Missouri Medicine

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Join-Renew-Recruit

2022 Missouri Legislative Preview

The Jab or My Job? COVID Vaxx Mandates

Recognizing Decline in Physician Wellbeing

Dirge for Academic Medicine

Post Traumatic Stress Disorder Review

1 FIRST LITERATURE REPORT ***Staphylococcus lugdunenis*** **as Cause of Septic Pericarditis**

Missouri State Medical Association Alliance

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We bring you tidings of good cheer & wish you a happy, healthy & peaceful New Year.

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The Journal of the Missouri State Medical Association - Since 1904

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Missouri State Medical Association

Unite Our Profession

The Most Effective Advocate for Physicians & Patients *Join-Renew-Recruit!*

by John C. Hagan III, MD

Any objective assessment of all the U.S. state medical associations would find the Missouri State Medical Association (MSMA) in the top three for effectiveness and number one for value. MSMA dues are among the absolute lowest in the nation. In further enhancing MSMA membership, our leadership has waived dues for physicians-in-training and further reduced dues for physicians entering practice.

MSMA's advocacy for physicians is unparalleled. MSMA's many legislative wins on the part of physicians and patients have been outlined in detail in the weekly *Legislative Report*, our monthly *Progress Notes,* and in the pages of *Missouri Medicine*, MSMA's nationally acclaimed peer-reviewed medical journal.

Among MSMA's most recent legislative victories are the newly authorized statewide prescription drug monitoring program and the long overdue Mental Health Parity law requiring insurance providers to cover mental health conditions in the same manner as physical health conditions. MSMA has succeeded in COVID liability relief to physicians and healthcare facilities. MSMA benefits you whether you are in academia, in private practice, or work for a hospital, a healthcare system, or state or federal agency.

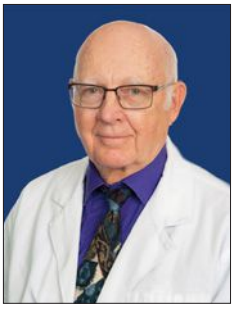
MSMA members, please renew your membership and be sure your profile on the new MSMA website (www.msma.org) has your proper information including your preferred email address. Then please enthusiastically work with your MSMA in the quest to enroll as many Missouri physicians and physicians-in-training as possible in 2022.

Non-MSMA members, we invite you to join us in our advocacy for physicians and patients that began in 1850. MSMA officers and leadership, I ask each of you to make growing MSMA a personal priority. Work with MSMA Executive Vice President Jeff Howell (jhowell@msma.org) and membership staff Cassie Williams (cwilliams@msma.org) to recruit non-member physicians in your community and hospital staff. Nothing works as well as physician-to-physician contact.

No Missouri medical organization has full-time, highly-skilled, and experienced lobbyists as does MSMA that work full-time exclusively on Show-Me State medical/physician legislation. Every Missouri physician subspeciality organization benefits from MSMA's stalwart efforts to restrain non-physician practitioners' scope of practice regulations that increasingly intrude into the practice of medicine and surgery. All these organizations, for example in ophthalmology, the Missouri Society of Eye Physicians & Surgeons (MOSEPS), should encourage their members and especially their officers to belong to MSMA.

MSMA members, take action now, renew your 2022 dues on line or over the phone (800-869-6762). Non-members contact MSMA or go to the newly revamped website www.msma.org, request an invoice, and join MSMA. MSMA membership is one investment that always grows in value and pays unceasing dividends.

Individually we are weak; collectively working through MSMA we can shape the many challenges facing medicine in a salubrious way for our patients and ourselves. **MM**



John C. Hagan, III, MD, FACS, FAAO, is a Kansas City, Missouri, ophthalmologist and *Missouri Medicine* Editor since 2000. He is a multi-year Diamond Contributor to MMPAC.

Join MSMA for our 2022 in-person White Coat Day on Tuesday, March 1!



Looking Back in 2021 - A Year of Change

by Jeff Howell, JD, MSMA EVP



This was a year of change at MSMA headquarters.

This past summer, the roof needed repairs on our 150-year-old building. Workers removed up to six layers of shingles in some places, including a section of the original cedar shake roof. They didn't just replace shingles; the decking was replaced entirely.

In November, the building's original plumbing in the basement needed to be replaced. The old cast iron pipes had collapsed under the foundation. Replacement involved a concrete saw, a jackhammer, and a number of burly gentlemen. Due to this disruption, we are planning a moderate remodel of the lower level of the building.

The building isn't the only thing that needed change.

In March, MSMA planned and hosted a successful virtual Annual Convention. Registrations were up and participation was strong considering this was our first virtual effort. We are planning to meet in-person in 2022, but it's good to have this experience in case we need to quickly pivot to a virtual event next spring.

In May, after almost 20 years of trying, MSMA helped secure legislation to establish a statewide prescription drug monitoring program.

In August, we launched a new website. The MSMA website now has a members-only section, which protects access to our intellectual property and assists with recruitment. It allows members to register for events and engage MSMA in new ways. The new member database allows for seamless renewals by offering recurring payment options. MSMA (and MMPAC) now accepts payments through PayPal and Venmo, as well.

It is important that MSMA continue to innovate as a professional association. The needs of physicians have changed significantly and MSMA must change to meet those needs.

Staff will be working in 2022 to identify member-driven benefits such as more leadership and professional growth opportunities, increasing outreach into local communities, and providing a place for individual physicians to be heard. MSMA's political advocacy in Jefferson City will remain our most valuable benefit, but we must be willing to evolve in order to attract new members.

As the lobbyists prepare for the upcoming legislative session, you can help recruit members. Start a conversation with a colleague and share what MSMA does for physicians. Direct them to the new website, where it is easy for non-members to join.

As always, please feel free to contact me at jhowell@msma.org with your comments and suggestions on how MSMA can innovate and better position itself heading into the new year. **MM**

MSMA: Defined By Its Actions and Purpose

by Alexander R. Hover, MD

After the medical care we give our patients, the next most important medical care we give is to our communities and our state.

I generally avoid dramatic words like "existential," but that word does apply to our need to increase MSMA membership. MSMA is only effective to the extent it represents Missouri physicians on the critical issues of public health, patient safety, reducing burdensome administrative practice requirements, and putting physicians back in control of what patients want and need from their doctor. MSMA members who pay dues, work locally on behalf of their community, and help with our advocacy make MSMA successful. So, I start this message with a heartfelt thanks to all our current members.

We do have an existential problem, but I am confident that we can turn it around. We ended 2021 with 1,882 active members and 294 honorary members. In the past few years, we increased total membership by the inclusion of many new student and resident members—which is great. We need young physicians bringing their energy and ideas. More importantly, MSMA needs to represent the future generations of physicians who will be practicing medicine long after some of us have gone to our reward (hopefully).

However, active membership declined about 6% per year from 2017 through 2020 and fell 10% in 2021 over 2020. I think that part of the loss of membership relates to increasing physician employment rather than private practice.



Alexander R. Hover, Jr., MD, FACP, AGAF, is President of the Missouri State Medical Association for 2021-2022. He is a Gastroenterologist from Ozark, Missouri.

Perhaps, some membership loss in 2020-2021 has been reductions in personal recruitment for physician groups. Perhaps we are not reaching nonmembers to help them understand the important issues that MSMA is advocating on their behalf. We can certainly address some of these issues.

The budget deficit from loss of membership dues has reached about $300,000 per year. While we can currently manage that from reserves, deficit spending is not sustainable over the long run. More importantly, we must have better representation of Missouri physicians as a validation of our advocacy and representation for physicians. Whether it is the mass of white coats each March in the Capitol, messaging legislators through our Phone2Action program, doctors online each Friday in the "Lunch with Legislators" program, all of these do influence lawmaking and regulatory change. Because this *Missouri Medicine* issue is focused on adovcacy and membership, please bear with me while I repeat a portion what I felt was an important part of my presidential address.

Someone who is not familiar with MSMA might think we are a professional organization focused only on hiring political lobbyists to promote physician specific issues. Who we are, however, is defined by our actions and our purpose. Rather than just lobbying, I believe, that as a whole MSMA actions constitute advocacy in the best sense of the word. I do think who we are exemplifies our mission statement, to whit: *The mission of the MSMA is to serve its members through promotion of the science and art of medicine, protection of the health of the public and betterment of the medical profession in Missouri.*

Protection of public health is certainly at the core of who we are and what we do as MSMA. Whether it is our work to reduce tobacco-related

disease, helping pandemic control, or advocating for safety requirements for children in automobiles, MSMA is a strong advocate for public health. Physicians' daily work involves ever increasing amounts of time-consuming and expensive administrative burden. That serves health payers … but not the needs of patients. MSMA is committed to fighting unnecessary regulatory and health payer requirements that continually reduce the time physicians have for patients. Our fight to mitigate the patient care harm of required step therapy, prior authorization, revolving formularies, and surprise billing are among just a few of the battles we fight as part of organized medicine.

Each of us on MSMA's leadership Council challenged ourselves to bring at least five new members this year. It will not happen without personal contact and ability to speak to the value that MSMA brings its members in the community at large. I applaud our county and component societies who are beginning to schedule appropriately safe social opportunities, and participate in the MSMA Council's letter-writing campaign. Hopefully, we all can create that social opportunity and have our "elevator speech" ready to go.

In past few years, MSMA successfully reduced onerous prior authorization requirements, mitigated surprise billing for patients, helped pass mental health parity along with PDMP, and defended legislative limits for malpractice non- economic damage caps among other actions on physicians' behalf.

Principal issues in 2022 include the possibility that MSMA will need to counter attempts to reduce currently approved childhood immunization requirements. Good bills we need to pass in 2022 include "truth in advertising" to control how non-physicians title themselves, prohibiting insurers from down coding submitted bills, and address scope of practice by non-physicians. Every year we must educate legislators on the value of collaborative practice and harm of APRN independent practice.

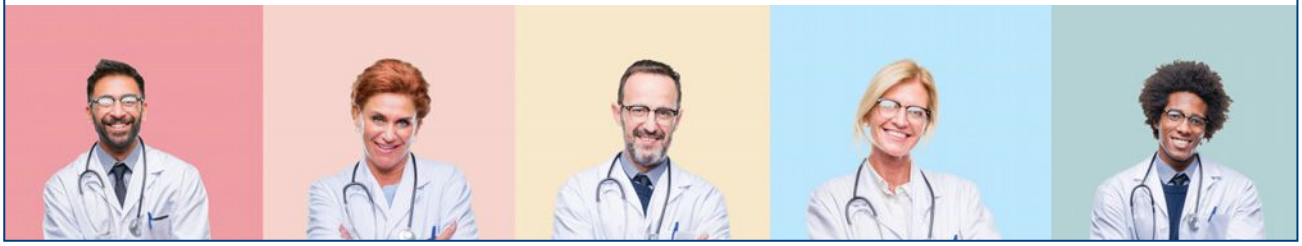
After the medical care we give our patients, the next most important medical care we give is to our communities and our state. That depends on all of us building the strength of MSMA. So, follow our weekly advocacy and legislative reports, use the stories to recruit other physicians who do not yet understand this important work, and learn to disseminate our phone to action advocacy to non-members. Thank you for your support. **MM**

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MSMA Legislative Preview 2022

by Heidi Geisbuhler Sutherland

Missouri's 101st General Assembly will convene on Wednesday, January 5, 2022, to begin its second session of legislative work. The Capitol will be humming with activity until adjournment on May 13, 2022. In between those dates, your MSMA lobbyists will be tirelessly advocating for physicians and heading off attempts to interfere with your profession. Following is a list of some of the issues we expect to see during the first few months of 2022.



Vaccines

Storm clouds have been brewing on the horizon for several years, and the legislative battle over childhood immunization requirements has finally arrived at our doorstep. Last year, an amendment that would have removed immunization requirements for private schools and daycares and added a "conscientious belief" exemption to our immunization laws was defeated by a fairly narrow margin in the House. We expect to see this harmful legislation again next year.

A dispute over the COVID vaccine runs parallel to the childhood immunization fight. We expect legislation to be proposed in 2022 that would prohibit employers from requiring their employees to receive the COVID vaccine. While we're busy standing up for our childhood immunization requirements, we expect that the business community will engage in the debate over COVID vaccine requirements.

We'll have to devote considerable time and effort to ensure that angst over COVID vaccine mandates doesn't spill over to childhood immunizations. Several bills in 2021 that sought to prohibit COVID vaccine mandates would have inadvertently nullified our childhood vaccine requirements as well. We'll have to keep a sharp eye out for a similar situation next year. After nearly two years of the COVID pandemic, the last thing we need is a measles outbreak because the legislature weakened our childhood immunization laws.

Texas

A Texas abortion law passed earlier in the year sparked quite a bit of interest in legislatures around the country. A handful of Missouri legislators have announced their plans to file similar legislation. While MSMA generally does not weigh in on politically fraught issues like abortion, we may need to wade into this particular conversation.

A provision in the Texas law allows any random citizen to bring a suit against anyone involved in



Heidi Geisbuhler Sutherland is MSMA's Director of Government Relations.

If you have any legislative questions or concerns, please reach out to Heidi Geisbuhler Sutherland at heidi@msma.org or Shantel Dooling at shantel@msma.org.

providing abortion services. That means anyone from a cab driver who takes the patient to the hospital to the physician who performs the procedure could be at risk of a lawsuit. Any law that allows a physician to be sued for providing health care to their patients is dangerous to patients and to the practice of medicine.

Prior Authorization

Despite the great legislative gains we made toward prior authorization reform in 2019, the general consensus among our members is that prior authorization continues to be a burdensome process for you and your office staff. An MSMA-backed prior authorization bill will be sponsored in 2022 that's similar to a Texas law passed earlier this year. That bill streamlines the prior authorization process by creating exemptions for physicians with a proven track record. Under the new law, Texas doctors with a 90% approval rate or higher for a particular service are exempted from prior authorization requirements for that service. A Missouri-specific bill has been drafted.

Scope of Practice

Another year, another slew of scope battles from non-physician health care practitioners who seek to provide services outside their training. We'll see many familiar bills, like legislation that seeks to chip away at our current collaborative practice requirements. As we saw last session, everyone from pharmacists to dental students wants to be able to administer vaccines. We'll also see legislation that would allow nurses and physician assistants to order home health care services without the approval of a physician. We may get a break from our annual clash with physical therapists over direct access, as a PT-related court case is currently pending. In addition to these scope bills, we're sure to see a few more come out of the woodwork.

Marijuana

Since legislation that would allow recreational marijuana use in Missouri has traditionally seen little support in the state legislature, an initiative petition has been submitted that would change the current Missouri law via constitutional amendment. This amendment, if the initiative petition gathers enough signatures, would be found on the 2022 ballot. Despite the long odds, we expect to see at least a few bills that seek to make recreational marijuana legal in the state.

Redistricting

While it might not affect the practice of medicine directly, the legislative redistricting process merits a mention in our legislative preview. We expect the legislature to be tied up with congressional redistricting discussions for several weeks at the beginning of session. The longer redistricting takes, the more legislation will pile up. We're hoping for a quick resolution to the redistricting process so we can get back to regular legislative business by the beginning of February.

Grab Bag

Every year, we testify on a litany of bills that aren't quite flashy enough to make the papers but still have a big impact on the world of public health. We expect to testify in favor of bills that would update Missouri's car seat requirements, ban texting while driving, authorize a safe needle exchange program, institute a statewide under-21 ban for tobacco products, and make bleeding control kits more accessible, to name just a few. We'll also weigh in on plenty of out-of-left-field bills like last session's legislation that would have required pathologists to return biological samples if requested by the patient. **MM**



GET INVOLVED: msma.org/advocacy

In 2022, the Physician of the Day program, MSMA's White Coat Day, and our weekly online Friday "Lunch with Legislators" series will all be back! Save the date for an in-person White Coat Day on Tuesday, March 1!

Volunteer for the MSMA Physician of the Day Program where physicians from around the state volunteer to serve as the on-call physician for the House and Senate for the day. Information, available dates, and registration at **www.msma.org/POD**.

MSMA members are invited to hear your MSMA advocacy team present a legislative preview via Zoom on Sunday, January 2, at 7:00 pm. Register at **www.msma.org/events.**

Report of the American Medical Association Interim (Virtual) Meeting

by Charles W. Van Way, III, MD & the Missouri AMA Delegation

The 2021 Interim Meeting of the AMA House of Delegates (HOD) was planned for Orlando, at Disney World. But thanks to COVID, all the delegates sat in front of computers for four days, November 12-16. And yes, that is just as boring as it sounds. This is the fourth virtual meeting of the AMA. None of them have been very good. The AMA uses two different online platforms (Zoom and Lumi, if you're interested). Last year's Interim meeting was the first with the new system. We said then: "Nobody wants to do it again." Yet, here we were. Everyone can speak, with some difficulty, so we can have reference committees, general sessions, and brisk debate. It turns out that the online platform works well enough, but we lose the personal interaction which really makes the AMA work.

Possibly because of the virtual format, the HOD sessions were somewhat less well-attended than previous Interim Meetings, drawing two-thirds of delegates (actually, 55% to 70%). As usual, the Interim Meeting was focused on urgent matters, particularly those dealing with legislation. Only some of the resolutions offered were considered at the meeting. The Resolutions Committee has been responsible for screening. There was debate over whether this process should be made permanent, and the question was referred to the Board of Trustees (BOT).



Charles W. Van Way, III, MD, FACS, FCCP, FCCM, Missouri/AMA Delegate, and *Missouri Medicine* Contributing Editor, is Emeritus Professor of Surgery, University of Missouri - Kansas City.

Gerry Harmon, MD, AMA president, addressed the meeting. He spoke a lot about the pandemic, which has killed more than 750,000 Americans. And the vaccination campaign, which has fallen short of our hopes. He compared the AMA to an army, against COVID, against injustice, and against "unresponsive bureaucracy." Dr. Harmon is a retired Major General (Air Force), so his military metaphor seems natural. He emphasized that the AMA promotes equity and racial justice both within the AMA and in the health care system. Systemic racism, he said, continues to harm "individuals and communities." More broadly, he highlighted three key battles for the coming year. First, Medicare payment reform, with prevention of payment cuts of 10% in 2023. Second, prior authorization reform. And third, promoting health equity to create a health care system which works for all patients.

James Madara, MD, Executive Vice President, spoke about trust. Trust in America's institutions has been challenged over the past two years, but trust in physicians remains strong. As well, the AMA remains one of the most trusted national institutions. Shifting the meaning, he described the AMA as a public trust. We serve the public by supporting physicians, and through them the health care system and to society in general. He cited several AMA efforts, such as promotion of clinical ethics, advocacy for health equity, and innovations through Health2047, an arm of the AMA. AMA strategy continues to be based on equity, advocacy, and innovation. Dr. Madara noted: "The AMA is committed to creating a health system that's accessible, efficient, and equitable. To get there we need an environment that supports physicians … one that allows doctors to be doctors rather than scribes and box checkers."

Indeed, health equity was a major theme of the meeting. A number of reports and resolutions focused on the issue of health equity. A separate program on health equity was held for the delegates and alternates on November 14. Speakers generally deplored inequities in the health care system. But just how to make things better remains unclear. There are 29 million still uninsured in the U.S. AMA trustee David Aizuss noted that we can afford to eliminate this "coverage gap," and that the AMA will continue to work for universal health care.

There was a major effort to address inequities in maternal health care. A joint report from the Councils on Medical Service (CMS) and Science and Public Health focused on eliminating inequities in maternal health. Resolution #701 advocated that all patients receive care for 12 months post-partum. The AMA will advocate for 12 months of pregnancy-related health care costs for all individuals, regardless of legal status, to be paid through Medicaid and CHIP programs. Further, pregnancy should be considered a qualifying event for getting insurance coverage. If enacted by Congress, this would be a major expansion of government-based health insurance. CMS report #4 advocated better financing of home and community-based health services. And CMS report #2 called for better information availability on lower cost prescription options.

Educating and maintaining the physician work force is a primary concern of the AMA. The Council of Medical Education (CME) report #1 dealt with principles of assessing competency in late career physicians. There was considerable concern that any physician should be entitled to due process protections in competency assessment. CME report #2 advocated the removal of barriers to medical education by individuals with disabilities. CME report #3 dealt with the chronic problem of rural physician work force disparities. The AMA will recommend that rural program tracks be added to existing training programs, among other initiatives. Discussion introduced the concept of "structural urbanism," said to be a systemic bias against rural areas in federal payment and other policies. CME report #4 assessed the influence of medical school debt on career choice. Perhaps surprisingly, the report concluded that there was relatively little influence, but acknowledged that excessive debt continues to haunt medical trainees. Studies will continue and the AMA will continue to support increased participation in the Public Service Loan Forgiveness Program.

Resolutions from the Medical Student Section included support for Puerto Rican medical schools and graduates (resolution #309) and support for students during the phase-out of 3-digit scoring of the USMLE Step 1 (resolution #301). Resolution #309 called for protecting access of medical students and residents to abortion education and training, making modifications to the current policy which supports such training.

There was a move to establish an employed physician section in the AMA to deal with the particular problems of physicians as salaried workers (resolution #615). While the idea of a separate section was not accepted, it was clear that the Board of Trustees (BOT) should address problems in the employed sector. As the dominance of hospital systems becomes greater, corporate governance is replacing hospital board and medical staff governance. BOT Opinion 11.2.1 lays out principles for physician responsibility in large systems. In fact, employed physicians have now become the majority, and their concerns are the concerns of the AMA.

The HOD considered a number of current political issues. BOT report #2 advocated police reforms, and that they should be evidence-based. The report generally took a moderate approach. A number of the delegates disagreed with moderation. There was acrimonious debate over qualified immunity, which protects police officers from civil suits. Some feel it should be abolished entirely. In the end, the AMA position remains that there is little evidence that abolishing qualified immunity would improve public safety. The HOD adopted guidelines for voting in national, state, and local elections, on the grounds that voting is a health issue in a time of communicable diseases (resolution #18). Oddly, this resolution mentioned no pandemic-specific measures, and was solely concerned with access to voting. More connected to medical issues, the AMA should advocate Medicare negotiation on drug prices, something which is currently in Congress.

In the COVID pandemic, public health has become a political issue. The HOD adopted policy strengthening public health infrastructure, and

opposing placing limits on public health authorities. Somewhat related to this were resolutions #411 and #412 to promote the dissemination of misinformation. A related resolution (#207) called for limiting the authority of non-physician practitioners to provide medical exemptions to vaccination. There was general agreement by speakers that physicians should be more active in speaking out on public health issues, especially including vaccinations, and on "helping science get heard."

Much less controversial was a resolution (#506) to strengthen standards to protect workers from heat injuries. Originally formulated to protect outdoor workers, this was expanded by the HOD to apply to all workers. Federal standards in this area are vague, and the AMA will now work to promote more precise standards to protect workers.

Council on Science and Public Health report #3 dealt with the effects of traumatic brain injury on driving. Research should be encouraged on just how far a patient needs to recover before he or she should be able to resume driving a car, which may be required for the patient to return to gainful employment. It was noted that many of the same considerations apply to firearm use, although of course this is only occasionally related to continued employment.

Of particular interest to dermatologists was a resolution (#505) to improve the teaching of dermatology by advocating including pictures of patients with a wide variety of skin tones. With our patient populations becoming steadily more diverse in skin color, this would both promote health equity and improve the diagnosis of skin lesions.

From the Council on Ethical and Judicial Affairs (CEJA) report #1 dealt with the issue of short-term medical service trips. While these are increasingly being carried out, there is concern that they may fail to benefit the host countries. Scarce resources may be diverted to support such trips. Some even term such trips as a form of "medical colonialism," a description which is certainly derogatory, but can be a bit hard to follow. Yet, these trips may result in better host country education, and can provide benefits to the host county medical systems. The report was sent back to CEJA for reconsideration, reflecting the many difficult issues involved.

Several physicians from Missouri serve in leadership roles. David Barbe, MD, represents the AMA on the world stage as Immediate Past President of the World Medical Association. Edmond Cabbabe, MD, serves as vice chair of the Council for Long Range Planning and Development. Elie Azrak, MD, serves on the board of AMPAC, the AMA Political Action Committee. Jerry Kennett, MD, is on the AMA Foundation board. Marc Mendelsohn, MD, is on the board of the Young Physicians Section. Gary Gaddis, MD, is Immediate Past Chair of the Academic Physicians Section. Sue Ann Greco is the Immediate Past President of the AMA Alliance. Charles Van Way III, MD, is on the steering committee of OSMAP, the Organization of State Medical Association Presidents.

Your AMA delegation would very much like to hear from AMA members throughout Missouri about all of the issues discussed at the meeting. For further information, the business of the meeting is available on the AMA website. Highlights are at: https://www.ama-assn.org/house-delegates/special-meeting/highlights-november-2021-ama-special-meeting. All of the reports and details are at: https://www.ama-assn.org/house-delegates/special-meeting/business-november-2021-special-meeting-ama-house-delegates.

The Annual Meeting of the HOD is scheduled to take place in Chicago, June 12-16, 2022. We all hope that it will take place as planned, and in person. Meanwhile, the AMA continues to advocate for physicians and their patients at the national level. **MM**

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If you would like to receive text alerts on urgent legislative developments, don't forget to sign up for the Phone2Action program. Members who have opted in to this program receive a text alert from the MSMA advocacy team when we need our members to contact their legislators quickly on an amendment or a bill. In 2020, we used the program to shore up support for a vote on the prescription drug monitoring program. If you're interested in signing up for the alerts, open your text messaging app, enter 52886 in the recipient line, enter "MOMEDICAL" in the text box, and press send. A message will then be sent to you that allows you to opt in to the program.

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The Jab or my Job? COVID-19 Vaccine Mandates in Healthcare

by Zaina A. Niles, JD



Source: The Texan

As of November 8, 2021, approximately 224 million people in America—67.5% of the total U.S. population—were fully vaccinated against COVID-19.[1] On the same date, COVID-19 cases totaled 46,405,253, and U.S. deaths exceeded 752,000.[2] As the number of cases, hospitalizations, and deaths continue to rise, so do the number of hospitals, health systems, and other healthcare institutions across the country mandating vaccination for employees.[3] Recent developments at both the state and national levels are impacting who must be vaccinated and by when.

This article examines the COVID-19 vaccine mandate that kick-started the industry trend, the novel employment litigation that resulted, and where Missouri healthcare workers and institutions stand with regard to the ongoing vaccine mandate debate.



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Houston Methodist

In April of 2021, Houston Methodist, a seven-hospital system (System), became the nation's first hospital system to require all employees to get vaccinated against COVID-19.[4] Shortly thereafter, the System expanded the requirement to mandate vaccination for all employees *and* all medical staff with clinical privileges at any of the seven locations, including physicians, nurse practitioners, physician's assistants, and others.[5] Under the mandate, all 26,000

employees and medical staff were required to submit proof of full vaccination on or before June 7, 2021 or, alternatively, submit all required documentation for a medical or religious exemption by May 3, 2021.[6] The requirement sparked protest among some members of the System's staff and others in the communities where the System operates. To voice their objections to the requirement, many stood outside Houston Methodist locations talking with the media and holding picket signs with phrases such as "vaccinate or terminate" and "the jab or my job."

On June 7, pursuant to the System's vaccination policy, 178 Houston Methodist employees received two-week suspensions, without pay, for non-compliance. Twenty-five of those employees obtained vaccinations during the suspension period, thereby meeting the requirement. Therefore, those 25 employees were permitted to return to work. The remaining 153 suspended employees were ultimately terminated or voluntarily resigned in opposition to the requirement.[7] Of those, 117 employees, led by Registered Nurse Jennifer Bridges, brought suit against the System in late May.[8] The suit alleges that, because the currently available COVID-19 vaccinations are "experimental" and "dangerous," Houston Methodist's vaccine policy is violative of public policy and federal law. The plaintiffs further claim that firing employees for refusing vaccination constitutes wrongful termination.

Approximately two weeks after the case was filed, Judge Lynn N. Hughes of the U.S. District Court for the Southern District of Texas granted the System's motion to dismiss, upholding Houston Methodist's vaccination policy. The opinion wholly rejected the plaintiffs' claims, stating that "Texas law only protects employees from being terminated for refusing to commit an act carrying criminal penalties to the worker," and that "[r]eceiving a COVID-19 vaccination is not an illegal act, and it carries no criminal penalties." In addition, the opinion cited recent Equal Employment Opportunity Commission guidance stating that employers can require employees to be vaccinated against COVID-19, provided there are reasonable accommodations for those with disabilities, legitimate medical conditions, or sincerely held religious beliefs precluding vaccination.[9]

The opinion concluded by noting that not only did the plaintiffs' claims fail as a matter of law, but that the plaintiffs had also not sufficiently demonstrated that they had been coerced. In the words of Judge Hughes:

"Bridges says that she is being forced to be injected with a vaccine or be fired. This is not coercion. . . . Bridges can freely choose to accept or refuse a COVID-19 vaccine; however, if she refuses, she will simply need to work somewhere else. If a worker refuses an assignment, changed office, earlier start time, or other directive, he may be properly fired. Every employment includes limits on the worker's behavior in exchange for his remuneration."

The plaintiffs are currently appealing to the U.S. Court of Appeals for the Fifth Circuit.[10] On August 16, 2021, however, 62 former Houston Methodist employees brought *another* lawsuit against the System, this time formally alleging wrongful termination.[11] In response, System officials have called the suit "frivolous" and noted, "Since we issued that mandate, more than 1,500 hospitals throughout the country have mandated the COVID-19 vaccine for employees. In fact, only Houston Methodist and one other hospital system in the U.S. are fully vaccinated during the Delta surge that is filling our hospital beds."[12]

Indeed, the System's vaccine mandate, as well as its success in the initial lawsuit, has prompted other healthcare institutions across the U.S. to implement similar policies.[13] Moreover, the opinion now serves as persuasive authority on the novel topic of COVID-19 vaccine mandates, giving courts across the nation a roadmap with which to respond to the imminent wave of lawsuits challenging employer-mandated vaccinations, at least where private employers in the healthcare setting are concerned.[14] For example, on September 24, 2021, Judge David L. Bunning of the U.S. District Court for the Eastern District of Kentucky declined to grant a preliminary injunction to 40 workers who brought constitutional claims against St. Elizabeth Healthcare, a private health system with over 11,000 employees, based on its COVID-19 vaccine mandate.[15]

Judge Bunning, like Judge Hughes, noted that employees who do not want to follow rules set by their employers are free to find work elsewhere:

"To work at St. Elizabeth, Plaintiffs agree to wear a certain uniform, to arrive at work at a certain time, to leave work at a certain time, to park their vehicle in a certain spot, to sit at a certain desk and to work on certain tasks. They also agree to receive an influenza vaccine, which Defendants have required of their employees for the past five years. . . . If an employee believes his or her individual liberties are more important than legally permissible conditions on his or her employment, that

employee can and should choose to exercise another individual liberty, no less significant – the right to seek other employment."[16]

One notable difference between the Houston Methodist and St. Elizabeth lawsuits is that on August 23, 2021, the U.S. Food and Drug Administration fully approved the Pfizer-BioNTech COVID-19 Vaccine.[17] Prior to that, all three COVID-19 vaccinations on the market had only Emergency Use Authorization. Therefore, the 40 Plaintiffs in *St. Elizabeth* had a far less plausible argument that requiring vaccination was effectively human experimentation than did the 117 Plaintiffs in *Houston Methodist*.

As of mid-October, employees and advocacy groups had filed almost 40 federal cases challenging employer- or government-mandated vaccination requirements. A handful of those cases ended in dismissal, and the courts in several of the other cases that are still pending have denied plaintiffs' requests for temporary restraining orders.[18] These results suggest that workplace COVID-19 vaccine mandates will, in the end, stand up to scrutiny outside of just Texas and Kentucky.

Vaccine Rates and Preferences in Healthcare

According to the COVID States Project, a multi-university research collaboration funded in part by grants from the National Science Foundation, healthcare workers are "settling into two extremes:" already vaccinated or explicit refusal to be vaccinated.[19] A national study conducted by the American Medical Association in June of this year indicated that over 96% of practicing physicians were, at that time, fully vaccinated.[20] As of July, however, 27% of all healthcare workers were still unvaccinated.[21] Research indicates that of those, 15% are vaccine resistant, meaning that unless their employers impose mandates, they will likely *remain* unvaccinated.[22]

Those in support of mandatory vaccination have pointed out that requiring healthcare workers to be vaccinated against various infectious diseases is a longstanding practice, and, therefore, requiring the COVID-19 vaccination is merely an extension of existing policy.[23] Although requirements differ between states and institutions, healthcare workers have routinely been required to obtain vaccination against communicable diseases such as influenza, hepatitis B, measles, mumps, rubella, varicella (chickenpox), and more as a condition of employment.[24]

On July 26, 2021, a group of more than 50 health care professional societies and organizations, including the American Hospital Association,[25] the American Medical Association,[26] the American College of Physicians,[27] the American Academy of Family Physicians,[28] and the American Public Health Association,[29] joined together to issue a joint statement "in support of COVID-19 vaccine mandates for all workers in health and long-term care." The statement, in pertinent part, is as follows:

"Due to the recent COVID-19 surge and the availability of safe and effective vaccines, our health care organizations and societies advocate that all health care and long-term care employers require their workers to receive the COVID-19 vaccine. . . . [A]ll health care workers should get vaccinated for their own health, and to protect their colleagues, families, residents of long-term care facilities and patients. . . . We call for all health care and long-term care employers to require their employees to be vaccinated against COVID-19."

The day the joint statement was released, the U.S. Department of Veterans Affairs announced that all employees and staff at VA facilities had a period of eight weeks from the date of the announcement to become fully vaccinated.[30]

As of late July, almost 30 more organizations had signed on as proponents of the joint statement, bringing the list of total proponents to 88.[31] Another joint statement, released November 4 and attributed to the American Hospital Association, American Medical Association, and American Nurses Association, referenced the "devastating milestone" of 750,000 U.S. COVID-19 deaths and urged "everyone who is eligible to get vaccinated as soon as possible to protect themselves and their loved ones from this disease."[32]

Missouri Mandates

Presently, Missouri has not passed any legislation that would either mandate COVID-19 vaccination or ban COVID-19 vaccine mandates. As of early October, 23 states have passed legislation that mandates that healthcare workers vaccinate or, as an alternative in some states, undergo regular testing. Six states have outright banned vaccine mandates, and four states have imposed bans but specifically exempted healthcare organizations from those bans.[33]

Table 1. Healthcare entities in the state of Missouri mandating vaccination

Entity	Announced	Deadline
BJC HealthCare[38]	6/15/2021	9/15/2021
St. Luke's Hospital (Chesterfield)[39]	6/25/2021	8/13/2021
SSM Health[40]	6/28/2021	9/30/2021
Mercy[41]	7/7/2021	9/30/2021
Truman Medical Centers / University Health (Kansas City)[42]	7/26/2021	9/20/2021
Ascension[43]	7/27/2021	11/12/2021
MU Health Care[44]	8/5/2021	10/1/2021
CoxHealth[45]	8/23/2021	10/15/2021*
Saint Luke's Health System[46]	8/30/2021	10/30/2021
North Kansas City Hospital[47]	9/2/2021	11/12/2021
Lake Regional Health System[48]	11/4/2021	12/5/2021*

*First dose only.

On September 9, 2021, the Biden-Harris administration announced[34] a COVID-19 Action Plan requiring sweeping vaccine mandates for federal workers and contractors, employers with one-hundred or more employees, and healthcare settings that receive Medicare or Medicaid reimbursement (including nursing homes).[35] On November 4, the Centers for Medicare & Medicaid Services (CMS) issued an emergency regulation giving an estimated 17-million healthcare workers in Medicare and Medicaid certified facilities across the nation two months to be fully vaccinated against COVID-19.[36] 2019 CMS data indicate that there are just over 7,550 Medicare certified institutional providers in the state of Missouri, including 140 hospitals, 510 skilled nursing facilities, and thousands of home health agencies, hospices, health clinics, labs, and other healthcare institutions.[37]

Several Missouri hospitals and health systems instituted mandates prior to President Biden's announcement. Notable healthcare entities in the state of Missouri mandating vaccination are included in Table 1. Additionally, the table lists the date each vaccine mandate was announced, as well as the date by which all employees are required to be fully vaccinated against COVID-19 per each entity's respective policy.

Employment relationships in the state of Missouri, and in the United States at large, are generally governed by the "at-will" doctrine. When employment is "at-will," meaning that no employment contract exists between the employer and employee, an employer can terminate an employee for any reason or no reason at all (*i.e.*, with or without cause). As long as an employer's reasons for firing an at-will employee are not due to discrimination based on the employee's membership in a protected class, the employee's refusal to commit an illegal act, or retaliation for the employee's exercise of a legal right (such as the right to take family and medical leave), the employer will generally not incur legal liability for the decision.[49] Similarly, an at-will employee can leave a job at any time and for any reason without facing adverse legal consequences.

The two cases touched on above—*Houston Methodist* and *St. Elizabeth*—demonstrate the application of the at-will employment doctrine to employee-raised challenges of employer-imposed COVID-19 vaccine mandates: "If an employee believes his or her individual liberties are more important than legally permissible conditions on his or her employment," then they "will simply need to work somewhere else." In many ways, the at-will doctrine is a double-edged sword; employers can mandate vaccination if they desire, but if they do, employees can (and some will) seek work elsewhere.

Previously, when individual entities were mandating vaccination, healthcare workers who opposed vaccination but wanted to remain in the field could choose to relocate to other Missouri institutions without mandates. However, now that President Biden has announced a vaccination deadline of January 4, 2022 applicable to all eligible staff at health care facilities that participate in Medicare or Medicaid programs, that choice may be limited or nonexistent.[50] Thus, the industry fear is no longer a tug-of-war for personnel between entities that have mandated vaccination and those that have not but, rather, overall staffing shortages as healthcare workers leave the industry altogether rather than comply with vaccine mandates.

Conclusion

Given the possibility of vaccine-related legislation at the state level and the recently announced federal plan to vaccinate the unvaccinated, the legal landscape remains uncertain. Yet, it is apparent that many individual hospitals and health systems in Missouri are continuing the nationwide trend of requiring their employees to get vaccinated against COVID-19. The court rulings out of Texas and Kentucky suggest that any Missouri healthcare employees seeking to challenge employer-based vaccine mandates may be fighting an uphill battle. At the same time, healthcare entities may be fighting to hold onto their employees as the pandemic rages on.

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Recognizing Decline in Physician Wellbeing: When to Seek Help or Intervene

by Emily A. Slat, MD, Ian C. Parsley, MD & Jessica A. Gold, MD

Improving mental health and wellbeing starts with the self, extends to physician peers, and must involve major changes in the medical workplace.

A resident physician, Jennifer, is sitting in a workroom writing notes. She has looked at the same lab result in the electronic medical record three times. She feels mentally exhausted and cannot remember the result. She did not sleep very well last night, or any night in recent memory. She thinks she slept about two, maybe three hours. It is starting to affect her mood. When a nurse asks her a question, Jennifer snaps back much more irritated than usual. The resident physician is embarrassed at how she acted. She apologizes. She wonders if every resident experiences physical and mental exhaustion. Maybe this is just what residency is supposed to be. Maybe this is how medicine is supposed to be. She goes to the breakroom for another cup of coffee, then gets back to work. She thinks to herself, "I don't feel like myself, but is this normal for medicine anyway? How do I know if I need mental health help?"

Burnout, Depression, and Suicide: Mental Health Challenges Are Widespread in Medicine

Jennifer's story is unfortunately not unique. Long before the COVID-19 pandemic, physicians' mental health was significantly worse compared to age-matched peers, with higher rates of burnout, depression, and among the highest suicide rates of any profession.[1,2] While mental health symptoms affect the entire healthcare workforce, the scope of this article is limited to physicians because some of the screening tools discussed are designed specifically for physicians.

Burnout is the result of chronic work-related stress and is characterized by emotional exhaustion, low sense of personal accomplishment, cynicism, and detachment from patients.[3] Burnout can occur in any occupation but has been found in most studies of physicians to be as high as 50%.[4] Burnout is a distinct phenomenon from other well-understood mental health disturbances such as depression or anxiety disorders.[5] While burnout typically only occurs in the setting of chronic work-related stress, depressive and anxiety disorders may arise in the absence of any external stressors. The distinction of symptoms can be difficult to identify. While diagnoses such as major depressive disorder (MDD) have clear criteria in the Diagnostic and Statistical Manual (DSM) 5, the definition of burnout has varied over the years.[5] Based on most definitions, burnout may carry overlapping symptoms with depression, such as loss of enjoyment from work or an increased feeling of fatigue. Further confounding the disorder is increasing severity of burnout has been strongly associated with increased likelihood of major depression and suicidal thoughts.[6] As burnout is a risk factor for other mental health conditions, understanding symptoms and warning signs might facilitate prevention and earlier physician intervention before mental health problems develop.

Like burnout, psychiatric comorbidity is highly prevalent among physicians. Prevalence of depression or depressive symptoms has been estimated to be 28.8% among resident physicians[7] and 27.2% among medical students.[8] There are less data for attending-level physicians but a similar pattern appears to exist.[9] This is not limited to depression. Physicians also are likely to have increased prevalence of other psychiatric



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Table 1. Wellbeing Self-Assessment Tools

Assessment Tool	Sensitivity	Specificity	Details
Physician Well-being Index (WBI)[20]	73.3% for low mental quality of life; 59-93% for severe distress among medical students	81.0% for low mental quality of life; 88-91% for severe distress among medical students	Brief (7 items); No cost for non-profit organizations & a version free for individual use
Maslach Burnout Inventory-Human Services Survey (MBI-HSS)[3,30]	50.4-58.6% for burnout	92.3-94.7% for burnout	Measures emotional exhaustion, depersonalization, personal accomplishment; gold standard for research; Proprietary/individual cost per use; Long (22 items)
Stanford Professional Fulfillment Index (PFI)[31]	72% for burnout	84% for burnout	No cost for non-profit organizations; Long (16 items); cost for commercial use
Physician Work-life survey (PWLS) Single Item Burnout Measure (in Mini-Z)[32]	83.2% for emotional exhaustion	87.4% for emotional exhaustion	Publicly available (no cost)
Patient Health Questionnaire (PHQ-9)[33]	88% for MDD	88% for MDD	Brief (9 items); easy to administer; Publicly available (no cost); Designed for patient use
Generalized anxiety disorder questionnaire (GAD-7)[34]	89% for GAD	82% for GAD	Brief (7 items); easy self-assessment of anxiety; publicly available (no cost)

illnesses, including anxiety disorders and substance use,[10] with alcohol use,[11] and prescription drug use being problematic.[12, 13] Suicide rates are higher among physicians compared to the general population, particularly in women.[14, 15] Medical training intrinsically correlates with this data. Medical students during training develop higher rates of suicidality compared to their age-matched peers.[16]

While the baseline mental health of physicians was already poor, the significant stressors of COVID-19 compounded these numbers.[2] Frontline workers in New York City had high rates of psychological symptoms of distress, including acute stress in 57%, depressive symptoms in 48%, and anxiety symptoms in 33%.[17] Thirteen percent of frontline healthcare workers reported receiving mental health services or medication due to stress related to the pandemic.[18] One in five healthcare workers reported needing services and not receiving them.[19]

It is extraordinarily important for healthcare workers, especially physicians, to recognize their own mental health needs and know when they require help. It is also important for them to know how to help their peers recognize their mental problems and seek care. This article will provide resources for self-assessment of burnout and related mental health conditions. It will also provide guidance for discussion of wellbeing with colleagues.

Self-Check In: How to Recognize When We Individually Need Help

While the need for mental healthcare in physicians is significant, that does not mean physicians routinely get help when they need it. There are major barriers to seeking treatment. Despite training in mental health, physicians often cannot assess their own wellbeing. Surgeons completed the Mayo Well-Being Index, a seven question self-assessment tool that screens for burnout in physicians and compares with their peers.[20] The surgeons who scored in the bottom 30% were asked how they did relative to their peers; 70% said they were at or above average.[21] Although there are other possible explanations, these results suggest that physicians cannot accurately compare themselves relative to each other and that the scale for measurement of wellbeing itself is likely inaccurate. In a medical or surgical culture that normalizes sleeping so little and crying so much, may 'normal' be 'abnormal'

Table 2. Self-Assessment Applications

Assessment App	Measures	Considerations
MoodKit[35]	Based on Cognitive Behavioral Therapy (CBT) concepts. Allows tracking of activities, thoughts, and mood. May also place freestanding journal entries.	Available for iOS only. $7.99 to buy.
Sanvello: Anxiety & Depression[36]	Uses principles of CBT. Users complete a self-assessment questionnaire and receive scores on anxiety, stress, and depression	Free to download with in-app purchases; available for iOS and Android
Woebot[37]	CBT-based app that uses CBT principles to guide users through distressing thoughts and feelings. Through check-ins, users are prompted to enter details about current mood.	Free; available for iOS and Android
Replika: My AI Friend[38]	AI-based chatbox app that allows users to create a digital journal. Also has capacity for mood tracking, self-monitoring, and development of coping skills.	Free to download with in-app purchases; available for iOS and Android
iMoodJournal[39]	Encourages users to rate their mood 2-3 times a day. Allows for rating intensity of mood and categorization of specific mood states.	Available for iOS and Android. $2 to buy.
Daylio[40]	A micro-diary that tracks users' moods, activities, habits, and goals. Provides statistics on patterns of mood over time.	Available for iOS and Android. Free to download but requires purchase of premium version for some more advanced statistics.

for mental wellbeing? It is challenging to know when a physician requires help when self-acknowledgement of any struggle is viewed as weak, and the medical culture has normalized unhealthy behaviors.

Because many physicians struggle to recognize their own psychological problems, it is critical to have objective measures available for increasing self-awareness of burnout, depression, suicide ideation, and related symptoms. It can be helpful to assess one's baseline mental health and subsequent changes overtime. Among these tools the Mayo Well-Being Index is widely used by physicians for self-assessment.[20] Many residency programs use it to track the wellbeing of their resident physicians. Example questions include: During the past month, have you worried that your work is hardening you emotionally? Another measure, the Maslach Burnout Inventory, is the gold standard for burnout research, but incurs a fee for use.[3] Additional examples of instruments can be found in Table 1.

Another way of performing self-assessments could be through various evidence-based smartphone applications (apps) (Table 2). These applications allow users to easily enter and trend their wellbeing scores over time. This increases the users' awareness of wellbeing relative to a baseline. Trends relative to other activities or stressors in their days can be identified. There are various methods by which this can be accomplished, from nearly free-form journaling to formal rating scales of depression and/or anxiety. When choosing an app, it is important to consider the American Psychiatric Association's five steps to evaluate an app,[22] in addition to the privacy measures taken by the developer. Helpful app databases are available through One Mind PsyberGuide[22] and the M-Health Index and Navigation Database.[23]

Finally, if formal tracking through self-assessment or apps is not something that works for a particular physician, it can also help to just 'check-in with yourself' daily, something that physicians often neglect to do when they are focusing on their patients and duties. A few helpful self-questions to make note of over time include:

- How often have I been experiencing low mood?
- Am I still able to enjoy things I used to enjoy?
- How well am I connecting with my patients (or friends or family)?
- How often have I had thoughts of giving up?

Also track sleep, eating, and drinking alcohol habits at baseline and overtime, as well as their relation to mood and stress. For reference, 7-8 hours of sleep per night, and (for those who drink) 7 or 14 alcoholic drinks per week (average 1/day women vs. 2/day men) are considered generally normal.

Table 3: Tips For Communicating With Peers About Wellbeing

Before starting the conversation, make sure you are both in a private and comfortable environment, and that it is an ok time for them to speak with you.
Let them know you are willing to talk about mental health. Naturally bringing up your own experiences during conversation can signal that you are willing to discuss the topic further. Example: "This pandemic has been really hard for me, I am barely sleeping. What has it been like for you?"
When approaching them, first start by expressing that you care. Then, share your observation. Example: "We've been friends for a while and I care about you. I've noticed that you've seemed more on edge than normal, so I wondered how you're doing."
Being direct about the topic can help normalize issues related to mental health. Example: "You've had a lot on your plate lately. Have you been feeling stressed?"
Refrain from accusing them or making them feel like they have been "messing up". Example: "You've been extremely helpful on this project; I can tell you've been working hard. How have you been handling it all?"
If you are worried about someone, trust your gut and just ask how they are.
Use open-ended questions and try to avoid making assumptions. Example: "I'd like to understand what you're going through. Could you tell me more?"
When they're sharing their experience, refrain from trying to problem solve or give advice. Just listen.
Let them share at their own pace. If they say they aren't ready to talk about it, let them know that's ok and that you'll be there when they're ready.
If they express concern about burdening you with their problems, reiterate that you care about them and that normalize the conversation. Example: "This isn't a burden. Everyone goes through difficult periods sometimes. I care about you and want to make sure I'm there for you."
After talking with them, emphasize that you will continue to be there for them. It can also be helpful to ask how you can help now, as well as how they'd like you to check in on them in the future, or if they would like your help connecting to resources.
Be ready and willing to help if a crisis arises.

Peer Check-In: How to Recognize When Our Colleagues or Peers Need Help

While it is important to be self-aware and seek care when needed, sometimes physicians cannot recognize symptoms in themselves. It is important to have other physicians observe for problems in their peers.[24] Peer support is a significant protective factor against burnout.[25] The first step in peer support is identifying colleagues who need help. The next is thoughtfully and confidentially talking to that colleague. This is often very difficult for physicians to do.

A reason talking to physician colleagues about their mental health can be challenging is the fear of bringing up mental health topics and not knowing the colleague's reaction. Social media is a good example of a place to normalize these conversations, as some physicians have done in response to the suicide of an emergency medicine physician, Lorna Breen, MD, during COVID-19.[26] The more we talk about mental illness openly, the less power stigma will have in our physician community and the easier sharing in small groups it will become.

Beyond stigma, some physicians just simply do not have the words to say to others (or the comfort with using them) and this can prevent them helpful intervention. To help ease this conversation, friends, colleagues, supervisors may find Table 3 useful. For additional tips and information on having these conversations, the #RealConvo guide from the American Foundation for Suicide Prevention (AFSP) website is helpful.[27]

On a local level, having more conversations within teams that focus on the emotional aspects of a case or patient, or even the day, can normalize feelings and mental health in medicine and make useful verbalization more commonplace. On a strategic level, physicians must make efforts to speak out about their mental health experiences. Our medical profession

must recalibrate "normal' to create a safe environment for all physicians, starting with leadership level on down the medical hierarchy. There are also efforts to change the language of physician licensure questions as an effective way to reduce the barriers for physicians to seek mental healthcare.[28]

Conclusion

In a medical/surgical culture where poor mental health is normalized, physicians often do not know how to identify when to get help for themselves or their peers. Using assessment tools, either through formalized scales or smartphone apps, can help improve awareness of problematic symptoms and increase the likelihood that physicians will seek appropriate help when they need it. While barriers like time and availability exist,[29] learning to monitor self and peers will increase awareness, reduce stigma, and hopefully improve the mental wellbeing and working conditions of the physician workforce.

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Patients and Their Relationships with Their Companion Animals: Veterinary Collaboration and Referral

by Gretchen K. Carlisle, PhD, Timothy Brosi, BS, Stephanie Craven, BS, Elizabeth Deckert, BS & Angela Tennison, DVM

Recognizing the close bonds of many patients with their animals, physicians can assist patients by acknowledging the role these animals play in their patients' lives while recommending steps to work collaboratively with their veterinary colleagues to keep their patients healthy.

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Physicians can expect to work with individuals benefiting from the assistance of an animal, most commonly a dog, at some point in their career. Furthermore, physicians and mental health practitioners might receive requests from patients to document the mental health benefit such an animal provides. This article serves to provide an understanding of service animals, emotional support animals, therapy animals and their use and benefit provided to patients as well as rights and responsibilities associated with each and when veterinary collaboration or referral might be appropriate.



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Background

Service animals are defined under the Americans with Disabilities Act (ADA) as "a dog that has been individually trained to do work or perform tasks for an individual with a disability."[1] The dog's task must be specifically associated with the person's disability. The ADA also has a provision for the use of a miniature horse as a service animal, but for the purpose of this paper, service dogs will be discussed. While there are certain breeds more commonly used as service dogs, there is no regulation on breed or size of dog, nor must a dog wear a vest or other identification. The term disability, as it relates to an individual, is clearly defined by the United States government in the ADA legislation as "a physical or mental impairment that substantially limits one or more of the major life activities of such individual, a record of such an impairment, or being regarded as having such an impairment…"[2] Service dogs are protected by the ADA in Title II and III in terms of access to public entities.[1] Though many service dog training organizations are accredited through Assistance Dogs International, there is no requirement for training organization accreditation or for individual certification of service dogs.

When one encounters an individual presenting a dog as a service dog, there are only two questions which may be asked:[1]

1. Is the dog a service dog and required because of a disability?
2. What work or task has the dog been trained to perform?



A veteran and his service dog who have worked with me at ReCHAI MU's Research Center for Human Animal Interaction.

The handler cannot be asked to have the dog demonstrate the task or be required to provide any documentation.[1] However, while service dogs are protected by ADA for public access rights, the animal must be housebroken and under control of the handler or a public entity can ask for the animal to be removed from the premises.

Emotional Support Animals (ESAs) are animals that provide companionship and relief of a mental health condition.[1] These animals are not considered service animals, however, as they have not been individually trained to perform a specific task or job related to a person's disability. While an individual can obtain a letter from a mental health or other medical professional citing the benefits and recommendation for an ESA, there is no formal certification process. Additionally, any type of animal can serve as an ESA, unlike the more restrictive definition for a service dog. Access to public entities is more limited for an ESA; however such animals are protected under the Fair Housing Act (FHA).[3] The U.S. Department of Housing and Urban Development (HUD) stated in January 2020, that "FHA complaints concerning denial of reasonable accommodations and disability access comprise almost 60% of all FHA complaints and those involving requests for reasonable accommodations for assistance animals are significantly increasing."[3] Under the FHA, ESAs are allowed to reside with their owners free of additional cost regardless of their landlord's animal policy. In another legislative ruling in 2020, the U.S. Department of Transportation released a document entitled Service Animal Final Rule in which such ESAs are defined as pets by airlines and are no longer entitled to travel in the same manner as service animals.[4]

Therapy animals are well trained pets, usually dogs, who partner with their owner to visit others in settings with people who may benefit from human-animal interaction.[5] Therapy animals do not have public access rights, like those of a service dog. These animals have basic obedience training and, unlike service and emotional support animals, earn a certification or registration. According to information provided by the American Veterinary Medical Association (AVMA), "a therapy animal is a type of animal-assisted intervention in which there is a 'goal directed intervention in which an animal meeting specific criteria is an integral part of the treatment process. Animal-assisted therapy is provided in a variety of settings, and may be group or individual in nature."[5] Table 1 describes the differences between service dogs, ESAs, and therapy dogs.

Service Dogs

Documentation of a blind man using the assistance of a service dog was first made in 1780.[6] Today, individuals with disabilities receive support in many forms and this may include the aid of a service dog. Service dogs can provide assistance for those with visual, hearing, or mobility impairment. Service dogs may also assist those needing medical alert for diabetes or seizures, support for symptoms of post-traumatic stress disorder (PTSD), autism spectrum disorder (ASD), and other needs. The benefits of service dogs have been identified as greater quality of life,[7] and decreased absenteeism for individuals with their dog as a work accommodation.[8] For veterans with PTSD, service dogs have been associated with

Table 1. Differences in service dogs, ESAs and therapy dogs.

	Service Dogs	Therapy Dogs	Emotional Support Animals
Protected by the ADA	yes	no	no
Protected by the Fair Housing Act	yes	no	yes
Allowed public access in areas with no pet policies	yes	no	no
Trained for calm and controlled behavior	yes	yes	no
Trained to assist one person	yes	no	no
Animal is certified or registered	no	yes	no
Requires a letter of need from a licensed healthcare professional	no	no	yes

decreased symptoms of PTSD.[9] Benefits have also been found for children with ASD. The cortisol awakening response for children with ASD was significantly lower in the presence of a service dog compared with the same measure of cortisol awakening response after the removal of the service dog from the home.[10] Benefits may also extend to caregivers of service dog recipients, including companionship through a bond with the dog.[11]

Does having a service dog easily solve all the challenges of individuals with disabilities? As with all support measures and therapies, there can be challenges. Some difficulties identified by those with service dogs have included the need for ongoing behavior training and physical care of the dog,[12] and the need to educate others about the rights of service dog public access.[13] Of important note is that those in the Rodriguez[12] study who were on a waitlist to receive their service dog anticipated significantly fewer problems than those reported by service dog recipients after they received their dog. Consideration of the benefit and work effort balance is important when discussing service dog acquisition with patients. Opening a discussion of burdens and benefit expectations before a service dog is acquired, and continuing the conversation with those clients who are matched with a dog, can help providers to be aware of potential problems, as well as being supportive of the client's choice to have a service dog. Incorporation of the service dog into the patient's plan of care is an important consideration since the service dog will impact patients' activities of daily living.

Physicians can also educate their practice teams on public access laws for animals. While ESAs do not have public access rights, service dogs do have this right.[1] According to the ADA, a well-mannered service dog is allowed access, including the office of a medical provider, in any non-sterile area that would typically be accessible to other patients. If office staff have a fear of dogs or allergies, these concerns do not provide a rationale for removal or denial of access of the service dog.[14] However, a client may be asked to remove a service dog only if the dog is not housebroken or not under the control of the handler.

Emotional Support Animals

Younggren[15] suggests formal guidance for medical and mental health professionals to support their patients requesting a letter to certify the patient's need for their pet as an ESA. The guidance asserts that mental health professionals should meet four requirements: understand policies regarding ESAs, assess the patient for disability, assess the animal for competency as an ESA, and observe the relationship between the patient and animal to establish the



A veteran's service dog, doing what most service dogs do best, waiting quietly.

positive effect of the animal on the patient's mental health disability. From this framework, while not legally required, it is recommended that healthcare professionals utilize the support of veterinary experts for the evaluation of the animal. For the healthcare professional, inclusion of a veterinarian can lessen risk and provide reassurance for the safety of the animal, their owner, and others. To achieve this end, mental health professionals might consider requesting records from a veterinarian stating the animal is current on vaccinations, in good health, and exhibits behaviors consistent with managing the responsibilities of an ESA. While Younggren[15] advocates direct observation of the patient and animal, others[16] conclude that a discussion between the patient and healthcare professional regarding the client's relationship with their animal is adequate to support the need for an ESA, without direct animal observation. Once the animal has been identified as an ESA through a letter of support, it is important that the patient be encouraged to continue receiving both their regular mental health treatment, as well as maintaining regular appointments with their veterinarian for the maximum welfare of both the patient and their ESA. In this sense, the ESA may be considered similar to other therapeutic interventions, with regularly scheduled clinic appointments to evaluate progress.

Therapy Dogs

Therapy dogs (TD) who are registered or certified through an organization with standards for animal behavior and health, and covered by an insurance policy, may be allowed to accompany their handler as a volunteer in a hospital, clinic, library or other setting. Establishing precautionary measures and policies for TD visits can minimize risk while allowing the benefits. TD visits in healthcare settings have been found to enhance therapy for those with mental health-related conditions and as a supportive measure for patients during medical interventions.[17] Potential contraindications and hazards to avoid when deciding to implement dogs into a therapeutic plan can include allergies, sharps injury, stress, hearing impairment, erratic patient behavior or zoonotic disease transmission.[18] To have the confidence of taking the lowest risk, it is imperative to include a veterinarian in setting healthcare site policies for TD visitations along with therapeutic plans. The veterinarian(s) will benefit the policy team as a consultant and to conduct direct medical and behavioral monitoring of any visiting animals. To gain the full benefits of including TD into the specific therapeutic plan for an individual patient, the health care professional, veterinarian, patient, and TD need to all be fully cooperative and communicate together regarding any issues that could possibly arise.

Pets

Over the past couple decades, pets have increasingly become an integral part of many families' lives and well-being. According to the American Pet Products Association National Pet Owners Survey, 70% of US households own a pet, or approximately 90.5 million families.[19] Because of the high prevalence of pet ownership in American families, physicians and mental health professionals should be encouraged to take advantage of the

health benefits of pets by integrating these animals into treatment plans. Obesity is one common condition, with an age-adjusted prevalence of 42.4% of Americans,[20] in which pets can contribute to better health results by acting as a "consistent initiator," and adding a sense of "enjoyment" and "parental pride."[21] Furthermore, people experience more social interactions when walking their dog and longer conversations compared to those who walk without a dog.[22] This is important because social relationships have shown to be one of the strongest influences in successful weight loss programs.[23] In a study of pet ownership and older adults, older adults with a dog were more likely to get the recommended physical exercise than those without a dog.[24] Pet ownership has also been associated with other benefits. Dog ownership has been shown to be associated with patients having lower cardiovascular complications with significantly lower blood pressure and triglycerides.[25,26] Companion animals have also been associated with alleviating chronic pain for patients.[27] Acknowledging the physical benefits of patients' pets may help in incorporating that animal into the patients' plan of care.

In addition to physical benefits, pets have also been associated with mental health benefits. Pets can replace feelings of loss of a family member, provide support in times of crisis, reduce feelings of isolation, and provide unique opportunities for communication and opening up about topics patients otherwise might not discuss.[28] Pets have been associated with a patient's ability to perform tasks needed to manage their mental health such as exercise activities, housekeeping, taking medications, maintaining relationships, and personal care. In addition to these benefits, pets may also help divert attention from unpleasant symptoms such as hearing voices, panic attacks or suicidal ideation.[28] Furthermore, pets can significantly assist those recovering from a serious mental illness by providing empathy and companionship, redeveloping social connections, supporting patients' self-efficacy and creating a sense of empowerment.[29] Pets have also been associated with improving the quality of life for military veterans with PTSD, by reducing feelings of loneliness, depression, worry and irritability, and increasing feelings of calmness, as well as positive effects on mood.[30] Animals have also been associated with symptom alleviation for children with ASD. Parents of children with ASD report their children benefit from their pets through unconditional acceptance and companionship.[31] Unfortunately, despite this growing body of evidence for benefits, pets are rarely incorporated into the discussion between the medical or mental health care providers and patients, even with the potential impact pets can have on the patient's life.[32]

One Health

One health is the collaboration of physicians, veterinarians, public health workers, and others to develop, implement and improve programs, policies and legislation.[33] Physicians can implement this collaborative practice by considering the role veterinarians might play in the support of their patients. Consideration of zoonotic infections is one way physicians might partner with their veterinary colleagues. Common zoonotic infections and examples from companion animals include: parasite infections (toxoplasmosis), fungal infections (ringworm), bacterial infections (campylobacter and salmonella), and viral infections (rabies).[34] Early research indicates it is unlikely for animals to transmit COVID-19 to humans, however humans may be able to transmit the virus to their pets.[35] For safe interactions with animals, patient education can aid in prevention. Recommended guidelines to prevent zoonotic disease transmission include: personal hygiene (hand washing, avoidance of raw animal food diets), kitchen hygiene (keeping animals and supplies out of kitchen) and partnering with a veterinarian to encourage patients to address their animal's health such as having an annual veterinary health check, maintaining animal vaccinations, deworming, and flea/tick control.[36] Preventative efforts are especially important for patients at risk such as those who are very young, elderly, pregnant or immunocompromised. Recognizing the close bonds of many patients with their animals, physicians can assist patients by acknowledging the role these animals play in their patients' lives while recommending steps

to keep their patients healthy. A veterinarian can play a role in establishing whether the human patient is properly caring for the welfare of their animal. The veterinarian can initiate discussions with the animal owner about the animal's physical, environmental, dietary, medical, behavioral, and psychological needs. The human physician may be able to advise whether or not the patient is at risk of certain diseases or disorders with an animal in the home, especially for patients who are immunocompromised. This interconnectivity of health care communication ensures the safety of both the human and the animal. The One Health Initiative continues to push multidisciplinary collaboration among physicians, veterinarians, and public health professionals to disperse information to pet owners about the risk of zoonotic disease transmission. The benefits of the service animal, ESA, or therapy dog may outweigh the risks to the patient; therefore it is worth discussing options and expectations with the patient during initial conversations about their animal.

Physicians might also consider asking patients what they feed their animals. Feeding raw diets to pets offers a risk of disease transmission to animal owners as raw pet food has been shown to commonly exceed thresholds counts of Enterobacteriaceae, as well as a host of other infectious organisms including *listeria*, shiga toxigenic *Escherichia coli*, toxoplasma gondii and brucella.[37] For this reason, patients taking their animals for therapy visits and those patients who are immunocompromised should avoid raw diets for their animals. Physicians can encourage their patients to consult with their veterinarian on the diet that they feed their animal, explaining the risks of feeding their animal a raw diet.

Due to the prevalence of animal allergies ranging between 10-20% of the global population,[38] the risk of animal allergies should be a discussion between the physician and the patient. Although "hypoallergenic" animals are becoming a popular trend, there is no evidence to date to support that there are any true hypoallergenic animals. In fact, a study demonstrated that in dogs considered to be hypoallergenic, the levels of the canis familiaris allergen 1 (Can f 1) were found to be comparable to non-hypoallergenic dog breeds.[39]

Implications for Physicians

Practical steps can be incorporated into a patient visit:

- Does the patient have an animal and if so what type (Service dog, ESA, Therapy Dog, Pet)?
- Is the patient at high risk for zoonotic disease (young, elderly, immunocompromised)?
- Is there a possible concern if the patient is feeding their animal a raw diet?
- Does the patient understand safe animal handling such as hand washing?
- Does the patient have a dog? If so, consider recommendations to walk the dog for exercise, if appropriate.
- Does the patient take their animal for regular veterinary care?

Recognizing the close bonds of many patients with their animals, physicians can assist patients by acknowledging the role these animals play in their patients' lives while recommending steps to work collaboratively with their veterinary colleagues to keep their patients healthy.

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Current Research in the Departments of Neurology and Psychiatry & Behavioral Neuroscience

by Noam Grysman, MD & George T. Grossberg, MD

SAINT LOUIS UNIVERSITY
HENRY AND AMELIA NASRALLAH CENTER FOR NEUROSCIENCE

Our goal is to better understand, assess, treat, and most importantly prevent Neuro-Psychiatric illness to better the lives of the general population.



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Introduction

In both the departments of Neurology and of Psychiatry and Behavioral Neuroscience at Saint Louis University (SLU), we aim to fulfill the vision of the Henry and Amelia Center for Neuroscience (CfN); that is, to advance neuroscience research, education, clinical care, and outreach activities across Saint Louis University, the broader St. Louis community, and nationally. Both of our departments work towards achieving the vision of the CfN through our eclectic areas of research. We have the privilege of working with many researchers of diverse educational backgrounds. The goal of this article is to provide a brief glimpse into the various studies currently ongoing in the departments of Neurology and the department of Psychiatry and Behavioral Neuroscience at SLU. We are extremely excited to see what will come of the results of these studies in the coming years.

Psychiatry & Behavioral Neuroscience

Within the department of Psychiatry and Behavioral Neuroscience there are a variety of research projects.

Within the Division of Forensic Psychiatry, there are currently several ongoing projects. Theodore Malmstrom, PhD, is currently leading a survey assessing judge and attorney perspectives regarding mental health and the criminal justice system. The goal of this study is to help mental health care providers better understand the perspectives and understanding of mental illness amongst criminal defendants by the legal system. Based on the results of this survey, Dr. Malmstrom plans to create a free, experiential, and educational workshop to offer to attorneys and judges involved in criminal work throughout the state of Missouri.

Another study with a forensic focus is current research led by clinical faculty member John Hearn, MD, and recent program graduate, Anna-Lee Asamoah, DO. They are performing a comparison of characteristics of auditory hallucinations in clinical and simulator samples. There is a considerable need to understand the basic phenomenology of auditory hallucinations associated with psychotic illnesses (e.g.,

schizophrenia, schizoaffective disorder, etc.). It is estimated that ~60% of individuals with schizophrenia experience auditory hallucinations.[1] An understanding of the natural course of hallucinations is critical to accurately diagnose and treat psychosis. In Forensic Psychiatry, experts commonly testify regarding the veracity of defendants' reported hallucinations. In the forensic context, psychiatrists' understanding of hallucinations may profoundly impact the outcome of legal cases, as defendants may exaggerate or fabricate psychotic symptoms to avoid trial and/or provide justification for alleged criminal acts. It is critical that evaluators do not misdiagnose psychosis where none exists. It is equally important that evaluators not falsely mislabel genuine hallucinators as feigners/malingerers.

The study seeks to partially replicate literature related to the phenomenology of auditory hallucinations, while providing additional information that will be relevant to forensic psychiatrists.

William Newman, MD, is Professor of Psychiatry, the Director of Inpatient/Adult Psychiatry at SLU Hospital, and a past president of the American Academy of Psychiatry and the Law. He also is the director of the Forensic Psychiatry Fellowship as well as the Medical Director of the Adult Inpatient Psychiatry Service at SLU Hospital. He, along with psychiatry resident John Flo, MD, are investigating medical sequelae of physicians who have been stalked. The hypothesis is that being stalked creates a chronic anxiety/stress state that may trigger numerous abnormalities in the body. This state may lead to elevated rates of medical illnesses such as autoimmune disease, cancer, etc. If any association is identified, the results could be applied to patient care. Future patients who are victims of stalking may gain more insight into potential elevated risk for specific diseases, and screening could be customized to this population's specific risk factors. Other benefits from any research findings may also include a more robust understanding of disease etiology as well as treatment considerations.

Another strength of our department is the division of Geriatric Psychiatry. We have many ongoing studies in this area, under the supervision of division director, George Grossberg, MD. Dr. Grossberg is currently working on two studies with Dr. Binu Chakkamparambil, MD, (former SLU resident, chief resident, and geriatric fellow) and Rita Khoury, MD (former geriatric fellow). The first project is to validate the SLU AMSAD Tool for depression. The SLU AMSAD is a short geriatric depression screening tool developed by the division, which has been validated against much longer tools, translated into five languages, and adopted by the American Academy of Emergency Room Physicians in patients with major neurocognitive disorder/dementia. The gold standard screening tool that is currently used is the Cornell Scale for Depression in Dementia; a lengthy tool that takes up to 20 minutes to administer. Alternatively, the SLU AMSAD is a fast and easy tool that takes one to two minutes to administer, and was previously shown to appropriately screen for depression in older adults without dementia. The objective is to test for this new scale's validity across the different stages of dementia.

A second project is the ILIAD-2 study. The aim of the ILIAD-2 is to investigate the relationship between the severity of ideomotor limb apraxia, as measured by the shorter version of the Postural Knowledge test (PKT) and the severity of Alzheimer's disease as measured by the gold standard staging tool: the mini-mental status examination (MMSE). The ultimate objective would be to develop a new short, easy and practical clinical staging tool for Alzheimer's disease. Dr. Grossberg is also working with Eric Marin, MD, fellow, Sleep Medicine, Stanford University and Dr. Khoury to screen individuals residing in the nursing home for obstructive sleep apnea (OSA). OSA is often underdiagnosed and undertreated in nursing homes, and left untreated, can cause memory loss. If identified and treated, memory loss may be

Table 1: Ongoing studies in the department of Psychiatry

Investigator:	Study title:	Study Description:
Dr. Theodore Malmstrom	Judge & Attorney Perspectives Regarding Mental Health & the Criminal Justice System: A Survey	This survey aims to collect data from attorneys and judges to better understand their appreciation of mental illness amongst criminal defendants, & also their knowledge of various rights and defenses available to these defendants.
Dr. John Hearn	Comparison of characteristics of auditory hallucinations in clinical and simulator samples	In this study, participants with genuine mental illness will be asked to complete a questionnaire to assess the ways in which they experience auditory hallucinations. Researchers will then administer the same questionnaire to individuals asked to feign serious mental illness. The study seeks to partially replicate literature related to the phenomenology of auditory hallucinations, while providing additional information that will be relevant to forensic psychiatrists.
Dr. William Newman	Medical Sequelae of Physicians who have been Stalked	The objective of the project is to screen physicians who have been stalked with a survey looking for incidences of medical illness following the stalking experience.
Dr. George Grossberg	Screening for Depression in Cognitively Impaired Older Adults using the SLU AMSAD Tool	The aim of this project is to validate the SLU AMSAD Tool for depression in patients with major neurocognitive disorder/dementia and correlate it with the gold standard screening tool that is currently used: the Cornell Scale for Depression in Dementia.
Dr. George Grossberg	ILIAD 2 Study - Ideomotor LImb Apraxia in Alzheimer's Disease: Development of a Short Staging Tool in Alzheimer's Disease	To investigate the relationship between the severity of ideomotor limb apraxia, as measured by the shorter version of the Postural Knowledge test (PKT) and the severity of Alzheimer's disease as measured by the gold standard staging tool: the mini-mental status examination (MMSE).
Dr. George Grossberg	Screening for Obstructive Sleep Apnea in the Long-Term Care Setting	This project aims to screen individuals residing in the nursing home for obstructive sleep apnea (OSA). OSA is often underdiagnosed and undertreated in nursing homes, and left untreated, can cause memory loss. If identified and treated, memory loss may be remediable, and patients' functioning will improve.
Dr. Lauren Schwarz	Neuroprotective effects of chess on memory Loss: Examination of cognitive Functioning and brain resting state networks.	This study will examine the effectiveness of a complex activity (specifically learning and playing chess) on memory, thinking function and brain activity among older adults with mild cognitive impairment (MCI). The study purpose is to determine if learning and playing chess will help reduce or delay memory and thinking loss over time among older adults with MCI.
Dr. Lauren Schwarz	Creation of a Neuropsychological Test Database for Future Research	This project would allow for the creation of a neuropsychological test database that would provide a large archival data set available for future research.

remediable, and patients' functioning will improve.

Within the department of Psychiatry and Behavioral Neuroscience we are privileged to have Lauren Schwarz, MD, as the director of the Neuropsychology division, as well as the Assistant Dean of Student Affairs at the Saint Louis University School of Medicine. Dr. Schwarz is currently researching the neuroprotective effects of chess on memory loss. This study includes three groups of older adults: 1) those with mild cognitive impairment (MCI) who learn and play chess; 2) those with MCI who do not learn and play chess; and 3) those who do not have MCI. The study purpose is to determine if learning and playing chess will help reduce or delay memory and thinking loss over time among older adults with MCI.

Dr. Schwarz is also working on creating a neuropsychological test database for future research. The use of neuropsychological assessment and analysis of patterns of test performances can differentiate between different types of disorders and lead to more effective diagnosis and treatment.[2] This project would allow for the creation of a neuropsychological test database that would provide a large archival data set available for future research.

A complete summary of ongoing research at the SLU department of Psychiatry and Behavioral Neuroscience is included in Table 1.

Neurology

Within the department of Neurology, the Souers Stroke Institute (SSI) is conducting a variety of studies regarding neurovascular

Table 2: Ongoing studies in the Souers Stroke Institute, a division of the Department of Neurology at Saint Louis University

Investigator:	Study title:	Study Description:
Dr. Randal Edgell and the SSI	ARCADIA study	This will be the first trial to test whether anticoagulant therapy reduces stroke recurrence in patients with atrial cardiopathy but no known atrial fibrillation; specifically, the effects (good and bad) of apixaban versus aspirin in patients with unexplained strokes and atrial cardiopathy
Dr. Randal Edgell and the SSI	STERLING registry	A prospective, multi-center, single arm study to obtain "real world" clinical data and characterize the acute and long-term performance of the MICRUSFRAME and GALAXY coils including the PulseRider Aneurysm Neck Reconstruction Device for the endovascular treatment of intracranial aneurysms.
Dr. Randal Edgell and the SSI	TESLA Trial	The aim of this study is to establish the effectiveness of intra-arterial thrombolysis (IAT) versus medical management in patients with moderate-large infarcts at baseline, with adaptive enrichment to better define the upper limit of infarct volume for treatment eligibility.
Dr. Randal Edgell and the SSI	VOTER	Vertebral Origin Treatment by Endovascular Techniques Registry: A prospective registry of patients who have received stenting plus medical management for the prevention of recurrent stroke in patients with symptomatic Vertebral Artery Origin Stenosis.
Dr. Randal Edgell and the SSI	CREST-2	Assessing stroke prevention in patients who have significant stenosis of the carotid artery, but without any associated stroke symptoms.
Dr. Guillermo Linares and the SSI	MOST Study	Evaluating whether adding one of two blood-thinning medicines (argatroban or eptifbatide) to standard treatment helps to decrease the impact of strokes and is safe.
Dr. Joanna Ramiro and the SSI	Sleep SMART study	The aims of this study are to evaluate the impact of treatment of Obstructive Sleep Apnea (OSA) with positive airway pressure starting shortly after acute ischemic stroke or high-risk TIA. Specifically: • If early OSA intervention reduces recurrent stroke, acute coronary syndrome, and all-cause mortality six months after the event • If early OSA intervention improves stroke outcomes at three months in patients who experienced an ischemic stroke.
Dr. Joanna Ramiro and the SSI	CHARM study	A phase 3 study evaluating the efficacy and safety of the use of intravenous Glibenclamide to improve functional outcome for patients with severe cerebral edema following large hemispheric infarction.

disease. The research team at SSI is comprised of the following members: Randall Edgell, MD, Joanna Ramiro, MD, Guillermo Linares, MD, Kara M. Christopher, MS, MPH, PhD, and André Guthrie, BS, CCRP. They are each involved in all the studies within the SSI. The studies within the SSI aim to better understand the clinical outcomes of various surgical and medical treatments for stroke, as well as establishing baseline clinical outcomes for those who have suffered from recent strokes. Current studies from the SSI within the department of Neurology are summarized in Table 2.

We are privileged to have within the department of Neurology many specialty clinics, including one of the few amyotrophic lateral sclerosis (ALS) clinics in the region, led by Ghazala Hayat, MD, and the Movement Disorder Center led by Pratap Chand, MD. Together with the rest of the department they are conducting studies of multiple neurological illnesses, which are investigating pathophysiology to comorbidities to treatment of many neurological illnesses, both common and obscure. A summary of current research is included below in Table 3.

Conclusion

The departments of Neurology and Psychiatry and Behavioral Neuroscience at SLU are making great strides in furthering both the breadth and depth of knowledge in neuroscience. Our research will hopefully lead us towards better understanding of the brain and the nervous system, in both its normal functioning, and how it is impacted by a variety of illnesses. Our goal is to better understand, assess, treat, and most importantly

Table 3. Ongoing studies in the Department of Neurology at Saint Louis University

Dr. Ghazala Hayat	Natural History of ALS and Other Motor Neuron Disorders.	This study aims to use data that has been added to the national data repository, NeuroBANK, to classify the various phenotypical presentations of patients with ALS in order to advance the potential for targeted therapies for patients with this disorder.
Dr. Ghazala Hayat	Assessment of the Burden of Constipation with ALS and possible Relationship to Dysautonomia	To use the pre-established PAC-QOL, PAC-SYM, and SCOPA-AUT questionnaires as a tool for assessing the severity of patient-reported symptoms of constipation in ALS and try to determine its relationship with possible ALS related dysautonomia.
Dr. Ghazala Hayat	Radicava®/(Edaravone) Findings in Biomarkers from ALS (REFINE-ALS)	The purpose of this study is to learn what changes happen in patients with ALS that can be seen in the blood and urine when they take Edaravone.
Dr. Roula al-Dahhak	Empathy Impairment in ALS	The study will examine empathy in patients with ALS using the Interpersonal Reactivity Index Empathy Scale (IRI); evaluate the relationship between empathy and the history and severity of ALS (the severity is determined using a standard of care ALSFRS-R scale).
Dr. Roula al-Dahhak	Evaluation of the Musculoskeletal Membrane Complex in Patients with Inclusion Body Myositis (IBM)	This study will evaluate the involvement of the musculoskeletal membrane complex including the dystrophin- sarcoglycan complex with its associated proteins including the contractile system to evaluate the changes that develop in patients affected with inclusion body myositis (IBM). The study will also evaluate the collagen and the connective tissue involvement in this condition as well.
Dr. Pratap Chand	Phase 2, Open-Label, Multi-Center Trial to Evaluate the Long-Term Safety & Efficacy of Repeat Treatments of DaxibotulinumtoxinA for Injection in Adults with Isolated Cervical Dystonia	The purpose of this study is to find out if daxibotulinumtoxinA for injection, a new investigational study drug, is safe & effective for use in adults with isolated cervical dystonia & if the effects last longer than the standard toxin treatment.
Dr. Jafar Kafaie	PXT3003 for Patients with Charcot-Marie-Tooth Disease Type 1A; a Follow-Up	This study is an international, multi-center, open-label follow-up extension study assessing the long-term safety and tolerability of PXT3003 in patients with Charcot-Marie-Tooth Disease Type 1A
Dr. Jafar Kafaie	Review of Patients with Small Fiber Neuropathy	Purpose of this study is to retrospectively review patients who were diagnosed with small fiber neuropathy. Patient demographics, clinical presentations, lab test results, and diagnostic test results will be presented. We will evaluate the factors that may affect clinical presentation and the test results that may help better diagnose small fiber neuropathy.
Dr. Lokesh Rukmangadachar	Infection risk in Multiple Sclerosis patients receiving Disease Modifying Therapies	Working in collaboration with The Advanced HEAlth Data (AHEAD) Research Institute at Saint Louis University, this study will analyze a data set of approximately 15000 MS patients across the US and investigate the real-world incidence of infection rates in MS patients and other relevant clinical outcomes.

prevent Neuro-Psychiatric illness to better the lives of the general population.

Acknowledgment

The authors would like to thank all the researchers involved in the above studies for letting us share their work. From the Souers Stroke Institute within the department of Neurology: Randall Edgell, MD; Joanna Ramiro, MD; Guillermo Linares, MD; Kara M. Christopher, MS, MPH, PhD; André Guthrie, BS, CCRP. From the department of Neurology: Lokesh Rukmangadachar, MD; Jafar Kafaie, MD, PhD; Pratap Chand, MD; Roula al-Dahhak, MD; Ghazala Hayat, MD; Eric Marin, MD.

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MM

The Astonishingly Slow Progress Towards Surgical Anesthesia

Part I

by Adam Booser, MD

Imagine...

...it is 1842 London, and you are suddenly awakened from a fevered and distressed state by several men summoned by your family to take you to one of London's public operating room theatres. You suffered a fracture one day ago, and part of your lower femur is jutting through the skin above your knee. Amputation is the only way of saving you from a horrible death. However afraid you are of that kind of death, you are equally if not more fearful of what you know is to come.

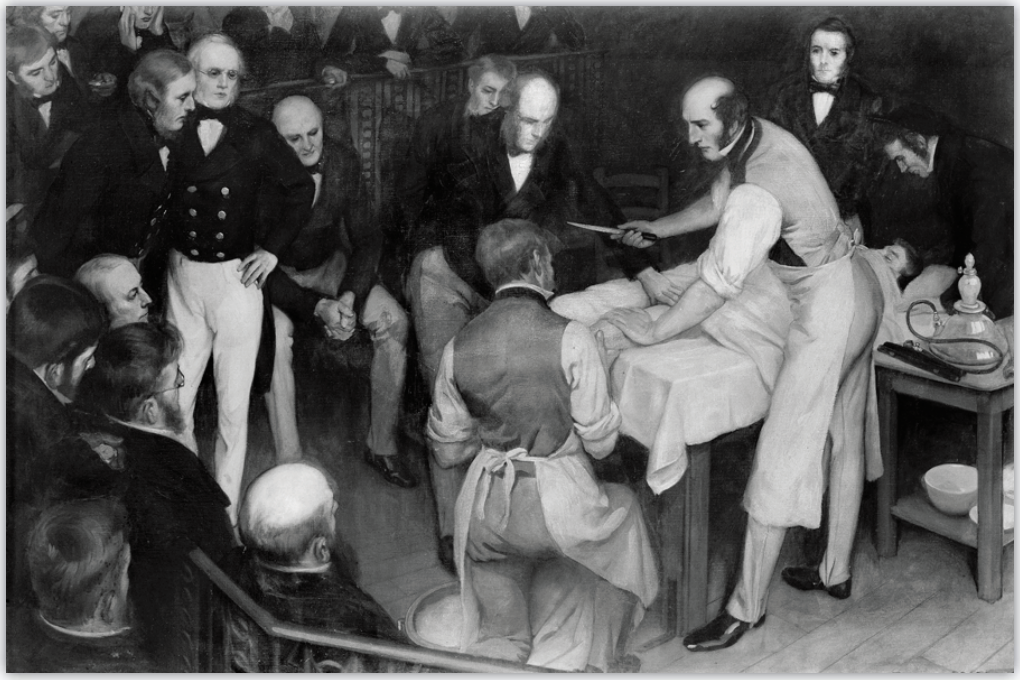
You arrive to find yourself in the center of an amphitheater surrounded by as many as two hundred spectators there to see another of the night's amputations done by the renowned surgeon Dr. Robert Liston. There is no anesthesia offered to avoid your inevitable suffering. As Liston enters the theatre dressed in his apron stiffened by other patients' blood, the audience of medical students and the public remains hushed. While students have come to learn from the renowned fastest surgeon of his time, others come to see the gore as entertainment.

Think of the unimaginable horror you would experience when observing the blood-stained surgical instruments laid out, the audience there to be regaled in your torment, and the men there to hold you down. The terror you feel causes you to fight Liston's assistants but to no avail. Liston's men overpower you, and the surgery commences as you experience the most unfathomable pain as he speedily makes deep incisions to fashion large flaps of tissue to cover the stump below your knee. Liston stops the bleeding with forceps and ligature and rapidly saws through the bone proximal to the compound fracture. He finishes by skillfully sewing up the stump left behind with no hint of aseptic concern throughout the entire operation, of course.



This was the tragic experience of countless patients throughout history before the advent of dependable and safe anesthesia. It is upsetting to find out that there were compounds available for hundreds of years before 1842 (arguably the year of the first recorded general anesthetic) that an anesthesiologist of today could have used in combination to provide adequate and safe anesthesia.

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Robert Liston operating in a surgical theatre in London. Painting by Ernest Board of Bristol 1912.

The world needed a safe and dependable state of general anesthesia to end agony during surgery and allow surgical progress to begin. That definitive discovery came in 1842 (or 1846, depending on which historical version of events one believes.) What came after is a complicated tale of three gases (ether, nitrous oxide, and chloroform), a topic that others have extensively covered. It is incredible how long it took for humanity to employ sufficient anesthesia to avert the pain, shock, and mental anguish caused by surgery.

In a paper published in 2010, Astyrakaki, Papaioannou, and Askitopoulou from the University of Crete examined the Hippocratic Collection in its original Greek and found evidence that the first physician to use the words "anesthesia" and "analgesia" in medical writing was Hippocrates himself. Incredibly, he not only defined pain's characteristics and identified opium and other hypnotic (soporific) substances to relieve pain, but he also associated analgesia with the state of anesthesia when he asserted that the "unconscious patient is insensitive to pain."[1] Hippocrates is the historical figure who liberated medicine from religion by redefining it as a science. Humanity then essentially ignored his teachings about analgesia and anesthesia for over two millennia, postponing the triumph over surgical pain.

Today, student physicians can go through their entire anesthesia residency and come away with little more than a cursory understanding of anesthesia's foundational history. Most are ignorant of how truly horrible it was during most human history for patients to undergo surgery without the techniques and drugs skillfully used by modern anesthesiologists. The discovery of dependable and safe anesthesia was one of the most monumental breakthroughs in the history of medicine. And for the 179 years that followed, the application of reliable anesthesia allowed millions to avoid suffering and death caused by surgically treatable disease and injury. The ever-improving knowledge, pharmacopeia, and anesthesia technique have permitted medical and surgical innovation, leading to surgical advances like transplantation of organs and correction of once deadly congenital heart disease.

Any empathetic person would be disturbed by reading the rare accounts of surgery on the awake patient. Stories of amputations, bladder stone removals through incisions in the perineum, and tumor excisions carried out on fully conscious screaming patients, especially children, will send a chill up the spine and cause horror thinking of those poor patients. There are descriptions and drawings of patients with tumors nearly as heavy as they were, cystic masses that had to be carried along in carts, and facial deformities that caused persistent misery all because of the fear of being conscious of the pain during surgery. People endured infections until they had to choose between surgery or certain death. Countless people must have died rather than feel the pain of the surgeon's cruel blade.

Before anesthesia, a careful selection of patients who would likely tolerate a surgical procedure, keeping a patient conscious, and the surgeon's speed were what made surgery relatively successful for that time in



Fanny Burney at age 32. Painted by her cousin Edward Francesco Burney, 1784-85 and excerpt from Francis Burney's letter to her sister about her "terrible operation."
Source: https://www.bl.uk/restoration-18th-century-literature/articles/frances-burneys-account-of-her-terrible-operation

history. Bleeding was the surgeon's enemy, and they thought anything that intoxicated a patient increased blood loss. Amputations were done at lightning speed to lessen blood loss and to reduce the risk of shock caused by extreme pain. Dr. Robert Liston was so fast that he once cut off an assistant's fingers while amputating a patient's leg. Both the assistant and the patient died of sepsis following the surgery. His rivals in London's medical community were delighted to advertise that he had killed two people with one surgery, a two hundred percent mortality rate.[2]

Witnessing surgery on the awake patient veered many potentially gifted people away from the practice of medicine altogether. As a medical student, Charles Darwin was witness to surgery without anesthesia. In 1827, he wrote in his diary: "I ... attended on two occasions the operating theatre in the hospital at Edinburgh, and saw two very bad operations, one on a child, but I rushed away before they were completed. Nor did I ever attend again ... The two cases fairly haunted me for many a long year."[3] Darwin promptly resigned from studying medicine because of what he experienced and began his education in mathematics, the classics, and theology.

There is a surprising lack of detailed descriptions of surgery's psychological impact on patients without anesthesia, especially when equated with the total number that must have suffered through history. There are even fewer descriptions of how surgeons were affected by operating on awake patients. So gruesome was surgery before dependable anesthesia that surgeons felt like they were "going to a hanging" and would often shed tears and vomit after their patients' forced torment.[4] Patients expecting surgery were like criminals awaiting their execution, counting the days, hours, and minutes before the dreaded procedure. These nightmarish experiences of patients who survived surgery and the surgeons who operated on them probably precluded any desire to record their story.

From the patient's perspective, Frances Burney (a 19th Century novelist, playwright, and diarist) authored one rare account of being awake during surgery. She wrote a letter to her sister describing the "profound evil" of her four-hour mastectomy for a painful tumor in 1811. Burney had put off the surgery she feared for years until her condition left her no choice.

She wrote: *"When the wound was made, & the instrument was withdrawn, the pain seemed undiminished, for the air that suddenly rushed into those delicate parts felt like a mass of minute but sharp & forked poniards (small dagger), that were tearing the edges of the wound — but when again I felt the instrument — describing a curve — cutting against the grain, if I may so say, while the flesh resisted in a manner so forcible as to oppose & tire the hand of the operator..." "Yet—when the dreadful steel was plunged into the breast—cutting through veins, arteries—flesh—nerves—I needed no injunctions not to restrain my cries. I began a scream that lasted unremittingly during the whole time of the incision—and I almost marvel that it rings not in my Ears still! so excruciating was the agony."*[5]

After the operation, she could not think or speak of the incident for nearly nine months; she felt so utterly sick at what had happened to her that she battled incessant headaches. Burney also wrote powerfully about the operation's terrible effect on her famous, experienced, and remarkably empathetic surgeons.

Before safe anesthesia, it is not surprising that surgeons tended to avoid intracranial, intrathoracic, and abdominal surgery for fear of profound shock, risk of death, and the unavoidable agony caused by these more complex prolonged operations. On average, only one major surgery was performed at Massachusetts General Hospital each week before the demonstration of ether in 1846.[6] Even the fastest of surgeons like Liston only did a few significant operations each week.

Western and Religious Beliefs

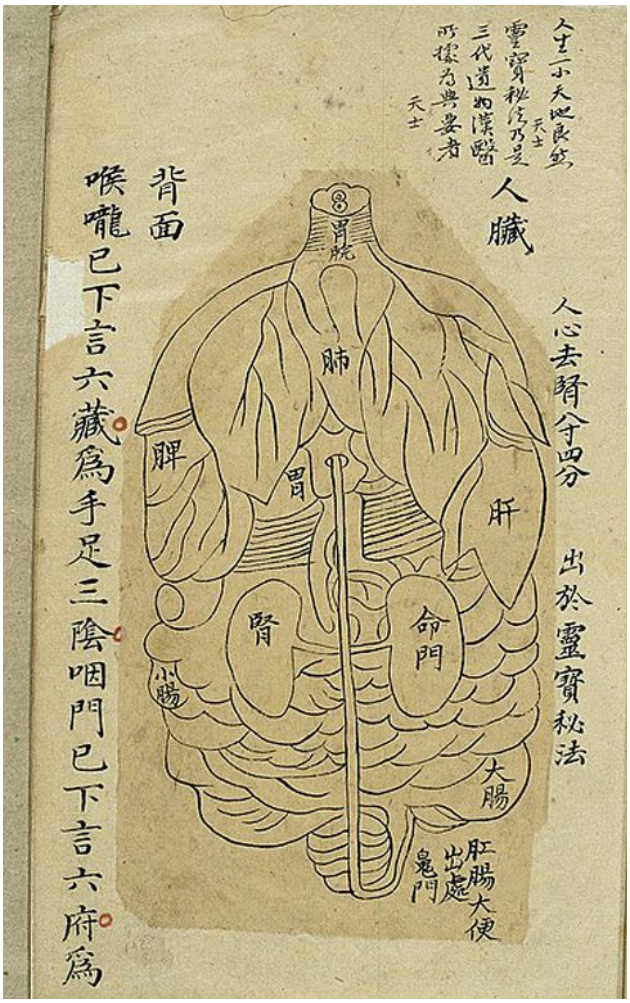
There was an erroneous yet pervasive Western view for hundreds of years before 1842 that the awake patient's stress and anguish during surgery primarily kept them alive. Surgeons felt more secure operating on conscious patients because their screams were a positive sign that they were still living. The thinking against having an unconscious surgical patient may also have come from anecdotal experience in administering too much opium or alcohol to surgical patients. Some unfortunate patients may have died secondary to respiratory arrest caused by excessive intoxication.

Religion was responsible for the false belief that surgical patients must be awake during their procedure because suffering was an Old Testament virtue. The religious doctrine of the time taught that if God meant us to suffer when injured (or operated on), we must not interfere with His plan, even if this led to excruciating and needless agony.[7] Religious doctrine significantly impacted medicine from the Middle Ages to the mid 19th century by steering thinking away from pain relief until the mid-1800s, when views changed in the West.

For thousands of years, man has known that substances like opium, the root of the mandrake (mandragora), leaves of hemlock, and certain parts of the henbane (Hyoscyamus) plant can relieve pain and cause a degree of unconsciousness. In ancient times and through the Middle Ages, physicians boiled botanicals such as those listed above into a soporific (hypnotic) sponge used as a device for inhaling its vapor. The vapor inhaled or liquid that dripped from them supposedly caused such a deep pain-free sleep to render a patient motionless during even the most painful procedures. However, historical writings provide clues that this type of anesthesia was unreliable and that the patient still had to be tied or held down for surgery. Before the development of pharmacology as a science, it was impossible to administer precise amounts of hypnotic and analgesic substances. Giving too much could kill their patients, and giving too little would lead to suffering.

It was not until 1842 that one physician made the crucial mental leap that provided a safe and dependable general anesthetic to a surgical patient. For hundreds of years before the 1840s, people knew how to synthesize ether and knew its hypnotic qualities. There was common knowledge that opium was a potent pain reliever. How did surgeons not use these substances on their surgical patients during the centuries preceding the momentous discovery starting in the 1840s? The answer to this question is complicated and enormously infuriating when one thinks of the millions that have suffered surgery without the benefit of anesthesia.

Ancient Asian medical texts contain evidence that physicians in that part of the world used herbal concoctions to relieve suffering during surgery. The individual identified with bringing surgery to China in the early third century was the legendary physician Hua T'o (c.141–208.) Before T'o's time, the Confucian doctrine that the human form was too sacred to mutilate in any way, even to save a life, prevented the development of surgery. Hua T'o was such a skilled physician that people constructed temples to honor him, and his fame and skill as a surgeon made surgery an accepted form of treatment in China for the first time. Chinese medical history also credits T'o with developing a powder that, when mixed with wine, made patients insensible to even the most ambitious surgical procedures. According to folklore, "Hua noted a wounded deer staggering to a pasture. After grazing at certain herbs, the animal seemed relieved of its discomfort. Out of curiosity Hua personally tasted several herbs and found a few that made his mouth numb." This is how he thought to have produced his pain-relieving powder. Hua T'o was not able to leave behind his formula for the herbal



Yuanmen Maijue Neizhao Tu (元門脈訣內照圖), a chart of the internal viscera and organs. Attributed to Hua Tuo, ancient Chinese Father of Surgery. Imprint of the Qing dynasty.
Source: wikipedia

anesthetic that he called mafeisan. Unfortunately, he was executed for escaping the captivity of King Ts'ao Ts'ao, whom he had been treating for chronic headache.[8] It is impossible to verify that his concoction worked or that it was dependably safe. It was unlikely that mafeisan perform like a genuine general anesthetic considering what compounds were available during T'o's time and location. His legendary skill as a surgeon survived through history, but the recipe for his miraculous powder did not.

Sweet Oil of Vitriol

It is a misconception that ether miraculously appeared when physician Crawford Long used it in the first general anesthetic recorded in 1842. For all its historical significance in medicine, ether is an easy compound to produce and was made for over five hundred years. In the thirteenth century, a Spanish mystic and philosopher named Raymond Lully was the first to make ether and describe it (Sweet Oil of Vitriol). He, in all probability, discovered it after spilling sulfuric acid into wine with high alcohol content. However, he did not recognize its anesthetic effects.[9]

Valerius Cordus (1515-1544) and Paracelsus (1493-1541) are the two figures that historians give simultaneous credit for studying ether as a chemical compound with medicinal value.

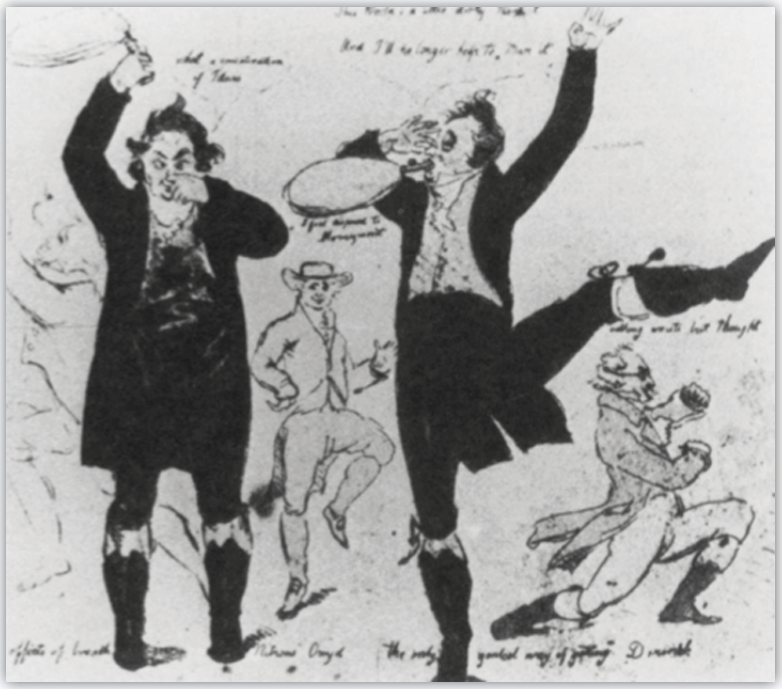
The Nuremberg physician and botanist Valerius Cordus was the first to record a precise method of preparing ether in his book written in 1561, "De Artificiosis Extractionibus." His recipe was to combine sulfuric acid, called sour vitriol, with "strong, very biting thrice purified wine" (wine with very high alcohol content).[10] Cordus wrote about the physiological effects of ether and proposed some possible medical uses, such as an expectorant of mucus. Curiously, he also did not uncover ether's anesthetic qualities. He is, however, the first to describe using ether as a recreational drug.

The Swiss alchemist, physician, and the first real toxicologist Philippus Aureolus Theophrastus Bombastus von Hohenheim, known as Paracelsus, documented his method of distilling ether and his use of it on animals at around the same time as Cordus. His writings show that he realized some of its anesthetic and pain-relieving qualities.[11] Paracelsus documented that he succeeded in anesthetizing chickens by mixing ether with their feed. He is given credit for being the first known person to identify the anesthetic properties of ether. Frustratingly, he had no triumphant moment where he understood the benefit that ether could have for surgical patients.

Ether (or Aether) was given its name in 1730 by August Sigmund Frobenius, a German chemist. He demonstrated its various properties to the Royal Society in 1730.[12] Eighteenth-century chemists used ether in many ways, such as extracting essential oils from plants and separating gold from copper. Frobenius's method of ether production was supposedly the same recipe used by Isaac Newton. It seems that even the renowned intellect of Sir Isaac Newton, who dabbled a bit in chemistry, could not make the mental leap that would have linked ether's anesthetic effects to use on patients during surgery.

Before 1842, physicians used ether in many ways other than for anesthesia. Ether became a treatment for various maladies, including arthritic and rheumatological diseases, digestive disorders, and respiratory ailments. Some physicians advised patients to ingest two teaspoons of liquid ether per day to calm "nervous" conditions. Others treated headaches by having liquid ether rubbed into patients' temples, and other physicians wanted their patients to inhale ether.[10]

In 1821, during a lecture by Benjamin Collins Brodie for the Royal College of Surgeons of England, he placed a jar containing ether over a guinea pig. For twelve minutes, it appeared dead, not moving. He then lifted the jar and revived the animal with artificial respiration to the astonishment of the audience.[13] Not one physician that observed this demonstration is known to have grasped ether's potential value for patients having surgery.



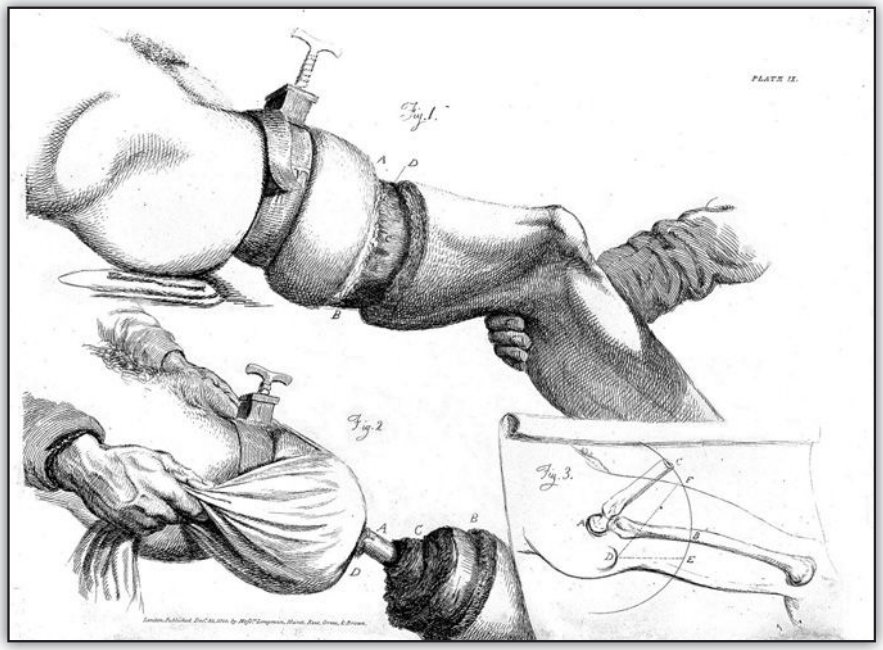
Caricature of nitrous oxide (ether) frolics. 1808.
Source: http://susanbuckmorss.info/text/aesthetics-and-anaesthetics-part-ii/

Dr. Crawford Long, a physician in Jefferson, Georgia, utilized ether as an anesthetic for the first recorded time and excised a tumorous growth off his patient James M. Venable's neck.[14] Mr. Venable, who felt nothing during the successful operation, was already accustomed to ether because of his experience inhaling it at parties with others who wanted to feel its stimulating effects. They called these gatherings the "ether frolics," a common form of amusement in the mid-1800s. As detailed in a dental journal about that time: "There was hardly ever a gathering of young people that did not wind up with an ether frolic…. Some would laugh, some cry, some fight, and some dance, just as when nitrous oxide is inhaled." [15]

Dr. Long noticed that when he and his acquaintances emerged from their intoxication, they would often have evidence on their bodies of injuries from falling that they had not felt and did not remember. He and his patient Venable must have determined that because it seemed safe enough to use as a form of entertainment and appeared to have the ability to cause a pain-free and unconscious state, they should make use of ether while Dr. Long operated on him. Long did not seem to appreciate the significance of his accomplishment. Despite using it successfully a few other times before 1846, he did not announce his discovery to the medical community until 1849. Four years after Long used ether on his first anesthetized patient, other famous physician-scientists took credit for its first use. It is even more tragic because ether was available in apparent abundance at the time. For four years after ether's successful use as a general anesthetic in 1842, patients had to suffer through surgery conscious because of Long's lack of insight into his discovery's impact on medicine.

Laughing Gas

The history of nitrous oxide "laughing gas" is also a story of a missed opportunity given the length of time people knew of its anesthetic characteristics before its demonstration as a potential anesthetic. It, like ether, was used as a form of entertainment long before the discovery of its medical utility. Joseph Priestley, a minister with no scientific education but thought of as the father of the modern scientific study of gases, described nitrous oxide gas in 1772 and isolated oxygen in 1774.[16] Humphrey Davy, a 20-year-old Superintendent of Experiments at the prestigious Pneumatic Institution in England and former surgeon's assistant, was the first to experiment with nitrous oxide



Amputation of the Thigh. Sir Charles Bell, 1820.
Source: https://dirtysexyhistory.com/2016/07/17/the-age-of-agony-surgery-in-the-19th-century/

in 1795. He realized its intoxicating and pain-relieving qualities in his experiments and when he used it on himself for dental pain. He stated that "as nitrous oxide in its extensive operation appears capable of destroying physical pain, it may probably be used with advantage during surgical operations in which no great effusion of blood takes place." [17] For some inexplicable reason, even though expertly published by one of England's most outstanding minds at the time, Davy's words on nitrous oxide were ignored by the medical community that denied a necessary treatment for surgical suffering for decades. Although not sufficient as a general anesthetic by itself as we understand today, it certainly would have offered safe and considerable respite from surgery's pain.

Other delayed great discoveries in science and medicine throughout human history resulted from cultural prejudice, religious doctrine, or the pure lack of the development of scientific analysis. However, only a small number of them had as many opportunities laid out for great minds to connect discovery with advancement for humanity, as seen with the development of safe and dependable general anesthesia. Even fewer delayed discoveries led to such an unfortunate impact on so many lives throughout history.

Going back to the imagined amputation Liston was performing on you, think of the relief you would feel if there was an anesthesiologist present. This physician was to administer ether plus nitrous oxide to you for the procedure. You knew it was safe and effective at preventing agony from amputation. Now you need only be concerned about postoperative pain and infection, other complications requiring medical breakthroughs.

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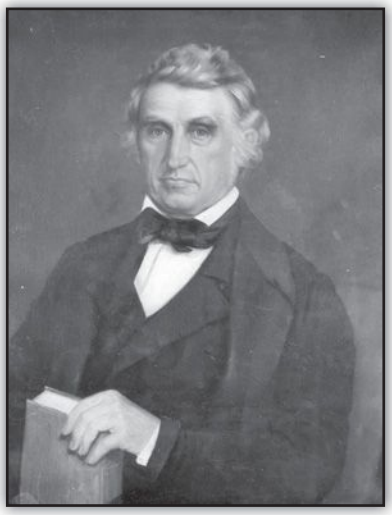
Editor's Note

Part II of the History of Anesthesia will continue in a future edition of *Missouri Medicine*. **MM**

Dr. William Beaumont: Founding Father of Gastroenterology

by Arthur Gale, MD

Early SLMMS president also was outspoken critic of false expert witness testimony.



To commemorate the 175th anniversary of the St. Louis Metropolitan Medical Society, we remember the world's first great experimental gastroenterologist, Dr. William Beaumont. Most physicians are unaware that after his groundbreaking experiments on digestion when he was an army surgeon in Michigan, Beaumont moved to St. Louis where he had a successful medical and surgical practice and was elected president of the St. Louis Medical Society.

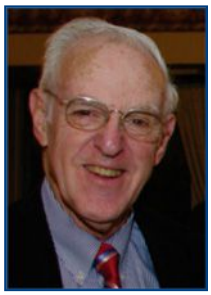
Beaumont was born in 1785 in Connecticut. Thomas Jefferson, John Adams and other founding fathers of our country were still alive when he started medical practice, which was quite primitive at that time. As was often the custom of the day, his entire training consisted of a two-year apprenticeship to a practicing physician. He had no formal training in chemistry, physics or science, which makes his later accomplishments all the more remarkable.

Beaumont became an army surgeon. His future fame rested on a chance medical encounter with Alexis St. Martin, an illiterate worker who was accidentally shot in the chest by a musket. Beaumont attended to the patient within a half hour of the injury. St. Martin's left lung and stomach had prolapsed into the wound. The stomach had been perforated by a spicule of rib. Beaumont gave a fatal prognosis but nevertheless did everything possible to save his patient's life, dressing the wound on a daily basis. To his astonishment, St. Martin survived. His lung sloughed. He developed a gastric fistula, which Beaumont was unable to close. The fistula was large enough for Beaumont to insert his entire forefinger into St. Martin's stomach. Food and drink constantly extruded unless prevented by a compress and bandage. The fistula persisted until St. Martin's death at age 86.

The most amazing thing about Beaumont's experiments on St. Martin is that they occurred at all. Beaumont had minimal medical training. He was not tutored in the scientific method. He was apparently motivated solely by scientific curiosity. He undertook his research at his own expense. Although he petitioned the government for financial support, he received none. Nor did he receive financial support from any other source. He performed his laborious experiments over a period of eight years from 1825 to 1833. In return for letting Beaumont in and out of his stomach, St. Martin was to get board, lodging and about $150 a year. He also performed some odd jobs for Beaumont. A legal contract sealed the agreement.

Beaumont measured gastric secretion and the digestion of various foods that he tied to a silk string that he would insert into the stomach through the fistula. He even studied the effects of emotions on digestion. He kept meticulous records of his experiments, which still exist. He sent samples to university chemistry laboratories at Virginia, Yale and Stockholm, which confirmed his view that the main active constituent of gastric juice was hydrochloric acid.

Beaumont published a book in 1833 titled Experiments and Observations on the Gastric Juice and the Physiology of Digestion. His book immediately received international acclaim. Because the book was held in such high esteem, it was reprinted in 1929 for distribution at the first physiological congress to be convened in the Americas and distributed to the members along with a medallion of its author.



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Beaumont's Career in St. Louis

After serving in the Michigan Territory, Beaumont was transferred to Jefferson Barracks in St. Louis. He invited St. Martin to continue the experiments in St. Louis. However, a visit could not be arranged and they never saw each other again. Beaumont eventually resigned from the army and developed a lucrative private medical and surgical practice. He became a good friend of Lt. Robert E. Lee who was stationed at Jefferson Barracks at the time.

In 1840, Beaumont was one of three physicians who treated a man who had been attacked and beaten on the head with an iron cane. The patient died and the assailant was tried for murder. The attorney for the defense contended that the operation performed by Dr. Beaumont, which was approved by both of the other treating physicians, and not the blows to the head, caused the patient's death. Three local physicians who had not seen the patient testified against Beaumont.

In 1841, Beaumont was elected president of the St. Louis Medical Society. He was furious at the doctors who, in his opinion, had testified falsely against him. In his inaugural address he delivered a scathing denunciation of these physicians and their supporters. Parts of his speech, which were printed in the St. Louis Centennial Volume, are excerpted below:

"… But not until the admission into the Society and development of some pernicious influences, emanating from that anomalous assemblage of discontented spirits, deceived strangers and duped imbeciles … in 1839 were the seeds of discord introduced amongst us. Yet since that time we have witnessed little else at our meetings than one continual series of strife, jargon, and confusion—angry debate, personal invective, and total disregard of the honor, interest, or reputation of the society.

"Does not gratuitous swearing or rank perjury before courts of law, designed to screen a murderer from punishment, and blacken the characters and blast the fair reputation of honest and honorable members of the profession, go unpunished. … Have we not the degrading instance in this city of medical men, claiming to be respectable in the profession, conspiring to afford collusive testimony to the public tribunal, discreditable and damning even to themselves, with evident malicious design and dishonest intent to debase the medical character of this community, injure individual reputations, pervert justice, rob the gallows and subvert the best moral principles of society? Can we not discern green-eyed jealousy, envy, and disgusting arrogance disseminating baneful influence among us?"

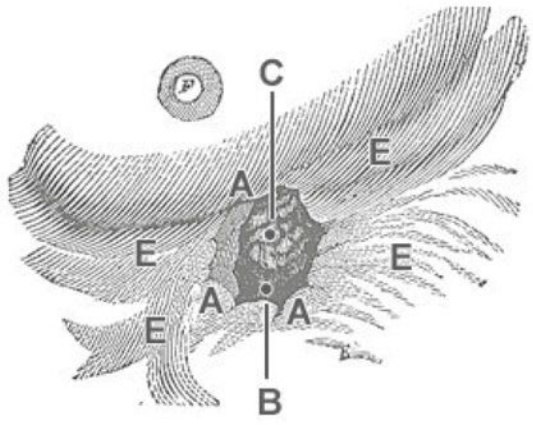


Diagram of Alexis St. Martin's wound from Dr. Beaumont's book, *Experiments and Observations on the Gastric Juice and the Physiology of Digestion* - Published in 1833
"This engraving represents the appearance of the aperture with the valve depressed."

Later, Beaumont was the object of a malpractice suit in which a patient developed a fecal fistula following an appendectomy. Beaumont was not present and had no connection with the operation, but was called in for one consultation. In those days the law disqualified a party of record from testifying at the trial. Beaumont was sued jointly with the operating surgeon so as to deprive the defense of his testimony in court. The jury exonerated Beaumont and the surgeon. But again a vicious war of words ensued within the St. Louis Medical Society. Apparently this was the final straw. Beaumont resigned from the Society never to return.

Over time, members of the St. Louis Medical Society recognized the importance of Beaumont's pioneering research. One member of the Society, Jesse Meyer, MD, wrote a biography of Beaumont. At the 100th anniversary of the Society, four physicians gave lectures about his career. They lamented that although Beaumont had become internationally famous and was considered to be the world's first experimental gastroenterologist, St. Louis—the city where he practiced medicine and surgery, the city he called home and where he was buried—had not seen fit to honor him with a monument describing his contributions or even, for that matter, a lectureship. This oversight continues to the present day. Hopefully it will be corrected in the future.

Editor's Note

This article is reprinted with permission from the *St. Louis Metropolitan Medicine* magazine. The St. Louis Metropolitan Medical Society was founded in 1836. **MM**

HISTORY IN THE MAKING

American Medical Association Alliance 1922-2022



Alliance members came from across the nation to the City of St. Louis October 9-10 representing both North Central Region states as well as board members of the American Medical Association Alliance including President Heather Rifkin (MS), President Elect Jacqueline Nguyen (NV), Dave Street, Treasurer (GA), Grace Wellman, Director Events (SD), Karen Begrow, Director Membership (MI), and Beth Irish Director Programs (OR).

In honor of the AMA Alliance's 100th Anniversary, the group met at Missouri Botanical Garden near the original site where the Alliance was created nearly 100 years ago in 1922. Sue Ann Greco, AMA Alliance, MSMA Alliance, and St. Louis Metro Alliance Past President, stood at the steps of the Tower Grove House in the Botanical Garden and re-enacted the speech that Mrs. Samuel Clark Red of Houston gave the women in May 1922 to establish an Auxiliary to the American Medical Association that was convening in St. Louis at the time.



Leadership during the North Central Regional Meeting included, from left: World Medical Association Immediate Past President David O. Barbe, MD; Heather Rifkin, AMA Alliance President; Barbara Hover, MSMA Alliance President, and Alexander Hover, MD, MSMA President.

The place is St. Louis, Missouri; the date, Wednesday, May 24, 1922. The meeting of the American Medical Association House of Delegates is in progress. Dr. Edward H. Cary, of Dallas, Texas, requests the floor and presents the following resolution, prepared by the Woman's Auxiliary to the State Medical Association of Texas, of which Mrs. Samuel Clark Red of Houston is president:

"The Woman's Auxiliary to the State Medical Association of Texas respectfully requests the approval of the American Medical Association of a movement to organize a Woman's Auxiliary to the American Medical Association the object of which shall be, To extend the aims of the medical profession through the wives of doctors to the various women's organizations which look to the advancement in health and education, to assist in entertaining at all medical conventions and to promote acquaintanceship among doctors' families so that closer fellowship may exist."

Discussion of the resolution follows. It is stated, "The present plan does not appear to involve any financial or other obligation on the part of this association." The resolution is approved. With Mrs. Willard Bartlett of Missouri as chairman of the Ladies' committee, it was arranged that Mrs. Red address the 200 wives who had accompanied their husbands to the convention at a dinner-musicale. Mrs. Red announced an organizational meeting for the next morning, Thursday, May 25, in the Palm House of the Missouri Botanical Garden. The weather did not cooperate with the plans and, as a result of rain, many visitors took cover near the entrance of the garden. This made Mrs. Red's task extremely difficult. Undaunted, Mrs. Branford Lewis, chairman of the morning, assisted



The Palm House at the Missouri Botanical Garden 1917.

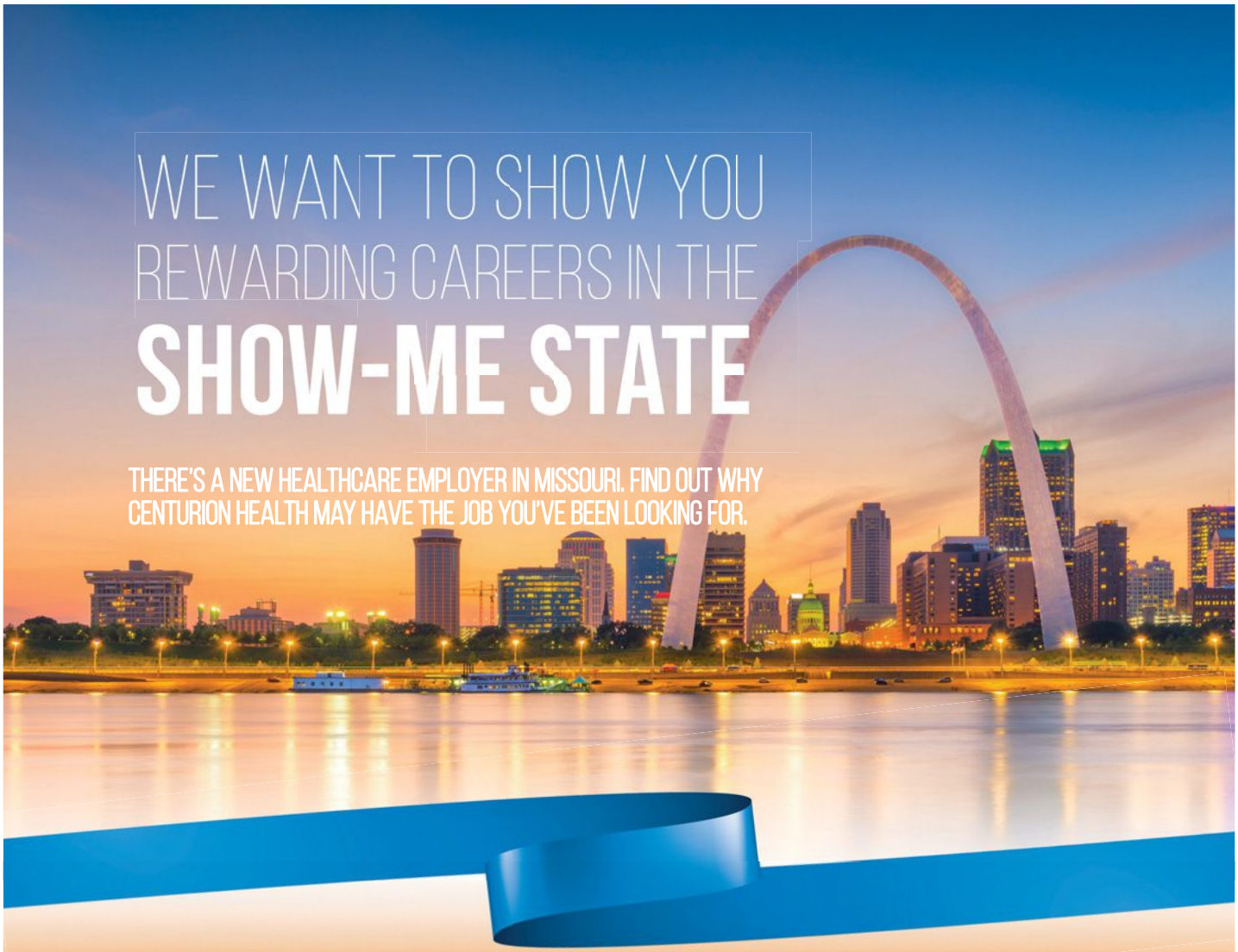
Mrs. Red to the nearby steps, raised a megaphone to her lips, and presented the enthusiastic Mrs. Red to the group. Despite the awkward circumstances, her message was heard by the visitors and all were urged to attend an organizational meeting on the following morning, Friday, May 26, at the Statler Hotel.

Thus in St. Louis on that Friday morning, with 23 women from 10 states present, the infant Women's Auxiliary to the American Medical Association was born. Shortly thereafter Mrs. Red wrote to the Presidents of the State Medical Societies, asking that a State Auxiliary in each be organized. Eighteen responded with encouragement. Each state was asked to send two delegates to the first annual meeting in San Francisco: Colorado, Virginia, South Carolina, Alabama, Texas, Mississippi, Utah, Nevada, Arizona, Louisiana, Tennessee, Kentucky, Missouri, Montana, Idaho, and Minnesota.

Inaugural Officers of the AMA Auxiliary

- President, Mrs. S.C. Red, Houston, Texas
- First Vice President, Mrs. W.W. Graves, St. Louis Missouri
- Second Vice President, Mrs. Southgate Leigh, Norfolk,Virginia
- Third Vice President, Mrs. Ray Lyman Wilbur, Palo Alto, California
- Recording Secretary, Mrs. W.A. Wood, Waco, Texas
- Corresponding Secretary, Mrs. H.L. D. Kirkham, Houston, Texas
- Treasurer, Mrs. Walter Timme, New York
- Parliamentarian, Mrs. A.C. Scott, Temple, Texas

Copy excerpted from "The First Twelve Years" 1922-1934, Woman's Auxiliary to the American Medical Association, The Right Side of the Caduceus, The First Fifty Years, 1922-1979, and American Medical Association Bulletin. Graphics from Missouri Botanical Garden website.



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A Dirge for Academic Medicine: Combined Effects of the COVID-19 Pandemic and Private Equity Acquisitions

by Philip G. Boysen, MD, Katherine Cox, MD & Gary Hearns, MD

The invasion of private equity into healthcare portends deleterious paradigm shifts in academic medicine.

This essay aims to make two points. Firstly, the practice of academic medicine has been eroding for decades due to legal and legislative changes. Secondly, the decline has been accelerated by two recent and ongoing phenomena, the COVID-19 viral pandemic and private equity acquisitions. Alone and in combination these two forces will exert a profound, long-lasting, and probably permanent effect on academic medicine and medical education.

For purposes of our discussion, we will define a 'corporation' as a group of people acting legally as a single person, as opposed as an institution, organization, or association. In a private equity acquisition, a fund "acquires" a company using a combination of debt and equity for the purchase price. It differs from merger which is a voluntary combination of two companies. The new owner can substitute a new vision (and usually does) replacing the vision of the founder(s), expand into other markets, and make decisions resulting in lucrative short-term gains.

Legislative and Legal Decisions

Although not originally a tort involving medical practice or the medical profession, the Goldfarb Virginia State Bar, rendered in 1975, opined that medicine and law were not professions, but transactional commodities, and as commodities fell under the purview of the Federal Trade Commission (FTC).[1] The FTC sued the American Medical Association (AMA), charging that the AMA Code of Ethics was no more than a restraint of trade. After years of legal battles, during which the AMA lost every round, the decision was upheld by the Supreme Court, with not a single dissenting Justice, and thus no minority opinion.

The language of medicine changed rapidly to the language of business.[2] No longer considered professionals, basing charges on usual and customary fee-for-service, physicians were reduced to a "provider" of a commodity, and an employee of a corporation. A commodity can be defined, packaged, and priced. Fee-for-service, the bedrock of the physician-patient relationship was replaced by relative value units.[3] What followed was the meteoric rise of corporate medicine as predicted by Professor Regina Herzinger in 1997 and documented in 2007.[4,5] Corporations began to purchase practices and hospitals, absorbing physicians as employees. In a very real sense, it was a corporate effort to obtain market share and eliminate competition, despite losing money on each practice acquisition.[6]

The changes in physician payment imposed by the Center for Medicare and Medicaid Medical Services (CMS) had an impact on all physicians, but the "teaching physician" bore an additional burden. On every bill submitted to CMS for services rendered, the teaching physician has to attest that no teaching time was included in the submitted bill. The position taken by CMS that physician teaching time was already paid for and reimbursed through GME Medicare tax support is ludicrous, since these monies flow to the hospital with no guarantee or mandate of pass-through to the physicians rendering care.



Philip G. Boysen, MD, MBA, FACP, (left), is Professor and Vice Chair, Department of Anesthesiology, University of Mississippi Medical Center, Jackson, Mississippi. Katherine Cox, MD, is Assistant Professor and Program Director, Department of Anesthesiology, and Gary Haynes, MD, PhD, is Professor and Chair, Department of Anesthesiology; both are at Tulane University School of Medicine, New Orleans, Louisiana.

The legal decision to deny medical practitioners as professionals had an impact on medical practice and education. In 1998, George Sheldon, MD, focused on professionalism in his presidential address to the American College of Surgeons.[7] His address was the result of participation in a two-year long consortium which identified five elements of professionalism, 1) altruism; 2) special education, training, and a high degree of knowledge; 3) ability to apply that knowledge; 4) autonomy, or the right to self-regulate; and 5) development and adherence to a body of ethics. Dr. Sheldon concluded that the "body of ethics" and its evolution is the single differentiating feature of a profession from other occupations. Clearly this was a consideration of the FTC to sue the AMA and its Code of Ethics. In 1999 the American Council for Graduate Medical Education (ACGME) implemented the six Core Competencies, one of which is professionalism. However, how to teach it, assess and measure it, and model it is difficult, because of the complexity of the issue.[8] Ethics and professionalism must be promoted at all stages of medical education and practice. The academic physician is critical to this endeavor due to a direct relationship with medical students and resident physicians.[9] In the face of a diminishing number of academic physicians, medical school enrollments are increasing dramatically.[10]

The Status of Academic Physicians Circa 1981

Robert Petersdorf, MD, a past president of the Association of American Medical Colleges, and an early promoter of diversity, described the academic physicians of the past as a caricature, noting that they were mainly "white, male, and independently wealthy," a situation that should not, and could not, continue.[11] The same year the New York Academy of Medicine published the proceedings of their Committee on Medical Education and expressed concern about the diminishing number of clinical investigators.[12] They described the clinical investigator as the conduit between patient care at the bedside and the research of basic science. At the same time these physicians served as role models, stimulating medical students, resident physicians, and fellows to "perpetuate the species."

Petersdorf quoted data on current income from private physicians across specialties versus their colleagues in academic medicine. Noting lower compensation for the academicians, he identified the draw for the teaching environment and the opportunity for clinical research in academic medical practice. He also noted that the academic physicians of the time had "substantial fringe benefits." Among the benefits he described were retirement plans, which included both personal contributions and matching contributions from the hospital or university, medical insurance and disability insurance were also provided. There was support for society dues, travel to meetings, and reimbursement for the cost of journal subscriptions and books. Later in his analysis, Petersdorf refers to the "exceptional security in the form of academic tenure," and the "travel to meetings and visiting professorships add spice to the academic physician's existence." A final comment was a warning that clinical income flowing to academic physician compensation changes expectations and time allocation, minimizing time and resources for academic pursuits.

The exceptional security for an academic physician is gone. For current Deans, NIH money is the coin of the realm. The letter offering a position to the newly minted academic physician explicitly informs of a non-tenure accruing position, and a year-to-year contract. Tenure granted to a successful investigator can be reviewed and rescinded at any time, and loss of grant support initiates an immediate review.

The COVID Pandemic and the Academic Physician

A decline in revenue at the onset of the pandemic was immediately disruptive. There was no CPT code for COVID-19 as yet, and there was a mandate to suspend elective procedures. The result was an immediate response by Academic Health Centers to trim expenditures:

- A reduction in force, including front line professionals addressing the COVID-19 patient volume;
- Pay cuts for all personnel whose employment was not terminated;
- Program elimination and unfilled or "floating" vacancies;
- Increased patient care loads, higher teaching load, increased clinical time assignments;
- Reduced employer contribution to retirement plans;
- Elimination of merit, cost-of-living, and promotional raises;

- Elimination of funding for travel, visiting professorships, CME, and professional development;
- Limited access to office space, technical support, printing, and other resources.

The list of adjustments reads very much like the list Petersdorf offered as reasons why a physician would pursue an academic career. Both job security and fringe benefits are gone and there is no guarantee, or likelihood, of return. Even before the pandemic, the academic physician had only to review his or her pay slip to discover the true status and benefit of the "fringe benefits." Premiums for health care and disability are deducted from the pay check. The premiums are at a reduced rate, but corporate medicine has an imbedded caveat. The coverage for health care only exists within the extended practice plan. Out-of-network health also means out-of-pocket, and co-pay is nil. Disability coverage is outsourced, and the chosen company can decide not to provide coverage to an individual or cancel it. This means that if a physician is terminated, so are all of the benefits at that exact moment. COBRA provides short term coverage, which is helpful while seeking another position, but extremely expensive.

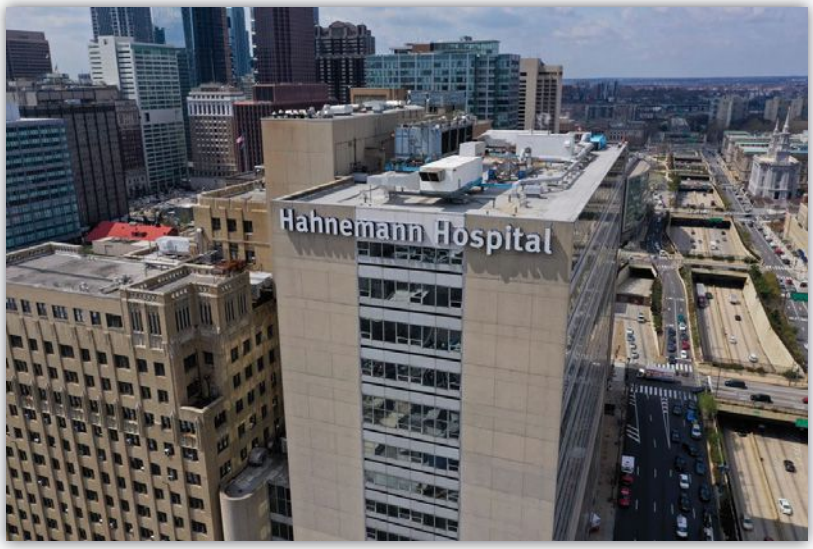


Figure 1. A primary example of the invasion of private equity acquisition into health care is the demise of Hahnemann Teaching Hospital in Philadelphia.

Teaching and learning also suffered. The loss of elective procedures meant loss of opportunity to teach face-to-face or in small groups. Dynamic in-person interactions for seminars, grand rounds, and other didactics were replaced by a nearly universal shift to virtual instruction. Presentations, such as grand rounds, remained in cavernous auditoriums with social distancing separating participants, bans on small group work, and presenters riveted in place in front of a laptop screen. Not every student or resident has a laptop, and many participants have computers that do not have a camera for full participation. Without resources and coordination, the resulting "ZOOM is DOOM" attitude prevailed.

Corporate and Private Equity Acquisitions

Corporate medicine focuses on both horizontal and vertical expansion to dominate health care markets. An example of horizontal expansion is the purchase of medical practices, hospitals, extended care facilities, and free-standing clinics. Vertical expansion focuses on gaining control of medical education, and for physicians that involves acquiring medical schools, and post-graduate medical education, making corporate acquisition of teaching hospitals a priority. The end goal of controlling medical education, eliminating possible role models and private practice options, is ensuring a pipeline of employed physicians that are not exposed to, or aware of, other options. For example, the Hospital Corporation of America (HCA) proudly announced on their website successfully matching 1,456 residents and fellows to their 30 academic health centers in 2019, noting that HCA now employs 3,900 residents and fellows and are now the largest "supporters" of graduate medical education in the US.[13] In 2016, HCA announced an affiliation with the University of Central Florida forming an agreement to build a teaching hospital, another positive step to control medical student education.[14]

Of even more concern is the invasion of private equity acquisition into health care. Merger in medicine is oriented toward voluntary agreements, whereas private equity acquisition in an involuntary takeover and the hospital purchase leverages investments in other markets such as real estate.[15] A primary example is the demise of Hahnemann Teaching Hospital in Philadelphia (Figure 1). Hahnemann and Medical



Figure 2. The Hahnemann acquisition put 2,500 employees out of work, and 574 residents and fellows in terminated programs.

College of Pennsylvania had joined forces and became the teaching hospitals of Drexel School of Medicine.[16,17] Tenet Healthcare found Hahnemann an attractive purchase and took control dismissing the Dean and Department Chairs. The investment was a financial failure and they sold everything to American Academic Health Care (AAHC), a private equity acquisition firm, in 2018 following a $15 million loss in 2017.

In short order the new owners declared bankruptcy and gave notice of intent to close the hospital, citing lack of support from the city of Philadelphia and the state of Pennsylvania. The result was the loss of a hospital of last resort, a safety net hospital, for the citizens of the city. The acquisition and takeover were a prelude to a legal separation of the hospital buildings, medical office buildings, parking garages, and even GME resident slots, from the operational business. D'Mello writes, "The way the hospital was closed not only defied regulatory attempts at protecting the community but also defied the values of healthcare workers working in the hospital."[18] This acquisition put 2,500 employees out of work, and 574 residents and fellows in terminated programs (Figure 2). The city of Philadelphia lost a safety net hospital.

Zhu et al.[19] likened the private equity acquisitions in medicine to a "new predator introduced into an ecosystem of lizards." While we continue our concern for patient safety, quality of care, equity in patient access, and other issues, the introduction of private equity acquisition will have a negative effect on all medical practices and specialties.[20]

The Academic Health Centers

In August of 2020, a quartet of experienced and senior academic Deans collaborated to study the financial impact on Academic Health Centers (AHCs). They began by restating the vulnerability of the of the AHC and academic physicians due to reliance on clinical income.[21] They reviewed the decision of Moody's Investment Service, a bond rating credit agency, important to the AHC since many of them financed expansion by issuing bonds. Early in the course of the pandemic, March 2020, Moody's downgraded the bonds issued by public and not-for-profit hospitals. Reasons cited for the downgrade included, 1) decreased revenue due to cessation of elective procedures and other profitable services; 2) increased expenses, higher staffing and supply costs; 3) initial lack of a DRG for COVID-19 patients; and 4) increased utilization of expensive ICU care.

The impact of the pandemic on the AHC and the population they serve, did not go unnoticed as many of the AHCs are safety net hospitals. Suspension of elective procedures meant sudden death for many critical access hospitals in rural areas, since these hospitals had one week or less of expenses in reserve. Rising unemployment and loss of health care benefits also increased the number of non-paying patients being transferred to AHCs.

Colendas et al. [21] opined that the majority of AHCs would survive the pandemic crisis, adding that those with strong operating cash flow, margins, and sufficient cash on hand will fare better. The comment favors the AHCs that have been engulfed by corporate health systems, the reason for "corporate creep" into our public and state supported AHCs. In one heavily populated state there is not a single surviving state supported hospital, and converting one of the state hospitals to a not-for- profit resulted in a decision not to accept Medicaid patients.

Structural organizational changes are ongoing. The classic model had a CEO who managed the hospital and a medical school Dean who led the

academic physicians, the physician practice plan, and medical school. The leadership dyad was effective for many years. Many academic physician practice plans have ceased to exist. In the integrated health care organization, a single individual bears both titles, Dean and CEO, and additional titles as well.

Many AHCs follow the corporate agenda. Salaries for front line personnel are compressed, understaffing is the norm, highly paid executives stifle competition, form monopolies, build huge cash reserves, and develop extensive advertising programs. While many AHCs will survive, the academic physician will not fare so well, except for those in a small number of well -established programs with NIH funding and cash reserves. The remainder will train apprentices to serve the corporate master, depending on computer-based learning. Corporate medicine will continue to be "unapologetically oriented to productivity," defined as directly billable patient care, dismissing the process of discovery through clinical research, teaching, and other scholarship venues.

The New Normal of Medical Teaching: Digital Tools

"Academia, typically a steady, slow-moving river, has wrestled powerful course-altering rapids over the last 18 months. In that time, we have re-imagined how physical campuses, executive education, and study abroad programs look, feel, and function." So reads an advertisement for a course in the *Harvard Business Review* in referring to the pandemic.

Recently a course offered by the Kellogg School of Management of Northwestern University presented a course that registered more than 4,000 attendees. Presenters were simultaneously on four different continents while presenting to a global audience. Speakers are now able to have visible holographic presence during presentations, providing an electronic in-person classroom.

The academic physician is at a distinct disadvantage compared to academic colleagues in other disciplines: the economic response to the pandemic reduced the number of academic physicians and those remaining experienced increased clinical workloads.

For most academic faculties there are less than 10% with the academic rank of full professor, a preponderance of assistant professors. The rank of associate professors is vacant, a long and steady downturn even before the pandemic.

In 1981 it was possible to write a report on 14 patients and publish in a first line journal. Now it is necessary to publish with numbers in the hundreds, even thousands of patients. In this regard the electronic medical record software has not delivered on research. De-identified, scrambled data can improve practice-based learning.

Of the digital learning techniques currently available, we discount LMS (a compliance tool, not an educational base), task trainers (individual learning and hand-eye coordination), high fidelity simulation (too expensive, requires de-briefing space and personnel), as having major impact.

Two viable digital resources remain and should be utilized, especially in a combined approach. Hybrid classrooms combine in-person learning with other learners on-line. The flipped classroom provides learners with material to study in advance of the session. There is no lecture per se, but a discussion group guided by the teacher who ensures the topic is adequately covered. This technique of teaching and learning provides for spaced learning and cognitive retrieval. In order to gain the teaching skill, it is helpful to record sessions to de-brief the presenter.

Teaching in the hybrid space is also an acquired skill. Building an inclusive virtual classroom is a challenge. It is difficult not to revert to the familiar.[22] In addition to synchronous learning, recorded sessions can be reviewed to verify content quality, thus providing asynchronous learning and building curated content to promote individual and collective learning.

Investment of time dedicated to improving presentations for digital learning will be rewarding. Simple efforts make a big difference, such as raising your laptop to eye level and looking straight at the camera, improving learner involvement, and pre-session communication.[23] However, some experts in the field insist that the camera and the microphone on laptops are inadequate and advise purchasing a separate microphone and camera with tripod to improve quality. With a minimal expenditure for equipment, one can expand the presenter's image below the clavicles with a vast improvement in body language which also improves learner engagement.[23]

Moore gives a complete review of online learning over 30 years.[24] Just the suggestions for building slides and his advice to avoid cognitive overload are guidelines for marked improvement. Previously he identified 12 research-based principles to provide

computer-based instruction and promote academic learning.[25] Whether digital teaching is viewed by ACGME as scholarship is yet to be seen. The designation "academic physician" and "teaching physician" are not equivalent, the latter term being an invention of CMS. In addition to teaching, the expectation of clinical research has been the foundation for physicians to advance through the academic ranks. Young aspiring academic physicians are well advised to publish case reports, a meta-analysis, or manuscripts in journals with a PubMed ID number.

NIH Institutional Training Grants (requiring 75% of time commitment to research) should be targeted by academic practices that can support these grants. It should be a priority to identify qualified and motivated young physicians and aggressively pursue this funding mechanism.

Conclusion

At its core, academic medicine is a human-to-human interaction; it combines interaction with patients and interaction with medical students and physicians in post-graduate programs. Academic medicine is by nature a noble and virtuous endeavor that promotes public good. The COVID-19 pandemic will run its course, but its impact on health care and academic medicine will be ongoing. Private equity acquisition will be a continuing threat that will require legislative regulation by the federal government and individual states to protect the patient population, health care workers, and safety net hospitals. The acquisition and closure of Hahnemann University Hospital is an example of the discordance of mission and goals of private equity corporations and academic medicine. It is prudent to recognize this and other transactions as a warning and a threat. Treating resident positions as an asset to be bought and sold is a dangerous precedent, and bypasses CMS regulations and ACGME protocols and authority to redistribute positions.

With no guarantees we suggest that we tenaciously adhere to our altruistic tripartite mission of education, research, and patient care. It will require innovation, creativity, and a sense of purpose. To quote Osler,[26] "You are in this profession as a calling, not as a business; a calling that extracts from you at every turn self-sacrifice, devotion, love, and tenderness to your fellow man. We must work in the missionary spirit with a breadth of charity that raises you far above the petty jealousies of life."

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Marijuana Killed My Son! Doctors, Let Me Tell You Something About the Dangers of Cannabis

by Laura Stack

Marijuana, legal for recreational use in Colorado since 2012, killed my son Johnny Stack at age 19. He started using at 14, obtained from a friend's older 18-year-old brother, who had a medical marijuana card. Johnny got his own medical marijuana card at 18 years old from an unknown doctor, and he had no medical or mental conditions—he just wanted to get high with his friends. Today's marijuana, very high in THC (Tetrahydrocannabinol, the euphoria producing-addicting substance in cannabis products) is destroying the health and social structure of my state Colorado. Marijuana, whether obtained with a medical marijuana card or purchased for recreational use, could kill you, your child, your patients, and it will lay waste to the health of Missouri. As physicians and as parents, you must not let this happen. I thank your medical journal *Missouri Medicine* for this unique opportunity to address physicians directly. Let me tell you about my deceased son Johnny and the marijuana caused morass that the Centennial State is becoming.

Colorado Goes to Pot

Colorado passed a medical marijuana law in 2000, and in 2012, Colorado was the first state to legalize recreational marijuana (HiTHCpot). Many people believe the false narrative that because marijuana is legal, it must be safe and harmless. By 2014, HiTHCpot was appearing in high schools. My son, Johnny, was 14 at that time. Five years later, he died by suicide after becoming psychotic from 'dabbing' HiTHCpot (no other drugs in his system). Johnny had been diagnosed with "THC abuse – severe" by a psychiatric hospital.

Devastated by his death, I formed a nonprofit, Johnny's Ambassadors (www.johnnysambassadors.org). I began research on HiTHCpot and wrote a 300-page book with 176 scientific citations, *The Dangerous Truth About Today's Marijuana: Johnny Stack's Life and Death Story* (see sidebar). In Johnny's memory, I will go anywhere to speak with anyone who will listen about the epidemic of HiTHCpot and the misery, poor health, and death it causes.



Laura Stack is the mother of Johnny Stack who killed himself after becoming psychotic from THC marijuana concentrates (dabs). She is the founder of Johnny's Ambassadors a non-profit organization dedicated to informing the public of the dangers of youth marijuana use and a nationally known anti-recreational marijuana activist.

High THC Concentrates

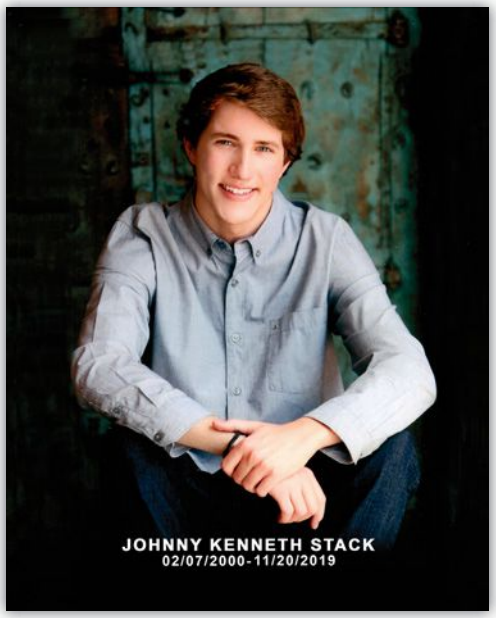
Hash oil is a concentrated cannabis extract that can be smoked, vaped, eaten, or rubbed onto the skin. Hash oil products first appeared around 2010. Medical pot dispensaries began to carry early versions of known as budders, saps, and waxes (Figures 1 and 2). They weren't common in 2012 when voters legalized Colorado recreational marijuana. But by 2015, these novel high-potency waxes and extracts were being used by high schoolers. The Colorado Department of Public Health and Environment started tracking "dabbing" on its annual Healthy Kids Colorado Survey (HKCS). I'd never heard of concentrates and didn't know a "dab" of marijuana from a dance move. In fact, it wasn't for another two years until Johnny left for Colorado State University (CSU) that we found a HiTHCpot "Nectar Collector" in his dorm room and said, "What is this stuff?"

Dabs and Dabbing

Have you ever heard of dabbing? No, not the hip-hop dance! "Dabs" are extracted concentrates of tetrahydrocannabinol or THC, the chemical (cannabinoid) in marijuana that makes users "high." The 2019 HKCS reported 10.2% of high school

students use dabs, and of those who admit to using marijuana, 52% report dabbing—a nearly 70% increase in only two years.

Here's how dabs are made: Cannabis flowers are run through a solvent such as butane, ethanol, or propane. The THC leaves the plant material and dissolves into the solvent. The concentrated THC solution is filtered to remove most of the solvent and dried in a tray. The result is a sticky, bronze-colored oily substance that looks like beeswax or earwax. These can be additionally processed into distillates, which are more pure THC oils and extracts. Dabs are a chemical, not a plant, and they are highly potent, containing up to 99% THC. Dabs are typically heated on a hot surface with the vapors inhaled through a dab rig or dab pen.



Dabs are usually called by their consistency, such as shatter, wax, budder, crumble, live resin, or pull 'n snap (Figure 1). Many advocates, usually in states like Colorado and Nevada where recreational marijuana use is legal, defend dabbing as no worse than smoking pot. But they're full of it. Dabbing carries a lot more risk for mental illness and addiction than smoking. And its levels of THC aren't regulated or restricted. Dabbing isn't the only way high-potency marijuana is delivered. There's also:

Smoking

This refers to the dried flowers of the marijuana plant. In practice, it could include seeds, bits of stems, and shredded leaves as well. Users often refer to any cannabis plant matter by the catch-all terms flower, herb, bud, or grass. Until the 1990s, THC potency in herb averaged 3-5%; now, it varies between about 12-25%, depending on the cannabis strain, with an average of 18.8% in 2019.[1] Growers continually increase herb potency through selective breeding, and they boast strains from 69.4% THC. It's usually smoked using a pipe or a bong or rolled into a joint or a blunt.

Eating (Edibles Such as Candy and Brownies)

Edibles are made either directly with the dried flower or with THC concentrates, so potency varies widely. In Colorado, one serving in an edible is measured in milligrams (mg) rather than percentages, and is 10 mg THC per serving. However, not all states are regulated. Be aware that one package (such as a candy bar) could contain 1,000 mg or more, so the serving size consumed is extremely important.

Vaping (Such as Oil and Distillates)

Users vape high-THC oil in a pen. Distillates go through extra refinement processes to remove additional compounds. Once the THC has been distilled, it is re-condensed, and the finished product can be anywhere from 15% to 99% pure THC. Distillates like these are usually vaporized, but users also put them under the tongue, dab them, smoke them, ingest them in a capsule, or infuse them into an edible.

Other Products (THC-Infused Soda, Tampons, Suppositories, Toothpicks, etc.)

The pot industry has created countless ways to get THC into the body through any opening.

Doctor, what you really need to know is this — even today's more potent marijuana plants contain 28% THC[2] or higher (with one grower boasting over 40%), while the weed hipsters rolled in the '70s and '80s was 2-5% THC. Dabs are more than three times more potent than the strongest marijuana plant. A dab is no longer a plant. Dabs aren't natural; they are potent, potentially lethal chemicals. Dab is to marijuana what crack is to cocaine. Depending on potency, one dab is like smoking three to five joints at once. For example, an edible brownie contains one serving of THC which is 10 milligrams. In a variant like Shatter, that is 65% THC, one gram is actually 650 milligrams of THC!

The write-up on a bag of "Scooby Snacks Shatter" reads: "There may be long term physical or mental health risks from use of marijuana including additional risks for women who are or may become pregnant or are breastfeeding. Use of marijuana may impair your ability to drive a car or operate machinery. This product was produced without regulatory oversight for health, safety or efficacy. This product complies with testing requirements. This packaging is child resistant. This product is intended to be inhaled."

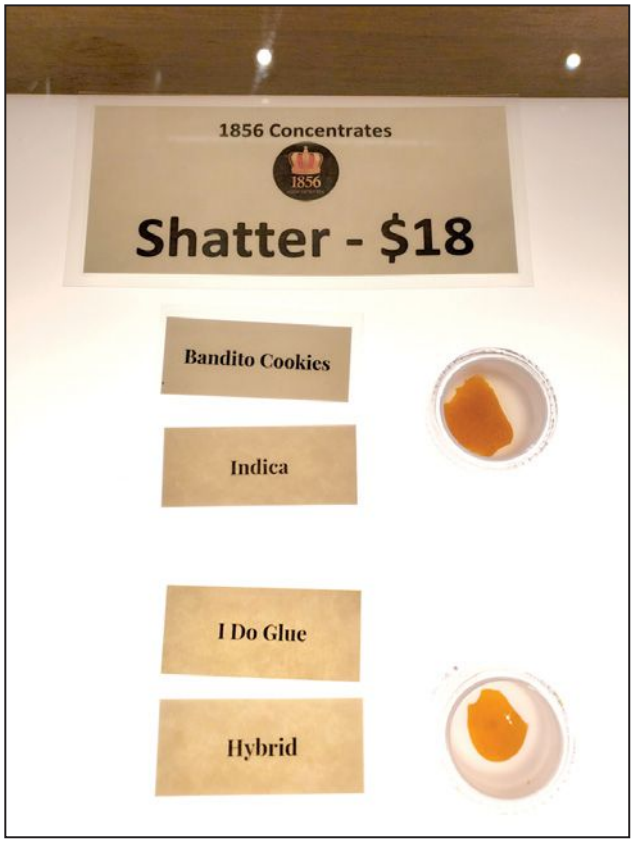


Figure 1. Shatter marijuana is also known as BHO. It is a hash oil concentrate produced by the use of butane solvent to derive high THC levels from the marijuana plant.

High Potency THC Users Are Getting Younger and Younger

In addition to no regulatory oversight, here's what's worse dabbing has become popular among very young people.[3] Many kids start dabbing by age 14. Most of the time, their parents don't have a clue. You see, dab vapor doesn't have the skunky smell most marijuana smoke has. It may not even have a scent at all, so kids can do it behind their parents' backs at home and their teachers' backs in school. Vaping THC doesn't always make your breath stink in the same way tobacco and grass do, so they don't have to be quite as sneaky. Vaping devices can look just like nicotine vaping devices, so check the cartridges. They may tell you they are "just vaping," but be aware they could be vaping THC. "Vaping" can refer to nicotine or THC while dabbing is only marijuana (Figure 2).

Maybe you think young users are just being typical teens. Maybe you think marijuana is harmless because it's legal. Maybe you think your child is getting straight As, so marijuana can't be affecting him/her. Or your kid wouldn't do that because you go to church. Well, I used to think all of that, too.

Until the mid-to-late age 20s, a person's brain is still developing,[4] and intoxicants can damage brain development. Hence, one reason why 21 is the legal age for alcohol, pot, and cigarettes (except "medical" marijuana when the legal age is 18 and an oxymoron) is because people don't actually get a prescription. It's recommended "off label." But numerous medical studies show dabbing can slow mental development and cause depression[5] as well as trigger schizophrenia.[6] And these mental illnesses can lead to suicide.[7] My Johnny only realized that connection weeks before his death.

Compared to heroin or crack, marijuana has a lower addiction rate, but the danger is today's high-potency pot is extremely hazardous to the developing mind. It's highly addictive[8] with dabs being like pot on steroids. There's also a high rate of psychological addiction among young people. Sure, maybe they could stop, but they enjoy the high so much, they don't want to stop. It doesn't take an addiction to dabbing to hurt you. For some who have tried dabbing, it took just one hit to put them in the hospital with life-threatening effects or cause psychosis.[9] My 51-year-old girlfriend landed in the mental hospital for three weeks from hallucinations caused from hitting a dab pen twice. This doesn't even account for all the damage dabbers do to their families[10]—often accidentally, sometimes fatally.

The Retail Marijuana Public Health Advisory Committee (RMPHAC) 2020 report,[10] which is part of the Colorado Department of Public Health and Environment, issued this statement:

"The RMPHAC reviewed the relationships between adolescent and young adult marijuana use and cognitive abilities, academic performance, mental health, and future substance use. Weekly marijuana use by adolescents is associated with deficits in academic and cognitive abilities, even 28 days after last use. Weekly use is also associated with failure to graduate from high school or complete a college degree. Adolescents and young adults who use marijuana are more likely to experience psychotic symptoms as adults (such as hallucinations, paranoia, and delusional beliefs), future psychotic disorders (such as schizophrenia), and suicidal thoughts or attempting suicide. Evidence shows that adolescents who use marijuana can become addicted

to marijuana, and that treatment for marijuana addiction can decrease use and dependence. Additionally, those who quit using marijuana have lower risks of adverse cognitive and mental health outcomes than those who continue to use. Marijuana use is also associated with future use and use disorder for tobacco, alcohol, and other drugs. Adolescent use of marijuana with higher THC concentration (>10% THC) is associated with continued use and development of future mental health symptoms and disorders."

A joint study from the University of Michigan and Brown University[11] found higher potency marijuana to be more addictive than low potencies. It is associated with a higher risk of cannabis use disorder (CUD) or marijuana addiction in young users. Researchers found that regular pot users who first tried marijuana when the national average THC levels held at 4.9% had almost twice the increased risk of developing symptoms of cannabis use disorder within a year. But those who started regularly using pot when national average THC levels were 12.3% had a 4.8 times higher risk of cannabis use disorder. And yet the state of Colorado continues to allow these high-potency THC products to be sold with no regulation or limitation on potency.

In a nutshell, marijuana harms adolescents in these ways:

- Marijuana dependence[12]
- Decreased IQ[13]
- Increased risk of addiction with higher potency[14]
- Increased odds of using other drugs[15]
- Death from throwing up[16]
- More likely to drop out of school[17]
- Possible psychosis and schizophrenia[18]
- Decreased fertility rates[19]
- Lowered motivation to do things[20]
- Possible paranoia and thoughts that others intend to harm you[21]
- Health damages[22]
- Poor driving skills[23]



Figure 2. Dabs are typically heated on a hot surface with the vapors inhaled through a dab rig or dab pen. Dabs are now used frequently by high schoolers and increasingly elementary students in Colorado and other legal recreational marijuana states.

My Johnny's Suicide Was Caused by Dabbing

Three days before Johnny killed himself, he came over for dinner. He lived in our condo a couple miles down the street and would often pop in for a home-cooked meal. "I need to tell you that you were right," he said to me. "Right about what?" I asked. "Right about the marijuana. You told me weed would hurt my brain, and it's ruined my mind and my life. You were right all along. I'm sorry, and I love you." He died by suicide three days later, a victim of an acute psychotic episode. After he died, we recovered his journal, where he had just written, "the mob is after me."

So doctor, if you think today's high-potency marijuana is benign, I hope this article gives you some new information. Please become one of Johnny's Ambassadors and help us save our youth from the harms of marijuana. And do what you can to keep high THC concentration chemicals from becoming legal for potentially deadly 'recreational' use. Don't let Missouri go to pot!

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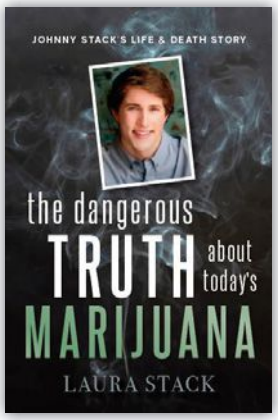
BOOK REVIEW

The Dangerous Truth About Today's Marijuana

by Laura Stack
Review from Amazon.com

Freiling Publishing
ISBN-10: 195094879X
ISBN-13: 978-1950948796
Available on Amazon

This is the poignant life-and-death story of Johnny Stack, whose young and vibrant life ended by suicide after his descent into addiction to high-potency marijuana and cannabis-induced psychosis.



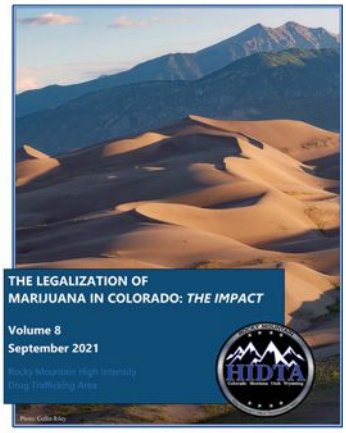
You'll laugh and cry with his mother, Laura Stack, as she retells the story of Johnny's joyful childhood and then takes you through the unthinkable tragedy of his loss. It's every parent's nightmare. But this book is much more than Johnny's story.

Today Laura, who is a nationally recognized speaker and best-selling author, leads a national effort of parents, impacted family members, healthcare professionals, coalitions, teachers, and youth who are concerned about the harmful effects of marijuana on our children, teenagers, and emerging adults.

This book is a clarion call for parents across America to educate themselves about the risks of today's high-THC marijuana products and to better understand the potentially devastating effects on youth mental health. Laura's real-life story is backed by recent scientific-based research on how today's potent THC products lead to mental illnesses in adolescents, such as anxiety, depression, paranoia, psychosis, and sadly, suicidal ideation. This book is her vision to dramatically decrease adolescent marijuana usage, the false perception of safety, mental illness, and suicide, to allow our youth to live productive, happy lives

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The Legalization of Marijuana in Colorado: The Impact

Volume 8, September 2021

by the Rocky Mountain High Intensity Drug Trafficking Area Program

Medical and recreational marijuana legalization is destroying the health and social fabric of Colorado. Suicide, overdoses, ER visits, hospitalizations, and domestic and street violence due to cannabis are soaring while cannabis tax revenues are an anemic 0.98% of the 2021 state budget. Tax revenues are dwarfed by the Centennial State's cost for law enforcement, automobile and industrial accidents, and increased school crime. Missouri must keep recreational marijuana from being legalized in 2022.

Executive Summary

The Rocky Mountain High Intensity Drug Trafficking Area (RMHIDTA) program has published annual reports every year since 2013 tracking the impact of legalizing recreational marijuana in Colorado. The purpose is to provide data and information so that policy makers and citizens can make informed decisions on the issue of marijuana legalization.[1]

Section I: Traffic Fatalities & Impaired Driving

- Since recreational marijuana was legalized, **traffic deaths** where drivers tested positive for marijuana **increased 138%** while all Colorado traffic deaths **increased 29%**.
- Since recreational marijuana was legalized, **traffic deaths** involving drivers who tested positive for marijuana **more than doubled** from 55 in 2013 to 131 people killed in 2020.
- Since recreational marijuana was legalized, the percentage of all Colorado **traffic deaths** involving drivers who tested positive for marijuana **increased from 11%** in 2013 to **20%** in 2020.

Section II: Marijuana Use

- Past month **marijuana use** (ages 12 and older) **increased 26%** and is **61%** higher than the national average, currently ranked **3rd** in the nation.
- Past month **adult marijuana use** (ages 18 and older) **increased 20%** and is **62% higher** than the national average, currently ranked **3rd** in the nation.
- Past month **college age marijuana use** (ages 18-25) **increased 10%** and is **53% higher** than the national average, currently ranked **3rd** in the nation.
- Past month **youth marijuana use** (ages 12-17) **decreased 22%** and is **39% higher** than the national average, currently ranked **7th** in the nation.

Section III: Public Health

- Marijuana-*only* exposures **increased 185%** from 2013 when recreational marijuana was legalized compared to 2020.
- Treatment for marijuana use for all ages **decreased 34%** from 2013 to 2020.
- The percent of suicide incidents in which toxicology results were positive for marijuana has **increased** from **14%** in 2013 to **29%** in 2020.

Section IV: Black Market

- RMHIDTA Colorado Drug Task Forces (10) conducted **294 investigations** of **black market marijuana** in Colorado resulting in:
  - **168** felony arrests
  - **5.54** tons of marijuana seized
  - **86,502** marijuana plants seized
  - **21** different states the marijuana was destined
- Seizures of marijuana reported to the El Paso Intelligence Center in Colorado **increased 48%** from an average of 174 parcels (2009-2012) when marijuana was commercialized to an average of 257 parcels (2013-2020) during the time recreational marijuana became legalized.

Section V: Societal Impact

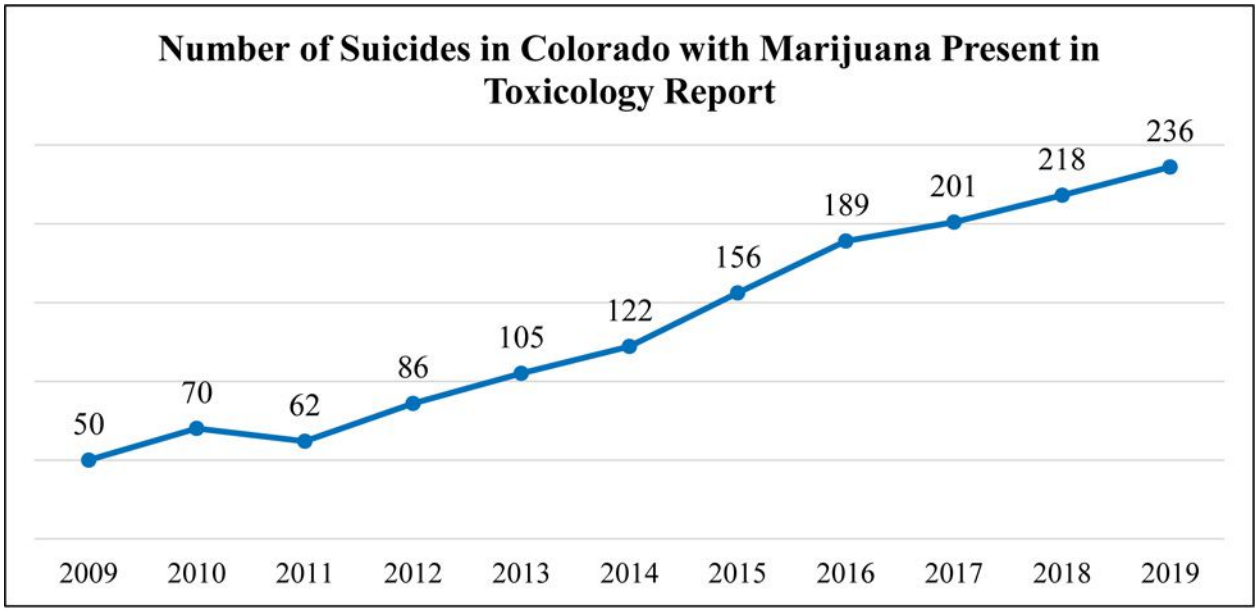
- **Marijuana tax revenue represent approximately 0.98% of Colorado's FY 2020 budget.**
- **66% of local jurisdictions in Colorado have banned medical and recreational marijuana businesses.**

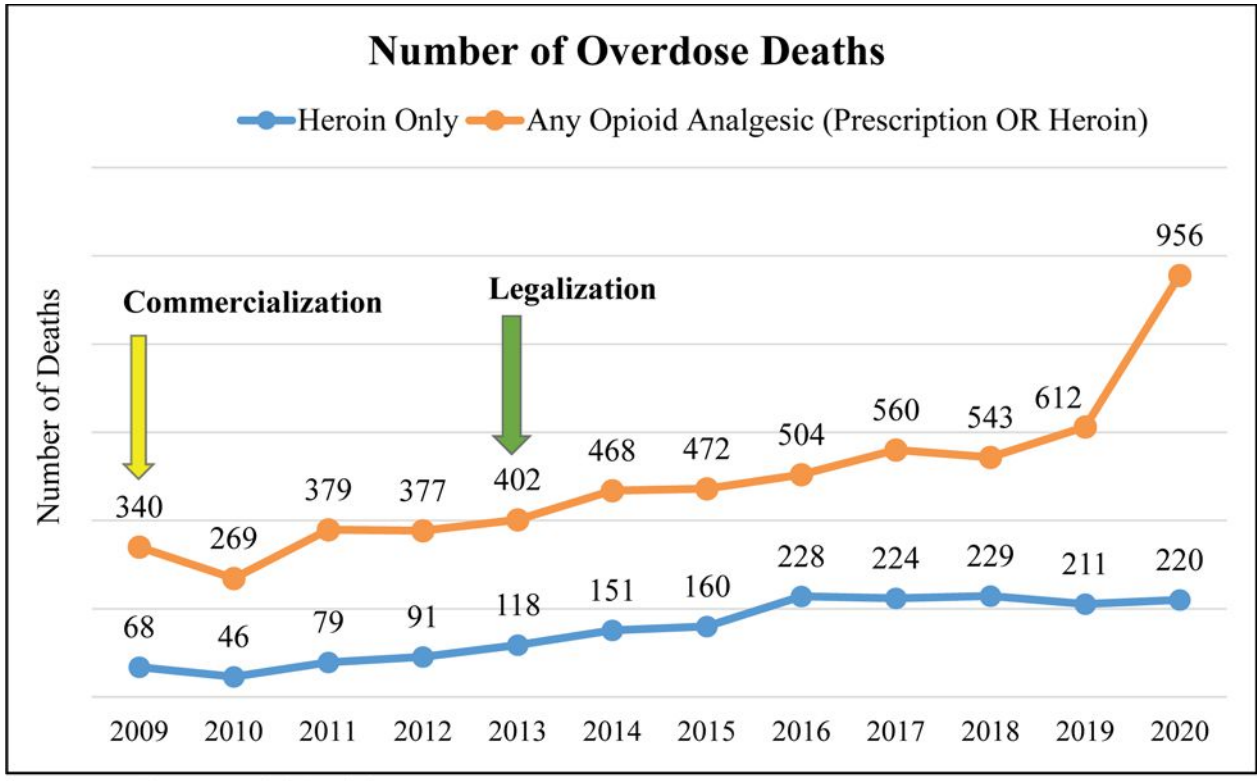
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Volume 8, September 2021 | Rocky Mountain High Intensity Drug Trafficking Area Program

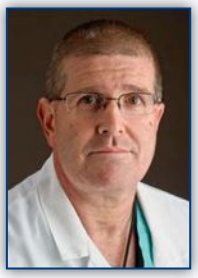




MSMA Members in the News

Did you make the news? Submit your success story and photo to lfleenor@msma.org.

New *Missouri Medicine* Editorial Board Member



John G. Markley, MD, is the new Editorial Board member for Cardiac Surgery beginning in January 2022. Dr. Markley is a thoracic surgeon in Columbia, Missouri, and is affiliated with multiple hospitals, including MU Health Care, Harry S. Truman Memorial Veterans Hospital and Boone Hospital Center. He received his medical degree from Medical College of Wisconsin and has been in practice for more than 20 years. He replaces **Michael C. Murphy, MD**, who has been on the Editorial Board for over 10 years. *Missouri Medicine* thanks Dr. Murphy for his service.

Young Physician is New Contributing Editor Board Member



Emily Hillman, MD, MPHE, is the new *Missouri Medicine* Young Physician Contributing Editor for a three-year term beginning in 2022. Dr. Hillman is an Associate Professor of Emergency Medicine and Director of Simulation Education at the University of Missouri-Kansas City School of Medicine, and she is also at Truman Medical Center, Department of Emergency Medicine, Kansas City, Missouri. She replaces **Jessica D. Bauerle, MD**, who recently completed her three-year term as the inaugural Young Physician representative of *Missouri Medicine's* Contributing Editors.

Thank You Non-Editorial Board Contributors

Missouri Medicine would like to publicly thank the following invited non-Editorial Board experts who have done peer-review of submitted manuscripts in 2021: Lawrence M. Lewis, MD, **Eden M. Esguerra, MD**, Satish Kalanjeri, MD, **Richard Hellman, MD**, Fahd A. Ahmad, MD, **Javed Sayed, MD, Andrew Lee, MD, Joel Eissenberg, PhD, Anand Chockalingam, MD, John S. Daniels, MD**, Sarah Dubin, MD, Clayton Nuelle, MD, Sumit Gupta, MD, Anthony R. Lupo, PhD.

MSMA Members in the News



William Jewell College has honored **Raghu Adiga, MD**, with the 2021 William F. Yates Medallion for Distinguished Service. The award recognizes Dr. Adiga's dedication to community health and safety during the pandemic. Dr. Adiga is the Chief Medical Officer at Liberty Hospital.





Alexander Finck, MD, (top), and **Zachary Treat, MD**, (bottom), both new MSMA members, have opened a direct primary care practice, Cornerstone Family Medicine, in Mexico. Drs. Finck and Treat recently completed medical school and residency at the University of Missouri-Columbia. Cornerstone Family Medicine opened on August 17 and is located next to the Audrain Community Hospital's Stribling Building.



Richard Gimpelson, MD, is retiring his long-time column, "Parting Shots." The column, which Dr. Gimpelson began writing during his term as SLMMS President in 1999, ran as a regular item in *St. Louis Metropolitan Medicine* for over 22 years. Dr. Gimpelson retired from his Gynecological Surgery practice in 2017.



Lannis E. Hall, MD, has received the 2021 Women of Achievement award for Health Advocacy. This honor is bestowed annually on ten metropolitan St. Louis area women who have demonstrated extraordinary volunteer service and leadership. Dr. Hall is Director of Radiation Oncology at the Siteman

Cancer Center at Barnes-Jewish St. Peters Hospital and Associate Professor of Clinical Radiation Oncology at Washington University School of Medicine.







Kansas City Medical Society President **Scott Kujath, MD**, presented several awards at its recent Annual Meeting. MSMA members honored include: **Michael Weaver, MD**, retired Emergency Physician – Lifetime Achievement Award (top left); **Amy Patel, MD**, Breast Radiologist – Patient and Community Advocate Award (top right); and **John Hagan, III, MD**, Ophthalmologist – Innovation Award (bottom left). Photos by Jim Braibish.



Mikhail Kosiborod, MD, recently presented the results of a clinical trial, PRESERVED-HF, at the Heart Failure Society of America's scientific sessions. The trial is the first to demonstrate significant improvements in symptoms for those living with heart failure with preserved ejection fraction (HFpEF). Dr. Kosiborod is a Cardiologist at Saint Luke's Mid America Heart Institute.



Richard Valuck, MD, has been honored with the 2021 Bob Richards Hannibal Cannibal Legacy Award. The award recognizes those who support the Hannibal Cannibal race and promote healthy and active lifestyles. Dr. Valuck, who has conquered all distances of the race, recently celebrated 30 years of service as a Cardiologist in the Hannibal community.



MSMA member **Maureen Weber, MD**, has been recognized by the Saint Luke's Physician Group Service Excellence Champion Program for outstanding service to patients and family members. Dr. Weber is a Hospitalist at Wright Memorial Hospital.



David Weinstein, MD, Chief of Obstetrics/Gynecology at Missouri Baptist Medical Center, has received the 2020 March of Dimes Hero for Babies award, which recognizes individuals who fight for maternal and child health.



The Golden Medallion Lifetime Achievement Award is the highest honor of the Missouri Society of Eye Physicians and Surgeons. **William White, MD,** (top), Kansas City, Missouri, the 2020 recipient and **John Holds, MD** (bottom) of St. Louis, the 2021 recipient. Both are internationally known oculoplastic surgeons.





Timothy Woods, MD, has been appointed to the Board of Lost & Found Grief Center for 2022, which provides grief support to children and their families. Dr. Woods is a General Surgeon at Ferrell Duncan Clinic and serves as Trauma Medical Director at CoxHealth in Springfield.



Letters to the Editor

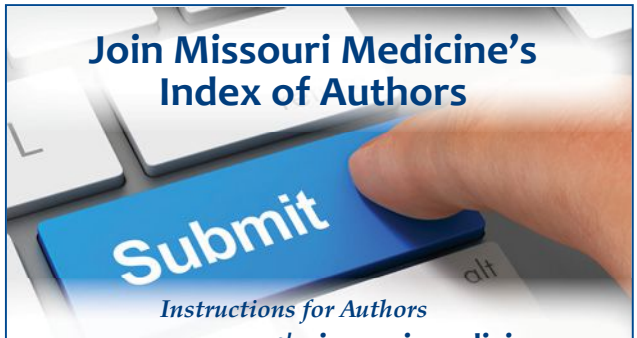
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SARS-CoV-2 Reinfections during the Delta Variant Surge - Missouri, June-October, 2021

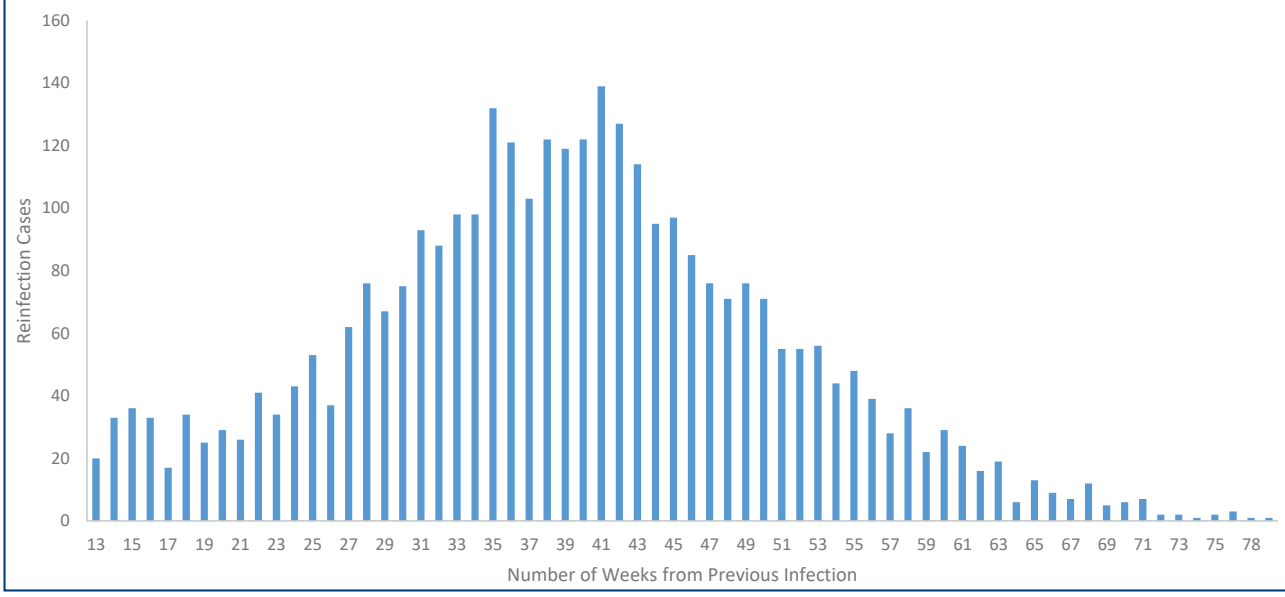
In early June 2021, Missouri experienced surge in reported COVID-19 cases. It was associated with increase in the proportion of Delta variant of SARS-CoV-2, the virus that causes COVID-19, among all circulating virus variants. By the beginning of June 2021, Missouri has had highest percent share of Delta variant (29.1%) among all states with available data, and it further increased to 96.6% by September 2021. The Missouri Department of Health and Senior Services (MDHSS) analyzed COVID-19 surveillance data during the Delta surge to evaluate timing of reinfections relative to the previous infection.

A reinfection case was defined as a Missouri resident with laboratory-confirmed SARS-CoV-2 infection by positive nucleic acid amplification test (NAAT) and a subsequent positive NAAT result documented >90 days after the first positive test during the initial infection. The state surveillance database, EpiTrax, was queried to identify reinfections during the period from June 1 to October 17, 2021.

Overall, 3,336 case-patients were identified in the database as SARS-CoV-2 reinfection and met study eligibility criteria. Among subgroups by age (0-18, 19-49, 50-64, and ≥65 years), case distribution was 378 (11.3%), 1,928 (57.8%), 556 (16.7%), and 474 (14.2%), respectively. The median age of cases was 41 years (range = <10 years - 102 years), and 60% were female. The median time to reinfection was 39.2 weeks (range = 13-80 weeks). It was lowest in >65 years age group (36 weeks) and highest in 19-49 years group (40 weeks). The percentage share of SARS-CoV-2 reinfections among all NAAT positive COVID-19 cases increased from 0.5% in the pre-Delta surge period to 1.8% during the surge.

Reinfections with SARS-CoV-2 are considered relatively uncommon.[1] Evidence suggests that antibodies induced by initial SARS-CoV-2 infection are largely protective, even though they do not guarantee effective immunity against subsequent infection.[2] Current knowledge regarding duration of protection is also limited by the maximum duration of follow-up. Previously reported median interval between primary infection and reinfection was seven months in a large prospective cohort study of health care workers in England.[3] Findings in this report, based on up to 20 months of epidemic follow up in Missouri, suggest that naturally acquired SARS-CoV-2 immunity protection has a median time of about nine months after the onset of initial infection. A recent estimate of median time for SARS-CoV-2 reinfections was 16 months after

Figure. Distribution of SARS_CoV-2 Reinfection Cases by Week from the Previous Infection, Missouri, June 1 to Oct 19, 2021



peak antibody response (range = 3 months - 5.1 years) when endemicity of this virus was assumed.[4] Even though relatively low, reinfection rate in this study increased during the Delta surge, and may further increase as epidemic continues. The observed increase in reinfections is likely attributable to highly transmissible Delta variant, as well as waning natural and vaccine immunity.

This report is subject to limitations. First, it is possible that previously infected persons were tested less due to presumed natural immunity, and the rate of reinfections could have been underestimated. Second, some reinfections could have been break through infections as well. Considering low break through infection rate in Missouri, it is unlikely that such cases would have changed study findings significantly.

This study suggests that when reinfections take place, half of those cases may occur as early as first nine months after the initial infection. Emergence of more aggressive variants of SARS-CoV-2 may shorten this time. All persons with previous SARS-CoV-2 infection could further reduce their risk for future infection through vaccination.

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Tomb of the Unknown Soldier



by Charles W. Van Way, III, MD

One hundred years ago, on November 11, 1921, an American soldier who fell in the Great War, was buried at Arlington National Cemetery. His remains could not be identified, and the inscription on the tomb, he was "known but to God." He was intended to represent all of the soldiers who died during the war. On November 11, 2021, there was a ceremony to commemorate that event. This included a military formation representing all of the services, a warplane flyover, a public flower ceremony lasting several days up to November 11, and a ceremony in the Rotunda of the U.S. Capitol Building. There is justifiably great public reverence surrounding the Tomb of the Unknown Soldier. But just how did it come to pass?



Charles W. Van Way, III, MD, FACS, FCCP, FCCM, is Colonel, U.S. Army Reserve, Medical Corps, Retired; Missouri/AMA Delegate, *Missouri Medicine* Contributing Editor; and Emeritus Professor of Surgery, University of Missouri - Kansas City.

World War I was a catastrophe of previously-unimagined proportions. Countries around the globe lost millions of their young men, with still more injured, often crippled. The carnage on the battlefield was incredible. Often called the First Industrial War, the Great War used rapid-firing rifles and artillery, machine guns, airplanes, and submarines, which were far more effective than 19th Century weapons. Huge armies were deployed and fed into the industrial meat-grinder of modern weapons. And as if that were not enough, when the war ended, the entire governing structure of Europe had been overturned. The empires of Russia, Germany, Austria-Hungary, and Turkey were gone, replaced by a bewildering array of new countries and new political systems. And finally, as the war ended, the Great Influenza pandemic killed more people all over the world than had perished in the Great War.

People struggled to try to find meaning in this slaughter. Across the world people set up commemorations. Indeed, the Liberty Memorial in Kansas City was established as a part of this commemorative effort. Yet, the U.S. lost "only" 117,000 young men. France, England, Belgium, Russia, and the central powers of Germany, Austria, and Turkey all lost millions. How could they bring this terrible series of events into some sort of perspective?

Most poignant were those who died on the battlefield without being identified. Their families had nothing save a telegram saying their son (or daughter, in some cases) was "missing in action." And there were many of these, on all sides. The British were the first to commemorate them specifically, with the Tomb of the Unknown Warrior, placed in Westminster Abbey on November 11, 1920. In France, la tombe du Soldat inconnu was placed under the Arc de Triomphe de l'Etoile in Paris, on the same day. Indeed, many countries in Europe and around the world have commemorated this or other wars in this way. In the U.S., it was decided to honor an unknown soldier who would stand for all those who fell in the war. The grave has since been called, just as the French had done, the Tomb of the Unknown Soldier.

How was the soldier selected? Most of the American war dead were disinterred and re-buried in cemeteries which were built in France and Belgium. As this process was going on, four caskets containing remains that could not be identified were brought to the French city of Châlons-en-Champagne. There, Sergeant Edward F. Younger, a decorated veteran, picked one of them. The USS Olympia transported the casket to the USA.

And so, on November 11, 1921, the unknown soldier was laid to rest in Arlington. Beneath the casket in the tomb, there was placed a layer of two inches of French soil, symbolizing where he died.

In honor of the original ceremony in France, a commemorative ceremony was held in October 2021, in Châlons-en-Champagne. Another ceremony commemorating this was also held in October 2021, aboard the USS Olympia, which is now at the Independence Seaport Museum in Philadelphia.

The story does not end here. In 1956, a similar ceremony was conducted. Remains from the European and Pacific theaters of World War II were placed aboard the USS Canberra, together with an unknown from the Korean War. Naval Corpsman William Charette, a Medal of Honor recipient, selected one of the two World War II caskets, not knowing where they had originated. The remaining casket was buried at sea, and the selected remains, together with the Korean War remains, were taken to Arlington and placed in crypts at the Tomb.

Following the Vietnam War, in 1984, an unknown soldier was selected and interred at Arlington, as well. But ten years later, he was actually identified by DNA evidence. He was Air Force 1st Lt. Michael Joseph Blassie. At his family's request, his remains were reinterred at Jefferson Barracks National Cemetery, in St. Louis County, Missouri. It was decided to leave the crypt at the Tomb vacant. It is now covered with a slab bearing the inscription "Honoring and Keeping Faith with America's Missing Servicemen." Given the universal use of DNA identification, it is felt unlikely that any future wars will be commemorated in this fashion.

The marble block of the Tomb as we know it today was built and set in place in 1932. Originally, soldiers from Fort Meyer were designated to guard the tomb. After 1937, the tomb was guarded day and night by a special detail from the 3rd Regiment, the Army's ceremonial regiment. Becoming a Guard at the Tomb is a signal honor. It requires great physical fitness and takes a lot of work. Very few people get there. The badge awarded after nine months of service as a guard has only been given out more than 600 times, and is one of the most exclusive of military awards. Originally, only men were eligible. But now, women can become guards. The November 11, 2021, ceremony marked the first time that the guard at the Tomb was all women.

Born out of the need to find meaning and purpose in the calamity of the Great War, the Tomb of the Unknown Soldier has become one of our cherished national shrines. Modern technology may make it possible to identify all of the fallen in future wars. But the spirit and dedication which is the heart of our reverence of the Tomb will last long beyond the wars of the 20th Century.

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- Video: Commemorative ceremony held October 2021 in Châlons-en-Champagne at https://www.youtube.com/watch?v=Xpu4xmvamc
- Video: Commemorative ceremony held in October 2021 aboard the USS Olympia, which is now at the Independence Seaport Museum in Philadelphia at https://www.legion.org/honor/photos/254136/unknown-soldiers-voyage-home-remembered

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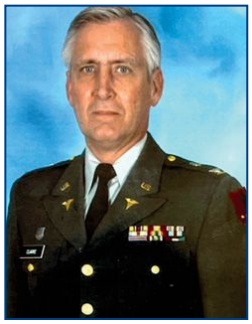
USU Uniformed Services University | School of Medicine F. Edward Hébert School of Medicine

Uniformed Services University: An All-American Medical School

by Michael Clarke, MD

The mission of USU is "Learning to care for those in harm's way." USU has trained more than 5,000 medical doctors in military medicine.

The acronym USU may not be familiar. It stands for the Uniformed Services University (USU) in Bethesda, Maryland. This relatively new medical center trains allied health students and medical students for military medical careers. After World War II, many military facilities found it difficult to retain their medical specialists. USU was established in 1972 in order to supply medical personnel for the three major services, which at that time were the Army, Navy, and Air Force. Later the Public Health Service was added. In the last of the twentieth century, there was a tendency to downsize treating facilities of the military and transfer care to private or state-supported medical centers. However, the demand for military medical professionals persisted. An example of downsizing was the 2011 closing of the prestigious Walter Reed Army Medical Center. A second example would be the Brooke Army Medical Center in San Antonio, Texas, which has become a tri-service teaching hospital. It now treats active and retired military personnel, and in many situations, civilians. Willford Hall Medical Center, formerly a USAF teaching hospital in San Antonio has been downsized to an outpatient facility.



A retired U.S. Army Colonel, **Michael S. Clarke, MD**, has practiced orthopedic surgery in Springfield, Missouri, for 47 years. He is the *Missouri Medicine* Editorial Board member for Military Medicine.

Missouri Physician Founder of USU

One may also hear the acronym USUHS, which stands for Uniformed Services University of the Health Sciences. Other names of USU are "America's Medical School" or "West Point for Doctors" or finally "The F. Edward Hebert School of Medicine." Hebert, a Cajun Congressman from Louisiana, served in the U.S. Congress for 36 years and led the campaign for the military medical school after WWII. Another congressman instrumental in the development of the USU was Durward G. Hall, MD, of Cassville, Missouri, who served as a representative from Missouri's 7th Congressional District (1961-1973) (Figure 1). Dr. Hall is also considered a founder of the School of Medicine. Hall, along with this author, Michael J. Clarke, MD, of Springfield, Missouri, founded the American College of Surgeons chapter in southwest Missouri. Dr. Hall had an extensive military background in WWII, and he well recognized the need for trained military medical professionals.

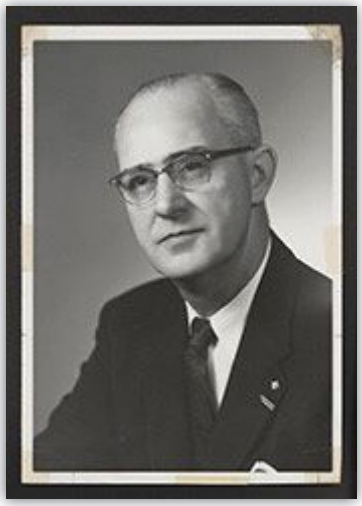


Figure 1. Durward G. Hall, MD, Cassville, Missouri, was instrumental in the development of USU and on its Board of Trustees.

The state of Missouri is fortunate to have multiple medical training facilities. The recent opening of the Kansas City University (KSU) Joplin, Missouri,



Figure 2. USU campus in Bethesda, MD; our nation's only federal health sciences university.

campus, brought the number of schools (DO and MD) to six on eight campuses. There are now approximately a thousand first-year medical school positions in Missouri, split approximately evenly between osteopathic and allopathic students.

History of USU

After a multi-year battle in Congress, USU was chartered in 1972 as the first and still the only Federal Health Science University devoted to filling the military services' need for career physicians. President Nixon called for an end to the draft in 1970. This further exacerbated the military physician shortage. Congress, led by Dr. Hebert, complied with USU appropriation and a well-located Bethesda campus was purchased just north of the District of Columbia (Figure 2.) The medical school was formally chartered on September 21, 1972, with a fifteen-member Board of Directors appointed by the President. A highly qualified faculty was assembled. The first class was admitted in 1976. A traditional medical curriculum was adopted with special emphasis on military medicine. Anthony R. Curreri, MD, Professor of Surgery at the University of Wisconsin and chairman of the Wisconsin Board of Regents, was appointed the first president of USU.

Dr. Curreri developed the curriculum, hired faculty, and put forth an admissions plan. Dr. Curreri stepped down shortly after the first students were admitted in 1976. In signing the bill establishing USU, President Nixon stated that the purpose of the school was to ensure enough highly-trained career physicians for the three major military services (Army, Navy, and Air Force). Jay Sanford, MD, a prominent infectious disease specialist, was appointed first Dean of the medical school, and later, he became president of USU. The new campus at the Bethesda Medical Centers spans 100 acres and is located on a major Metro line from the District of Columbia, just north of the DC border and across from the National Institutes of Health.

The School of Medicine soon attained full accreditation, and the construction of a modern state-of-the-art facility was completed. The first class of 29 students matriculated in 1976 and graduated on May 24, 1980.

Upon admission, the students are commissioned as either Second Lieutenants in the Army/Air Force or as Ensigns in the Navy. Upon graduation, the new MDs are promoted to the rank of Captain Army/Air Force or Lieutenant in the Navy. Graduates participate in the national matching program.

In 1987, President Reagan gave the commencement address affording the medical school needed positive publicity. The capacity for medical students gradually grew from the initial 29 to approximately 171 students in 2019. The percentage of graduates remaining on active duty beyond their seven-year service obligation has been 65%. During medical school, clinical rotations may be taken at military installations around the world.

USU has not functioned without detractors. Serious threats for the closure of the school surfaced in the late 1980s. A number of congressional members considered the school too costly. However, the university continued to grow and demonstrated its value as a training and research institution. The university, in response, underwent a cost-cutting reorganization and streamlined its administration. Over 100 USU MDs served in operation Desert Storm. These MDs demonstrated their value as invaluable front-line medical officers (Figure 3).

The mission statement of USU is "Learning to care for those in harm's way." USU has trained more than 5,000 medical doctors in military medicine and care for those in need. Additionally, thousands of paramedical professionals have graduated from USUHS.

The Road to a USU Medical Degree

All medical applicants for USU must take the MCAT (Medical College Admission Test) within three years of their desired matriculation. The

average MCAT score for successful matriculants is 509. In comparison, the 43 medical schools with the highest MCAT scores in 2020 averaged 517. Applicants may retake the MCAT multiple times and retain the highest score. The American Medical College Admission Service is used. Data for the USU class of 2023 show 3,096 applicants; 274 of these applicants were offered admission, and 171 accepted—86 were men, and 85 were women. The undergraduate cumulative grade point average was 3.7 on a 4.0 scale. Thirty-four states were represented in the 2019 freshmen class of 171 students. Additional admission requirements, unique to USU are that all students must be USA citizens between the ages of 18-36. All applicants must have a baccalaureate degree from an accredited academic institution. No applications are accepted from students with GPA below 3.0. Required prerequisite courses are similar to most American medical schools. USU does not accept transfers. All four years of medical school are required to be taken on the Bethesda campus. The graduation percentage of entering first-year students is 95%.



Figure 3. USU physicians and surgeons are invaluable to the mission of our Armed Forces. Shown is a front-line Army medical unit in Iraq.

All students must meet relatively lenient height and weight standards and pass a physical fitness exam yearly. The new medical graduates are committed to seven years of active medical service. Special features of acceptance to USU include becoming paid commissioned officers, free tuition, free medical care, assistance with moving expenses, and a housing allowance. Quite important are a likely debt-free graduation and access to an excellent military retirement program.

Presently 25% of active-duty military medical doctors are USU graduates (Figure 4). USU physicians are generally relatively young after the 20 years of service required for retirement. Many outstanding opportunities are available to these young military physicians after retiring. USU offers an exceptional opportunity for medical education and retirement.

Military Sponsored Medical Education for Non-USU Students

The Health Professions Scholarship Program allows non-USU medical students to join prior to starting medical school, in exchange for the military paying tuition and a monthly stipend. Upon graduation the physician will generally owe the military four years of active duty as repayment. More information can be found at: https://www.medicineandthemilitary.com/joining-and-eligibility/medical-school-scholarships

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Figure 4. USU graduation class. USU supplies 25% of military physicians and 65% of USU graduates pursue a career in military service.

A Review of PTSD and Current Treatment Strategies

by Christian Schrader, MD & Abigail Ross, MS

Approximately 6-7% of the adult population in the United States will at some point during their lifetime meet the criteria for a diagnosis of Post Traumatic Stress Disorder.



Christian Schrader, MD, is at Carl R. Darnall Army Medical Center Psychiatry Residency, Fort Hood, Texas. Abigail Ross, MS, is at the New York Institute of Technology College of Osteopathic Medicine, Old Westbury, New York.

Abstract

Current treatment strategies for control of trauma-associated symptoms of Post Traumatic Stress Disorder (PTSD) have recently been updated by the Veterans Affairs (VA) and the Department of Defense (DoD, after over a decade of dedicated research. The most recent evidence is compelling that its use of trauma-focused therapies such as Cognitive Processing Therapy (CPT), Prolonged Exposure Therapy (PE), Eye Movement, Desensitization, and Restructuring (EMDR), and others with significant trauma focus are the current gold standard for treatment. Additional medication use may be of assistance in treatment of symptomology, with special avoidance of benzodiazepines or other sedative hypnotic medications which are causal of increased intrusive and dissociative symptoms over time.

Introduction

In his early theories of the mind, Sigmund Freud hypothesized that the individual has stages of psychological development: that of forming an unconscious defense against pain and shock through the turning away from the triggers of unpleasure and finally the conscious disapproval of an impulse through use of judgement.[1] Much of his early work focused on the traumatic shocks that his patients had endured through their lifetime; many of them through workplace accidents, loss of life or loved ones, involvement in war, and from sexual assault. Despite the efforts and work of many before and after him, those same traumatic experiences have historically elicited very similar reactions from those who have suffered through them and have so far, been difficult to appropriately treat. What we have known for some time is that trauma is no respecter of persons, status, or intellectual capacity, and that the after effects of trauma can significantly impair function in life.

The Modern Concept of Post-Traumatic Stress Disorder

The diagnosis of what is now accepted as Post Traumatic Stress Disorder (PTSD) has changed over the years as we have gained a better understanding of the stress response and its longer-term impact on the body and the brain. During the Seven Years War (1756-1763) a physician from Austria, one Joseph Auenbrugger, observed and documented symptoms in some troops such as excessive physical exhaustion, anger, and irritability (angst), and depressed mood. He termed the condition "nostalgia"



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after the soldiers being so homesick, and so far distant from that which they knew, that their personality and the core of who they were was significantly changed. In his 1761 book Inventum Novem he wrote:

"When young men who are still growing are forced to enter military service and thus lose all hope of returning safe and sound to their beloved homeland, they become sad, taciturn, listless, solitary, musing, full of sighs, and moans. Finally, these cease to pay attention and become indifferent to everything, which the maintenance of life requires of them. Neither medicaments, nor arguments, nor promises, nor threats of punishment are able to produce any improvement."[2]

Granted, the pharmacopeia of that generation was severely limited, ineffective for treatment of PTSD as it often included laudanum, strong spirits (such as rum and whiskey), and certain tinctures that were thought to improve the mood such as that of Saint Johns Wort, as well as other mild sedatives such as Chamomile and Valerian root. His observations though were valid, and matched those of the Greeks and Romans who also shared a history of documentation of similar symptoms among their returning troops.

While war and violent conflict among nations may be historically well documented as a cause of profound emotional changes, it is by sheer number alone the civilian population that will carry the numerical burden of PTSD. By far the most common causes in triggering traumatic events among the entire populace are motor vehicle collisions and assault (inclusive of sexual assault and rape). These trauma experiences are fairly common in childhood, with adolescents between the ages of 14-17 having a 28% lifetime prevalence of sexual victimization with 8% of girls in that age cohort with a history of an attempted or completed rape against them.[3] Approximately 6-7% of the adult population in the United States will at some point during their lifetime, meet the criteria for a diagnosis of PTSD.[4] Amongst the U.S. military veteran population the variance in studies has ranged from approximately 30% of the Vietnam era veterans to more recently 13-14% of veterans serving in the dual wars in Iraq and Afghanistan over the last 20 years.[5,6]

We also recognize that the self reporting of symptoms from these populations over the most recent conflicts is under represented due to fears of stigma and concerns over job loss, just as is speculated are the numbers from the general populace, who face the additional hurdle of potential lack of appropriate insurance coverage for appropriate albeit specialized treatments. Our primary care physicians are indeed 'in the trenches' so to speak when addressing mental health concerns of this same populace. Among the general population in 2010 approximately 20% of all primary care visits included treatment for mental health issues or diagnoses - making the primary care settings an important place to screen for and initiate mental health care.[7] As all providers become more familiar with the diagnosis of PTSD and the current successful treatment options, educational barriers to initiation of care becomes less problematic – and those we serve can start care immediately while waiting on their referral to a mental health professional for continued care.

Over the last two decades a wealth of research has been conducted on PTSD, driven primarily by the rising suicide completion rates and daily impairment to military members with that diagnosis. Funded mainly by the U.S. Governmental agencies these projects over the years have added to the medical knowledge and understanding of the brain, human behavior, the effects of persistent stress on the hypothylamic-pituitary-adrenal axis system, stress change to the limbic-amygdylar circuitry, as well as more effective treatment strategies. Past well thought of treatments have either passed the rigorous tests of double blind and placebo-controlled studies and continue in use, or did not – and have been discounted. The amount of research was a boon to the mental health community, who at the time of late 1990s had only 15 controlled trials on treatment for PTSD to draw from.[8]

The following decade brought great gains. A large meta-analysis in 2013 reviewed all available research on efficacy of treatments and interventions for PTSD, with a total of 112 non-duplicate studies included. This existing body of research was influential in the formation and updates to the VA and DoD clinical practice guidelines for assessment and treatment of PTSD in that same year.

Diagnosis

In 2013 the diagnosis itself received an update with the Diagnostic and Statistical Manual of Mental Disorders (DSM) – V and shifted from an anxiety disorder and into a new category of trauma associated disorders. This was in part done to provide an updated diagnosis representing the underlying pathology of the illness and to further differentiate it from anxiety and depressive disorders which it does share some symptomatology with. At present, to have a diagnosis of PTSD a person must have had a significant trauma exposure that has caused significant impairment to occupational and social function for greater than one month.

Symptoms must include one intrusive (recurrent, involuntary, distressing memories and/or dreams, dissociative reactions such as flashbacks, intense or prolonged psychological distress to triggers, or marked physiological reactions to triggers); one avoidance symptom (avoidance of memories, feelings, or thoughts of trauma or avoidance of external reminders of trauma); two negative alterations to cognition or mood related to the trauma (dissociate amnesia, negative beliefs of self or the world, persistent negative emotional state, anhedonia, feelings of detachment or estrangement from others, inability to experience positive emotions); two symptoms of marked alterations in arousal and reactivity (irritability or anger outbursts, reckless or self-destructive behaviors, hyper vigilance, exaggerated startle response, problems with concentration, sleep disturbance). A provider may specify if there are persistent dissociative symptoms such as depersonalization (feeling detached from oneself, as if observing from out of body) or derealization (feelings of the unreality of the environment). Because of the prevalence of childhood trauma and differences in the brain and personality development of children at that age, specific criteria for children ages 6 and younger are also detailed in the DSM-V.[9]

Non-Pharmacologic Treatment for PTSD

Shared Decision Making and Collaborative Care (Strong Recommendation for)

Both are important early interventions which have been shown to improve patient-centered care and treatment outcomes. Review of the relevant diagnosis along with treatment options with consistent use of decision aids with patients has been shown to improve clinical outcomes, enhance psychoeducation on the diagnosis of PTSD, and reduce ambivalence in regards

to accepting the most efficacious treatment strategies.[10] In particular for the collaborative care model (inclusive of telehealth modalities to improve access), a stepwise treatment approach in the primary care setting has been shown to increase patient compliance with treatment and to potentially reduce the possibility of the patient stopping medication or therapy treatment too early.[11]

Trauma-Focused Therapy as First Line Treatment for PTSD (Strong Recommendation for)

Prior to 2013 there was little evidence to suggest that there is a differentiation in treatment with pharmacotherapy versus psychotherapy. One of the larger changes to the updated clinical practice guidelines was to recommend therapy over medication for treatment of PTSD, to the recommendation now that manualized trauma focused therapies are the first line treatments. This change was a result of two large meta-analyses which did a head-to-head comparison between existing pharmacotherapy and manualized psychotherapy with a comparison of treatment outcomes. A manualized therapy is one in which the therapist or psychiatrist uses a guide manual to assist in care delivery, ensuring that all important trauma related topics are addressed. Use of a manual for trauma therapy is the gold standard for treatment delivery. It was noted in both that the psychotherapy alone presented a longer duration of symptom resolution with a reduction in risk of side effects from ongoing medication use amongst the studied patient populations.[12]

In conjunction with specific positive research supporting use of manualized, trauma-focused therapies such as PE, EMDR, and CPT have shown consistent reduction of symptoms of PTSD with completion of 12-16, 60 minute weekly sessions.[13,14,15] While those three 'main' trauma therapies have been the foundation of trauma-focused therapy research, new subtypes of manualized focused therapy such as cognitive behavioral therapy for PTSD (CBT for PTSD), Narrative Exposure Therapy (NET) and Written Exposure have also shown evidence to support their use in treatment.[16,17,18, 19] All of the therapies that have shown the greatest treatment benefit have been individual therapy, not group. Recent research also highlights that therapy through video call is as effective as in person and is a cost effective first line treatment strategy.[20] Use of a manual to guide and structure therapy with a patient has been shown in the above, and many more studies to improve outcomes – both in terms of adherence to and attendance in the treatment program, and in improved symptom reduction over time as compared to therapy that does not use a manualized approach. It in no way limits the therapist or reduces their expertise—in fact it has been shown to enhance it by providing a scaffolding that addresses all core issues of trauma is a systematic way, and provides for evidence-based work for the patient in treatment outside of the treatment sessions. Of the newer researched therapies, written exposure therapy has been showing excellent benefit with good treatment retention. Especially for people whose learning style may be more tactile or experiential, it allows for the patient's written narrative with additional cognitive therapy to be the mechanism for improvement, rather than a verbal repeated retelling as in Prolonged Exposure therapy.

The verbal with imagining retelling of the trauma experience as is performed in PE is effective, though described as difficulty at best, by the patient undergoing that type of therapy. Drop out rates from PE tend to be higher than that of other more cognitively-focused therapies such as CPT and EMDR. Written exposure therapy provides a mid point between the two with emerging data suggesting a much improved retention rate in therapy when compared to PE.

There is strong evidence for:

- Individual, manualized trauma-focused psychotherapy, 12-20, 60-minute sessions weekly, as main and first line treatment for treatment of PTSD.
- Cognitive Processing Therapy
- Eye Movement Desensitization and Restructuring (
- Written Exposure Therapy
- Narrative Exposure Therapy
- Prolonged Exposure
- Any of the above therapies delivered through video teleconferencing (aka, virtual health)

Pharmacologic Treatment of PTSD

Pharmacotherapy as a Treatment for PTSD (Strong Recommendation for)

As based on the most relevant and recent research, the medications fluoxetine, venlafaxine, or paroxetine have shown the most benefit as monotherapy in treatment

of posttraumatic stress disorder symptomology. The relative benefits of use of the selective serotonin reuptake inhibitors (SSRI) or selective norepinephrine reuptake inhibitors (SNRI) are that the side effect profiles are generally well tolerated. In clinical practice a psychiatrist will often switch to different SSRI or SNRI medications based on patient response, tolerability, or other issues of slow or rapid metabolism of those particular medications. Specifically, paroxetine is less prescribed as it tends to have greater anticholinergic side effect profiles than the other SSRIs and has an extremely short half-life often requiring twice daily dosing. Other medications such as des-venlafaxine and duloxetine are both acceptable alternatives, as is sertraline in the treatment of post traumatic stress disorder. Specifically noted Celexa and Lexapro in the research have a less significant impact on reduction of symptoms than these other medications.[21]

There is strong evidence for use of the following medications for treatment of PTSD:

- Fluoxetine, initial dose 10-20mg daily, response range 20-80mg daily.
- Paroxetine, initial dose 10-20mg daily, response range 20-50mg daily.
- Sertraline, initial dose 25-50mg daily, response range 50-200mg daily.
- Venlafaxine XR, initial dose 37.5mg daily, response range 75-225mg daily.
- Augmentation Strategies (Weak or Insufficient Evidence for)

Augmentation strategies (Weak or Insufficient Evidence for)

Augmentation strategies for treatment resistant comorbid symptomology can be done in conjunction with a primary SSRI or SSRI. The most studied of these medications include the short half-life alpha adrenergic antagonist prazosin for the treatment of PTSD associated nightmares and hyper arousal response, though recent research concluded that there was only weak evidence for use in some studies even in this limited capacity. Typical dose ranges for prazosin range from 1-12mg usually nightly, though some individuals may respond well to a split dosing regimen with a smaller morning dose and larger even dose. Another augmentation medication with weak evidence for use is mirtazepine, dosed to target reduction of sleep latency, improvement of sleep duration, and augmentation of the primary SSRI or SNRI in anxiolytic effects. As a nightly anxiolytic this medication not only improves sleep architecture but may reduce anxiety symptoms in as early as two to three weeks which can be a remarkable benefit to those who do respond well to it—especially those not with PTSD but with Generalized Anxiety Disorder or Panic Disorder, with or without Agoraphobia. It is also important to note that all medications targeting reduction of anxiety symptoms tend to assist in reduction of the active anxiety components of PTSD rather than decreasing the avoidant and negative symptoms of post traumatic stress disorder. This again leaves therapy is the primary choice a first line treatments in that it can address all aspects of symptomology.

Weak or insufficient evidence for augmentation with:

- Prazosin, for reduction of nightmares/hyper arousal symptoms
- Mirtazapine, for augmentation with an SSRI or SNRI and sleep benefit for PTSD
- PTSD Non-Advised Treatments

Given the amount of research conducted over the last two decades, and the interest in PTSD as a diagnosis due to the active military conflicts over that same time period, many medications have also been studied. Of particular note, benzodiazepines have been found to carry a 'strong against' use recommendation. In some studies that class of medications carries an 'X' recommendation as well due to evidence that they cause harm with long term use with a diagnosis of PTSD. This is thought to be due to the strong sedative, addictive, and dissociative properties of the benzodiazepines (sedative hypnotics) when used to attempt to treat a condition in which dissociation and hypnotic sedation fosters trauma reliving intrusive symptoms which in turn worsened avoidant symptoms of PTSD. That said, acute or emergent use of benzodiazepines for reduction of imminent risk aggression in an emergency room or inpatient setting, or to treat seizures or alcohol withdrawals is medically indicated and does not worsen outcome of PTSD symptoms. Other medications studied included all anti-convulsants, which are often used in psychiatry as mood stabilizers to treat both subtypes of bipolar disorder, and many typical and atypical antipsychotic medications which have been shown to be of benefit in treatment resistant major depressive disorders, in psychotic disorders such as schizophrenia, and also in bipolar disorders.

Additional procedures that have been effective in other areas of psychiatry were also well researched. While Electroconvulsive Therapy (ECT) and the newer repetitive transcranial magnetic stimulation (rTMS) are effective for treatment of severe major depressive disorder and bipolar disorders, there was no conclusive evidence that they effectively were able to reduce symptoms in PTSD as did on those primary mood disorders. Additional procedures showed benefit to a small subset of patients but those findings were not generalizable to a broad population base.

The following have been found to not be recommended for use in treatment of PTSD:

- Risperidone, quetiapine, olanzapine, and other atypical antipsychotics
- Divalproex, tiagabine, guanfacine, ketamine, hydorcortisone, D-cycloserine
- Benzodiazepines (Causes harm)
- Cannabis or cannabinoids

There was insufficient evidence to support use of the following procedures for treatment of PTSD:

- Electroconvulsive Therapy Repetitive Transcranial Magnetic Stimulation
- Hyperbaric Oxygen Therapy
- Stellate Ganglion Block
- Vagal Nerve Stimulation

Summary

There has been a wealth of new and updated research into PTSD and its treatment over the last 15 years. Out of the many treatments researched, the trauma-focused therapies, delivered individually, with use of a manual by the therapist showed the most benefit in treatment. While very effective the patient may be limited by access to a therapist who has been trained in trauma-focused therapy, who may not wish to use a manualized treatment approach, or by cost and/or insurance coverage. More research needs to be conducted to directly discover and address the reasons underlying the lack of broader availability of manualized trauma focused therapy by therapists. For those desiring such, or in the absence of good access to trauma focused therapy there is also strong evidence for use of SSRIs and SNRIs such as fluoxetine, paroxetine, sertraline, and venlafaxine, and at appropriate doses will assist with symptom reduction.

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Staphylococcus lugdunensis as Cause of Septic Pericarditis

by Suha Abu Khalaf, MD, Abdallah Mansour, MD, Isma perveze, MD, Belinda Fender, MD, Daniel R. Walker, MD & Dima Dandachi, MD

1FIRST LITERATURE REPORT

S. lugdunensis is a gram-positive coagulase-negative staphylococcus (CONS), which has been linked to multiple severe infections. This is the first case report of pericarditis secondary to _S. lugdunensis_. _S. lugdunensis_ culture should be treated as true infection rather than a contaminant, particularly in a suspect clinical context.



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Abstract

***Staphylococcus lugdunensis* (*S. lugdunensis*) is a coagulase-negative gram-positive bacterium, considered part of skin flora, which can simultaneously cause human diseases. *S. lugdunensis* has been reported in the literature as one of the causative agents for infective endocarditis.[1] Although one of the coagulase-negative staphylococci, *S. lugdunensis* shares many virulent characteristics with *Staphylococcus aureus* (*S. aureus*), including biofilm formation. It has been associated with various foreign body-related infections such as prosthetic joint infections,[2] in addition to bacteremia, osteomyelitis, septic arthritis, central nervous system, urinary tract infections, peritonitis, infective endocarditis and others. Given the association with severe and aggressive infections, it is important to treat *S. lugdunensis* as true infection rather than a contaminant, particularly in a suspect clinical context.[3-6] Currently, there are no reported cases in the literature on pericarditis secondary to *S. lugdunensis*. We present a case of a 69-year-old woman with pericarditis, sepsis and disseminated intravascular coagulopathy (DIC) due to *S. lugdunensis*.**

Case Summary

The patient was a 69-year-old female with a past medical history remarkable for obesity class I, insulin-dependent diabetes mellitus, and hypertension who presented for evaluation of progressive shortness of breath for 10 days and 50 pound weight loss over six months, generalized weakness and fatigue. The patient denied fever, night sweat, chills, or diarrhea prior to presentation.

On admission, the physical examination was remarkable for hypoxemia with SpO2 of 83% on room air, requiring 4 liters of nasal oxygen. She had a temperature of 37.9 C, a heart rate of 90 bpm, respiratory rate of 20 breaths/minute, and blood pressure of 135/76 mm Hg. She was awake and alert. Lungs were clear to auscultation. Precordial examination revealed distant heart sounds with regular rate and rhythm. She

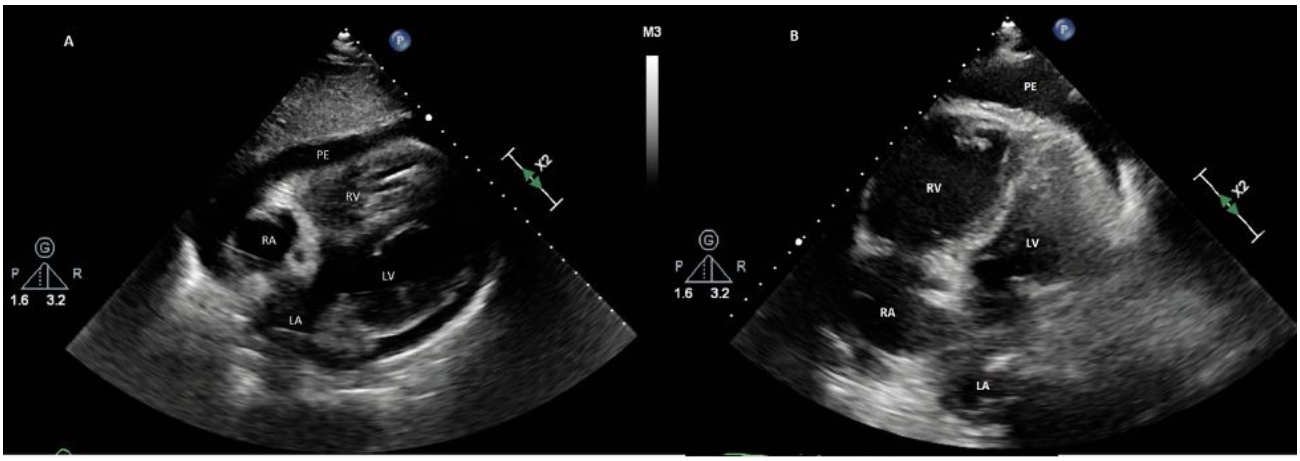


Figure 1. Transthoracic echocardiogram images (subcostal (A) and apical (B) views) showing circumferential pericardial effusion.

had hepatomegaly and trace bilateral lower extremities edema. Initial work up showed elevated serum white cell count of 20.52 × 10^9/l (reference range 3.5-10.5× 10^9/l) with bands of 5.3%; hemoglobin of 7.4 g/dl(reference range 12-15.5 g/dl); platelet count of 95 ×10^9/l(reference range 150-450 ×10^9/l); peripheral smear showed 3-6% schistocytes; lactic acid of 2.5 mmol/L (reference range 0.5-2.2 mmol/L); serum HCO_3^- 17 mmol/l (reference range 22-29 mmol/l); International normalized ratio (INR) 1.4 (reference range 0.9-1.1); and total bilirubin of 5.5 mg/dl (reference range 0.0-1.6 mg/dl). Arterial blood gas analysis revealed respiratory alkalosis; PH: 7.48/ CO2: 20.67 mmHg / pO2 75 mmHg. Chest x-ray was unremarkable.

ECG showed low voltage in precordial leads without ST-T changes. Computed tomography angiography (CTA) of the chest showed moderate pericardial effusion along with concerning lung mass and possible metastases to the liver and bones. There was no evidence of pulmonary embolism. Transthoracic echocardiogram (TTE) showed a severely dilated right ventricle (RV) with moderately reduced function. There was moderate circumferential pericardial effusion without echocardiographic evidence of tamponade (Figure 1A, 1B). She underwent a diagnostic pericardiocentesis yielding 570 mL of serous fluid, which was sent for laboratory analyses and cultures. Shortly thereafter, the patient's condition deteriorated with new onset fever, tachycardia and worsening hypoxemia. She became anuric and was intubated for increased work of breathing and refractory hypoxemia.

Repeat labs showed worsening leukocytosis (36.4 ×10^9/l with 11% of bands), anemia (hemoglobin 6.5 g/dl), coagulopathy (INR 3.9; haptoglobin <8 mg/dl (reference range 63-273 mg/dl); D-Dimer >20 mcg/ml(reference range <0.5 mcg/ml)), liver injury with aspartate aminotransferase of 5824 units/L(reference range <32 units/L); alanine transaminase of 4608 units/L (reference range <35 units/L); alkaline phosphatase 1494 units/L (reference range 35-104 units/L), and lactic acidosis(12.2 mmol/L). Peripheral blood smear revealed leuko-erythroblastic reaction and numerous schistocytes(>6%) concerning for microangiopathic hemolytic anemia secondary to disseminated intravascular coagulopathy (DIC) in the setting of sepsis. She was subsequently started on broad-spectrum antibiotics (vancomycin and meropenem) twenty hours after admission. Repeat TTE showed persistent small pericardial effusion without any signs of tamponade. She was started on sustained low-efficiency dialysis to correct acidosis and fluid overload. She was in refractory septic shock despite aggressive fluid

resuscitation and multiple vasopressors attributed to septic pericarditis. Due to worsening multi-organ failure, the family opted for comfort care based on their best interpretation of patient's wishes. The patient died within 36 hours of admission and the family declined an autopsy. The patient's pericardial fluid culture was completed within 72 hours; it grew *Staphylococcus lugdunensis* sensitive to oxacillin, and resistant to penicillin and clindamycin. Two sets of blood cultures remained negative after five days. Pericardial fluid cytology was negative for malignant cells.

Discussion

S. lugdunensis is a gram-positive coagulase-negative staphylococcus (CONS), which has been linked to multiple severe infections, though there are no reported cases of pericarditis secondary to *S. lugdunensis* to date.[3-6] When compared with other coagulase-negative gram-positive bacteria, *S. lugdunensis* can cause more severe and life-threatening infections. While other CONS are most clinically relevant in the context of hardware devices, *S. lugdunensis* has been reported to cause infections of both native and prosthetic materials. *S. lugdunensis* tends to affect native valves more often than prosthetic valves.[6,7]

The prevalence of *S. lugdunensis* is difficult to estimate, as most microbiological laboratories will not further identify a coagulase-negative staphylococcus, under the assumption that it is a probable contaminant.[8] Despite being one of the coagulase-negative staphylococci, *S. lugdunensis* shares may virulent characteristics with *S. aureus*, including biofilm formation and clumping factor (a membrane-bound form of coagulase).[6] While immunocompromised status and trauma are recognized risk factors for *S. lugdunensis* infections, infections in immunocompetent individuals have also been reported.[5]

A positive culture for CONS could quite often be considered a contaminant. Souvenir et al. investigated this problem and considered having one or more of the following as supportive evidence of true bacteremia: prolonged temperature (≥38°C), hypotension (<90 mmHg), leukocytosis or neutropenia with a left shift differential, or disseminated intravascular coagulopathy (DIC).[9] In our case, the patient had a single pericardial fluid culture positive for *S. lugdunensis* in the setting of leukocytosis with left shift, persistent fever, hypotension requiring vasopressors, and DIC, consistent with a real and fatal infection.

S. lugdunensis shows a wide range of antibiotic susceptibility in vitro as in our patient, including susceptibility to B-lactams. The treatment of choice for S. *lugdunensis* is penicillin. Less than 25% of isolates were found to be penicillin-resistant, in which case the drug of choice would be vancomycin.[10-12] Penicillin resistance is mediated by two mechanisms: altered penicillin-binding protein and β-lactamase.[12] Taha et al. reported a higher prevalence of penicillin resistance of 45%.[8] Taha et al. suggested that penicillin G should be used over oxacillin given lower MIC values.[8] Heldt Manica et al. suggested treating methicillin sensitive S. *lugdunensis* like methicillin sensitive *S. aureus* with cefazolin/cephalexin.[5]

Coagulase-negative staphylococcus (CoNS) susceptibility to methicillin is reported based on minimal inhibitory concentration (MIC). S. *lugdunensis* oxacillin/methicillin susceptibility is reported based on MICs of *S. aureus*, with a cut-off of <= 2, susceptible and > = 4, resistant. Other CoNS have lower oxacillin MICs in the range of 0.5-2 g/ml.[12,13] Methicillin resistance and presence of MecA gene are much less common in comparison to *S. aureus*.[8]

S. *lugdunensis* tolerance and lack of appropriate response to vancomycin were described in the literature, despite being susceptible in vitro.[14] Our patient's culture was resistant to erythromycin and penicillin, which has frequently been seen in other studies.[12]

Biofilm formation by *S. lugdunensis* plays an important role in defining its pathogenicity as it protects bacteria from antimicrobials and allows them to connect to hardware/metal surfaces. Adherence to surfaces is not limited to the presence of biofilm, but also to other well-described factors, including von Willebrand factor binding protein.[15] Identification of CONS species and thus early detection of *S. lugdunensis* has improved mortality and prognosis.[6] *S. lugdunensis* bacteremia should be treated in a similar fashion to *S. aureus*.[7]

Conclusion

S. lugdunensis pericarditis is a rare pathological entity that has not been previously described in the literature and requires clear guidelines for treatment, especially with reported tolerance to vancomycin. It has a high morbidity and mortality due to several virulent factors. More studies are needed to diagnose this life-threatening condition in a timely fashion, and to better characterize appropriate therapeutic options.

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Encouraging *Flow*: A State Of Calm and Deep Focus May Improve Exercise Compliance in Cardiac Rehabilitation

by Anand Chockalingam, MD & Kavin Anand

Starting with intuitive mindfulness methods, we encourage our cardio vascular disease patients and their families to explore sports or physical exercises that induce *flow*.



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Abstract

Cardiovascular disease (CVD) accounts for more deaths worldwide than any other illness. Over 80% of CVD can be prevented by lifestyle changes. Improving compliance with exercise requirements and reaching 30 minutes of brisk physical activity (PA) on most days remains a challenge. Only a minority of eligible CVD patients complete cardiac rehabilitation (CR) and fewer sustain PA long term. Changing work environments, urbanization, and virtual engagement foster a sedentary lifestyle in students and healthy adults. Disabilities and comorbidities limit PA in older CVD patients. The *Flow* phenomenon was described in the 1970s as an intrinsically enjoyable state, typically achieved by highly trained people encountering significant challenge like competitive tennis or writing new music. Siddha Tamil medicine has recognized the importance of this 2,000 years ago, recommending ways to experience *flow* and engage enthusiastically. We hypothesize that *flow* can be learned and targeted during CR. Older cardiac patients despite comorbidities can experience some level of *flow* state during CR. This significantly improves long term PA adherence while also sustainably improving other aspects of lifestyle, including diet, smoking cessation, stress reduction, and medication compliance. Clinicians can estimate *flow* at baseline, following PA sessions and during clinic visits to encourage a deeper mind-body connection. Once PA becomes enjoyable, compliance and cardiac outcomes may improve in CVD.

Flow Phenomenon in Cardiac Rehabilitation and Implications for Sustainable Lifestyle Changes

Cardiovascular diseases (CVD) are the leading cause of mortality accounting for 17.9 million or 31% of all deaths globally in 2016 according to the WHO.[1] Importantly, 80-90% of CVD can be prevented by lifestyle improvements such as addressing tobacco use, unhealthy diet, obesity and physical inactivity.[2] Sedentary lifestyles increase CVD mortality by 90% and may account for 250,000 deaths in the

U.S. alone.[3,4] Variety of factors like increasing urbanization, changing workplace culture, and busy schedules leave little time for physical activity (PA). Over 85% of CVD patients do not reach exercise requirements due to comorbidities, fear or lack of interest.[5] Improving PA through exercise and sports can improve and sustain healthy lifestyle in CVD patients.

Background

The *flow* phenomenon is an intrinsically enjoyable, exceptionally positive state of mind and is the psychological process underlying peak performance. Mihaly Csikszentmihalyi described *flow* in 1975 as the experiential state that occurs as one approaches optimal engagement with a task.[6] When in *flow*, a person becomes totally involved in an activity, free from self-consciousness. While it can be reached with any activity, most of the literature focuses on athletic performance and artistic creativity. The nine dimensions of *flow* are challenge-skill balance, the merging of actions with awareness, having clear task goals, unambiguous feedback, full concentration on the task at hand, a sense of control, a loss of self-consciousness, a perception of the transformation of time and an autotelic (or intrinsically rewarding) experience. During *Heartful Living,* our eight-week physician-led cardiac wellness program, we educate and encourage exercise related flow experiences.[7] This is central to self-inquiry, or asking '*who am I?*' in the Siddha mindfulness tradition using various mind-body and positive psychology tools to elevate consciousness.[8] Deeper self -awareness is the central tenet of this program that targets sustainable lifestyle changes at any age, despite significant comorbidities. Every day of the two-month course, cardiac patients explore different challenging yet safe PA with potential to experience *flow*.[6]

Hypothesis

We hypothesize *flow* phenomenon can be employed during CR in CVD patients and would improve long-term compliance with exercise and enhance confidence. *Flow* was first described in 1970s as an intrinsically enjoyable state in well trained people performing complex tasks like playing tennis or writing new music, but occurs with daily activities as well.[9] The high level of challenge may allow this *flow* or 'self-less' engagement to maximize performance, often beyond expectations. Siddha medicine has recognized the importance of this and systematically taught techniques to achieve 'uvagai' (meaning extreme happiness or bliss). Ancient Tamil literature dating back 5,000 years recommends specific mind-body techniques including yoga, dance, and martial arts to experience *flow* and live better.[8, 10] In 1996 Jackson reported a 36-item Flow State Scale to measure all these dimensions and quantify *flow* during sports events in athletes which has been adapted for mental activities in older adults.[11] We hypothesize that *flow* during PA can be quantified in CVD patients. We start with siddha mindfulness methods that deepen mind-body connection. Thus, our CVD patients are able to intuitively improve exercise capacity and continue to gain confidence in a positive feedback loop. To our knowledge, we are the only program prospectively targeting *flow* in CR.

We believe cardiac patients can learn to experience *flow* state during CR despite comorbidities and older age. Being intrinsically enjoyable, this can potentially improve and sustain PA. Beyond being a 'prescription,' PA can potentially transform into an enjoyable lifetime pursuit. We describe two CVD cases in cardiac rehabilitation (CR) to illustrate how targeting *flow* during PA has transformed their lives.

Case 1: Exercising Beyond Maximal Treadmill Capacity

In spring 2018, a 50-year-old sedentary chemical engineer presented to the local emergency room with 30 minutes of chest discomfort. He went into ventricular fibrillation cardiac arrest requiring CPR and two shocks at 200 joules. Anterior ST elevation improved with thrombolysis and subsequent cardiac catheterization revealed 95% mid LAD and 60% proximal right



Figure 1. Graphic description of a typical exercise session. Treadmill running at a constant speed of 3.7mph typically for 30-40 minutes forcibly terminating with Borg RPE reaching 10. Some sessions would continue additional 15 minutes when patient enters flow state with RPE dropping to 2 and heart rate stabilizing at about 133bpm.

coronary artery disease. PCI was performed with drug eluting stent to the LAD. Mild left ventricular (LV) dysfunction with anteroseptal hypokinesia and reduced ejection fraction (EF) of 40% was noted by the echocardiogram. Perindopril 5mg, Bisoprolol 2.5mg and atorvastatin 40mg were started along with dual antiplatelet agents. He completed CR as well as our cardiac wellness program and three months later, his LV EF improved to 50-55% range. Patient improved his diet, reduced work stress, and practiced yoga two times a week. His exercise tolerance improved steadily over three months with his confidence returning to exercise maximally in the modified 0-10 Borg rating of perceived exertion (RPE) scale. He reached his goal of treadmill running at a constant speed of 3.7mph three times a week without angina. Most sessions would forcibly terminate due to exhaustion at 30-40 minutes on reaching RPE 10 with heart rate about 125 bpm. However, few times a month he experienced a peculiar 'breakthrough' phenomenon while still on the treadmill. His heart rate would stabilize at about 133 bpm, and importantly, RPE would drop to 2 and he reported feeling '*relaxed*' and '*weightless*' while still running at 3.7mph (Figure 1). He would comfortably run an additional 15 -20 minutes, electing to stop while still feeling energetic on these occasions. We believe that entering a flow state accounts for the dramatic decline in RPE. The BEFIT score (see Discussion) of the first patient was 22 on occasions when he 'broke through' beyond 40 minutes on the treadmill. Warm-up angina and 'second wind' phenomena may have some overlap, but typically occur after a break and do not involve losing track of time, weightlessness, or altered awareness

Case 2: Professor Takes to Competitive Running After STEMI

In the summer of 2018, a 68-year-old professor at University of Missouri-Columbia developed acute chest pain that woke him

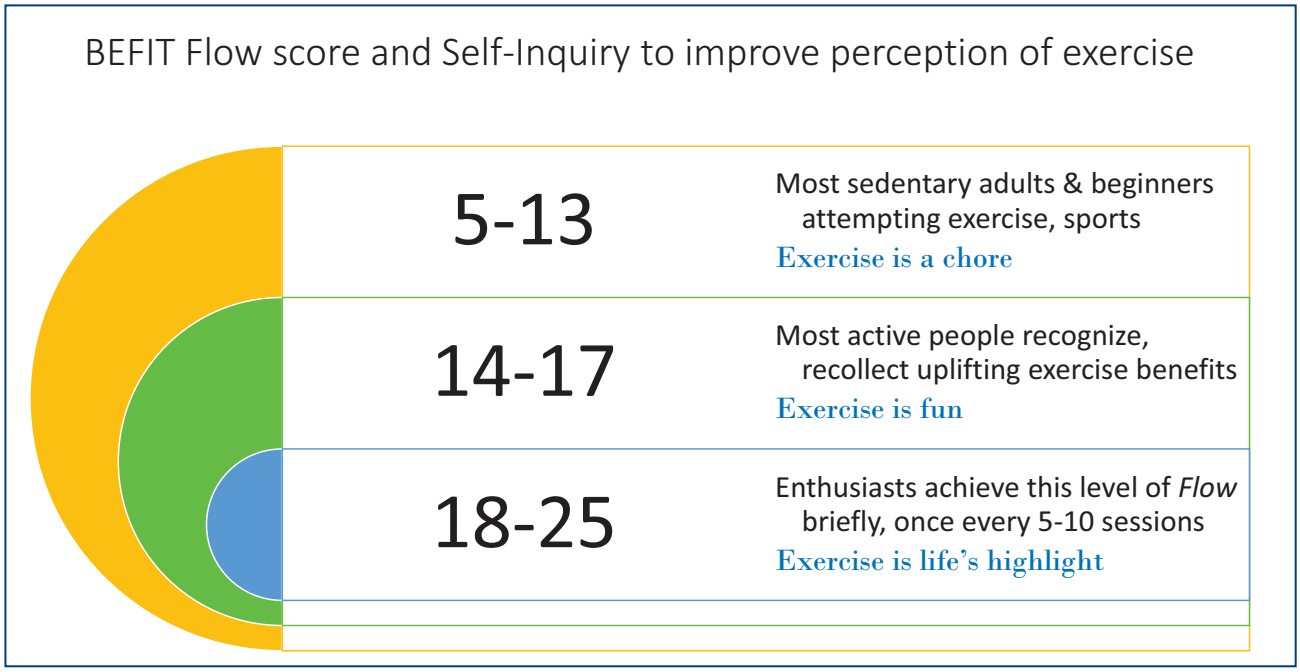


Figure 2. BEFIT flow scale (0 to 25) and typical scores following physical activity and general characteristics and exercise perception in adults. Participants are encouraged to score based on how they felt after completion of a recent 'fun' exercise or 'good' sporting experience.

up from sleep. He was not on cardiac medications. Cardiac risk factors were sedentary lifestyle and family history of a brother with heart disease at 60 years. Inferior ST elevation infarction was diagnosed at the ER requiring revascularization with drug eluting stent to the right coronary artery. Echocardiogram showed inferior hypokinesia, EF 45%. He was initiated on guideline mediated medical therapy and completed three months CR and our cardiac wellness program. At follow-up LV function improved with LV EF 60%. At baseline, prior to 2018, he could only walk two to three blocks. Progressive increase in exercise capacity with CR has led him to begin competitive running for the first time at the age of 69 years. By April 2019, he completed a 5 km run in 45 minutes. PA has become an integral part of his life because he has discovered how it helps improve physical and mental wellbeing. The BEFIT score of 14 at baseline increased to 18 over months corresponding with more athletic engagement. He is now resistance and endurance training year-round at a fitness academy along with student athletes to improve his performance for more challenging athletic events in his '70s.

Discussion

Both patients participated in *Heartful Living* along with traditional CR. Based on *flow* experience during competitive tennis, the authors have developed a simplified five-item scale to quantify *flow*, which is yet to be validated. After completion of the PA, our BEFIT scale grades the *flow* experience from 1 to 5 (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5= strongly agree). The BEFIT items are 1) I performed **B**eyond my expectations; 2) Things happened **E**ffortlessly and I felt weightless; 3) PA was a **F**un and rewarding experience, I look forward to repeating; 4) The sense of self "**I**" was lost, yet there was intuitive awareness; and 5) **T**ime just stopped, long periods feeling like

a blur or a moment. Based on preliminary data, a score ≥ 18 indicates *flow* experience, with higher scores increasing the likelihood of enjoying and embracing long term PA (Figure 2).

Current guidelines do not restrict athletic participation three months after coronary revascularization, if LV function is preserved without evidence for ischemia or arrhythmia.[12] Case reports document the safety of gradually increasing to maximal tolerated exercise and reaching beyond 100% of age predicted maximal heart rate even in older cardiac patients.[13] Positive psychological effects of *flow* include long-term adherence with physical activity, stress reduction, compliance with diet, medications, and risk factor control and better outlook towards life.[14, 15] The BEFIT flow scale needs validated in CR and other populations. Working with psychologists, we plan to prospectively evaluate if increasing BEFIT scores correlates with improved PA compliance. Ideally, we would like to compare BEFIT scores, PA adherence, and CV outcomes for traditional CR alone versus CR combined with *Heartful Living* mind-body education.

Conclusions

The *flow* experience can play an important role in holistic health and cardiac rehabilitation. Despite the numerous challenges faced by older cardiac patients with comorbidities, aiming for *flow* is likely to improve and sustain physical activity. Starting with intuitive mindfulness methods, we encourage our CVD patients and their families to explore sports or physical exercises that induce *flow*. Further study will clarify if targeting *flow* after a cardiac event may help patients increase exercise capacity, deepen self-awareness and intuitively pursue a more active lifestyle.

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