoms with mild activity
Grade 4	Moderate to severe decompensation, IV medication or intervention required, life threatening conditions

and he was treated with high dose corticosteroids for 3 days followed by a month-long steroid taper.

Discussion

The role of pembrolizumab in recurrent/metastatic squamous cell carcinoma of the head and neck was shown by the phase III KEYNOTE- 48 trial. In this trial, pembrolizumab was compared against cetuximab chemotherapy. With a 4-year follow up period it showed that patients responded well to pembrolizumab and demonstrated survival benefit. The overall survival improved with pembrolizumab (hazard ratio [HR], 0.61; 95% CI, 0.46 to 0.81).[4] The increase in use of immune checkpoint inhibitors, led to the increase in immune related adverse events as well; sometimes resulting in fatal consequences. A meta-analysis including 5090 patients showed the incidence of immune related adverse events resulting in death was 0.89 (95% CI, 00.49; 1.62, I2, 0.00). Immune related events associated with pembrolizumab in the literature are colitis, pneumonitis, hepatitis, myocarditis, vasculitis, arrhythmias and cardiac tamponade.[5] Highest rates of mortality have been associated with cardiac involvement including arrhythmias, myocarditis and cardiac tamponade.[6] There is very little data suggesting the probability of adverse events while on immune checkpoint inhibitors. One study done on 156 patients suggests the presence of eosinophilia to be a predictor for adverse events.[7] The increasing incidence of immune-related adverse events highlights the critical significance of vigilant monitoring during a patient's course of treatment with the respective drug.

Data on the management of pericardial effusion associated with immune checkpoint inhibitors is very limited. However, the American Society of Clinical Oncology (ASCO) offers guidelines supported by moderate evidence on how to address cardiovascular toxicity induced by immune checkpoint inhibitors. They recommend holding immune checkpoint inhibitors in all cases of cardiovascular toxicity and starting high dose corticosteroids 1-2 mg/kg.[8]

Our patient presented with classic signs of pericardial tamponade including Beck's triad which includes jugular venous distension, distant heart sounds, and hemodynamic instability and was found to have tamponade via echocardiogram with adhesions requiring emergent pericardial window. Given his negative workup, he was started on high dose corticosteroids with taper and his pembrolizumab was discontinued.

The approach to restarting immune checkpoint inhibitors has been described by ASCO based on grades of cardiovascular immunotoxicity (Table 1).[9] Immune checkpoint inhibitors should not be started in patients with grades ≥2 (abnormal screening tests with mild symptoms). Our patient was grade 4 (moderate to severe decompensation) and thus there are no plans at this time to restart his ICI.

Conclusion

Pericardial effusion leading to cardiac tamponade is an extremely rare and potentially fatal immune-related adverse effect associated with pembrolizumab that requires expeditious identification. The underlying cause of immune-related adverse events remains elusive. The increased incidence of such events is likely attributed to the growing use of immune checkpoint inhibitors, highlighting the importance of awareness among physicians of potential adverse effects during immunomodulator therapy.

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Examining the Relationships between Work Environment and Stress Coping Mechanisms with Burnout in Medical Students

Oluwafunke Oluwatosin Ogunremi, MS III; Ethan Noble, MS III; and Valeriy Kozmenko, MD

Abstract

Introduction – Throughout the duration of medical training, learners are oftentimes overworked and faced with high levels of stress and pressure; this can decrease quality of life for many individuals. The goal of this study was to gain an understanding of how work environments and stress coping mechanisms play a role in the amount of burnout experienced by medical students.

Methods – Data was collected from medical students at the University of South Dakota Sanford School of Medicine by using a 22 question Qualtrics survey. The survey remained open until a 50% response rate was achieved from the student body. The results of the survey were analyzed by using 2 sample t-tests and ANOVA tests as appropriate.

Results – No statistically significant differences were found in total burnout ratings, coping mechanisms, and perception of the work environment between the different cohorts of medical students. Students who had healthier behaviors, such as following CDC recommendations on sleep, exercise, and fruit and vegetable consumption or practicing meditation and mindfulness, had lower levels of burnout compared to those who did not. Students who stated on the survey that they were experiencing burnout had a lower overall score on the survey, indicating higher levels of burnout.

Conclusion – Some medical students may recognize when they are burning out, so providing resources to help them incorporate healthier behaviors into their lifestyles may help aid in burnout recovery. Finding effective ways to help students deal with stressors and develop coping mechanisms improves their own quality of life and can hence improve patient outcomes.

Introduction

Throughout the duration of medical training learners are oftentimes overworked and faced with elevated levels of stress and pressure. Varying factors that accompany medical training, such as workload and obligations, can decrease the quality of life for many individuals.[1] Studies have shown that the work environment that healthcare workers are exposed to can adversely impact their emotional and mental wellbeing.[2] Healthcare workers routinely experience not only long work hours and heavy work loads, but may also experience workplace violence from patients and oppression from colleagues.[3] This pattern described above may begin in medical school for some learners. From the U.S. data that is available, a study conducted by the Mayo Clinic analyzed six medical schools and found evidence that supports that, "the training process and environment contribute to the deterioration of mental health in developing physicians."[4] Additionally, a meta-analysis that included 23,735 medical students across the world, reported that more than half, 52.7%, of medical students experienced poor sleep quality.[1] It is known that failing to get adequate sleep can lead to an increase in accidents, mental health issues, and physical health issues.[5,6] The circumstances surrounding early medical training perpetuate an environment that adversely affects the mental health of many learners. Finally, it is estimated that almost half of all practicing physicians have experienced burnout.[7] Burnout not only affects the physician's wellbeing, it also adversely affects patient outcome. Burnout as defined by the Maslach's Model, focuses on 3 key aspects: emotional exhaustion, depersonalization, and reduced personal accomplishments.[8] Here, the authors focus on analyzing emotional exhaustion

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and reduced personal accomplishments. Understanding the general trends related to mental health status of learners and professionals at different points within their medical training can help us identify the prominent problems at each stage and make the pertinent changes. Mental health status and personal well-being generally tend to deteriorate as the levels of burnout that an individual experiences increases.[9] This study investigated the circumstances surrounding medical students' mental health at different stages of their medical training. The researchers conjectured that the work environment surrounding medical training would be a better predictor of student susceptibility to burnout than stress coping mechanisms would be. Additionally, it was conjectured that burnout would be inversely proportional with students' perception of the work environment and it would be inversely proportional with student use of coping mechanisms.

Methods

In order to assess aspects of both medical student wellness and burnout among University of South Dakota Sanford School of Medicine (USD SSOM) students a combination of questions from various surveys was utilized. The survey items had been previously used for engagement and productivity within work environments as well as personal coping mechanisms to stress. The Q12 survey by The Gallup was used to evaluate work environment perceptions, a question from the Mini Z Burnout Survey by the AMA was used to evaluate burnout, and a few questions pertaining to the CDC's recommendations for healthy living were used to evaluate general stress coping mechanisms. This IRB approved survey consisted of 22 questions and was distributed using the Qualtrics survey platform to all medical cohorts at USD SSOM. Students accessed the survey via either clicking a link or by scanning a QR code that was distributed by the Office of Medical Education in a school wide email. The survey remained open until a 50% response rate was achieved from the student body. Each question was analyzed using a 5-point Likert scale to statistically analyze differences in answer choices between the four medical cohorts. The results of the survey were analyzed by using 2 sample t-tests, linear regression, and ANOVA tests as appropriate.

Results

A total of 144 students out of 271 students completed the survey (Table 1). Data collection was concluded due to time constraints. The score on the survey was inversely related to burnout, so higher survey scores correlated to lower feelings of burnout. No statistically significant difference was found in total burnout ratings between the different cohorts of medical students ($p=0.833$). Marital status did not cause a significant difference in the total burnout rating for students ($p=0.88$). Students who had healthier behaviors, such as following CDC recommendations on sleep, exercise, and fruit and vegetable consumption or practicing meditation and mindfulness, had lower levels of burnout compared to those who did not (each factor had $p<0.0001$) (Table 2).

The survey had students choose a description that matched their current feelings of burnout, which showed a significant difference between different responses and total burnout rating ($p=0.00027$). The category "I enjoy my work. I have no symptoms of burnout." has the highest average at 68.3 (total score on survey) and "The symptoms of burnout that I am

Table 1. Survey completion among the medical cohorts, depicting the survey response rate both within and among the medical student cohorts.

Medical school cohort	Number of years completed in medical school	Number of students in the cohort	Number of students who completed the survey	Survey response rate in each cohort	Total survey response rate
Class of 2027	1	70	64	91.4%	44.4%
Class of 2026	2	70	41	58.6%	28.5%
Class of 2025	3	64	15	23.4%	10.4%
Class of 2024	4	61	19	31.1%	13.2%
MD-PhD*	N/A	6	5	83.3%	3.5%
Total	N/A	271	144	N/A	53.1%

*Results from the 6 MD-PhD students in their PhD training phase at the time of the survey were excluded from the study analysis but have been included here in order to accurately reflect the proportions of the total survey response rate.

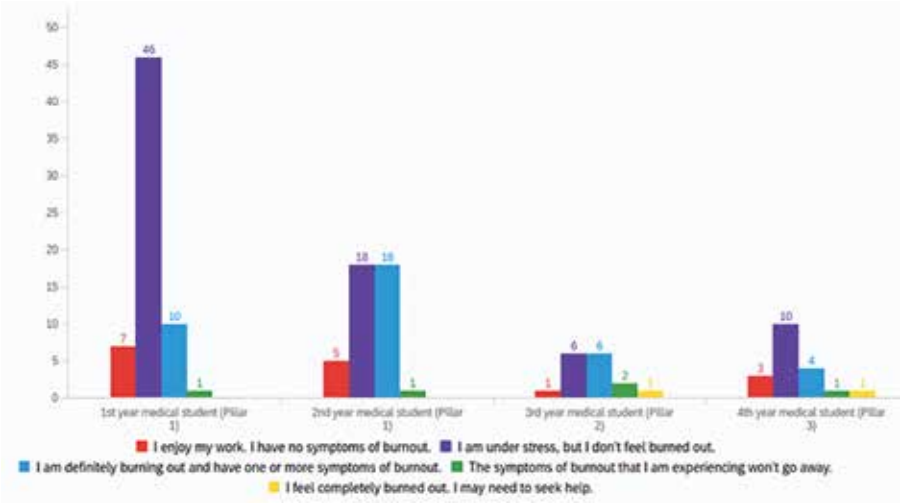
Table 2. The impact of stress coping mechanisms on burnout, depicting the average total score on the survey after the participants were sorted based on their response to the survey item shown in the center boxes. The scores were calculated as a summation of each survey question. Each survey question was graded on a 5-point Likert scale, with each category being assigned a number. Strongly disagree corresponded to a score of 1 for the item, and strongly agree corresponded to a 5. The numerical values in the table represent the average total survey score for those who responded with that answer to the item in question. For example, for "meets CDC recommendations for diet each week," the total survey score average for all those who responded strongly disagree to the question was 54.8. The P value for the difference between the groups is shown in the final column. The total score on the survey was found to be significantly different for each group after they were sorted based on responses. Higher scores on the survey correspond to lower feelings of burnout in the participants.

				Total survey score categorized by answer choices to survey item			
		Strongly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Strongly agree	P value
	Meets CDC recommendations for diet each week	54.8	63.4	65.8	65.1	70.4	P<0.001
	Meets CDC recommendations for sleep each week	58.0	60.4	60.7	65.9	69.2	P<0.001
Survey item	Meets CDC recommendations for physical activity each week	59.5	59.3	61.4	63.5	70.3	P<0.001
	Practices mindfulness at least 3 times a week	58.0	61.1	64.6	66.4	71.7	P<0.001
	Practices meditation at least 3 times a week	60.6	63.9	65.1	69.9	74.1	P<0.001

Table 3. Averages of survey items regarding individual behavior and the external work environment, depicting the average score for each cohort regarding the questions that analyzed their behaviors, such as diet and sleep, and the external work environment. The items that comprise each group can be seen in supplementary Table 1 at sdsma.org. There was no significant difference found between the different cohorts for intrinsic factors and work environment.

	Average of survey items regarding individual behaviors	Average of survey items regarding external work environment
Class of 2027	27.9	36.8
Class of 2026	28.1	36.5
Class of 2025	26.4	35.9
Class of 2024	27.7	36.0
P-value of the difference between medical cohorts	0.735	0.876

Figure 1. Self-evaluation of burnout by year of medical school, depicting responses to "Using your own definition of burnout, select one of the following answer choices" by year in medical school.



experiencing won't go away. I think about work frustrations a lot" was the lowest at 55.2 (Figure 1).

The questions were grouped according to intrinsic factors/coping mechanisms, such as eating and sleeping habits, and extrinsic factors/perception of the work environment, such as receiving recognition or having their opinion valued at work. There was a slightly stronger positive correlation found between intrinsic factors ratings and overall score on the survey ($r= 0.868$, $p < 0.001$) compared to the correlation between extrinsic factors and overall score on the survey ($r= 0.849$, $P <0.001$). There was no significant difference between medical cohorts for the reported intrinsic factors ($p= 0.745$) or extrinsic factors ($p= 0.876$). Based on the results of the research, there was no difference between medical cohorts in terms of coping mechanisms, perception of the work environment, and burnout.

Discussion

There are many variables that can contribute to burnout and mental illness in health care professionals including but not limited to: uncertainty, imposter syndrome, work environment, lack of stress coping techniques, and other general life stressors. Given the heightened objective of addressing and prioritizing medical professional well-being, the present study sought to investigate aspects influencing the mental health of medical students. The analyzed factors include coping mechanisms, work environment, and a self-assessment of burnout. Students who incorporated healthy habits pertaining to sleep, exercise, diet, and meditation practices had lower levels of burnout compared to their counterparts. Medical students had similar evaluations of their coping mechanisms and their perception of their work environment between all cohorts. Despite the differences in work and academic environments between the cohorts, the similar responses potentially indicate that similar levels of stress/burnout are present throughout the program.

The topic of medical professionals' wellbeing is being prioritized by both students and training programs alike. The previously normalized paradox of taking care of patients at the expense of a provider's own emotional, mental, or physical needs has become seemingly less popularized. In 2003, the Accreditation Council for Graduate Medical Education (ACGME) limited resident duty hours to 80 hours a week averaged over four weeks, whereas previously these hours were unregulated In 2011, the ACGME instituted a 16-hour duty hour restriction for consecutive work, for first-time resident physicians in order to improve both physician and patient safety.[10] These changes have been successful in decreasing rates of burnout and increasing well-being among resident physicians. Moreover, these changes at the resident level influence changes at the medical student level. Programs like USD SSOM have implemented limitations for duty hours to 80 hours a week averaged over four weeks, for medical students in their clinical training phase. There were differences between medical cohorts for their self-evaluation of their burnout, with students in their second or third years of training reporting higher proportions of students with more intense feeling of burnout, as seen in Figure 1. This could be due to the standardized testing students undergo during this time, such as USMLE 1 and 2, as well as increased academic and clinical responsibilities.

Although this research study aimed to evaluate well-being and burnout at different stages of early medical education, it did not take place without shortcomings. A limitation to this study was the variation in survey response rates among the different medical cohorts (Table 1). This variation in response rates can lead to the data misrepresenting reality, particularly in the cohorts with low response rates. Additionally, responses from MD-PhD students were not included in analysis to minimize confounding variables due to their increased duration of training.

One potential area of future research would be to administer this survey to one singular medical cohort at the time of initial orientation of medical school and continue administration of the survey on an annual basis until that cohort has graduated. This would allow for a more standardized analysis of how work environments, stress coping mechanisms, and burnout change throughout one's medical education. Essentially, this would be a comprehensive longitudinal cohort research design in which individuals would theoretically serve as their own control. Another area of future research would be replicating this study design in physicians undergoing residency training. Continuing to gather more data pertaining to medical student wellbeing is crucial as it will provide a framework for helping programs to identify possible areas of improvement and adaptation.

Conclusion

Burnout is a growing concern for medical students and healthcare professionals. The students' lifestyle and stress coping mechanisms, as well as the environment they learn in, make similar impacts on their overall feelings of burnout. It is imperative that both the students and educators work together to create a healthy environment. The students themselves can also recognize when they are burning out or are approaching burnout, so allowing students to express their feelings may become a necessary way to prevent burnout. The solution to student burnout will be a joint effort between students, administration, faculty, and other healthcare professionals. If this problem is inadequately addressed, both the physician and patient may suffer.

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Delayed Diagnosis of Subungual Acral Lentiginous Melanoma

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Abstract

We report a 62-year-old, Hispanic male who presented to a rural medical provider who noted dark nail discoloration to the left thumb. Several weeks later, he presented to a rural emergency department with left thumb subungual hematoma and paronychia attributed to recent trauma. After evacuation and oral antibiotics, the provider discussed the prospect of melanoma given presence of longitudinal melanonychia and positive Hutchinson's sign. After 2.5 years, the patient re-presented to the same provider who noted increased pain and scarring of the left thumbnail. Referral to an orthopedic hand surgeon led to an MRI, which demonstrated findings most consistent with a benign glomus tumor. A left thumb mass excision and partial matrixectomy was performed with pathology revealing subungual amelanotic melanoma. The patient underwent left distal phalanx amputation of the thumb through the interphalangeal joint. Appropriate imaging and sentinel axillary lymph nodes were negative for metastasis. He continues to follow with medical oncology.

Introduction

Subungual tumors can be either benign or malignant in nature, often leading to a delay in diagnosis given similar appearances. Subungual melanoma is an uncommon melanoma subtype which has a predilection for non-white races and carries a poor five-year survival rate.[1] This case report is of a delay in diagnosis of lentiginous amelanotic melanoma which was treated with amputation, highlighting the importance of a high index of suspicion of non-healing or progressive lesions of the nail bed unit and early referral to a surgical hand specialist.

Case Report

A 62-year-old right hand dominant Hispanic male was evaluated at a rural outpatient clinic for a left thumb nail abnormality after sustaining multiple nail avulsion injury at his job as a laborer. A general surgeon observed a dark line of discoloration under the nail extending from the base to tip, raising concern for subungual hematoma versus melanoma, but no further diagnostic workup was conducted.

Several weeks after initial evaluation, the patient presented to a rural emergency department with a weeklong history of severe left thumb pain (Figure 1). A subungual evacuation was performed which yielded purulence and the patient was treated with appropriate oral antibiotics.

Approximately 2.5 years later, the patient was undergoing evaluation for an unrelated procedure with the provider who initially assessed his left thumb who noted increased scarring to the left thumb nail bed with nail plate destruction, prompting an orthopedic hand surgery referral for evaluation.

At an orthopedic hand surgery clinic, the patient reported a 6-month history of left thumbnail abnormality with a dark line and pain with use. Physical exam revealed partial destruction of the radial aspect of the nail plate with a flesh-colored mass at the nail bed (Figure 2). Radiographs demonstrated a tiny cortical erosion at the dorsal cortex of the distal phalanx (Figure 3). An MRI without and with intravenous contrast demonstrated an approximately 1.5

Figure 1. Photograph of left thumb and nail on presentation to the emergency department.

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centimeter enhancing solid mass in the subungual space (Figure 4) and a glomus tumor was suspected. A mass excision with partial matrixectomy was performed.

Pathological examination was consistent with amelanotic, poorly differentiated melanoma. Appropriate staging imaging was negative for metastatic disease. The orthopedic surgeon recommended wide tumor excision versus amputation of the thumb distal phalanx through the interphalangeal joint. Amputation was performed with a sentinel lymph node biopsy yielding free margins and benign lymph nodes (Figure 5). Pathological results of the surgical specimen noted that the tumor extended to about 7.2 mm and invaded the dermis, subcutaneous fat, and bone (Figure 6). An interesting feature of this patient's melanoma was a positive staining for colloidal iron, a stain used to detect the presence of mucin, a mucopolysaccharide that is not normally expressed by melanocytic cells. To our knowledge, this is the first case of a positive colloidal iron stain in acral lentiginous melanoma (ALM).

The patient is following with oncology and has initiated a year-long course of immunotherapy. The surgical site is healing appropriately at a two-week (Figure 7) and two-month follow up appointment (Figure 8).

Discussion

ALM, or acral melanoma, refers to melanoma that develops on the soles, palms, and subungual regions.[1,2,3] Subungual melanoma is a rare entity which most commonly affects the thumb and great toe, is most found in the middle-aged to elderly and those of Hispanic, African or Asian origins.[4,5,6] Subungual melanoma originates from the nail matrix,

Figure 2. Photograph of left thumb upon initial presentation of orthopedic hand surgery clinic.

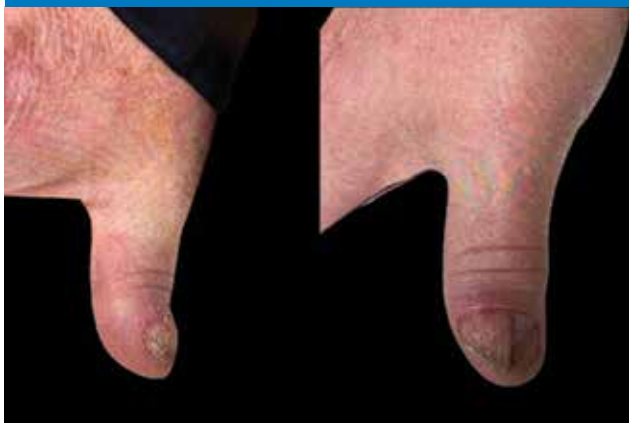

Figure 3. Lateral radiograph of the thumb demonstrates a tiny osseous erosion at the dorsal cortex of the distal phalanx.

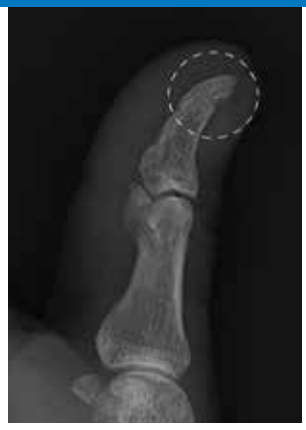

Figure 4. Sagittal T1 (A), T2-fat saturated (B), and T1-fat saturated post-contrast (C) MRI of the thumb demonstrates a 1.5 cm solid soft tissue mass in the subungual space with low signal intensity on T1, high signal intensity on T2, and post-contrast enhancement. There is reactive bone marrow edema and enhancement of the underlying distal phalanx with tiny cortical erosion.

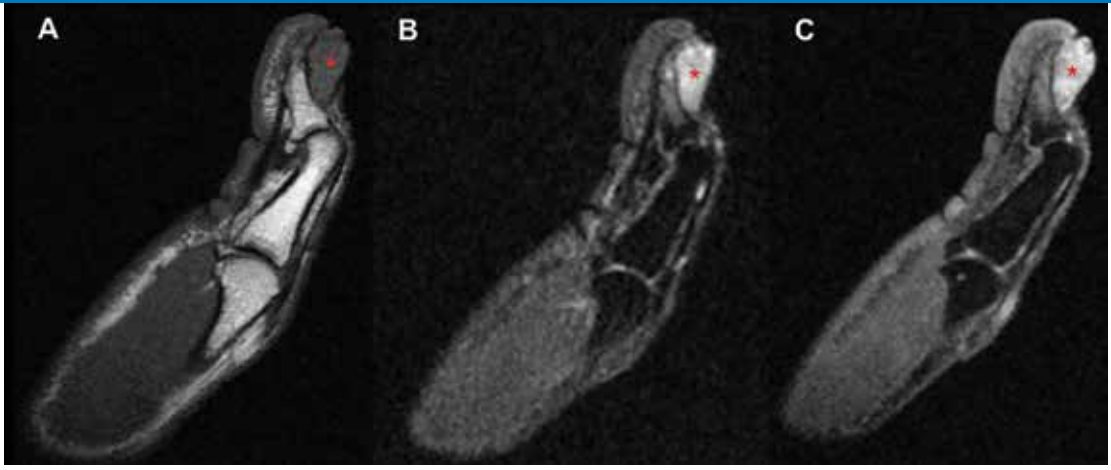

Figure 5. Intra operative photos of thumb amputation.

Figure 6. Photomicrograph of surgical specimen showing nests of malignant melanocytes (black arrow) invading through lamellar bone (white arrow) H&E 20X.

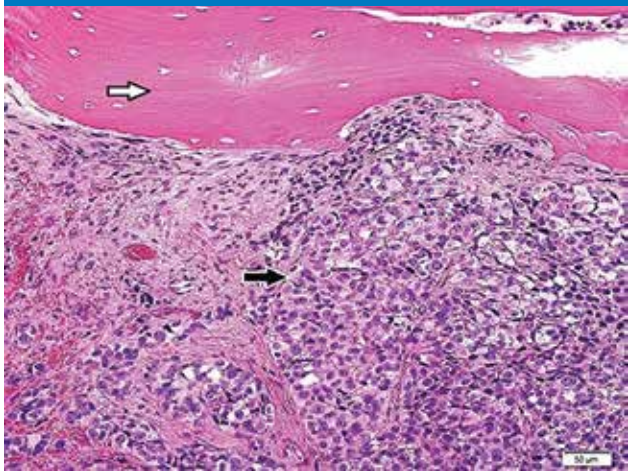

Figure 8. Two-month postoperative clinical photo.

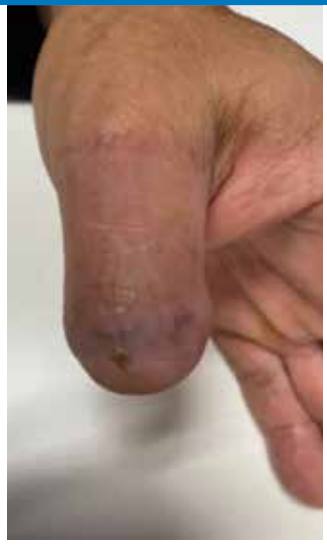

Figure 7. Two-week postoperative clinical photo.

and spreads to the nail bed and hyponychium, creating a Pathognomic dark line termed longitudinal melanonychia. This is a presenting feature in 70% of subungual melanomas so its presence should raise suspicion for melanoma.[1] When there is periungual melanotic involvement, especially in the proximal nail fold, this is termed the Hutchinson sign (Figure 9).[2]

Subungual melanoma can present as an amelanotic lesion

Figure 9. Clinical photo of a typical Hutchinson sign.

and can commonly be mistaken for infection, in-grown nail, simple nail split or benign subungual pigmentation.[2,4] Melonychia can have multiple causative entities including benign hyperpigmentation, subungual hematoma, bacterial infections, onychomycosis nigricans, HIV, metabolic deficiencies, secondary drug effects and endocrine disorders. When the diameter of a longitudinal melanonychia has a width greater than 3-6 mm, the risk of malignancy versus a benign entity is increased.[7] If a nail abnormality fails to resolve after treatment of a presumed infection or post-traumatic nail deformity, a biopsy is indicated.[1,4] Additionally, there is a myriad of soft tissue tumors, both benign and malignant, which can mimic ALM including glomus tumors and squamous cell carcinoma. Benign cystic lesions such as epidermal and mucoid cysts, should also be included in the differential diagnosis.[4,7,8]

The staging of ALM utilizes the typical tumor, node, metastasis (TNM) staging for solid tumors from the American Joint Committee on Cancer staging system (AJCC). This staging system includes tumor thickness or depth of invasion, also known as the Breslow thickness.[9,10,11] The tumor's measured depth is used in staging with the stage influencing overall prognosis.

Pathology

Most ALM have common histopathologic features with diffuse proliferation of large, atypical melanocytes in a lentiginous growth pattern with marked acanthosis.[12]

Immunohistochemical staining can be used to help classify the cell type. A lesion that is positive for MART-1, HMB-45, and S-100 with a negative result for cytokeratin helps confirm the diagnosis of melanoma.[1,9,13] S-100 can be expressed in tumors of neural crest origin and is not specific to melanocytic lesions.[2] Other markers of melanoma include SOX10, BRAF V600E, and PRAME. Notably, PRAME exhibits diffuse expression in approximately 94.4% of acral melanomas.[14,15]

ALM stands out among melanomas due to its unique characteristic of lacking UV-radiation induced mutations, which are typically prevalent in other melanomas. Telomerase reverse transcriptase (TERT), a promoter gene commonly mutated in melanomas is rarely observed in ALM, supporting the notion that UV-induced damage is not the primary driver of mutations.[15,16]

Imaging

The MRI appearance of melanoma is dependent on the melanin content of the tumor. The paramagnetic properties of melanin result in high signal intensity on T1-weighted images and often low signal intensity on T2-weighted images, helping distinguish melanoma from other tumors. However, since subungual melanomas can be amelanotic, the imaging properties of melanin cannot be relied upon. Therefore, the MRI appearance of an amelanotic subungual melanoma overlaps with other tumors, both malignant and benign. While osseous destruction or cortical erosion is a concerning feature of malignancy, these changes can be present in benign tumors because of the confined subungual space.[4]

Glomus tumors are included in the differential diagnosis for distal digital masses, because of the high frequency of glomus bodies at the fingertips and subungual space. Subungual glomus tumors are small, averaging around several millimeters.[8] Therefore, a larger subungual mass, like the 1.5 cm mass in our case, would be less typical for a glomus tumor. Ultimately, melanoma should be considered in the differential diagnosis of a solid subungual mass in the appropriate clinical context.

Surgical and Adjuvant Treatment

The gold standard for the last few decades has been amputation for subungual melanomas, but new research has challenged this treatment. One meta-analysis found no difference in the rate of recurrence in thin subungual melanomas between patients who received amputation versus digit sparing surgery.[17] For thicker tumors with 5 mm peripheral margins or greater, there is no difference in survival rates between amputation and wide excision surgery, but wide excision does yield higher local recurrence.[18]

Adjuvant therapy and monitoring after surgical treatment of ALM is crucial. Several BRAF/MEK inhibitors are considered the standard of care for patients who have been diagnosed with melanoma at risk for recurrence. Immunotherapies have demonstrated improvements for recurrence-free survival and distant metastasis-free survival but not overall survival.[19] The decision to proceed with adjuvant therapy should be carefully considered and discussed with medical oncology.

Conclusion

Melanoma makes up a small percentage of skin cancers but is responsible for over 75% of deaths from skin cancer. Subungual melanoma is associated with a worse prognosis. A United Kingdom study found that subungual melanoma carries a 5-year survival rate of 25% to 51%.[1] Nguyen and colleagues followed 124 cases of subungual melanoma treated with amputation and had a 5-year disease free survival rate of

59%. This cohort had a mean time to diagnosis of 2.2 years and average Breslow depth of 3.1 mm.[20] Given that ALM can mimic both benign and malignant pathology, medical providers must be aware of and watchful for non-healing or progressive lesions of the nail bed unit. A low threshold for referral to a surgical hand specialist for assessment should be maintained given the possible devastating consequences of untreated malignancy.

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Managing Congestive Heart Failure at Home by Transitioning From Intravenous Furosemide to a Subcutaneous Route

Muhammad Asif, MD; Awais Aslam, MD; Hammad S. Chaudhry, MD; Daud Shehzad, MD and Wahab J. Khan, MD

Abstract

Heart failure is one of the leading chronic conditions affecting millions of individuals in the U.S. and across the globe. Congestive heart failure (CHF) is one of the leading diagnoses resulting in acute hospitalizations for administration of intravenous (IV) diuretics, hence putting significant direct economic costs from in-hospital treatment and indirect due to loss of work being hospitalized. With the ever-increasing strain on hospital beds and staffing from a variety of acute illnesses, there has been an urge to treat patients in outpatient settings as much as possible, providing high-quality care and using hospitalization only as a last resort. Recently, there have been successful attempts to treat patients with subcutaneous furosemide and achieve results similar to conventional IV diuresis. In this article, we highlight some of the details and outcomes of these studies and summarize the important considerations about the utility of subcutaneous furosemide in treating CHF exacerbation.

Introduction

Heart failure (HF) can be defined as a clinical syndrome with symptoms and/or signs caused by a structural and/or functional cardiac abnormality corroborated by elevated natriuretic peptide levels and/or objective evidence of pulmonary or systemic congestion.[1] In heart failure syndrome, various physiological mechanisms play a role in the expansion of interstitial and intravascular compartments, leading to congestion. It can manifest in many symptomatic forms, including dyspnea, orthopnea, edema, fatigue, weight gain, and abdominal distention. However, a feeling of congestion is the hallmark of acute heart failure. Therefore, the condition is often called congestive heart failure (CHF). Congestion is a condition that arises from the accumulation of excessive body fluid due to HF. The symptoms affect the quality of life and cause significant impairment in daily functions, prompting the patients to seek medical care. Elevated JVP, pedal edema, body weight, and pulmonary rales are the most commonly noted signs of congestion. Heart failure is a growing public health burden in the U.S.; as per the CDC, nearly 6.7 million adults in the U.S. have heart failure. In 2020, heart failure was the cause of 85,855 deaths in the U.S. 1.29 million patients with heart failure are admitted to hospitals annually in the U.S.[2] Moreover, HF is a leading cause of re-hospitalization, reported to be up to 22% at 30 days and 40% at 90 days post initial hospitalization.[3] Intravenous diuretics are the mainstay of treatment for congestion and hospitalized patients for acute CHF. In one study, 83% of patients admitted with decompensated HF were found to receive IV diuresis.[4] In another study of 22,677 patients hospitalized for HF with reduced ejection fraction, 66% had uncomplicated hospitalization without escalation of treatment beyond initial IV diuretic therapy and had an average hospital stay of 4 days.[5] Nearly 80% of the HF management costs are from hospital admissions.[3] The HF-related costs in the United States are expected to be at least $70 billion annually.[6] In the past, HF clinics have been set up for patients to receive IV diuretics when they are having symptoms of acute exacerbation; however, these facilities are again limited and still have logistic requirements of transportation and staffing that add extra cost, time, and resources. Therefore, this option of outpatient treatment was also found to be significantly underutilized as an alternative to hospitalization for intravenous diuretics. In a study on Medicare beneficiaries from 2006–2015, the outpatient visits for IV diuretics comprised only about 1% of total HF visits.[7] The pathophysiology of congestion and its standard treatment with parenteral diuretics provides the basis for an opportunity where attempts have been made with some success by switching the IV diuretics to a subcutaneous route when a patient is having an acute exacerbation of their HF. By doing this, a large number of hospitalizations can be prevented, which can not only help reduce the economic burden on heart failure care but also benefit patients to get treatment in their home settings.

Pharmacokinetics of Furosemide

Diuretic therapy is the cornerstone of the chronic management of CHF. Furosemide is a commonly used diuretic that inhibits Na/K/2Cl transporter in the ascending limb of Henle's loop in the kidney. Historically, there have been oral and IV formulations of furosemide; however, as the congestion develops during acute exacerbation of heart failure, the intestinal absorption of oral diuretics becomes low and variable, requiring the diuretic therapy to be administered through parenteral, i.e., intravenous (IV) or subcutaneous (SC) route for better efficacy and reliability.

Many studies have shown that SC furosemide had complete bioavailability (99.65%) and equal diuretic effect as an IV formulation. The conventional IV furosemide had an alkaline pH (8-9.3) that could cause skin irritation; however, to overcome this problem, the SC formulation was buffered to come up with the neutral pH (7.4) product that helps minimize irritation at the site of administration.[8] FUROSCIX® (SC Pharmaceuticals, Burlington, MA), a furosemide injection of 80 mg/10 ml for SC administration, was approved on October 7, 2022, by the FDA as an additional treatment option for congestion due to fluid overload in adult patients with NYHA class II and III chronic heart failure.[9] Furoscix is a dose-containing and administration device (Figure 1), programmed to deliver 30 mg over the first hour followed by 12.5 mg/h for the subsequent 4 hours using the single-use on-body infuser with the prefilled cartridge. This prefilled device adheres to the body surface for the total administration time and is not an option for chronic use. Instead, it is a replacement for IV furosemide during acute congestion and should be replaced by oral medications as soon as clinically appropriate. Furoscix should be stored at room temperature until ready to use and has up to 24 months of shelf life. Once the patient has been taught about its application, the next time the medication can be mailed to them for self-administration on prescription, making it easily accessible for patients who live in remote areas away from any conventional infusion centers or healthcare facilities. Besides regular known side effects of loop diuretics, the most common adverse reactions with the Furoscix on body infuser are erythema, bruising, edema, and infusion site pain.[10]

Figure 1. Furoscix drug-device combination product.

Reproduced from Dahiya, Garima et al.[11]

Summary of Important Trials

Gilotra et al. in 2017 did a phase 2 randomized control trial in which 41 patients with CHF who were to receive diuretics were randomized to 2 groups of n:19 to get IV (mean dose 123±47 mg) and 21 n SC furosemide (80 mg over 5 h). The primary endpoint was to measure total diuresis at 6 hours. They found no statistically significant difference in 6-hour urine output between the two groups (median IV: 1425 mL) versus (median SC: 1350 mL). There was no statistically significant difference in weight loss between the two groups. However, early urine output was significantly higher in the IV group at hour 2 and higher in the subcutaneous group at hour 6. Higher natriuresis was seen in the SC group. Moreover, they did not note any worsening renal function, skin irritation, or autotoxicity with either formulation. They reported similar 30-day hospitalizations for each group.[12]

In the FREEDOM-HF trial, Bensimhon et al. in 2023 conducted a prospective, multicenter, open-label case-control study to assess the comparative cost of CHF treatment between IV and SC furosemide. In the study group, patients who presented to ER with worsening congestion despite being on oral diuretics were discharged on subcutaneous furosemide for up to 7 doses, n:24. Control group consisted of a group with 7 matching variables associated with HF hospitalization, n:66. These subjects in the controlled group were admitted to hospital for less than 72 hours for IV diuresis. The total cost of care, including the initial parenteral furosemide, hospital stay, and cost of medications on discharge accounted from the ER visit until 30 days post ED discharge in both groups, was calculated for cost of care comparison between the two groups. Of the 24 patients who received subcutaneous furosemide as initial therapy and were discharged from the ER, 23 successfully avoided hospitalization during the 30-day study period. There was a statistically significant reduction in heart failure-related healthcare costs of $–16, 995 per patient ($p<0.001$). Infusion site bruising was noted to be the most common adverse event (>10%), no subject withdrew from the study due to adverse events, and no deaths were reported.[13]

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In a follow-up study of secondary outcomes of assessing patient's quality of life, natriuretic peptide levels and patient/caregiver satisfaction were assessed in the FREEDOM-HF trial subjects. This study highlighted that patients with mild to moderate decompensation of HF were able to avoid hospitalization safely; at the same time, there were clinically meaningful reductions in natriuretic peptides, marked improvement in quality of life, and patient-reported satisfaction by being discharged from ED on treatment with SC furosemide.[14]

Another use of subcutaneous diuresis can be in palliative care population with advanced heart failure; this can not only help adequate symptom reduction but also help the patient to stay in the comfort of their home for their terminal period of life and still receive adequate relief for their dyspnea and congestion based on their goals of care. In one study involving 16 of such patients, 8 patients (50%) died without requiring hospitalization for symptom management. The use of subcutaneous furosemide showed a 50 % reduction in hospital admissions for the remaining eight patients who survived for a median of 6 months.[15]

Limitations

FUROSCIX is indicated for the treatment of congestion due to fluid overload in adult patients with New York Heart Association (NYHA) Class II and Class III chronic heart failure. FUROSCIX is not indicated for use in emergency situations or patients with acute pulmonary edema. FUROSCIX is contraindicated in patients with anuria, a history of hypersensitivity to furosemide or medical adhesives, and hepatic cirrhosis or ascites. Although limited trials have shown the efficacy and safety of this drug in selected groups of heart failure patients, the safety and efficacy of its use in the large spectrum CHF population has still to be seen in the clinical world on a larger community scale. Parenteral diuretic therapy comes with significant side effects, especially electrolyte abnormalities, and needs closer laboratory monitoring. Another limitation will be broad drug availability. Although the manufacturer can mail the medications, the patients and or their caregivers will still need to receive education on drug administration and device application from a healthcare team, at least in the beginning, and a large number of prescribers may not be familiar with or comfortable with prescribing this formulation currently.

Conclusion

CHF is one of the principal diagnoses that results in a large number of hospitalizations and significant healthcare resource utilization every year. The mainstay of treatment for hospitalized patients with congestion from CHF is intravenous diuresis. Studies have shown that a selected patient population presenting to the emergency room with acute CHF may be discharged home with subcutaneously administered furosemide via an adhesive device. This transition can help treat CHF patients with congestion in the comfort of their homes while saving huge costs incurred from hospitalization for IV diuresis.

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Healthcare in Turmoil

Muhammad S. Khan, MD, FACP

This past week, my kids and I have been watching Prince of Egypt on repeat. This is the story about Moses, from his birth to the liberation of the Hebrews from the Pharoah. Having seen this movie as a little kid myself, sitting at home watching this movie, I could not help but marvel at how good the animation, the effects and the music are, and how impactful the story itself is. Having watched it about 10 times in the last week, I cannot help but marvel at the beauty and deep message within each scene. From the life of luxury and amenities, to the anxiety and discomfort of the realization of his belonging, the comfort of the life of self-sufficiency, the realization of his role, the fear of how to bring about change as a single person, to being ridiculed and rejected by not just his brother, the pharaoh, but also his people for increasing their suffering, yet finding resolve in his task and finding within himself to practice patience and perseverance, and the pain of seeing his own people and land suffer while he struggled against the pharaoh. This movie expertly shows shades of human suffering with each scene.

We also saw real life unfold in yet another phase of human development in its current season. Brian Thompson, CEO of United Healthcare, one of the largest publicly traded insurance companies, was gunned down in New York by a hooded individual. Over that first week, social media responses evolved dramatically. This incident grew into a social media digest about the unjust insurance practices of United Health with frequent insurance denials of necessary medical care. With these complaints, the people almost justify the actions of the shooter, but is it okay for such a justice without a trial? This brought the mental anguish of Prince of Egypt into modern day. Was he justified in pushing the enforcer off the wood scaffolding who was lashing the old man? Do the injustices caused by the actions of one justify taking the life of another, even if to bring to life the bigger issue at hand?

Next, there were reports about United Health removing the names of its leadership from the company's website and social media platforms, and tightening of security protocols and policies and controlled access of its C-suite. After such an event, is there anyone who could be blamed for increasing security? However, I do believe it is important to ask a bigger question: would this increased security serve its purpose or lead to a greater divide among the disgruntled people and the proverbial gatekeepers of access to medical care?

The scene that comes to mind is the dialogue between Moses and Ramses on Moses' return to Egypt with the simple yet most difficult question, "what do you see?" In one cut, Moses is seeing the suffering of the Hebrews, and in the next cut, Ramses is seeing the might and growth of Egypt. Ramses ends with, "You see what you see, and I see what I see." What they both failed to see, to some point, is how both actions caused ruin to the same place they both so loved. But the bigger question remains, what was more important, the continuous growth of the city that was way ahead and mightier than any the world had seen at the time? Or, should one address the plight of the people on whom this great city was being built?

What is so interesting is how the same thoughts were relevant thousands of years ago as they are now. While many may have forgotten the Socratic discussions about "Justice," its relevance is more imperative in today's world than ever before. The C-suite of health insurance companies' view of the world seems to show what they have developed, how they support the populations with access to healthcare, how their endowments continue to aid in the progress of healthcare, making America one the most advanced in healthcare in the world. At the same time, the common person sees Moses' view, being buried under the weight of upholding the current world order. They can feel the injustice when their loved ones are denied medical care and go into hundreds of thousands in debts with just an ED visit. Does this conversation not resemble that of Moses and Ramses to you?

The top executives taking shelter in their C-suites for protection may keep them safe for a short period of time. But does that create a safe environment for them? Or does it, in fact, worsen the divide between the two sides, creating further angst, contempt and distrust among the two? This, in my opinion, would worsen the severity of responses among them. The C-suite over time will further burden the common people with higher cost of insurances, creating more avenues of denials while the other side will continue to distrust and lash out at the executive branch. Who would face a severe backlash of this as the executives stay holed

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up? The direct care givers, nursing, physicians and advanced practice providers. The distrust in medical arms will continue to worsen, which, at the back end of the pandemic, is already fractured due to the politicization of medicine.

How can we fix this? Rather than creating further divide, I believe, with mutual discussions this distrust can be reversed. What is interesting is that the motive of the killer is not even fully clear. Yet a large majority of social media is mobilized towards expressions of their intake of healthcare. Fingers are being pointed in every which way. As a physician, the issue that has been brought to the limelight with the unfortunate and untimely demise of Brian Thompson sits very close to my heart. We can and should mourn the untimely loss of a human being while also looking at the factors that drove another to taking a life in middle of the day in busy street, not by accident, but with steely intent and hatred. We can and should be discussing how to resolve this fractured relationship rather than raising our ivory tower above the common men and women who are feeling the pain and loss every single day. We should look at how healthcare, instead of "healing" its people and its societies, is causing such chaos and divide among people. We should look at the role each plays in this convoluted setting, focus ourselves back on the noble and sacred profession focusing on the art of healing of the body and mind, of the person and of societies. Without deliberation, discussion and discernment this cycle of hatred, of chaos and destruction will continue. The seasons of generations of human development and destruction will continue until it will be too late unless we realize the need to halt, to review and pivot, to truly understand justice, not just as the bidding of the strong but as a balance of all faculties in the mind and within societies that we will be able to stop this cycle and reach mutual growth and benefit.

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Robert Allison, MD

AMA MEMBER SINCE: 1991
South Dakota
AMA House of Delegates

"Every locality has a different perspective on what is most important for providing excellent health care. Everyone must be represented when policy is being crafted."

Mary Carpenter, MD

AMA MEMBER SINCE: 1982
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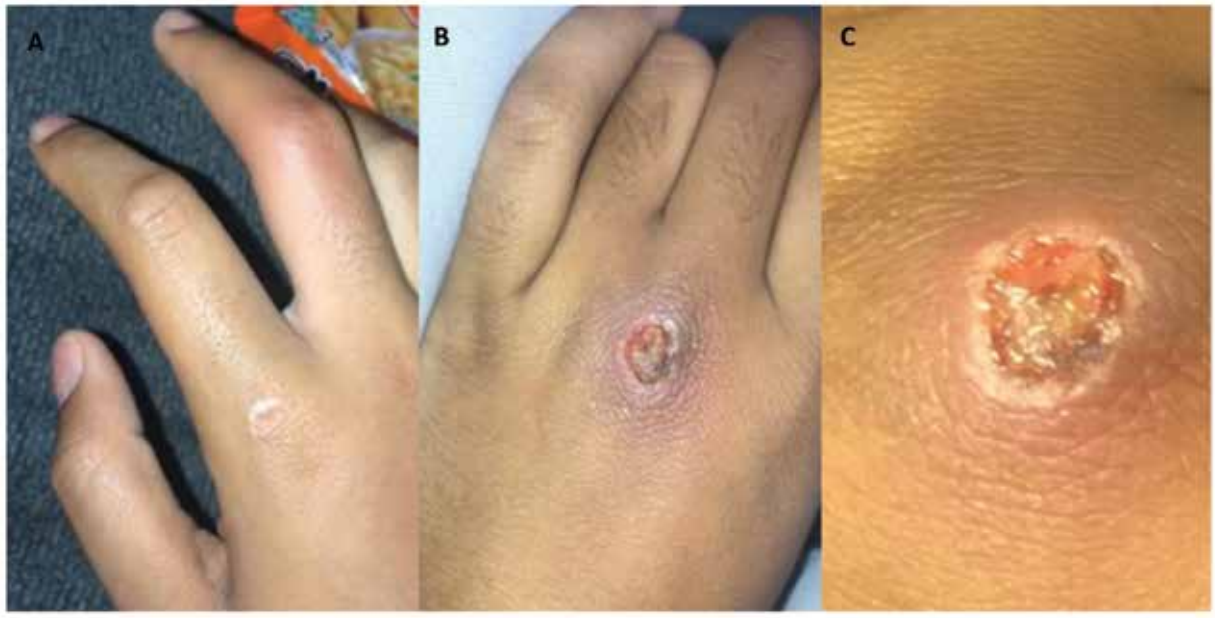
Gonococcal Arthritis-Dermatitis Syndrome

Peter Paul C. Lim, MD



A sexually active 14-year-old female presented with 1-week history of ulcers in her bilateral dorsal hand and right middle finger proximal interphalangeal joint swelling (Panel A). The skin lesions started as erythematous pustules that developed necrotic centers and eventually ulcerated. On physical examination, she has necrotic ulcerations with friable borders with surrounding erythema on the dorsal part of her hands (Panels B, C). *Chlamydia trachomatis* urine NAAT, HIV screen and syphilis screening testings were all negative. Blood culture demonstrated Gram-negative diplococci growing on chocolate agar identified as *Neiserria gonorrhoeae*. Nucleic acid amplification test was positive for *Neiserria gonorrhoeae* from her wounds and urine. A diagnosis of disseminated gonococcal infection was made.

Disseminated gonococcal infection occurs when gonococcal bacteremia leads to seeding of joints and cutaneous area.[1,2] The rash usually starts as vesico-pustular or petechial eruptions that develop into hemorrhagic lesions and ulcerations.[2] Joint involvement is usually polyarthritic and asymmetric.[2] The patient was treated with cefriaxone for 10 days which resulted to rapid improvement of her lesions. Contact tracing was done which prompted her most recent sexual partner to also be tested and empirically treated for gonorrhea. Both of them unfortunately were lost to follow up. Contact tracing is an integral public health component of sexually transmitted infection management to ensure further spread of infection and possible reinfection of index patient through re-exposure of untreated sexual partners is obviated.[3]

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Member News

Visit www.sdsma.org for the latest news and information.

SDSMA CEO Barb Smith Announces Upcoming Retirement

On behalf of the SDSMA Board of Directors, I announce the retirement of our Chief Executive Officer, Barbara Smith, which will be effective November 1, 2025. This marks the culmination of a remarkable 25-year career with the SDSMA.

Barb began work at the SDSMA in 2000 as Vice President, a position where she managed the association's policy and advocacy efforts. In that position Barb forged strong relationships with legislators, policymakers and key stakeholders at both the state and federal levels, solidifying the SDSMA's position as a powerful voice for physicians.

Barb became CEO in January 2007. Under her leadership, the SDSMA was instrumental on important initiatives in South Dakota including the passage of the state's indoor smoking ban, Medicaid expansion, and the successful defeat of numerous legislative attempts that sought to inappropriately expand scope of practice in South Dakota.

At the federal level, Barb has been a decades-long strong voice for Medicare physician payment reform, which led to the SDSMA's work toward the successful repeal of Medicare's flawed sustainable growth rate in 2015. She has continued to work with the American Medical Association to drive meaningful payment reform, advocating to stop harmful cuts and provide physicians an update that takes into account the cost of delivering care to patients. Such changes are needed to protect patients' access to care in a health system already facing widespread physician shortages.

The 2015 sale of Dakotacare, the insurance company founded by SDSMA physicians in 1985, and subsequent separation of Dakotacare from the association, brought a major shift and challenges for the SDSMA. Barb's leadership and dedication during this critical period was invaluable and decisive action in carrying out the Board's directives during this time, including the complete repayment of the SDSMA's building loan, provided stability and continuity amidst the transition period.

During the COVID-19 pandemic, Barb's leadership helped ensure the association remained a trusted source of information and support for both physicians and patients, helping them navigate that unprecedented time.

Prior to her work at the SDSMA, Barb was Vice President of Dakotacare from 1995-2000. Before joining Dakotacare, Barb served as South Dakota Secretary of Health, where she led efforts to improve the availability and affordability of health care in South Dakota. Prior to serving as Secretary, she was Senior Policy Advisor to South Dakota Governor George S. Mickelson.

Barb has always brought a patients-first perspective that has informed and enhanced what the SDSMA does on behalf of patients and physicians.

A testament to her leadership is her ability to retain a dedicated staff with very little turnover during her years as CEO. I rest easy knowing that the long-term staff at SDSMA share Barb's drive to advance our mission. A search for Barb's successor is underway. Please join me in thanking Barb for her leadership at our association, and do take the time to congratulate her on her achievements and upcoming retirement.

Jen Tinguely, MD, MPH
SDSMA President

SAVE THE DATE

2025 SDSMA Annual Leadership Conference is May 30

The 2025 SDSMA Annual Leadership Conference is Friday, May 30 at the Hilton Garden Inn Downtown Sioux Falls.

The theme of this year's conference is artificial intelligence. With presentations, discussions, networking opportunities and the awards banquet, the Annual Leadership Conference is a great time to share ideas and learn from fellow members.

Do you have a policy issue you'd like to bring to the SDSMA's attention? Schedule a time to address the SDSMA Policy Council during theMembership Open Forum. Watch sdsma.org for policy submission information to be posted soon.

The Annual Leadership Conference is a benefit of your membership – there is no registration fee for members. Tickets are required for some events and meals, and will be available for purchase at sdsma.org.

Thank you, Doctors of the Day!

The SDSMA Doctor of the Day program is responsible for providing a service to legislators and their assistants and attending to any medical emergency situations that may occur at the Capitol in Pierre during the legislative session. The Doctor of the Day program not only provides needed medical services for our legislators, but it also provides for a positive image of physicians and organized medicine.

A special thank you to the following members for volunteering their services during the 2025 legislative session:

- Benjamin Aaker, MD
- Rob Allison, MD
- Jerome Bentz, MD
- Theresa Bormann, MD
- Scott Boyens, MD
- Lisa Brown, MD
- Michelle Brosnan, MD
- Noel Chicoine, MD
- Collin Dague, DO
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- Natalie Tymkowych, MD
- Victoria Walker, MD
- Titus Weller, MD
- Jenna Wickersham, DO
- David Zeigler, MD

Don't Let Your SDSMA Benefits Expire – Renew Today!

Thank you for your membership in the SDSMA. Association renewal is annual and runs on the calendar year from January-December. If you haven't yet, please visit the link that was sent to your email to renew. There is still time!

We look forward to another great year of providing physicians with valuable benefits. SDSMA membership gives you access to networking and leadership opportunities with your local colleagues in your District Medical Society, a monthly subscription to South Dakota Medicine, your name and practice information in the physician directory, and advocacy on behalf of patients and the medical profession.

When you renew, you can choose to renew your AMA dues and sponsor a student's SDSMA membership dues for four years of medical school with one, easy transaction.

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- **Well-Being.** Navigate the stressors of today's ever-changing health-care landscape and prioritize wellness with the South Dakota Physician Well-Being Program.

Thank you to those who have already renewed. If you haven't yet, please complete your renewal at sdsma.org today!

Have you recently retired? Please let us know by contacting the SDSMA office at membership@sdsma.org or 605-336-1965.

Please note: if you are a life member, your membership is continuous. You do not need to take any steps to renew.

For Your Benefit:

Your SDSMA Membership Services & Programs

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

- Member advocacy and physician representation;
- Legislative;
- Legal;
- Regulatory;
- Annual meeting;
- Leadership development; and
- Personal and professional education

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

The SDSMA works hard to ensure that you have the programs and services you want and need, as well as marketing the association to potential new members. We want to hear from you if you have questions, concerns or ideas on how we can serve you better, or if you know of a potential new member. It's your association and we'll work with you to make it the best it can be.

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

Member News

Legal Brief Highlight: Blood Transfusions

Hospitals and ambulatory surgical centers are required to provide services related to blood transfusion in order to safely meet the medical needs of their patients. Blood collection, storage and transfusion must be handled appropriately and in conformity with established policies and procedures as required by law. A patient's designation of a specific blood donor must be honored, but only if the designated donor is available and the blood can be tested and transfused within the time safely available. If it isn't possible to obtain blood from the designated person or persons within the time available, the health care provider that provides or facilitates a donation from another donor is not liable to the patient for transfusing the blood of another.

For more information, download the SDSMA legal brief at sdsma.org. The SDSMA provides legal briefs for member physicians on a variety of rules and regulations that apply to the medical profession. For nonmembers, legal briefs are available for purchase.

2025 Annual Leadership Conference – Sponsorship & Advertising Opportunities!

Sponsoring or advertising during the SDSMA Annual Leadership Conference shows your support for the association's physicians, residents and medical students, helping the association defray costs incurred to bring educational sessions and activities throughout the day for physicians and medical students. In addition, the evening banquet is a time when the leadership and achievements of outstanding physicians are celebrated and recognized, and medical student scholarships are awarded by the SDSMA Foundation. To sponsor or advertise, please sign up at sdsma.org.

If you have any questions or would like additional information about the meeting, please contact the SDSMA office at 605-336-1965 or ereiss@sdsma.org.

South Dakota Medicine, the monthly peer-reviewed medical journal published by the South Dakota State Medical Association, is read by physicians, residents, medical students, hospital and clinic administrators, and other health care leaders. SDSMA members receive the journal through a mailed subscription as a member benefit and have access to full issues at sdsma.org.

With a 100-year history as the state's leading provider of medical information, *South Dakota Medicine*'s original research, educational articles and association news combine to offer you a comprehensive information support system that can help with the decisions you make every day. Additionally, the journal is indexed in PubMed and has unmatched reach and unsurpassed readership within its field, making it unique in meeting the needs of all physicians in state – from retired doctors and primary care physicians to specialists, medical students and residents. Articles published by students and residents in a PubMed-indexed journal strengthen residency and fellowship applications.

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South Dakota Medicine brings important medical information to South Dakota's physicians, and advertising in the journal generates revenue that helps support the SDSMA's ability to publish this high-quality, peer-reviewed journal. Help support *South Dakota Medicine* by advertising your practice while gaining excellent exposure – find more information at www.sdsma.org.

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

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