

# OFP

Osteopathic Family Physician

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COLLEGE OF OSTEOPATHIC  
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Resilient

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Wellness and Preventative Measures  
for Protection

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A Brief Review for Family Physicians

Update on Office-Based Strategies  
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Osteopathic Home Exercises for  
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# EDITOR'S MESSAGE

## Resilient

Ronald Januchowski, DO, FACOFP, Editor, *Osteopathic Family Physician*

2020 is turning out to be quite a year. I hear of calls to press “CTRL-ALT-DEL” or “turn it off and turn it back” to see if it will fix the situation.

I have seen and heard stories about physicians on the front line in hotspot areas placing their health at risk to care for those patients needing medical attention. Osteopathic physicians have met the challenges this year with incredible resiliency and an irrepressible spirit. Several articles in this issue speak to this hardy attitude in a variety of situations.

I have seen residents helping attendings adjust to virtual office visits and telehealth opportunities expand to meet the needs of patients. Medical training has quickly evolved and students have met the challenge of the virtual classroom.

In addition to participating in peaceful protests to increase the awareness of disparities in the United States, I am excited to see physicians running for political office in an attempt to influence policy at both the local and national levels. As the newly elected president of the South Carolina Osteopathic Medical Society, I am glad to report that our membership is at an all-time high, hopefully indicating the desire for osteopathic physicians to be a part of a broader community to do good. I look forward to working with these physicians to improve minds, bodies and spirits across our state.

Whatever the last half of 2020 holds, I am confident that the osteopathic spirit will continue to be resilient. I hope you can take time to recognize the challenges in front of us and find opportunities to grow into a better osteopathic family physician. Enjoy the issue!







## 2020 CALL FOR PAPERS

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- Management of the COVID-19 obstetrics patient
- Management of the pediatric patient with COVID-19 includes neonates with COVID-19 positive mothers
- Geriatric management of patients with COVID-19
- Management of the special needs COVID-19 patient
- COVID-19: Remote consultations. A guide to assessing patients by video or voice call.
- Assessing and managing adult patients with asthma during COVID-19 pandemic
- How COVID-19 is changing the face of family medicine
- COVID-19 communication aids. How to talk to patients about difficult topics related to COVID-19
- Successful strategies for family physicians to manage stress and psychological duress during virus outbreaks

### RESEARCH TOPICS

We are seeking original clinical or applied research papers. Original contributions include controlled trials, observational studies, diagnostic test studies, cost-effectiveness studies, and survey-based studies. The OFP will accept basic scientific research only if the work has clear clinical applications. For randomized controlled trials, study flow diagrams must be submitted. For all other types of original contributions, flow diagrams are encouraged. Original contributions should be 3000 words with no more than 50 references and 5 tables or figures. OFP requires you to submit a 250-word abstract, along with four to six keywords.

The content should include the following:

<i>Abstract</i>	<i>Discussion</i>
<i>Introduction</i>	<i>Conclusions</i>
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<i>Results</i>	

## FROM THE PRESIDENT'S DESK



### Our Osteopathic Oath: A Pathway for Change

Robert C. DeLuca, DO, MBA, FACOFP *dist.*

2019–2020 ACOFP President

*I have no desire to be a cat, which walks so lightly that it never creates a disturbance.*

—Andrew Taylor Still, DO

During these unsettling and upsetting times, it is difficult to know what to say. We worry about offending others who do not agree with our opinions. But I dare to interpret the quote above from our osteopathic founder, A.T. Still, that sometimes it is necessary to create a disturbance. Sometimes we must face issues that make us uncomfortable.

Americans have been worried about the COVID-19 pandemic for months now. It has literally disrupted and disturbed almost every aspect of life in every community and industry. As if the quarantine and pandemic weren't causing enough stress, the social disturbances we recently witnessed across the country have multiplied the fear and anger and unrest.

These emotions are fueled by decades of injustice against community members of color. They have suffered physically, mentally and spiritually. They have not been afforded the same opportunities as have others. Lack of adequate financial resources has limited their medical, nutritional and educational opportunities. These systemic issues contribute to the worsening social determinants of health.

*The osteopathic philosophy supports the idea of the unity of structure and function. The body is a unit, and the person represents a combination of body, mind and spirit.*

—Osteopathic Pledge of Commitment

Sickness and pain contribute to increasing stress and anxiety. When a patient lives with constant fear and anxiety—whether they are scared of what might happen because of their skin tone, of the illness they are trying to ignore or of the pandemic that has disproportionately taken the lives of minority populations—it affects their entire being; body, mind and spirit. Because of this fear, people of color may not seek medical attention until their condition has become an emergency.

*I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person's family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick.*

—Hippocratic Oath

Minority populations have a higher rate of morbidity and mortality in the United States. The latest overall COVID-19 mortality rate for Black Americans is 2.4 times as high as the rate for Whites and 2.2 times as high as the rate for Asians and Latinos. As of May 27, 2020, the mortality numbers make inequality very clear.

- 1 in 1,850 Black Americans has died (or 54.6 deaths per 100,000)
- 1 in 4,000 Latino Americans has died (or 24.9 deaths per 100,000)
- 1 in 4,200 Asian Americans has died (or 24.3 deaths per 100,000)
- 1 in 4,400 White Americans has died (or 22.7 deaths per 100,000)

Dramatic mortality disparities also exist for Indigenous residents in several states, especially Arizona and New Mexico. These states contain portions of the Navajo Nation, where the coronavirus outbreak has been devastating. In New Mexico, the Indigenous mortality rate is eight times as high as the White mortality rate. In Arizona, the Indigenous mortality rate is more than five times the rate for all other groups. With 315 Indigenous deaths between them, these two states alone account for more than two-thirds of all known Indigenous COVID-19 deaths.

*I will prevent disease whenever I can, for prevention is preferable to cure.*

—Hippocratic Oath

The challenge to the medical community is how to come together to address health disparities in our country. We need to find actionable, attainable solutions. We need to talk about disease prevention and lifestyle modifications that can help prevent diabetes, heart disease and other chronic disease states. We need to take a stance on the violence that leads to injury and death at a higher rate in minority populations. We can volunteer our time and expertise at free clinics for underserved communities. We can lobby for funding at the local, state and federal levels. We can donate to causes that support these populations or that work to find treatments and cures.

*I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon's knife or the chemist's drug.*

—Hippocratic Oath

There are many underlying reasons why minority populations have been more susceptible to violence, chronic diseases and COVID-19. Comorbidities compromise their health and promote chronic disease.

The social unrest and protests are exacerbating the COVID-19 problem. At a time when people should continue social distancing, they have been gathering in the streets, desperately demanding change in how they are treated. Though people of all races have been active in these protests, the majority are from the Black community. There is a strong possibility of a spike in COVID-19 cases because of this need for action against inequality.

*I will apply, for the benefit of the sick, all measures [that] are required.*

—Hippocratic Oath

Though it may not be consciously intentional, implicit biases can often sneak their way into the treatment of patients. Multiple studies have shown that health care providers exhibit the same level of bias as the wider population. Implicit biases explain a potential dissociation between what a person explicitly believes and wants to do (provide equal treatment for all patients) and the hidden influence of negative implicit associations on their thoughts and actions (e.g. perceiving a black patient as less competent and therefore deciding not to prescribe medication to the patient).

*I will abstain from all intentional wrong-doing and harm.*

—Hippocratic Oath

This may seem obvious as physicians. The goal of our profession is to help others. But sometimes we must ask ourselves if our inaction or inability to speak up for those who do not have a voice is directly harming them. What is the result of our inaction? Will the patient still receive the care they need? Will it be equal to the care we give someone else?

*I pledge to provide compassionate, quality care to my patients.*

—Osteopathic Pledge of Commitment

As DOs, we must also remember the osteopathic principles that guide us. We need to remember our compassion and empathy, even when we're exhausted or when the patient is behaving in a difficult manner. We should try to imagine how scared a sick or injured patient may feel, especially now.

We pledge to partner with our patients to promote health. We pledge to display integrity and professionalism throughout our careers. These principles are the cornerstone of our careers but also can be applied to our personal relationships. They can be applied to other health care professionals, law enforcement officers, politicians and protesters as well. They can be applied to all humans.

*I will remember that I remain a member of society, with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm.*

—Hippocratic Oath

Whether we lean to the left or right of the political spectrum, we treat all patients with respect. We should advocate for an appropriate and dignified approach to the treatment of immigrants. We should assist in our own communities to reduce the tension between the police and those who they are meant to protect. We should help to ensure that patients are not too scared to ask for the health care they need, during a pandemic or at any time.

Physicians have a duty to speak up when people are treated in ways that do physical and emotional harm. We can speak up for all children and respond when abuse is apparent. We have to educate others about the damage this does to all the family members. We can make the public and government aware of the unhealthy and unsafe treatment of marginalized populations. We can speak up about the emotional toll that regularly losing patients who were victims of violence takes on us as physicians.

We obviously cannot solve these problems alone, but it is important to leverage our role with patients and in our communities as best we can to help be one of many needed parts of the solution. We have a duty to protect the minds, bodies and souls of our patients.

*Let us not be governed today by what we did yesterday, nor tomorrow by what we do today, for day by day we must show progress.*

—Andrew Taylor Still, DO

Osteopathically yours,



Robert C. DeLuca, DO, FACOFP dist.  
2019–2020 ACOFP President

# Disaster Management During the COVID 19 Pandemic: A Closer Look at Managing Ehlers-Danlos Syndrome and Hypermobility Patients

To the *OFP* Editor:

The novel coronavirus (COVID-19) pandemic has drastically impacted the lives of all Americans. COVID-19, a coronavirus that causes illness ranging in severity and symptoms, has caused morbidity and mortality throughout the world.<sup>1</sup> As COVID-19 spread throughout New York, Governor Andrew Cuomo mandated residents to stay indoors aside from going out for essential supplies, groceries and dire medical care.<sup>2</sup> The area of Nassau County, where the Academic Healthcare Center and Ehlers-Danlos Syndrome/Hypermobility Treatment Center resides, was particularly hard hit.

Once the mandatory quarantine went into effect, the Center started receiving a large number of phone calls from worried patients expressing fear and asking for guidance on what to do. Measures including social distancing, staying at home, avoiding as much person-to-person contact as possible and avoiding gatherings of 10 or more people<sup>3</sup> were reiterated to all patients via telephone calls, virtual check-ins, telemedicine visits and web portal encounters. The Center's social media pages showcased the importance of minimizing virus exposure. The Center remained open throughout the pandemic, allowing patients who needed to see the Director to come for an in-person visit. All patients were advised to call the Center first so that proper triage and exposure precautions could be arranged for other patients, staff and providers. At the time of publication, in-person visits still remain at a bare minimum to minimize exposure and protect the patient.

All schools and businesses in New York state remain closed as of the writing of this letter. E-learning has become the new norm in teaching and the New York Institute of Technology College of Osteopathic Medicine (NYITCOM), an osteopathic medical school in Old Westbury, Long Island, suspended all in-person classes for the academic year. NYITCOM is unique because it has Academic Healthcare Facilities, located at two sites in New York, one on the Old Westbury campus and the second site in Suffolk County (Central Islip).

## EMERGENCY ROOM STATUS, SCHOOLS AND BUSINESSES

New York has become the epicenter of COVID-19 in the United States; as of April 28, 2020, more than 292,000 confirmed positive cases in New York, with over 17,000 deaths attributed to COVID-19 and more expected by time of *OFP*'s publication in July.<sup>4,5,6</sup> With the case increase, there was fear as to whether the New York hospital system could handle the increase of patients. The importance of primary care of vulnerable patient populations was apparent during this epidemic, with many patients scared and unwilling to go to emergency rooms.

Hospital emergency rooms in New York City responded to the surge in COVID-19 patients by increasing their intensive care beds and personal protective equipment (PPE).<sup>7</sup> Health care workers were running out of medical supplies and other PPE needed to treat patients, such as N95 respirators, face shields, nitrile gloves and ventilators.<sup>7</sup> At one point in March, Mayor Bill DeBlasio of New York City felt that hospital supplies in the city would only be able to last until the final week of March.<sup>8</sup> The EDS/Hypermobility Center and the Academic Healthcare Clinic received a generous donation of surgical masks by one of the authors of this paper, a first-year osteopathic medical student at NYITCOM.<sup>9</sup>

Medical students have worked hard to help during this pandemic. For example, organizations at NYITCOM, such as the Student Osteopathic Medical Association (SOMA), have begun collaborating with outside organizations to assist in efforts to provide PPE and medical supplies to health care facilities. Students have and continue to be contacting local businesses and asking for medical supplies to be donated to these organizations and health care workers. There has been high-level receptivity among medical students at NYITCOM to find additional supplies to help those in need.

## THE EHLERS-DANLOS/HYPERMOBILITY CENTER AT NYIT

The Academic Healthcare Center has a dedicated center for patients with rare and complex illnesses associated with Ehlers-Danlos Syndrome and Hypermobility Spectrum Disorders. Patients with these disorders get treatment at both campuses, with the Director based at the Old Westbury campus. Since Ehlers-Danlos and Hypermobility Syndrome abnormalities affect the entire body,<sup>10,11</sup> the state-of-the-art medical team consists of a variety of specialists, including cardiology, electrophysiology, orthopedics, osteopathic manipulation, sports medicine, physical medicine and rehabilitation, neurology, neuropsychology and clinical psychology.

Ehlers-Danlos Syndrome (EDS) consists of 13 subtypes of connective tissue disorders with certain defining features.<sup>10,12</sup> Hypermobility EDS (hEDS) is the most common subtype seen at the EDS/Hypermobility Treatment Center and many patients have comorbid conditions such as Postural Tachycardia Syndrome (POTS) and Mast Cell Activation Disorder (MCAD).<sup>11, 13, 14</sup>

Patients with hypermobility may have cardiac manifestations that include dysautonomia, tachycardia, mitral valve prolapse, palpitations and aortic root dilatation.<sup>11,12,15</sup> Patients with or at risk for arrhythmias need to be monitored by an electrophysiologist (EPS) and may require continual monitoring (i.e., via implantable LOOP recorder).<sup>15</sup> These patients required continual care during the pandemic. Much of this monitoring was accomplished virtually and with telemedicine.

## **EMERGENCY TELEHEALTH DEPLOYMENT FOR CARDIAC ISSUES IN EHLERS-DANLOS AND HYPERMOBILE PATIENTS DURING THE COVID-19 PANDEMIC**

The Long Island Heart Rhythm Center (LIHRC) provides cardiac and electrophysiology services to patients with Ehlers-Danlos and Hypermobile Syndromes.<sup>15</sup> One of the authors of this paper is the Director and Founder of the LIHRC, who worked closely with the New York Institute of Technology's Ehlers-Danlos/Hypermobile Syndromes Center's Director to devise a plan for continual care and was in constant communication regarding patients throughout the pandemic. Patients with cardiac complaints – including pre-syncope, syncope, palpitations and tachycardia – were treated and their needs were addressed.

To address these issues (and others) during the pandemic, the Long Island heart Rhythm Center rapidly investigated and deployed cloud-based methods, video telehealth and heart monitoring to these patients. The cardiology practice was the first at the medical school to offer telehealth to hypermobile patients. Patients who had implanted devices continued to be cared for remotely. Deadly arrhythmias, such as ventricular tachycardia, were found and treated during the pandemic. Within the first two weeks of March 2020, the Long Island Heart Rhythm Center was up and running in telehealth, adopting a HIPAA compliant video-based system, as part of an electronic cloud-based fax system, attached to the electronic health record system. Working behind the scenes, the Long Island Heart Rhythm Centers team contacted patients during this emergency and obtained and documented verbal consent to provide this service. To view a video interview explaining the process by the Center's Director (and Editor of EP Lab Digest), go to [www.eplabdigest.com](http://www.eplabdigest.com).

## **MISSION OF NYIT ACADEMIC HEALTHCARE CENTERS, EHLERS-DANLOS/HYPERMOBILE CENTER AND LONG ISLAND HEART RHYTHM CENTER DURING PANDEMIC**

The mission at NYIT's Academic Healthcare Centers has and will continue to be providing high-quality health care to our patients. With the outbreak of COVID-19 impacting the world and our country, this is more important than ever. Telemedicine allows the provider to evaluate and assess patients while limiting their risk of exposure to COVID-19. The Medical Director of the Academic Healthcare Clinic ensured telemedicine was immediately implemented in March 2020 and access for all patients was assured by making telemedicine appointments via smartphone or computer with a web camera and microphone. While telemedicine is a great tool, it is not appropriate for all conditions. While it is possible to assess a dermatologic condition, a physician may have difficulty auscultating the heart and lungs or check for reflexes using a standard smartphone or computer microphone.

Another catalyst for adoption accelerating of telehealth services is the loosening of restrictions and regulations from insurance companies. The Centers for Medicare and Medicaid Services (CMS) now allows for both new and existing patients to be seen through synchronous audio-visual communication.<sup>16</sup> Additionally, specific managed Medicaid programs, such as those in New York, are allowing telephone-based evaluation and management services to be performed and reimbursed. Finally, the Drug Enforcement Agency (DEA) is permitting physicians to prescribe controlled substances during a telehealth visit.

## **PATIENT EXPERIENCE WITH TELEMEDICINE**

Since the telehealth deployment over one month ago, the service has been well-received by patients. Many patients prefer the service, as EDS and hypermobility are rare, so many of the patients travel hours and days to get to the Center. Our best practice recommendations now include telemedicine and video chat function that allows the ability to record and document patient photographs. Both established patients and new patients are seen in the EDS/Hypermobility Treatment Center, both having stated positive results with the visit. All feedback has been documented and will be discussed at future committee meetings.

## **EMERGENCY HELP FOR EHLERS-DANLOS/HYPERMOBILE PATIENTS DURING THE COVID-19 PANDEMIC**

Some comorbidities associated with hypermobility and Ehlers-Danlos Syndrome make patients more vulnerable to COVID-19 infection. The Center has seen a rise in phone calls and medical concerns during this pandemic. The EDS/Hypermobile Center at NYIT has been open for in-person and virtual visits and all telephone calls have answered by the Director, who tries to stay up to date with the correct advice and to tailor it to fit the needs and considerations of each patient. Based on the information collected over the past few months, we felt that the best practice telemedicine, prescribing, triage of emergencies, limiting inpatient visits have helped limit COVID-19 exposure to a vulnerable population. We are increasing utilizing telemedical and virtual visits, to avoid emergency room (ER) visits and

unnecessary exposure for both the patient and health care workers and see this integration of telemedicine continuing. The Director has been in touch with ER doctors if, on a rare occasion, a patient does need to be sent to the ER and proper protocol, including triage, calling ahead, testing appropriately, have been followed. Coordinating care for emergencies with the hospital and other specialists have been vital during this pandemic. The Center is also a research Center and has received grant funding and although in-person studies have been postponed, research publications and papers are still being investigated by the Director, colleagues and osteopathic medical students who have an interest in hypermobility.

Through the stress of the pandemic, the Ehlers-Danlos/Hypermobility Center at NYIT and the Academic Healthcare Center have worked hard to continue our commitment to care for the hypermobile patients as well as the other patients, staff, students and faculty. The Center for EDS/hypermobility hopes to support the hypermobile/EDS community with education, resources and publications. May was Ehlers-Danlos Syndrome/Hypermobility Awareness Month and a virtual activity is planned to raise awareness of the needs of the hypermobile community and provide education on the subject. The Center has been featured in many publications, media portals and blogs, including the ACOFP blog. Our social media (@nyitedscenter) provides information on the Center and educational opportunities.

The providers at the Center continue to strive throughout this crisis to do what we do best, which is to provide quality patient care (whether in-person or virtually) for the patients.

Osteopathically Yours,

*Bernadette Riley, DO, FACOFP, FILM; Todd J. Cohen, MD, FACC; Hallie Zwibel, DO, MPH, FAAFP; Willis Lin, OMS*

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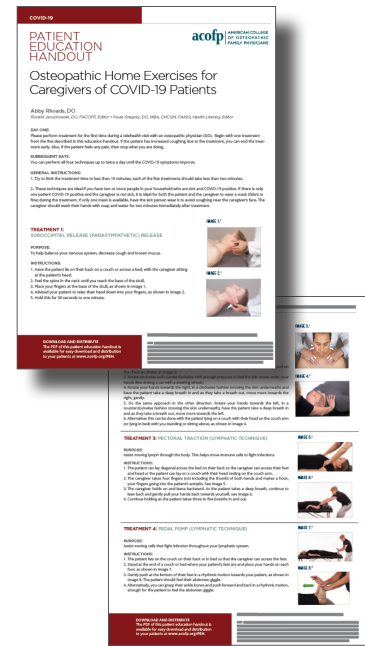
## PATIENT EDUCATION HANDOUTS

# COVID-19 Patient Education Materials

Learn more about COVID-19 and how it affects specific health conditions in these printable and downloadable patient education materials.

- COVID-19 & Cleaning and Disinfecting Safely
- COVID-19 & Osteopathic Home Exercises for Caregivers
- COVID-19 & Protecting Yourself and Others
- COVID-19 & Symptoms
- COVID-19 & What You Can Do to Manage Your Symptoms at Home
- COVID-19 & What You Need to Know

The PDFs of these patient education handouts are available for easy download and distribution to your patients at [www.acofp.org/PEH](http://www.acofp.org/PEH).



## LETTER TO THE EDITOR

## Pursuing Patients During COVID-19 Pandemic: A Novel Approach to Maintaining Continuity in a Rural Resident Clinic

To the *OFP* Editor,

We are facing a problem in my rural-resident run clinic on how to maintain continuity with patients when the number of visits has been greatly reduced during the COVID-19 pandemic. We were up against the challenging possibility of not monitoring our patients with high-risk comorbidities, which is a significant problem with substantial consequences.

Nationwide, outpatient providers have encountered dramatic decreases inpatient visits. There are many plausible reasons. The social distancing mandates have made it difficult for patients to come to the clinic office. Patients may not realize telehealth is a viable option at their clinic. In accordance with public health and government recommendations, patients are attempting to stay home if possible. Patients may wait too long to call for emergency health care and ignore red flag symptoms due to fear of hospitalization and exposure to COVID-19. Regardless, the bottom line is patient visits are down-trending and the impact is hitting the health care system.

For example, our resident clinic felt the negative impact by having practice visits down 22% in March 2020 as compared to March 2019. Fifty percent of the visits completed in March 2020 were telehealth appointments due to the COVID-19 pandemic. Individual residents' schedules were noted to have decreased the amount of telehealth or office visits. Patient volumes varied widely, and some clinics only had zero to three patients scheduled per half-day. No-shows and not reaching patients for telehealth visits was also an all-too-common occurrence. Hospital admissions lessened and patients appeared afraid to call 911 for emergency care even when in dire health. Patients may unknowingly be at high risk for poor clinical outcomes and even death. This has enormous ramifications for both patient care and clinic revenue.

The problem is apparent. If high-risk patients with chronic illnesses are not monitored appropriately, detrimental outcomes are sure to follow. We believe that clinics nationwide are experiencing this difficulty and could benefit from a strategic approach to this problem. In our resident-run clinic, we needed a method to blunt these undesirable ramifications.

Initially, we collected a list of patients seen by each resident within the previous year. The lists were provided through our billing company's assistance to produce specific reports within the requested date ranges. We procured the list through an encrypted file share and a securely managed physical document to fall into HIPAA guidelines. This could also be obtained from the electronic medical record system. The lists were distributed to each resident for review and comment. The lists may also be distributed to any office staff member to review and stratify patients using protocols established by the patient's physician.

Then, each list was filtered by a chart review to determine the need for follow-up visits. The necessity for the follow-up visit was determined by reviewing the follow-up plan in the last note or by stratifying patients with a past medical history of a chronic illness that would benefit from a follow-up visit. These chronic illnesses included: hypertension, diabetes type I or II, depression, anxiety, congestive heart failure, COPD, asthma, chronic pain, headaches, frailty, etc. All of these conditions are known to have increased patient morbidity and mortality if left unmonitored for extended periods.

Next, consideration was taken to determine the appropriateness of a telehealth visit versus having the patient come into the office if an exam was essential. Patients were slotted for an office visit if labs were needed. An option for a nurse visit for labs post-telehealth visits was available to patients as well.

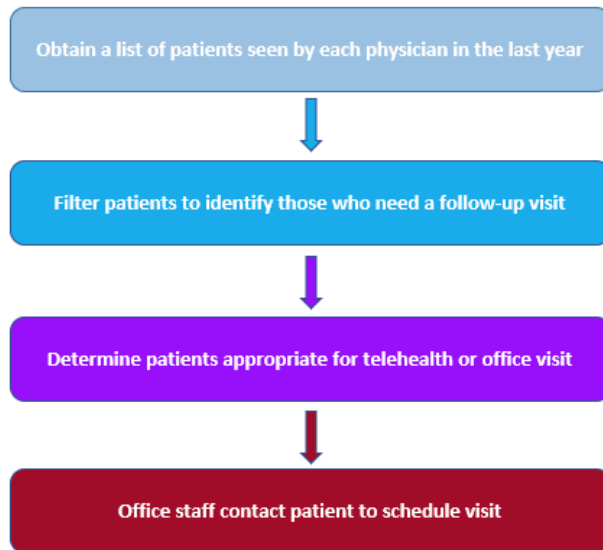
Finally, the front office staff was sent patient lists of those needed follow-up visits with essential information, including patient identification and type of visit needed (telehealth versus office).

The front office staff would then contact the patients to have them scheduled for a follow-up visit. They also were able to make sure they did not have any immediate needs in the setting of the COVID-19 pandemic. If the patient did have needs for refills or questions for the provider, these messages would be securely sent to the resident from the front office staff.



Using the flowchart below (algorithm for method), physicians can improve patient contact during the COVID-19 pandemic, and other seasons of visit stagnation.

### Patient continuity method during COVID-19 pandemic



There is an innate value to reaching out to patients. The patients get the message, "I care about you." There is a therapeutic element to someone making sure you are doing well and simply checking in, and this is an incredibly powerful gesture from physicians. This proposed workflow allows providers to enhance the physician-patient relationship. This relationship has the potential to play an active part in healing and patient well-being.

Furthermore, we had the personal experiences of watching patient schedules go from zero to four, then to a full load. The more we reached out to patients, the more they responded. This is not only beneficial for revenue but for residents to provide the best care for patients. This approach promotes practice sustainability in these unprecedented times.

In our experience, patients responded well to this invitation and pursuit. This workflow provided an opportunity to answer patient-specific questions and/or refill needs that could be taken care of before the official visit. The overwhelming response was positive and one of gratitude.

In the future, we will have time to reflect on this pandemic, our flexibility, and our response to the

difficulty it brings. What will we say to future generations of physicians when they ask about our pandemic experiences? Can the challenge be reframed as an opportunity for growth and improvement in patient care and workflow of a practice? We argue this is possible and is occurring before our eyes as history is made.

At the core, this strategy benefits the patient and improves care. It was so rewarding that we plan to utilize it yearly or quarterly to engage our patients and enhance patient continuity and quality of care. It is a useful strategy not only now, but in other times when visits are at a low volume. We, as physicians, can use what we learn from this challenging crisis to enhance our ability to pursue our patients in every-day practice purposefully. What an opportunity this situation has presented to us. The newness of COVID-19 is forcing us to rethink medicine. That might be a good thing!

*Brianna Buchanan, DO, PGY-2; Ryan Hudson, DO; Regina Bray-Brown, MD*

## RESEARCH ARTICLE

# ACOFP Member Survey on Physician Wellness and Preventative Measures for Protection

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## KEYWORDS:

ACOFP

Burnout

Family Medicine  
Physicians

Wellness

**ABSTRACT:** The current medical landscape highlights that physicians are experiencing an unprecedented epidemic of burnout. National studies show that at least 50% of physicians practicing in the United States are experiencing this harmful, detrimental disorder. This not only leads to personal consequences but potentially adverse patient events. As studies suggest, family medicine physicians are at the highest risk. To evaluate the impact of this effect on its current members and to establish strategies to promote wellness, the American College of Osteopathic Family Physicians (ACOFP) appointed a Task Force on Physician Wellness. Data was collected by a voluntary internal survey between March 21 and April 7, 2019, distributed to all ACOFP members. A total of 133 members completed the survey. Nearly half (47%) of respondents admitted to experiencing burnout symptoms. The factors that influenced burnout the most were the burden of non-clinical/administrative work and the inefficient/burdensome electronic medical record. The most protective elements to combat burnout are having a supportive spouse/partner/family member and recognizing the meaning of their daily work. A transition must occur to focus on health instead of the disease of our physicians. Individual and organizational attention must be placed on the physical, mental and social well-being of physicians. In the creation of this task force, ACOFP has begun to create educational references, provide live CME and generate conversational networks for physician support.

Wellness, as defined by the National Wellness Institute, is “an active process through which people become aware of and make choices toward, a more successful existence.”<sup>1</sup> This implies a conscious effort to achieve full potential, which encompasses a multidimensional holistic lifestyle. Simply put, it is the process of caring for the body that allows its optimal health and function while preventing morbidity and mortality. Existentially promoting the wellness of physicians translates into an improvement in patient care outcomes and organizational success.

Over the past few years, national studies have highlighted that 50% of physicians practicing in the United States are suffering from professional burnout.<sup>2,3</sup> This epidemic varies by medical discipline and the highest risk is among those physicians practicing family medicine, internal medicine and emergency room physicians.<sup>2</sup> As this highlights the three major practice environments for family

physicians, ACOFP established a task force in 2018 to evaluate the current environment of its members and create solutions to improve the current medical landscape for all physicians.

Under the current World Health Organization (WHO) ICD-10 classification system, *Burn-out (Z73.0) is a state of vital exhaustion and falls under (Z73.0) Problems related to life-management difficulty.*<sup>4</sup> Burnout is a syndrome characterized by feelings of exhaustion, cynicism and reduced professional efficacy.<sup>5</sup> Shanafelt and Noseworthy have described the divergent negative results of physician burnout as both personal and professional.<sup>6</sup> Figure 1 shows that burnout causes personal catastrophic events, global organizational and patient care problems, as well as concerning states of change within the physician.

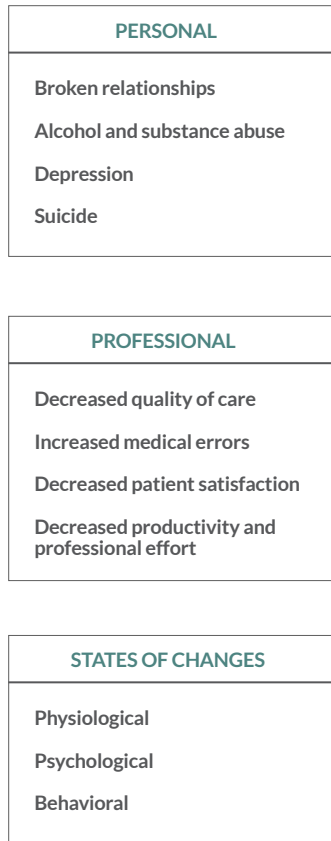
As described by previous national studies, family physicians are at the forefront of burnout. As such, the ACOFP Task Force on Physician Wellness set out to evaluate its organizational members. The purpose of this manuscript is to describe the current reality of current ACOFP members and to offer strategies for pursuing osteopathic physician wellness.

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Jesse Shaw, DO | [jdshawdo@yahoo.com](mailto:jdshawdo@yahoo.com)

**FIGURE 1:**

Repercussions of burnout: personal, professional and states of change experienced by physicians



**METHODS**

During the ACOFP 56th Annual Convention & Scientific Seminars in Chicago, March 21–24, 2019, the ACOFP Task Force on Physician Wellness created and dispersed an internal voluntary survey to its members. Established iPad stations were set up throughout the conference area for easy access to members in attendance. After the conference, the same survey was sent to all ACOFP members by email. It was accessible for the two weeks following the meeting. No exclusion criteria existed, although osteopathic family physicians without an organizational relationship with ACOFP would not have had access to the survey.

**RESULTS**

ACOFPP members completed one hundred and thirty-three surveys during the period as previously described.

Table 1 shows the demographics of those members. Most respondents (about 33%) were between 30 and 39 years of age. The majority of respondents (47%) had greater than 15 years of medical practice experience. The majority of osteopathic family physicians surveyed practiced in either a group practice without ownership (24%) or were hospital-employed (29%). Practice sizes were diverse, but the majority of members were practicing in small (2–4 person) groups.

**TABLE 1:**

Demographics of ACOFP respondents

	AGE (YRS)	# OF RESPONDENTS (%)
<b>AGE</b>		
	20–29	5 (3.76)
	30–39	44 (33.08)
	40–49	30 (22.56)
	50–59	34 (25.56)
	60–69	15 (11.28)
	70+	5 (3.76)
		133 (100%)
<b>LEVEL OF EXPERIENCE</b>		
	1–4 yrs	42 (31.34)
	5–14 yrs	29 (21.64)
	15+ yrs	63 (47.01)
<b>PRACTICE SETTING</b>		
	Hospital-employed	38 (28.57)
	Group practice without ownership	32 (24.06)
	Academic practice	21 (15.79)
	Group practice owner	15 (11.28)
	Single owner practice	14 (10.53)
	Other	9 (6.77)
	Administrative	4 (3.01)
<b>PRACTICE SIZE</b>		
	Solo practice	21 (15.79)
	2–4 physicians	36 (27.07)
	5–9 physicians	26 (19.55)
	10–19 physicians	19 (14.29)
	20+ physicians	31 (23.31)

Table 2 shows the reality of burnout among respondents. Nearly half (47%) of the respondents admitted to symptoms of burnout, while 13% of members indicated they have no burnout symptoms.

**TABLE 2:**

Current reality of respondents level of burnout

I enjoy my work, I have no symptoms of burnout.	17 (12.78)
Occasionally I am under stress and I don't always have as much energy as I once did, but I don't feel burned out.	52 (39.10)
I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion.	44 (33.08)
The symptoms of burnout that I am experiencing won't go away. I think about frustration at work a lot.	11 (8.27)
I feel completely burned out and often wonder if I can go on. I am at a point where I may need some changes or may need to seek some sort of help.	9 (6.77)

The most significant factors that contribute to burnout (Table 3) appear to be the burden of non-clinical/administrative work and inefficient/burdensome electronic medical records (weighted average of 4.16 and 3.97, respectively). From the data, the least influential factor was the loss of physician/patient relationship (weight avg of 2.46). Table 4 shows the major contributors to physician sense of well-being. These elements protect the osteopathic family physician from burnout. The major contributor was a supportive spouse/partner/family (weighted avg 4.49). The lowest contribution was the practice of meditation/mindfulness (weighted avg 2.87).

**TABLE 3:**

Factor influencing physician sensation of burnout (rated by all respondents on a scale of 0–10)

Burden of non-clinical/administrative work	4.16
Inefficient/burdensome electronic medical record	3.97
Not being able to get my patient the care they need	3.47
Lack of work/life balance	3.34
Unrealistic patient volume expectations	3.20
The inherent stress of being a physician	3.17
Loss of autonomy in clinical decisions	3.09
Unsupportive administration	2.97
Loss of physician/patient relationship	2.46

**TABLE 4:**

Factors influencing physician feeling of well-being (rated by all respondents on a scale of 0–10)

I have supportive spouse/partner/family.	4.49
There is meaning in my work.	4.16
I exercise regularly.	3.45
I follow a well-balanced diet.	3.44
I am able to get my patients the care they need.	3.36
My administration is supportive of me.	3.34
I regularly get a good night's sleep.	3.26
I have a good work/life balance.	3.16
I have control of my schedule.	3.05
I practice meditation/mindfulness.	2.87

**DISCUSSION**

The current medical landscape has recently become damaged with the increasing rates of physician burnout. This is impacting osteopathic physicians as individuals, as well as health care organizations and the patient experience.

The data set presented here mirrors the average of physician burnout in national studies, 47% and 50% respectfully. As this survey was only of active osteopathic family physicians and family physicians impacted by burnout more than other disciplines, this was not a surprising result. Despite having a wide distribution of physician age, most of our respondents were experienced physicians with 15 or more years of experience.

Table 3 highlights the major factors that influence burnout among members of ACOFP. The most influential factor is the burdensome work required outside of the patient-physician relationship. This falls within Shanafelt and Noseworthy's concept of the "efficiency and resource factor."<sup>6</sup> ACOFP and its lobbying body have been actively working toward reform and addressing this area of concern. Members can join local and national chapters/committees to continue addressing large-scale change. On an individual level, osteopathic family physicians must improve efficiency, organizational skills and willingness to delegate if staffing levels permit.

When discussing contributing factors to well-being, the data supports that establishing a supportive network is the most significant influence to protect the osteopathic physician (Table 4). Areas that were identified that are not being optimized include both best sleeping behaviors and meditation/mindfulness. Sleep is a modifiable lifestyle factor and plays a large part in the overall health of individuals, especially physicians. Poor sleep is associated with dysfunctional motivation and emotion as well as increased risk of disease pathogenesis and all-cause mortality.<sup>7-9</sup> The American Academy of Sleep Medicine (AASM) recommends that adults should sleep seven or more hours per night on a regular basis with upper recommendations around nine hours per night for younger adults.<sup>7</sup>

It is well known that wellness is directly linked to mental capacity and the mind-body connection of an individual's psychological and neurophysiological identity. Boccia *et al.*<sup>10</sup> have shown that "there is

a positive biological substrate that underlies the pervasive positive effect of meditation practice.” The improvement in cognitive and emotional functioning, as explained by Lutz and colleagues<sup>11,12</sup> is accomplished through:

1. Improvement in working memory, attentional processes,<sup>13-14</sup> and perceptual abilities<sup>15</sup>
2. Promotion of emotional regulation<sup>16</sup>
3. Improvement in age-related cognitive decline<sup>17</sup>

It has been established that improvement in the mind-body connection enhances self-referential processes and mental well-being. Practices such as yoga, progressive relaxation and guided imagery should be utilized to optimize wellness.

Ongoing development of educational opportunities must be established. Osteopathic medical education to osteopathic medical students, continuing education for residents and board-certified physicians and pervasive, open communication must be established to optimize future generations of physicians.

The ACOFP Task Force for Physician Wellness has created resources and references for physicians to educate themselves about burnout and ways to defend against it. With the ever-changing landscape of medicine, we must continue to focus on why we care for patients, why we choose medicine and how to optimize our self-care to provide ideal care for our patients.

The ACOFP Task Force on Physician Wellness supports the ongoing development and creation of optimized wellness infrastructure focused on the osteopathic tenets of self-healing. The goal for osteopathic physicians should be self-wellness, which is a path to optimal function and health. Osteopathic family physicians must be aware of the signs and symptoms of burnout and they must consider strategies for protection against it. An osteopathic physician applying strategies for self-protection affects themselves, patients who they treat and the systems and organizations under their influence.

## CONCLUSION

Physician burnout has become a major focus within the national medical community. A transition of focus should emphasize physician well-being, which parallels the current change of disease focus to health focus within other medical disciplines. Family physicians are one of the leading at-risk populations within the medical community. From the data gathered analyzing our college, burnout rates mirror national averages. A focus on osteopathic family physician education, resources and ongoing medical landscape changes must continue to advance for the conservation of our community.

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## REVIEW ARTICLE

# SARS-CoV-2 and COVID-19: A Brief Review for Family Physicians

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## KEYWORDS:

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**ABSTRACT:** SARS-CoV-2, the newest coronavirus, causes COVID-19, a disease that runs the gamut of symptoms from none too mild to severe to death. The severe cases are most often due to acute respiratory distress. In addition to pulmonary symptoms, the virus causes a wide variety of pathological manifestations involving multiple other systems, including eliciting an exaggerated immune response that contributes to fatalities. The elderly are at the highest risk of severe disease. Higher mortality is seen among males, along with individuals with pre-existing comorbidities such as cardiovascular disease and diabetes, among others. Although pregnancy has not been identified as a risk factor yet, more research is needed to assess vertical transmission and strict perinatal precautions are recommended to minimize infecting newborns. Although COVID-19 in children is less likely to be severe, recent cases, albeit rare, have emerged of a multiorgan inflammatory syndrome, similar to Kawasaki disease. Early diagnosis can be done using molecular tests that detect viral genome, while cases manifesting late symptoms can be detected using serological tests looking for antibodies. Although there are no FDA-approved vaccines or therapeutics for prophylaxis, there are many viable vaccine candidates either in clinical trials or awaiting study in humans. Of the several drugs being considered for treatment, some target the virus, while others address the host factors that facilitate virus infection, from proteases that enable virus entry, to cytokines that elicit a harmful and out-of-control immune response. While we await a standardized prophylactic regimen, it is our collective responsibility to continue engaging in prevention measures.

## INTRODUCTION

Viral infections begin when the virus binds to the host cell receptor. Before host cell entry, the newest coronavirus, SARS-CoV-2, the etiologic agent of COVID-19, uses an envelope protein called the spike (S) glycoprotein to attach to the human angiotensin-converting enzyme 2 (hACE2).<sup>1,2,3</sup> Subsequently, upon cleavage by host proteases, such as Type II transmembrane serine protease (TMPRSS2), the S1 and S2 subunits of the S protein, enable host cell receptor recognition and membrane fusion, respectively.<sup>1,4</sup> It is the S1 C-terminal domain (CTD) that acts as the receptor-binding domain (RBD) in the case of two other coronaviruses, SARS-CoV and MERS-CoV, the etiologic agents of Severe Acute Respiratory Syndrome (SARS) and Middle-East Respiratory Syndrome (MERS).<sup>5,6</sup>

The SARS-CoV-2-CTD is structurally homologous to its SARS-CoV counterpart, not surprising, considering the approximately 73.9% shared identity between the two coronaviruses.<sup>7</sup> However, SARS-CoV-2-RBD shows a higher binding affinity to hACE2 when compared with SARS-CoV-RBD.<sup>7</sup> The SARS-CoV-2 RBD is less exposed (i.e., more hidden) than SARS-CoV RBD. The S protein gets preactivated by proprotein convertase furin, reducing its dependence on cell proteases for entry.<sup>8</sup> This could explain why SARS-CoV-2 can efficiently enter host cells while avoiding immune surveillance, which in turn may enable the dissemination of the virus.<sup>8</sup> A study of ACE2 expression levels across 31 normal human tissues revealed highest ACE2 expression levels in the small intestine, testis, kidneys, heart, thyroid and adipose tissue.<sup>9</sup> Medium expression of ACE2 was observed in the lungs, colon, liver, bladder and adrenal gland, while lowest expression was noted in blood, spleen, bone marrow, brain, blood vessels and muscle.<sup>9</sup> The wide range of tissues expressing ACE2 contributes to the wide variety of pathological manifestations of COVID-19.<sup>10</sup>

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## CLINICAL COURSE IN ADULTS

Early reports from China consistently found fever, fatigue, cough, myalgia and dyspnea to be the most common symptoms in patients who were hospitalized for COVID-19.<sup>11,12</sup> These symptoms have been reported globally, with additional, less common symptoms such as chills, sputum production, sore throat, headache, dizziness and diarrhea.<sup>13</sup>

Newer symptoms being considered include cutaneous manifestations, along with olfactory and gustatory dysfunction. In a study of patients with mild COVID-19 in South Korea, 39.5% reported hyposmia and 33.7% reported hypogeusia.<sup>14</sup> In a European study of 417 mild to severe laboratory-confirmed COVID-19 patients surveyed for olfactory and gustatory dysfunctions, 88% reported ageusia. Of the 85.6% of patients who reported anosmia, 11.8% of the patients reported presentation of anosmia before any other symptom, while 22.4% and 65.8% presented presentation of anosmia at the same time or after other symptoms, respectively.<sup>15</sup> Dermatologic reviews report the following descriptors for cutaneous presentations of COVID-19: chilblain-like edematous and erythematous eruption, vesicular rash, urticaria, maculopapular rash, acral-ischemia and livedo.<sup>16,17</sup> While awaiting further data to confirm their association, these symptoms may be relevant in identifying possible SARS-CoV-2 infections before the development of classic symptoms.

The majority of patients infected with SARS-CoV-2 will be asymptomatic or present with mild or moderate disease, defined as symptoms without and with radiographic changes, respectively.<sup>14,18,19</sup> Progression to more severe disease, which most commonly manifests as acute respiratory distress, most often occurs in the second week of illness.<sup>11,12,20</sup> The accepted criteria for the classification of the severity of COVID-19 was first described by the National Health Commission of China based on the Infectious Diseases Society of America and the American Thoracic Society criteria for defining severe community-acquired pneumonia.<sup>21,22</sup> The criteria for severe infection are dyspnea with respiratory rate  $\geq 30$  breaths/min, resting oxygen saturation  $\leq 93\%$ , PaO<sub>2</sub>/FiO<sub>2</sub> (partial pressure of arterial oxygen to fraction of inspired oxygen ratio) ratio  $< 300$  mm Hg or a greater than 50% growth of the lesion on pulmonary imaging. Critical COVID-19 is defined as a deterioration of clinical status to respiratory failure requiring mechanical ventilation, shock or multiorgan failure requiring intensive care unit management. In a report of 44,672 laboratory-confirmed COVID-19 patients in China, 14% progressed to severe disease and 5% progressed to critical disease over the course of their illness.<sup>21</sup> In Italy, over four weeks between February and March 2020, 9% of the 17,713 laboratory-confirmed COVID-19 cases were admitted to the intensive care unit.<sup>23</sup>

Patients with pre-existing chronic conditions are prone to increasing severity, complications and increased case fatality rate (CFR) due to COVID-19.<sup>12,19,20</sup> Table 1 summarizes some of the complications reported in patients with COVID-19.

TABLE 1:

Complications reported in hospitalized COVID-19 patients

TYPE OF COMPLICATION	EXAMPLES OF COMPLICATIONS
Pulmonary <sup>20</sup>	Respiratory failure, acute respiratory distress syndrome, ventilator-associated pneumonia
Cardiovascular <sup>24</sup>	Myocardial injury and myocarditis, acute myocardial infarction, heart failure, cardiomyopathy, arrhythmia, shock, cardiac arrest
Hematologic <sup>25</sup>	Deep venous thrombosis, pulmonary embolism, acute limb ischemia clotting catheters, mesenteric ischemia, disseminated intravascular coagulation
Neurologic <sup>10</sup>	Encephalitis, seizures, large vessel stroke
Renal <sup>10</sup>	Acute kidney injury, renal failure
Immunologic <sup>20</sup>	Sepsis, secondary infections, hypoproteinemia, cytokine storm

The following pre-existing conditions have been reported most commonly in patients with severe or critical COVID-19: hypertension, cardiovascular disease, hypercholesterolemia, diabetes and chronic lung disease.<sup>12,19,23,26</sup> Patient age is also a strong risk factor for the degree of disease severity and increasing CFR.<sup>21,27</sup> A study of 44,672 laboratory-confirmed COVID-19 cases reported a 2.3% overall CFR, with the highest CFR in patients aged  $\geq 80$  (14.8%), followed by patients aged 70-79 years (8%).<sup>21</sup> Underlying cardiovascular disease was the comorbidity with the highest CFR (10.5%), followed by diabetes at 7.3%. Despite the higher association of age or comorbidities with severe COVID-19, critical cases, complications and case fatalities have also been reported in young and/or otherwise healthy individuals.<sup>27,28</sup>

Another factor in severity and CFR is the immunologic cytokine storm, which is the leading cause of death in COVID-19 patients who progress to acute respiratory distress.<sup>29,30</sup> The presentation is similar to cytokine release syndrome (CRS) and secondary hemophagocytic lymphohistiocytosis (sHLH) observed in SARS and MERS.<sup>29</sup> The cytokine storm, with its overwhelming release and impact of pro-inflammatory cytokines leads to an aberrant systemic immune response.<sup>29</sup> This, in turn, directs the immune system to attack its own body, ultimately leading to multiple organ failure and death in the most critical cases of COVID-19.<sup>31,32</sup>

## DOES COVID-19 AFFECT MORE MALES?

In an Italian study of 1,591 COVID-19 patients admitted to the ICU, 82% were male.<sup>23</sup> A New York City study of 5,700 hospitalized COVID-19 patients also reveals higher mortality in males across all age groups.<sup>33</sup> The clue might lie in the fact that the androgen receptor (AR) regulates TMPRSS2 even in the lung.<sup>34</sup> This opens up the possibility of using androgen-deprivation therapy and AR antagonists in males infected with SARS-CoV-2.<sup>35</sup>

## COVID-19 IN PREGNANCY AND PEDIATRICS

To date, there are no studies that suggest pregnancy is a risk factor for severe COVID-19. Limited reports show a similar clinical course of COVID-19 in women, regardless of pregnancy, with respect to severity, length of hospital stay and presenting symptoms.<sup>36,37</sup> However, there have been reports of a small number of cases of severe maternal morbidity and perinatal death attributed to COVID-19.<sup>38</sup> It has been suggested that pregnant women with severe or critical COVID-19 may have an increased risk of preterm birth when infected in the third trimester.<sup>38</sup> In a study of 33 newborns born to women with COVID-19 pneumonia, in Wuhan, China, three of the newborns were symptomatic for COVID-19, one of whom was born prematurely at 31-weeks gestation and needed resuscitation. The authors suggest that the seriously ill newborn suffered from complications due to his premature birth, rather than from SARS-CoV-2 infection. All three infants were negative for SARS-CoV-2 by day seven.<sup>39</sup> There are other cases of newborns who have tested positive for SARS-CoV-2.<sup>38,40</sup> Recently, there was a report from Wuhan, China, of a newborn with elevated IgM and IgG antibodies to SARS-CoV-2 just two hours after being born to a woman with COVID-19. Since IgM does not cross the placenta and two hours is too soon for IgM to be made in response to infection after birth, vertical transmission is thought to have possibly occurred in the 23 days between the time of mother's diagnosis and delivery.<sup>41</sup> More research is needed to assess the risk of vertical transmission. Although there has been no evidence that SARS-CoV-2 can be transmitted through breast milk, strict precautions while breastfeeding, are recommended to prevent horizontal transmission.<sup>37</sup>

While the number of pediatric patients with confirmed COVID-19 has grown, there is a paucity of data regarding the clinical course in this age group. Smaller cohorts have reported that while the symptoms of fever, cough, sore throat/pharyngeal erythema, headache and myalgia are similar to that of adults, symptoms appear less frequently in children.<sup>42,43</sup> Overall, COVID-19 in children is less likely to be severe and has a lower CFR.<sup>43,44</sup> Similar to adults, pre-existing comorbidities are associated with increasing severity of pediatric COVID-19. A study from North American pediatric intensive care units (PICU) reported that 83% of admissions to the PICU had at least one pre-existing comorbidity, with immunosuppression/malignancy or a medically complex history with long term dependence on technological support being the most common.<sup>44</sup>

Most recently, cases of a multiorgan inflammatory syndrome in children (MIS-C), similar to Kawasaki disease, have been temporally associated with the SARS-CoV-2 pandemic. While this rare presentation is estimated to occur in about one in 1,000 children exposed to SARS-CoV-2, the incidence is much higher than reports of Kawasaki disease in recent years.<sup>45,46</sup> Table 2 describes the World Health Organization's (WHO) preliminary case definition of MIS-C based on clinical and laboratory features of case reports from Europe and North America as of May 15, 2020.<sup>47</sup> More conclusive evidence is needed to better define this syndrome and its association with SARS-CoV-2.

TABLE 2:

WHO preliminary case definition of MIS-C<sup>47</sup>

<b>MULTISYSTEM INFLAMMATORY SYNDROME IN CHILDREN AND ADOLESCENTS</b>
Children and adolescents 0–19 years of age with fever for ≥ three days
<b>AND TWO OF THE FOLLOWING</b>
Rash or bilateral non-purulent conjunctivitis or signs of mucocutaneous inflammation (oral, hands or feet)
Hypotension or shock
Feature of myocardial dysfunction, pericarditis, valvulitis or coronary abnormalities (including echocardiogram findings or elevated cardiac enzymes)
Evidence of coagulopathy: changes in prothrombin time or partial thromboplastin time or elevated d-Dimer
Acute gastrointestinal problems (diarrhea, vomiting or abdominal pain)
<b>AND</b>
Elevated markers of inflammation: eosinophil sedimentation rate, C-reactive protein or procalcitonin
<b>AND</b>
No other obvious microbial cause of inflammation, including bacterial sepsis, staphylococcal or streptococcal toxic shock syndromes
<b>AND</b>
Laboratory evidence of COVID-19 (RT-PCR antigen test or positive serology) or likely contact with an individual with COVID-19

## DIAGNOSTIC TESTS AND RADIOGRAPHY

While radiographic changes have been used to identify possible infection, determine disease severity and diagnose COVID-19, there are two main types of laboratory tests currently used in diagnosis: tests that detect viral nucleic acid using the reverse transcriptase-polymerase chain reaction (RT-PCR) and enzyme-linked immunosorbent assay (ELISA) detecting IgM and IgG antibodies against SARS-CoV-2 virus.<sup>48,49</sup> The viral RNA test is used to diagnose a current infection, while an antibody test can indicate a previous infection. The CDC has established guidelines on who should get tested and how to interpret the test results.<sup>50</sup>

The most reported radiographic findings in symptomatic patients are bilateral ground-glass opacities on chest CT scans.<sup>12,51</sup> One study reported that the most common finding in asymptomatic individuals was unilateral ground glass opacities at the lung periphery.<sup>18</sup> Conversely, another study reported that 56% of patients who presented within two days of diagnosis had no abnormalities on CT scan.<sup>52</sup> Changes over the course of illness have also been demonstrated on repeat CT scan, suggesting ground glass changes are replaced by consolidation and possible bronchiectasis.<sup>53</sup> Thus, while CT findings may be suggestive, radiographic imaging alone is not a reliable indicator of infection.

The most commonly used, reliable and accurate test for diagnosis of COVID-19 has been the RT-PCR test, with the sample of choice being nasopharyngeal swabs, other upper respiratory tract specimens collected from the posterior pharynx, or saliva.<sup>48</sup> In most symptomatic COVID-19 cases, the SARS-CoV-2 genome can



TABLE 3:

A few of the drugs currently being considered for the treatment of COVID-19

THERAPEUTIC	CURRENT STATUS
<b>ANTIVIRAL AGENT</b>	
Remdesivir	<ul style="list-style-type: none"> <li>It was recently issued an Emergency Use Authorization for treatment of adults and children with suspected or laboratory-confirmed COVID-19 and hospitalized with severe disease, i.e., with oxygen saturation (SpO<sub>2</sub>) ≤ 94% on room air or requiring supplemental oxygen/mechanical ventilation/ extracorporeal membrane oxygenation.<sup>63</sup></li> <li>Currently, it is not recommended for the treatment of mild or moderate COVID-19 outside a clinical trial setting.</li> <li>Remdesivir inhibits RNA-dependent RNA polymerase of SARS-CoV-2, resulting in premature termination of viral RNA transcription.</li> <li>Preliminary results from the first stage of the Adaptive COVID-19 Treatment Trial show this drug to be superior to placebo in shortening time to recovery in hospitalized adult COVID-19 patients and evidence of lower respiratory tract infection.<sup>64</sup></li> </ul>
<b>DRUGS TARGETING THE HOST</b>	
Camostat mesylate (CM)	<ul style="list-style-type: none"> <li>CM has been used for decades in Japan for acute symptoms of chronic pancreatitis.<sup>65</sup></li> <li>It has activity against TMPRSS2,<sup>66</sup> the main host protease that facilitates SARS-CoV-2 entry into host cells and has been shown to block SARS-CoV-2 infection of lung cells <i>in vitro</i>.<sup>1</sup></li> <li>It is currently in clinical trials (NCT04353284) to show its efficacy to inhibit SARS-COV-2 replication in early-stage, laboratory-confirmed, COVID-19 ambulatory patients.</li> </ul>
<b>CYTOKINES &amp; CYTOKINE DYSREGULATION:</b> Increasing studies highlight the utility of cytokine-targeted biological therapies to improve outcomes in CRS or Macrophage Activation Syndrome and are therefore beneficial in reducing ARDS.	
Gimsilumab	<ul style="list-style-type: none"> <li>It is a monoclonal antibody against granulocyte macrophage-colony stimulating factor, which is a myeloid cell growth factor and pro-inflammatory cytokine.</li> <li>It is currently in Phase 2 clinical trials for its ability to benefit patients with lung injury or ARDS secondary to COVID-19 (NCT04351243).</li> </ul>
Tocilizumab (TCZ)	<ul style="list-style-type: none"> <li>This is an anti-IL-6R biological therapeutic. TCZ binds to both membrane-bound and soluble forms of IL-6R.</li> <li>It has already been FDA-approved for Cytokine Release Syndrome (CRS), in addition to other immune dysfunction diseases such as rheumatoid arthritis, giant cell arteritis, polyarticular juvenile idiopathic arthritis and systemic juvenile idiopathic arthritis.<sup>67</sup></li> <li>It is hypothesized that TCZ can reduce severity and mortality in COVID-19 patients who are prone to CRS and ARDS. It is being used in an "off-label" indication in COVID-19 patients with severe life-threatening CRS.</li> <li>Currently, it is being evaluated in several multicenter, randomized controlled clinical trials. Preliminary data show that TCZ appears to improve clinical outcome immediately in severe/critical COVID-19 patients.<sup>68</sup></li> </ul>
ACE II Inhibitors & AT1R blockers	<ul style="list-style-type: none"> <li>Two clinical trials NCT04312009 and NCT04311177, are underway to determine if ACE inhibitors or angiotensin receptor blockers are beneficial in patients with COVID-19.</li> </ul>
<b>OTHER THERAPEUTICS</b>	
Convalescent Plasma (CP)	<ul style="list-style-type: none"> <li>The rationale for the use of this therapeutic comes from a pilot study on ten patients with severe COVID-19, who showed an increase in neutralizing antibody titers, improvement in clinical symptoms and radiological findings, with a tendency to improve lymphocytopenia and disappearance of SARS-CoV-2 genome.<sup>69</sup></li> <li>Several clinical studies are currently evaluating the safety and efficacy of CP transfusion (originating from COVID-19 survivors) in SARS-CoV-2-infected patients (NCT04343261; NCT04338360).</li> </ul>
Anticoagulation therapeutics as additional therapy	<ul style="list-style-type: none"> <li>The abnormal coagulation is seen in patients with COVID-19 results in a marked elevation of D-dimer and fibrinogen degradation products, both associated with poor prognosis of COVID-19 and patients receiving anticoagulants show decreased mortality.<sup>70</sup></li> <li>Heparin-binding causes a conformational change of the SARS-CoV-2 RBD, which could interfere with binding of the virus to the host cell receptor.<sup>71</sup></li> <li>A retrospective clinical study has shown the potential of low molecular weight heparin (LMWH) to mitigate the cytokine storm in severe COVID-19 patients.<sup>72</sup> The group reported that LMWH not only improved the coagulation dysfunction of COVID-19 patients but also served an anti-inflammatory role by reducing IL-6 and increasing the percentage of lymphocytes.</li> <li>Overall, anticoagulants seem to have a therapeutic benefit as an adjunct therapy for COVID-19 treatment.</li> </ul>

be detected in nasopharyngeal swabs by day 1 of symptoms, with a peak occurring within the first week of symptom onset. Genome detection usually declines by the third week and subsequently disappears. In a recent prospective study of COVID-19, with 43 mild cases and six severe cases, researchers found positive PCR results persisting past 45 days in both nasopharyngeal and fecal samples, regardless of disease severity.<sup>54</sup> A positive PCR result only reflects genome detection and not necessarily the presence of infectious virus.<sup>55</sup>

Serological diagnosis of a COVID-19 infection is especially important for patients with mild to moderate illness presenting with symptoms beyond the first two weeks of illness onset.<sup>49,50</sup> The most sensitive and earliest serological test detects total antibodies, levels of which begin to rise from the second week of symptom onset.<sup>56</sup> Although IgM and IgG ELISA may test positive even as early as the fourth day after symptom onset, higher levels occur in the second to fourth weeks of illness.<sup>57,58</sup> Although ELISA-based antibody tests have greater than 95% specificity for the diagnosis of COVID-19, antibodies may show cross-reactivity with common coronaviruses. Because of this potential for cross-reactivity, the United States Food and Drug Administration (FDA) requires testing laboratories to addend positive serology reports with a note that there may be false positives due to cross-reactivity with common coronaviruses. Testing of paired serum samples, one with the initial PCR test, followed by a serological test two weeks later can increase diagnostic accuracy. For more information on optimizing serological test outcomes and testing strategies, please refer to the CDC interim guidance.<sup>59</sup>

The rapid point-of-care tests that detect antibodies are of variable quality. These tests are qualitative in nature, only indicating the presence or absence of antibodies to SARS-CoV-2.<sup>49,50</sup> Neither these point-of-care tests, nor ELISA-based IgM/IgG tests can determine the presence of neutralizing antibodies that nullify the biologic effects of the virus, resolve the infection and hopefully prevent reinfection. The only confirmatory test for neutralizing antibodies is the plaque reduction neutralization test. However, it has been shown that high IgG antibody titers positively correlate with neutralizing antibodies.<sup>57</sup> How the presence of antibodies translates to clinical outcomes remains unknown at this time.

## TRANSMISSION

We refer you to Gandhi *et al.* for a great article on the transmission of SARS-CoV-2.<sup>60</sup>

## THERAPEUTICS

Currently, there are no FDA-approved or licensed therapeutics for treating COVID-19 infections. Potential therapeutics can be broadly divided into two categories based on the target: virus or host. The pathophysiology for SARS-CoV-2 likely resembles that of SARS-CoV in that the acute lung injury caused by SARS-CoV infection mainly results from aggressive inflammation initiated by viral replication.<sup>61</sup> Similarly, SARS-CoV-2 infection also causes increased secretion of cytokines and chemokines, such as IL-1  $\beta$ , IFN- $\gamma$ , IP-10, MCP-1, IL-4 and IL-10, all indicators

of aggressive inflammation.<sup>62</sup> As a result, possible therapeutic interventions may be applied to attenuate the inflammatory response to the virus. Table 3 summarizes a few of the therapeutics in development. While none of the therapeutics mentioned in Table 3 have been approved by the FDA for treatment of COVID-19, there are many clinical trials underway and many more potential treatment modalities not discussed in this brief therapeutic review.

## VACCINES

There are over a hundred vaccine candidates, a few of which are already in clinical trials, with a few of the furthest along being mRNA-1273 (NCT04405076), a DNA vaccine, INO-4800 (NCT04336410) and a recombinant vaccine, Ad5-nCoV (NCT04398147). In addition, there will be many other vaccine developers initiating clinical trials sometime this year, considering the fact that 115 vaccine candidates were developed globally as of April 8, 2020.<sup>73</sup>

## CURRENT PREVENTION MEASURES

The only approaches currently available to stop the disease spread are those of classical epidemic control. This includes processes such as case isolation, contact tracing and quarantine, physical distancing and hygiene measures.<sup>74</sup> Efforts to control the COVID-19 pandemic likely require a multifactorial approach. First, the human-to-human transmission must be limited. This also includes reducing secondary infections among close contacts and health care workers, prevention of transmission amplification events and containing further international spread. Second, infected patients must be rapidly identified, isolated and provided with optimized care. Third, we need to identify and reduce transmission from animal sources. Fourth, we need to address unknowns in our understanding of the disease and accelerate the development of diagnostics, therapeutics and vaccines.

## OSTEOPATHIC MANIPULATION

Osteopathic physicians use osteopathic manipulative treatment (OMT) to bring increased mobility to a patient's joints and soft tissues, which encourages the body's natural healing tendency.<sup>75</sup> When directed towards a target organ/system and condition, OMT may include techniques such as counter-strain, craniosacral and lymphatic drainage, high-velocity low amplitude, muscle energy and myofascial release.<sup>76</sup> The goal is to manipulate the body's structure, keeping in mind the underlying pathophysiology of a disease, so that normal physiologic function can be regained.<sup>76</sup> For instance, the efficacy of OMT as a treatment for chronic low back pain has been documented in a randomized, double-blind, sham-controlled study of 455 patients.<sup>77</sup> Patients received statistically significant moderate to substantial benefit from OMT compared to the control group who received sham treatment. In the same study, patients receiving OMT were significantly more likely to be very satisfied with their care and used fewer medications. Back in 2007, Hruby and Hoffman had proposed the use of OMT to treat avian influenza.<sup>78</sup> They cited retrospective data gathered on the delivery of OMT techniques during the Influenza pandemic of 1918–1919, which observed significantly lower morbidity and

mortality in their patients as compared to individuals treated by allopathic physicians. The authors also point to the limitations of the data, which include the fact that the study was not controlled and it lacked information on whether the populations treated by both arms of medicine were comparable. Sanderlin and Licciardone, in their very prescient article in 2007, point out the possibility that training others in OMT techniques could be critical to the success of OMT in mitigating the impact of a pandemic.<sup>79</sup> Most osteopathic family physicians will refer potential COVID-19 patients to the health department or the emergency department of the local hospital. These patients will be subjected to testing and/or follow-up for monitoring or treatment, depending on the severity of the symptoms, as well as the existence of risk factors such as advanced age, underlying comorbidities, etcetera. Given the limited exposure of osteopathic family physicians to COVID-19 patients due to the risk of transmission, some physicians are using telehealth to teach caregivers certain OMT techniques, such as suboccipital release, thoracic inlet release, pectoral traction and pedal pump.<sup>80,81</sup> Although the OMT technique of rib raising is used by osteopathic physicians to help loosen thick mucus, stimulate the nerves to the lungs and facilitate breathing, we feel the close contact needed to deliver this treatment may also increase the risk of virus transmission. The fundamentals of osteopathic medicine believe in the utility of the above mentioned OMT techniques in maintaining a healthy immune system or improving it to an extent where it is successfully able to fight disease.<sup>81</sup> Mobilizing the osteopathic workforce to train allopathic physicians or caregivers living at home with patients who have or are at risk of COVID-19 would be fulfilling the founding beliefs of osteopathic medicine, including looking at the person as a unit that is capable of homeostasis, self-healing and health maintenance.<sup>76</sup>

## CONCLUSION

The COVID-19 pandemic is highly fluid and there is still much to be learned. Once the pandemic stabilizes, it will be important to conduct a thorough analysis to fill in the current gaps in knowledge. At this point, many questions remain. How long is a person contagious? How long and through which means can the virus persist in the human body? Are there any genetic signatures that tilt the immune reaction in favor of CSR? Why are minorities more vulnerable to increased morbidity and mortality due to COVID-19? Can some drugs be used as pre- or post-exposure prophylaxis? Which platforms and surveillance technologies can be implemented to more quickly prevent the next infectious disease threat? Will these strategies be effective in preventing fatality? Experiments conducted at the United States Army's high-level biosecurity laboratory at Fort Detrick, Maryland, show that an increase in heat, humidity and sunlight reduces the survival of the virus. These experiments have not been published and were reported in a press briefing of the White House coronavirus task force. However, even if the approaching summer months may show a decrease in cases and severity of cases due to lower infectious dose with transmission outdoors, we may still need to contend with the very real problem of superspreaders.<sup>82</sup>

## AUTHOR DISCLOSURES:

The author(s) declare no relevant financial affiliations or conflicts of interest.

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## REVIEW ARTICLE

# Update on Office-Based Strategies for the Management of Obesity

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**ABSTRACT:** Over the last several decades, obesity has become one of the most pervasive issues plaguing the United States. The vast amount of comorbidities associated with obesity, ranging from breathing problems to severe cardiovascular disease, place individuals at further risk of developing adverse effects later in life. Currently, clinicians use tools and indices such as body mass index (BMI), percent body fat (%BF) and waist circumference to classify the obesity level of their patients. In 2018 however, the Obesity Medical Association amended its previous algorithms to include two distinct pathologies that fall within the category of obesity: Fat Mass Disease (FMD) and Adiposopathy. These two diagnoses are now classified under obesity, not otherwise specified ICD-10 Code (E66.9). In this article, we discuss the updated methods to classify, identify and manage patients with these disorders.

## OBESITY IN PRIMARY CARE

From 2015–2016, obesity affected 93.3 million adults, with a prevalence rate of 39.8%.<sup>1,2,3</sup> Current evidence shows a disparity among certain groups, with Hispanics and Non-Hispanic African Americans having the highest prevalence of obesity, followed by Non-Hispanic Whites and Non-Hispanic Asians. Middle-aged adults (40–59 years old) have the highest rates of obesity (42.8%) with young adults (20–39 years old) having the lowest rates (35.7%). Studies have also shown that lower education levels are correlated with a higher prevalence of obesity.<sup>4</sup>

Obesity is linked to numerous causes of morbidity and mortality, as well as increased risk of chronic diseases such as hypertension, dyslipidemia, diabetes, coronary artery disease, breathing problems and limitations in overall normal body functioning. The causes and consequences of obesity are multifactorial and should be examined individually by clinicians. Such factors include behavioral, genetic, family history and drug use.

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## QUANTIFYING OBESITY

According to the Centers for Disease Control (CDC), adult obesity is defined as any weight that is higher than the healthy weight outlined by the body mass index (BMI).<sup>1,2,3</sup> Methods used to assess obesity, known as anthropometric indicators, including BMI, percent body fat (%BF) and waist circumference. Each of these methods has certain benefits and detriments. BMI is a low-cost method but does not consider muscle mass. BMI measurements are less accurate in more muscular individuals. BMI is calculated using the following equation:  $BMI = (\text{weight in kg}) / (\text{height in m})^2$ .<sup>5</sup> Therefore, a patient that weighs more due to higher muscle content, but who may have a low body fat percentage, will have a higher BMI. BMI values are further described in Table 1.<sup>6</sup> Similarly, waist circumference mainly measures abdominal adipose tissue and is not superior to BMI. On the other hand, %BF is more specific, but reproducing consistent results is often difficult.<sup>7</sup> However, obesity can be classified in different categories (Class I, Class II, Class III) based on the measurements obtained. Acceptable values for percent body fat for women are between 25% – 31%, and between 18% – 24% for men. Patients with a %BF  $\geq 32\%$  in women, and  $\geq 25\%$  in men, are considered obese.<sup>8</sup> Waist circumference can measure direct anatomical adipose tissue deposition. Patients with a waist circumference  $\geq 35$  inches in women and  $\geq 40$  inches in men are considered obese.<sup>8</sup>

All three measurements correlate with an increased risk of developing metabolic syndrome. BMI, %BF and waist circumference are convenient methods of measurement and

TABLE 1:

BMI Classification<sup>7</sup>

<b>BMI &lt; 18</b>	Underweight
<b>BMI: 18 – 24.9</b>	Normal Weight
<b>BMI: 25.0 – 29.9</b>	Overweight
<b>BMI: 30.0 – 34.9</b>	Class I Obesity
<b>BMI: 35.0 – 39.9</b>	Class II Obesity
<b>BMI &gt; 40</b>	Class III Obesity

all have their place in the clinical setting. None of the three methods are necessarily superior to the other two. It is a matter of preference to see which method of measurement is best suited for the patient. Still, it is important to use the same particular method of measurement to assess body fat with subsequent visits of the same patient. This allows clinicians to have consistency with their measurements and track patients' progress more accurately.

## PATHOPHYSIOLOGY

There are differences between subcutaneous adipose tissue that lies beneath our skin and visceral adipose tissue that lies in our inner abdominal cavity.<sup>9</sup> Fat can be classified into two categories: visceral and non-visceral. Visceral fat consists of fat tissue located in either the thoracic cavity, intra-abdominal cavity or pelvic cavity.<sup>10</sup> Visceral fat (internal fat) has been demonstrated to be a more sensitive indicator of metabolic disease.<sup>9,10</sup> On the other hand, non-visceral fat includes fat tissue that is intramuscular and paravertebral. Radiological imaging such as magnetic resonance imaging or dual x-ray absorptiometry are tools used to assess visceral fat. However, these tests can be expensive and may not be covered by insurance if not used for diagnostic purposes.

Similarly, obesity can be further divided into two pathologies: Sick Fat Disease (SFD), also known as Adiposopathy, and Fat Mass Disease (FMD).<sup>11</sup> SFD is a disorder in which dysfunctional adipose tissue develops due to deranged endocrine and immune responses. The accumulation of ectopic adipocytes in the viscera is directly related to the development of insulin resistance. These visceral adipocytes can become enlarged and dysfunctional. The patient may present with clinical manifestations such as elevated blood pressure, elevated blood sugar, insulin resistance and dyslipidemia.<sup>12</sup> Currently, SFD is a diagnosis of exclusion. SFD in men can lead to hypoandrogenemia, hyperestrogenism, erectile dysfunction, low sperm count and infertility.<sup>12</sup> In women, SFD can lead to hyperandrogenemia, hirsutism, acne, polycystic ovarian syndrome (PCOS), menstrual disorders, infertility, gestational diabetes mellitus, preeclampsia and thrombosis.<sup>13</sup>

FMD develops as a result of abnormal and pathological physical forces, which may be observed in biomechanical or structural changes. Tissue compression can contribute to clinical manifestations such as hypertension, obstructive sleep apnea or gastroesophageal reflux disease.<sup>14</sup> FMD manifests with biomechanical and structural issues such as stress on weight-bearing joints, immobility, and tissue compression and friction.

TABLE 2:

Five As of Obesity Management: Interviewing Skills<sup>25</sup>

<b>ASK</b>	Ask for permission to talk about body weight and determine if there is motivation to change.
<b>ASSESS</b>	Asses vitals and baseline measures, including BMI/%BF/Waist Circumference. Assess the reasons for obesity as well as any pathology arising from obesity.
<b>ADVISE</b>	Advise about the benefits of weight loss, as well as complications due to obesity.
<b>AGREE</b>	Agree on a pathway for the plan to tackle obesity, including weight loss goals, behavioral modification, physical activity, and/or pharmacological intervention, if required.
<b>ASSIST</b>	Assist with providing necessary resources including support groups, follow-up appointments with relative specialists, such as a registered dietician, and remove obstacles that hinder weight loss.

Both disorders have common clinical manifestations that span all organ systems: cardiovascular (congestive heart failure, hypertension, varicose veins, etc.), neurological (stroke, nerve entrapment, carpal tunnel, etc.), pulmonary (dyspnea, obstructive sleep apnea, hypoventilation, etc.), musculoskeletal (immobility, osteoarthritis, etc.), gastrointestinal (hernias, reflux, etc.), integument (striae, pigmentation, etc.), psycho-social (depression, hopelessness, etc.), sleep disorders (snoring, obstructive sleep apnea, etc.), and genitourinary (urinary stress incontinence, buried penis, etc.) diseases. Treatment for SFD involves treating adipocyte and adipose tissue dysfunction, while treatment for FMD involves treating and managing excessive body fat.

## EFFECTIVE OFFICE STRATEGIES

### Establishing a Baseline

Clinicians should begin their evaluation by taking a complete history and physical exam. Risk factors for obesity should be identified and discussed with patients. If both the patient and physician agree to it, treatment for obesity can commence. The "Five As of Obesity Management" can be used as a guide while interviewing patients, as highlighted in Table 2.<sup>15</sup> Baseline measurements need to be established, including lab tests and body measurements. Table 3 highlights some common lab tests used for establishing a diagnosis. The physician should determine the classification of normal body weight, overweight or obese to make the most appropriate recommendations. In general, dietary and exercise modifications should be pursued as the first line and adjuvant treatment.

## Nutrition and Energy

Successful weight loss includes understanding the role nutrition and energy have in the management of obesity by both the physician and the patient. Finding the right balance between a caloric deficit and maintaining caloric nutritional needs to sustain metabolic function is crucial. The first goal is to calculate each patient's energy expenditure. Energy expenditure is composed of 70% resting metabolic rate, with the remainder consisting of physical activity and dietary thermogenesis.<sup>16</sup> The *Harris-Benedict Equation* from Cornell University can be used to calculate the basal energy expenditure.<sup>17</sup> From this equation, a clinician can calculate a realistic caloric goal while incorporating physical activity. After understanding the basal level of calories each patient needs, physicians can begin to reduce caloric intake in a stepwise manner. One pound is equivalent to 3,500 kilocalories (kcal). Ideally, reducing caloric intake by 500 kcal a day would result in the loss of one pound per week. In addition, if physical activity is increased to expend 500 kcal a day, that would result in an additional loss of one pound per week.<sup>15</sup>

Furthermore, insulin plays a vital role in the management of obesity as insulin promotes fatty acid and triglyceride storage and synthesis while inhibiting fat break down. Thus, a diet that ultimately lowers the frequency (insulin spikes) and the amount of insulin being secreted is beneficial for weight loss. Though the ultimate goal of weight-loss boils down to more calories burned than consumed, the quality of the calories consumed is important as well. Ultimately, the most effective nutritional therapy is the one that patients can consistently adhere to while making progress towards their goals. Physician familiarity and awareness about diet and nutrition is key to nutritional modification and behavioral changes. Table 4 lists general dietary plans that physicians should be familiar with in order to discuss appropriate options with their patients. Table 5 highlights some of the most popular dietary plans that physicians can review to gain a better understanding. Going through the listed diets with the patient can help identify what plan is the most suitable for them. Eventually, coming up with a tailored plan that limits insulin spikes and is easy to allow for long-term adherence is the most effective nutritional plan. Consults with a registered dietician may also prove to be effective in helping achieve long-term weight loss goals. Education from a registered dietician can provide the necessary information a patient needs to help decipher nutritional labels, build a diet plan that limits insulin spikes and customize the plan to the patient's needs (food preferences, lifestyle and career).

## Exercise Plan

The American Heart Association recommends >150 minutes per week of moderate exercise (like a brisk walk). This breaks down to five days a week of moderate exercise for 30 minutes. This exercise prescription, in conjunction with the proper energy restriction of 1200–1800 kcal per day, is effective for weight loss in obese patients.<sup>18</sup> Note that this number will vary for each individual based on their individual metabolic needs. It is important to explain to patients that although weight loss is the goal, maintaining a healthy lifestyle through nutrition and exercise have invaluable advantages that span further than weight loss alone.

**TABLE 3:**

Diagnostic Tests & Physical Exam<sup>26,27,28</sup>

BASELINE MEASURES	PHYSICAL EXAM
Fasting Blood Glucose	Vital signs
HbA1C	Height & Weight
Lipids (HDL, LDL, Cholesterol, Triglycerides)	BMI
Liver Enzymes	Blood pressure
Electrolytes	Pulse
TSH	Neck circumference
Vitamin D	Waist circumference
Electrolytes	
BF% & BMR assessment	
CBC	
Urinalysis	

A comprehensive and realistic exercise program should be prescribed, although there are no specific guidelines and evidence for a screening examination for exercise participation. However, physicians should perform a thorough medical evaluation of their patients and consider factors such as any cardiac, pulmonary, musculoskeletal, metabolic, renal or other barriers to physical activity.<sup>19</sup> However, there are those patients who have certain contraindications to exercise. In the case of musculoskeletal complaints, osteopathic manipulative treatment (OMT) to help treat musculoskeletal somatic dysfunctions that limit exercise participation is beneficial. Modifications to a standard exercise program may need to be adjusted for these patients. More frequent follow-up visits (six weeks, then every three months) is recommended for any patients starting a new exercise plan or in patients with chronic disease. This would allow physicians to assess compliance and screen for any signs or symptoms of disease progression.

## Behavioral Modifications

Successful weight loss depends on the patient's adherence to a weight loss program.<sup>20</sup> Behavior therapy seeks to identify and help alter potentially self-destructive and unhealthy behaviors. The goal of behavioral therapy in obesity is to promote long-term changes to the patient's eating behavior by modifying and monitoring their food intake, increasing physical activity and controlling cues and stimuli in the environment that trigger eating. The osteopathic tenets of incorporating the patient's mind, body and spirit in the management of obesity are paramount for success. Physicians should counsel and educate patients on behavioral changes that will assist with adherence to a weight-loss strategy. In 2011, the Centers for Medicare and Medicaid Services (CMS) initiated coverage of intensive behavioral therapy (IBT) for obesity, providing obese patients 14–15 brief, individual counseling visits in six months. One study showed, in a cohort of 50 patients, a mean of 5.4% weight loss from their initial weight at week 24; 46% of participants lost  $\geq$  5% of their baseline weight.<sup>21</sup> Integrating lifestyle modifications including encouraging



healthful eating patterns, reducing energy intake, increasing regular physical activity and developing a support system should be considered in conjunction with other weight-loss strategies.<sup>22</sup>

### Focused Visits with Spaced Repetition

Personalized plans with a comprehensive nutritional program, physical activity plan and behavioral counseling are the foundation of success in the treatment of obesity. However, this is not a set-it-and-forget-it approach. Patient and clinician involvement is essential for achieving long-term goals. After the initial plan is set forth with diet and exercise prescriptions, a one-month follow-up with a specific goal in mind is beneficial. At this follow-up meeting, an evaluation can be made as to the progress made by the patient and the physician has the opportunity to address any questions or concerns the patient may have. After the one-month follow-up, physicians and patients should schedule follow-up appointments based on the patient's obesity-related diseases and comorbid conditions. Unfortunately, there are no universal recommendations that would apply to all patients. These follow-up visits are dependent on individual patient circumstances but are paramount to keep patients accountable and gives them a realistic goal. The traditional method of following up at the next yearly physical is spread too far apart and is more likely to end in noncompliance. Dividing the goals into manageable expectations makes these major life changes more palatable and realistic.

### Role of Medication

According to the United States Preventive Services Task Force (USPSTF) guidelines, adjunct pharmacotherapy has been proven to be successful in individuals with BMI  $\geq$  30. Pharmacotherapy highlighted by USPSTF includes orlistat, liraglutide, lorcaserin, naltrexone-bupropion and phentermine-topiramate. Dosage recommendations should be followed as dictated by the U.S. Food and Drug Administration, as well as the manufacturer. Table 6 highlights the most commonly used pharmacotherapy, as well as comprehensive pharmacology treatment options. Orlistat, known as *Alli*<sup>®</sup>, available over the counter, is a popular drug to initiate treatment. Phentermine-topiramate can be used if other pharmacotherapies are resistant to weight loss.

**TABLE 4:**  
Types of Diets<sup>29,30,31,32</sup>

DIET	DESCRIPTION	EFFECTS & RISKS	DESCRIPTION
Restricted Carbohydrate Diets	50–150 g carbohydrates per day	Metabolic Effects	<ul style="list-style-type: none"> <li>Reduces fasting glucose, insulin, triglycerides</li> <li>Modestly increases HDL levels and could moderately reduce BP</li> <li>May increase LDL levels</li> </ul>
		Risks	<ul style="list-style-type: none"> <li>Carbohydrate cravings for the first few days</li> <li>If history of gout can cause a flare-up</li> </ul>
Restricted Fat Diets	10–30% of total calories come from fat	Metabolic Effects	<ul style="list-style-type: none"> <li>May reduce fasting glucose and insulin levels</li> <li>Modestly decreases LDL and HDL</li> <li>May modestly reduce BP</li> </ul>
		Risks	<ul style="list-style-type: none"> <li>Hunger control may present challenges, which may be mitigated with weight management pharmacotherapy</li> <li>Fat restriction could lead to a substantial increase in carbohydrate consumption, which may contribute to hyperglycemia, hyperinsulinemia, hypertriglyceridemia, and reduced HDL</li> </ul>
Very Low-Calorie Diets	less than 800 kcal/day	Metabolic Effects	<ul style="list-style-type: none"> <li>Reduced fasting glucose, insulin, triglycerides and BP</li> <li>May modestly increase HDL</li> <li>May modestly decrease LDL</li> <li>Reduces BP</li> </ul>
		Risks	<ul style="list-style-type: none"> <li>Fatigue, nausea, constipation, diarrhea, hair loss, brittle nails</li> <li>Cold intolerance</li> <li>Small increases in gallstones, kidney stones, gout flare-ups</li> <li>Insufficient mineral intake may predispose to palpitations, cardiac dysrhythmias and muscle cramps</li> <li>Weight regain will occur if patients do not maintain healthy eating</li> </ul>

### Surgery

Surgery can be considered as an option if conservative treatment plans show limited progress. Surgery can be used as an adjunct with other treatment plans. It is not necessarily utilized as a final resort if other treatment plans have failed. Individuals can be referred to a bariatric surgeon to see if they are an appropriate candidate for intervention. The interventional plan can be as extensive as involving the disciplines of lifestyle, medication, low-calorie diet and surgery. They can start off gradually, by working on lifestyle changes starting with physical activity and nutritional changes. To maximize treatment, medications and a low-calorie diet can be added, with surgery reserved as an option if the previous treatment proves to be refractory. However, risks with bariatric surgery include micronutrient deficiencies, gallstones, dumping syndrome, band obstruction and strictures, hernias, infection and perforation. There are currently four popular procedures for bariatric surgery.

TABLE 5:

Dietary Patterns Description<sup>33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44</sup>

DIET	DESCRIPTION	ENCOURAGES	AVOID
<b>Mediterranean</b>	This diet has been found to be most successful in reducing the risk of atherosclerotic cardiovascular disease.  Emphasizes eating primarily plant-based foods, replacing butter with healthy fats, using herbs and spices instead of salt to flavor foods	The use of olive oil  Vegetables, fruit, legumes, whole grains, nuts and seeds  Moderate intake of red wine  Moderate consumption of seafood, poultry, eggs and fermented dairy products.	Limit large amounts of red meat, meat products, sweets, refined oils, trans fat, processed meat and excessive sugars
<b>Therapeutic Lifestyle</b>	A low-fat meal-plan variant. It is most often used by patients with high lipid levels.	Total fat should be 25–35% of daily calories Carbohydrates should be 50–60% of total calories Soluble fiber should be at least 5–10 grams/day 2 grams per day of plant sterols through food	Limit saturated fat to under 7% of total calories  Limit cholesterol to under 200 mg a day Avoid foods with trans fatty acids
<b>Atkins</b>	This is a carbohydrate-restricted diet that promotes the utilization of fat for energy and generates ketosis.	A. <i>Induction phase</i> : allows no more than 20 grams of carbohydrates per day. Encourages adequate protein intake to reduce insulin levels & generate ketosis.  B. <i>Ongoing weight loss phase</i> : allows for a wider variety of vegetables, seeds and nuts, and low-glycemic fruits  C. <i>Pre-maintenance phase</i> : once the goal weight is achieved, allows carbohydrate intake to be slowly increased  D. <i>Maintenance phase</i> : allows 60-90 grams of carbohydrates per day including legumes, whole grains and fruits  All phases encourage a balance of saturated, monounsaturated and polyunsaturated fatty acids	Processed and refined foods Foods with a high glycemic index  Foods rich in trans fatty acids In all but the maintenance phase, limit: - cereals, breads, grains - dairy products, except cheese - starchy vegetables - most fruits
<b>Ornish</b>	Fat-restrictive diet	Foods in their natural form Vegetables, fruits, whole grains and legumes One serving of soy products per day Limited amounts of green tea Fish oil 3–4 grams per day Small meals eaten frequently throughout the day	Limit dietary fat to > 10% of total daily calories Limit dietary cholesterol to > 10 mg per day Limit sugar, sodium, and alcohol Avoid animal products and caffeine Avoid foods with trans fatty acids Avoid refined carbohydrates and oils
<b>DASH</b>	Dietary approaches to stop hypertension (DASH)	Vegetables, fruits and whole grains Fat-free or low-fat dairy products Fish, poultry and lean meats Nuts, seeds and legumes Fiber, calcium, potassium and magnesium	Limit sodium to 1500–2300 mg per day Limit total fat to 27% of total daily calories Limit saturated fat to less than 6% of total caloric intake Limit cholesterol to less than 150 mg per day Avoid red and processed meats Avoid sugar-sweetened beverages Avoid foods with added sugar
<b>Paleolithic</b>	Based on a diet pattern presumed to exist during the Paleolithic period	Fresh vegetables, fruits and root vegetables Grass-fed red-lean meats Fish/seafood & eggs Nuts & seeds Healthful oils	Cereals Legumes (including peanuts) Dairy products Potatoes Processed foods Refined sugar, vegetable oils and salt

**TABLE 6:**

Pharmacology Management of Obesity<sup>45, 46, 47, 48, 49, 50</sup>

MEDICATION NAME	MECHANISM OF ACTION	COMMON SIDE EFFECTS	WARNINGS	DOSING
<p><b>Orlistat (Xenical)*</b></p> <p>Available in lower dose without prescription (Alli©)</p>	<p>Pancreatic lipase inhibitor; alters fat digestion by inhibiting pancreatic lipases</p>	<p>Diarrhea, gas, leakage of oily stools, stomach pain</p> <p>Levels of fat-soluble vitamins (A, D, E, K) and beta carotene were lowered</p>	<p>Rare cases of severe liver injury have been reported.</p> <p>Avoid taking with cyclosporine.</p> <p>Take a multivitamin pill daily to make sure you get enough of certain vitamins that your body may not absorb from the food you eat.</p>	<p>120 mg TID</p>
<p><b>Liraglutide (Saxenda)*</b></p> <p>Available by injection only</p>	<p>Long-acting human GLP-1 agonist (an incretin hormone); increases glucose-dependent insulin secretion, decreases inappropriate glucagon secretion, increases B-cell growth/replication, slows gastric emptying and decreases food intake</p>	<p>Nausea, hypoglycemia, diarrhea, constipation, vomiting, abdominal pain, headache, raised pulse, decreased appetite, dyspepsia, fatigue, dizziness</p>	<p>May increase the chance of developing pancreatitis</p> <p>Has been found to cause a rare type of thyroid tumor in animals</p> <p>Contraindicated with personal or family history of medullary thyroid cancer or Type 2 Multiple Endocrine Neoplasia syndrome</p> <p>Discontinue suspected pancreatitis, gall bladder disease or suicidal behavior and ideation</p> <p>May slow gastric emptying, which may impact the absorption of concomitantly administered oral medication</p>	<p>Week 1 = 0.6 mg per day</p> <p>Week 2 = 1.2 mg per day</p> <p>Week 3 = 1.8 mg per day</p> <p>Week 4 = 2.4 mg per day</p> <p>Week 5 and onward = 3.0 mg per day</p>
<p><b>Lorcaserin (Belviq)*</b></p>	<p>Serotonin-2C receptor agonist. Acts on the serotonin receptors in the brain. May help to feel full after eating smaller amounts of food</p>	<p>Constipation, cough, dizziness, dry mouth, feeling tired, headaches, nausea, weight loss</p>	<p>Serotonin syndrome, heart failure, psychiatric disorder, and priapism</p> <p>Can interact with: serotonergic or anti-dopaminergic medications, St. John's Wort, triptans, bupropion, dextromethorphan, CYP 2D6 substrates</p>	<p>10 mg twice per day for immediate-release formulation</p> <p>20 mg once per day for the extended-release formulation</p>
<p><b>Phentermine-topiramate (Qsymia)*</b></p>	<p>A mix of two medications: phentermine, which lessens the appetite, and topiramate, which is used to treat seizures or migraine headaches. May make patients less hungry or feel full sooner</p>	<p>High blood pressure, rapid/irregular heart rate, overstimulation tremor, insomnia, constipation, dizziness, dry mouth, taste changes, especially with carbonated beverages, tingling of your hands and feet, trouble sleeping</p>	<p>Not used with glaucoma or hyperthyroidism</p> <p>Not used with pregnancy or before pregnancy or lactation</p>	<p>Once-daily in the morning with or without food</p> <p>Starting dose = 3.75 mg/23 mg (phentermine/topiramate extended-release)</p> <p>After 14-day intervals, and as clinically indicated, escalate doses to:</p> <ul style="list-style-type: none"> <li>• Recommended dose = 7.5 mg/46 mg</li> <li>• Titration dose = 11.25 mg/69 mg</li> <li>• Top dose = 15 mg/92 mg</li> </ul>
<p><b>Naltrexone-bupropion (Contrave)*</b></p>	<p>A mix of two medications: naltrexone, which is used to treat alcohol and drug dependence, and bupropion, which is used to treat depression or help people quit smoking</p>	<p>Constipation, diarrhea, dizziness, dry mouth, headache, increased blood pressure, increased heart rate, insomnia, liver damage, nausea, vomiting</p>	<p>Not used with uncontrolled high blood pressure, seizures, or a history of anorexia or bulimia nervosa</p> <p>Not used with bupropion (Wellbutrin, Zyban)</p> <p><b>MAY INCREASE SUICIDAL THOUGHTS OR ACTIONS.</b></p>	<p>Week 1 = 1 tablet in AM, no tablets in PM</p> <p>Week 2 = 1 tablet in AM, 1 tablet in PM</p> <p>Week 3 = 2 tablets in AM, 1 tablet in PM</p> <p>Week 4 and beyond = two tablets in AM, two tablets in PM</p>
<p>Other medications that curb your desire to eat include:</p> <ul style="list-style-type: none"> <li>• phentermine</li> <li>• benzphetamine</li> <li>• diethylpropion</li> <li>• phendimetrazine</li> </ul>	<p>Centrally acting on the satiety center of the brain</p> <p>Note: FDA-approved only for short-term use—up to 12 weeks</p>	<p>Dry mouth, constipation, difficulty sleeping, dizziness, feeling nervous, restless, headache, raised blood pressure, raised pulse</p>	<p>Not used with heart disease, uncontrolled high blood pressure, hyperthyroidism, or glaucoma</p> <p>Can cause anxiety</p>	<p>Standard dosing regimen</p>

\*Most common pharmacological therapy as per the United States Preventive Services Task Force (USPSTF) Guidelines 2019

The greatest expected weight loss is from the *Biliopancreatic Diversion with Duodenal Switch* procedure with weight loss predicted as high as 70–80%. It is optimal for patients with Type II Diabetes Mellitus but is considered to be the most challenging bariatric surgery.<sup>23</sup> Other bariatric procedures include *Roux-en-Y Gastric Bypass*, the *Vertical Sleeve Gastrectomy* and the *Laparoscopic Adjustable Gastric Banding*.<sup>23,24</sup> Even after bariatric surgery, the patient's treatment plan continues, including lifestyle management as well as obesity-related pharmacotherapy.

## CONCLUSION

Obesity is a complicated, multifactorial disease, and so is the treatment plan. Preventative medicine in these patients is the name of the game. The goals of obesity management are to assist patients during their weight loss journey, prevent obesity-related diseases and prevent weight regain. If the patient already has obesity-related comorbidity, an additional treatment goal would be to decrease or eliminate these clinical manifestations. However, there are certain protocols, tools and medications that clinicians may employ with all patients along the obesity spectrum. Establishing appropriate baseline measurements, implementing diet/exercise changes, incorporating osteopathic principles and treatment and using appropriate medications and surgeries, where necessary, are the foundation of success in managing patients with obesity. With the tools we have outlined above, clinicians will be well prepared to recognize and treat patients with obesity.

## AUTHOR DISCLOSURES:

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## REVIEW ARTICLE

# Detection and Management of the Female Athlete Triad

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## KEYWORDS:

Amenorrhea

Eating Disorder

Female Athlete Triad

Low Bone Mineral Density

ABSTRACT: The female athlete triad is a disorder seen in physically active females that manifests as three interrelated syndromes that may or may not occur simultaneously.<sup>1,2,3</sup> It is a multi-component disease initiated by an energy deficient state (possibly from an eating disorder), bone mineral density abnormalities and menstrual changes.<sup>1,2,3</sup> Prevention and early intervention are important in averting permanent debilitating damage. The cornerstone of treatment is creating a positive net energy availability, which requires a multidisciplinary approach comprised of a licensed physician, nutritionist, exercise physiologist, mental health practitioner, athletic trainer, coaches, the athlete and their parents.

## INTRODUCTION

In the United States alone, it is estimated that three million females participate in interscholastic sports yearly.<sup>4</sup> This may be due to the many physical, mental and social benefits of exercise and competition. However, there are unique physiologic and behavioral effects of excessive physical activity. As the benefits of exercise outweigh the risks, the American College of Sports Medicine (ACSM) recommends that all females participate in some sort of physical activity or sports.<sup>2</sup> With this recommendation of participation in sports, clinicians noticed a rise in menstrual abnormalities and non-traumatic stress fractures.<sup>1</sup> The ACSM noticed that these conditions were interrelated and termed them the female athlete triad.<sup>1</sup>

## ENERGY AVAILABILITY

Energy availability is the key etiological component behind the triad.<sup>1,2,3</sup> The combination of exercise and inadequate caloric intake contributes to low energy availability. Energy availability (EA) is expressed as kilocalories of fat-free mass (kcal/FFM). According to the ACSM, the proportion of fat needed to maintain a healthy weight is about 5 percent for men and 12 percent for women; this means that a healthy fat-free mass for males should be between 78–90 percent lean mass and 68–80 percent lean mass for women.<sup>5</sup>

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Those considered at high risk for low energy states are females involved in sports that emphasize specific weight goals or aesthetics (gymnastics and ballet).<sup>1</sup> However, all female athletes, regardless of physical build or sport, are at risk. It is also important to consider the athlete's level of competition. As athletes progress from high school through collegiate and to an elite level of competition, the incidence of the triad increases. In one study conducted by the Norwegian Olympic Committee, it was observed that elite athletes from 66 different sports were found to have a higher incidence of menstrual abnormalities and stress fractures than the control population.<sup>6</sup>

Low energy availability may be the result of an eating disorder but can occur in the absence of such a diagnosis.<sup>7</sup> Athletes may experience low EA by inadvertently failing to meet the energy requirements of intense training due to time constraints or lack of nutritional knowledge.<sup>7</sup>

## AMENORRHEA

The spectrum of menstrual abnormalities seen in the female athlete range from eumenorrhea, which is a typical 28-day cycle  $\pm$  7 days, to amenorrhea.<sup>2</sup> Amenorrhea is defined as the absence of menses for at least three months.<sup>2</sup> We can further differentiate amenorrhea as either primary or secondary. In primary amenorrhea, we see patients who have a delay in menstruation past 15 years of age in the setting of normal sexual development.<sup>2,3</sup> Secondary amenorrhea is the loss of menses after menarche.<sup>7</sup>

The type of amenorrhea seen in female athletes with low energy availability is functional hypothalamic amenorrhea (FHA).<sup>7,8</sup> With FHA, there is a suppression of the hypothalamic pituitary ovarian axis with no discernible anatomic cause. The three types of FHA are weight loss, stress and exercise-induced.<sup>8</sup> This occurs from irregularities in pulsatile gonadotropin-releasing hormone secretion, which results in decreased gonadal functioning.<sup>1,2,7,8</sup> In one randomized prospective cohort study, LH pulsatility was

disrupted abruptly at a threshold of caloric intake below 30 kcal/kg.<sup>9</sup> Leptin, a cytokine expressed on adipose tissue, plays a key role in up-regulating gonadotropin-releasing hormone release.<sup>2</sup> In patients with decreased fat mass, there is a decrease in circulating leptin, which further exacerbates menstrual dysfunction.<sup>7</sup> Amenorrhea, secondary to low energy availability, does not require the presence of an eating disorder. In one long term prospective study it was found that anovulation was induced in females who increased energy expenditure through exercise despite adequate nutritional status.<sup>2</sup>

## BONE MINERAL DENSITY ABNORMALITIES

According to the National Institutes of Health, osteoporosis is classified as a state of low bone density, which predisposes patients to an increased risk of fractures.<sup>10</sup> We quantify one's risk for osteoporosis based on their bone mineral density.<sup>10</sup> It is important to understand, however, that bone mineral density is not solely responsible for patients' risk of fracture. Aside from bone mineral density, bone strength is dependent on the actual structure of the bone mineral and the quality of bone protein. The greatest development of bone mass occurs during puberty, typically between the ages of 11 and 14 years in females. In one prospective study, we see that bone formation prevails over bone resorption, resulting in a 40 percent peak bone mass during that time.<sup>11</sup> It is estimated that by the age of 18, young, healthy women achieve 92 percent of their total body mineral content and 99 percent by age 26.<sup>7</sup> Osteoporosis is not just accelerated bone mineral loss as we age but can also be secondary to poor accumulation of optimal bone mineral density during childhood and adolescence.

The International Society for Clinical Densitometry recommends that bone mineral density in children and pre-menopausal women be expressed as Z-scores.<sup>7</sup> The Z-score shows the bone mineral density of an individual as the number of standard deviations from the mean for an age matched, population specific patient. An acceptable Z-score for normal bone mineral density of any age range is greater than -2.0. Those below -2.0 are classified as below the expected range for age.<sup>7</sup> Osteoporosis is diagnosed in childhood when a child is in the bottom 5th percentile for bone density for their respective age and has a history of recurrent fractures.<sup>7</sup>

Healthy female athletes tend to have higher bone mineral densities when compared to non-athletic females.<sup>2</sup> Weight-bearing exercises are beneficial in bone development and architecture. However, despite similar weight-bearing exercises, female athletes with low energy availability and amenorrhea tend to have lower bone mineral densities.<sup>2</sup> In one study, amenorrhea observed in female athletes was associated with decreased bone mineral density in the lumbar spine.<sup>7</sup> The hypogonadal state appears to play a major role in promoting lower bone mineral density. Estrogen plays a significant role in the regulation of bone mass by its effects on human growth hormone, as well as osteoblast and osteoclast function.<sup>1,2</sup> Low estrogen states, as seen in amenorrhea, cause a decrease in osteoclasts' inhibition leading to increased bone breakdown.

## SCREENING AND DIAGNOSIS

The diagnosis of the female athlete triad can be difficult. Some of the health consequences related to the disorder are not typically apparent. The optimal time to assess elements associated with the triad is at the pre-participation physical examination.<sup>1,2,7</sup> Any athlete who presents with a component of the triad should be screened for the other components. The 2014 Consensus Panel recommended that female athletes undergo annual screening with a triad-specific self-reported questionnaire displayed in Table 1.<sup>3</sup>

TABLE 1:

Triad consensus panel screening questions

1. Have you ever had a menstrual period?
2. How old were you when you had your first menstrual period?
3. When was your most recent menstrual cycle?
4. How many periods have you had in the last 12 months?
5. Are you presently taking any female hormones?
6. Do you worry about your weight?
7. Are you trying to or has anyone recommended that you gain or lose weight?
8. Are you on a special diet or do you avoid certain types of foods or food groups?
9. Have you ever had an eating disorder?
10. Have you ever had a stress fracture?
11. Have you ever been told you have a low bone density (osteopenia or osteoporosis)?
<i>De Souza, Mary Jane, Native, Aurelia, Joy, Elizabeth, Misra, Madhusmita, Williams, Nancy L., Mallinson, Rebecca J, Gibbs, Jenna C, et al. (2014). 2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of The Female Athlete Triad. British Journal of Sports Medicine, 48(289)</i>

Obtaining a detailed history regarding each component of the triad should be addressed at each visit. An accurate menstrual history includes age at menarche, provides clinicians a baseline of patients' menstrual status. When evaluating, it's important to know if menstrual cycles were eumenorrheic at baseline and if there has been any deviation from normal. There is no single lab test available to determine functional hypothalamic amenorrhea. Typically, FHA is a diagnosis of exclusion once other causes of amenorrhea have been ruled out. Initial lab work should include urine pregnancy testing, LH, FSH, prolactin and TSH.<sup>1</sup> LH and FSH allows us to evaluate for ovarian failure. The ratio between the two hormones provides insight into whether the patient may have polycystic ovarian syndrome (PCOS).<sup>7</sup> Clinical findings of excess androgen secretion (i.e., hirsutism) can also give clues toward a diagnosis of PCOS.<sup>1,7</sup> In FHA, LH and FSH are usually normal-low and estradiol is low.<sup>7</sup> Typically, TSH and prolactin are in normal range.<sup>7</sup>

Eating disorders tend to be more difficult to diagnose. It is one of the most under-diagnosed disorders in the United States.<sup>2</sup> Most patients do not present to their primary care providers with the chief complaint of an eating disorder. Inquiring about eating disorders is challenging. It requires skillful interview techniques as well as a strong interpersonal relationship with the patient. Clinicians can perform a personalized, structured interview based upon the patients eating habits or can have patients complete questionnaires such as the eating disorder examination questionnaire (EDE-Q).<sup>1</sup> The EDE-Q has shown to be reliable in the assessment of eating disorders; however, they tend to be time-consuming. In a busy primary care office, it may be impractical to complete an EDE-Q with each patient with a suspected eating disorder. Therefore, a brief questionnaire called SCOFF could be utilized. The SCOFF questionnaire (Table 2) is a quick and easy to remember acronym that is reliable in detecting eating disorders.<sup>1</sup> Any score greater than or equal to two indicates a likely diagnosis of anorexia nervosa or bulimia.<sup>12</sup> Initial laboratory workup should include a chemistry panel, CBC with differential, ESR, thyroid function and urinalysis.<sup>2</sup> Also, an EKG should be obtained as patients identified as having an eating disorder have prolonged QT intervals, even in the setting of normal electrolytes.<sup>13</sup> The QT prolongation improved after re-feeding.<sup>13</sup>

Bone mineral density should be assessed in any female athlete who is presenting with a history of recurrent stress fractures or fractures with minimal trauma. Also, if there is a six-month history of amenorrhea, oligomenorrhea or eating disorder, a bone mineral density assay should be obtained.<sup>1</sup> Bone mineral density assessment is done by dual-energy x-ray absorptiometry (DXA).<sup>1,2,7</sup> Diagnosis is made with a low Z-score of either a PA view of the spine or the hip. Both sites are evaluated and whichever has the lowest Z-score is what is used as the actually measured score.<sup>1</sup> It is recommended that patients under the age of 20 obtain a whole body DXA and PA x-ray of the spine.<sup>1,2</sup> A Z-score of less than -2.0 confirms the diagnosis of low bone mineral density for expected age.<sup>2</sup> It is recommended that after medical management a repeat DXA should be conducted in 12 months.<sup>2</sup>

## MANAGEMENT

The first goal of treatment should be to increase total energy availability by either decreasing energy expenditure or increasing dietary energy intake.<sup>1,2,7</sup> A multidisciplinary approach is necessary for recovery. Increasing energy availability has been shown to restore normal menses and improve bone mineral density.<sup>1,2</sup> It is estimated that the female athlete may need to increase energy availability to a minimum of 30 kcal/kg of lean mass per day to normalize menses. Per the ACSM, the recommended energy intake for a sedentary female is roughly between 1800–2000 kcal/d; an additional 500–1000 kcal/d is added for active females.<sup>1</sup> The dietician and patient should devise a meal plan that focuses on the patient's estimated energy requirement. This is based on an individual's energy intake, expenditure, age, sex, weight, height and physical activity level.

Many athletes are not as open to alterations in exercise intensity and duration. Therefore, nutrition should be the primary focus to help increase energy availability. Although research is limited,

**TABLE 2:**

The Scoff questionnaire: a screening tool for eating disorders

1. Do you make yourself sick because you feel uncomfortably full?
2. Do you worry you have lost control over how much you eat?
3. Have you recently lost more than one stone (14 lbs) in a three-month period?
4. Do you believe yourself to be fat when others say you are too thin?
5. Would you say that food dominates your life?
<i>*One point for every "yes"; a score of <math>\geq 2</math> indicates a likely case of anorexia nervosa or bulimia?</i>

supplementation of vitamin D, vitamin K and calcium can be added.<sup>1</sup> Increasing energy availability should continue to be the focus of management until normal menses resume.

Overcoming the psychological component of their disorder seems to be the biggest hurdle towards recovery. Athletes are driven individuals who are goal-oriented and look for success regardless of damages that could be done to their health. Altering an athlete's perception and mentality offers a difficult challenge. It is important to utilize the assistance of a mental health clinician to help overcome specific mental barriers towards recovery. Personal contracts appear to have shown positive results in the goals of treatment. If certain parameters of the personal contract are not met (i.e., dietary intake of 2000 kcal/d), the patient may have to abstain from competition or training.<sup>1</sup>

## PHARMACOLOGICAL CONSIDERATIONS

There is very little evidence for pharmacological management as a standard of treatment for the triad. Typically, once the weight is restored, most patients are started on SSRIs for management of their eating disorder if present.<sup>2</sup> There is no one pharmacologic agent that can be used to treat functional hypothalamic amenorrhea. Oral contraception (OCPs) has been shown to normalize menses, but it is important to recognize that metabolic factors that impair bone health are still relevant.<sup>2</sup> Some studies now suggest that transdermal estrogen therapy may have a better impact on bone health. However, most research is limited to postmenopausal women.<sup>7,14</sup>

In one randomized double-blinded study of 110 females with diagnosed anorexia nervosa, it was found that for those patients prescribed transdermal 17- $\beta$  estradiol, bone mineral density increased in both the spine and hip.<sup>14</sup> The benefit of using transdermal estrogen is that it has little to no effect on insulin-like growth factor, as opposed to OCPs that have relatively high levels of estrogen, which further suppress IGF-1.<sup>14</sup> Insulin-like growth factor is an important bone trophic hormone secreted by the liver and is typically suppressed in patients with FHA.<sup>8,14</sup> Bisphosphonates that are approved for management of low bone density in postmenopausal women should not be used in young female athletes with functional hypothalamic amenorrhea.<sup>1</sup> Bisphosphonates tend to remain in bones for years and their teratogenic potential should be avoided in women of child-bearing age.<sup>1,2</sup>



**TABLE 3:**

Return to play risk stratification protocol worksheet

RISK FACTORS	LOW RISK - 0 POINTS EACH	MODERATE RISK - 1 POINT EACH	HIGH RISK - 2 POINTS EACH
Low EA with or without eating disorder	<input type="checkbox"/> no dietary restrictions	<input type="checkbox"/> some dietary restriction	<input type="checkbox"/> meets DSM-V criteria for ED
Low BMI	<input type="checkbox"/> BMI $\geq 18.5$ or $\geq 90\%$ EW or weight stable	<input type="checkbox"/> BMI $17.5 < 18.5$ or $<90\%$ EW or 5 to $<10\%$ weight loss/month	<input type="checkbox"/> BMI $\leq 17.5$ or $<85\%$ EW of $\geq 10\%$ weight loss/month
Delayed menarche	<input type="checkbox"/> menarche $< 15$ years	<input type="checkbox"/> menarche 15 to $<16$ years	<input type="checkbox"/> menarche $\geq 16$ years
Oligomenorrhea and/or amenorrhea	<input type="checkbox"/> $> 9$ menses in 12 months	<input type="checkbox"/> 6-9 menses in 12 months	<input type="checkbox"/> $<6$ menses in 12 months
Low bone mineral density	<input type="checkbox"/> z-score $\geq -1.0$	<input type="checkbox"/> z-score $-1.0 < 2.0$	<input type="checkbox"/> z-score $\leq -2.0$
Stress fracture	<input type="checkbox"/> None	<input type="checkbox"/> 1	<input type="checkbox"/> $\geq 2$ ; $\geq 1$ high risk or of trabecular bone site
Cumulative risk	___ points +	___ points +	___ points = ___ Total
<i>De Souza, Mary Jane, Native, Aurelia, Joy, Elizabeth, Misra, Madhusmita, Williams, Nancy I., Mallinson, Rebecca J, Gibbs, Jenna C, et al. (2014). 2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of The Female Athlete Triad. British Journal of Sports Medicine, 48(289)</i>			

Currently, the best approach for management is early detection and prevention. Strong efforts should be made to educate patients, medical staff, coaches and educational institutions on how to optimize energy availability best and prevent injury. Pre-participation physicals provide the best time to screen for symptoms associated with the triad.<sup>1,2,7</sup>

## RETURN TO PLAY CONSIDERATION

To date, there is no standardized clearance or return to play guidelines. According to the ACSM 2012 consensus statement, the physician's goal is to return an uninjured athlete to practice or competition without putting that individual at undue risk.<sup>9</sup> The consensus panel recommends a risk stratification protocol be followed to guide clinicians when to allow athletes back to competition.<sup>3</sup>

Table 3 outlines the risk stratification protocol worksheet. Patients who score 0–1 points are considered low risk for injury and can be granted full clearance. A score of 2–5 points puts the patient at moderate risk and would require limited clearance. Any patient with a score of 6 or higher is restricted from further training or competition. It is important to recognize that recovery for each component of the triad is different. Increasing energy availability positively affects metabolic function within days to weeks. Menses can typically resume within several months but could take up to one year. Bone mineral density recovery occurs over a more extended period and can usually take several years to restore.<sup>3</sup>

## CONCLUSION AND FUTURE CONSIDERATIONS

The female athlete triad is a multi-component disorder comprised of low bone mineral density, menstrual abnormalities and eating disorders. Any female who presents with one component should prompt a more comprehensive workup. Once identified, the most important initial step towards recovery is increasing energy availability, either through dietary intake or decreasing energy

expenditure. Management requires a multi-component therapy team comprised of physicians, mental health therapists, athletic trainers, nutritionists, coaches and educational administration. Increased education in recognition of signs and symptoms associated with the triad is needed to facilitate prompt diagnosis and prevention.

The International Olympic Committee recently provided updates to the female athlete triad to include a broader list of health consequences deemed relative energy deficiency in sports (RED-S).<sup>15</sup> The purpose was to show how males also can present with analogous symptoms. Most of the clinical symptoms are parallel to what we would see in the female athlete triad. However, RED-S looks to address aspects of physiologic function including metabolic rate, menstrual function, bone health, immunity, protein synthesis, cardiovascular and psychological health.<sup>15</sup>

### AUTHOR DISCLOSURES :

The author(s) declare no relevant financial affiliations or conflicts of interest.

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## CALENDAR OF EVENTS

### JULY 17-18, 2020

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# PATIENT EDUCATION HANDOUT

## Osteopathic Home Exercises for Caregivers of COVID-19 Patients

Abby Rhoads, DO

*Ronald Januchowski, DO, FACOFP, Editor • Paula Gregory, DO, MBA, CHCQM, FAIHQ, Health Literacy Editor*

### DAY ONE:

Please perform treatment for the first time during a telehealth visit with an osteopathic physician (DO). Begin with one treatment from the four described in this education handout. If the patient has increased coughing due to the treatment, you can end the treatment early. Also, if the patient feels any pain, then stop what you are doing.

### SUBSEQUENT DAYS:

You can perform all four techniques up to twice a day until the COVID-19 symptoms improve.

### GENERAL INSTRUCTIONS:

1. Try to limit the treatment time to less than 10 minutes; each of the five treatments should take less than two minutes.
2. These techniques are ideal if you have two or more people in your household who are sick and COVID-19 positive. If there is only one patient COVID-19 positive and the caregiver is not sick, it is ideal for both the patient and the caregiver to wear a mask (fabric is fine) during the treatment. If only one mask is available, have the sick person wear it to avoid coughing near the caregiver's face. The caregiver should wash their hands with soap and water for two minutes immediately after treatment.

### TREATMENT 1:

#### SUBOCCIPITAL RELEASE (PARASYMPATHETIC) RELEASE

#### PURPOSE:

To help balance your nervous system, decrease cough and loosen mucus

#### INSTRUCTIONS:

1. Have the patient lie on their back on a couch or across a bed, with the caregiver sitting at the patient's head.
2. Feel the spine in the neck until you reach the base of the skull.
3. Place your fingers at the base of the skull, as shown in Image 1.
4. Advise your patient to relax their head down into your fingers, as shown in Image 2.
5. Hold this for 30 seconds to one minute.

IMAGE 1:<sup>1</sup>



IMAGE 2:<sup>1</sup>



**SOURCE(S):** 1. *Atlas of Osteopathic Techniques* 2. *ACOFP OMTotal Video Library*

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## TREATMENT 2: THORACIC INLET RELEASE (LYMPHATIC TECHNIQUE)

### PURPOSE:

To open up the pathway to drain the lymphatic system (improves the immune system)

### INSTRUCTIONS:

1. The patient sits in a chair with a caregiver standing behind.
2. Place your thumbs where the neck meets the patient's shoulders with the rest of your hand on the chest, as shown in Image 3.
3. Rotate clockwise and counterclockwise with enough pressure to feel the skin move under your hands (like driving a car with a steering wheel).
4. Rotate your hands towards the right, in a clockwise fashion (moving the skin underneath), and have the patient take a deep breath in. As they take a breath out, move more towards the right, gently.
5. Do the same approach in the other direction. Rotate your hands towards the left, in a counterclockwise fashion (moving the skin underneath). Have the patient take a deep breath in and, as they take a breath out, move more towards the left.
6. Alternative: This can be done with the patient lying on a couch with their head on the couch arm (or lying in bed) with you standing or sitting above, as shown in Image 4.

IMAGE 3:<sup>1</sup>



IMAGE 4:<sup>2</sup>



## TREATMENT 3: PECTORAL TRACTION (LYMPHATIC TECHNIQUE)

### PURPOSE:

To assist moving lymph through the body and help move immune cells to fight infections

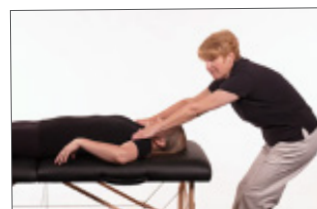
### INSTRUCTIONS:

1. The patient can lay diagonally across the bed on their back so the caregiver can access their feet and head or the patient can lay on a couch with their head resting on the couch arm.
2. Take four fingers (not including the thumb) of both hands and make a hook, with your fingers going into the patient's armpits. See Image 5.
3. Hold on and lean backward. As the patient takes a deep breath, continue to lean back and gently pull your hands back towards yourself. See Image 6.
4. Continue holding as the patient takes three to five breaths in and out.

IMAGE 5:<sup>1</sup>



IMAGE 6:<sup>2</sup>



## TREATMENT 4: PEDAL PUMP (LYMPHATIC TECHNIQUE)

### PURPOSE:

To assist moving cells that fight infection throughout the lymphatic system

### INSTRUCTIONS:

1. The patient lies on the couch on their back or in bed so that the caregiver can access the feet.
2. Stand at the end of a couch or bed where your patient's feet are and place your hands on each foot, as shown in Image 7.
3. Gently push at the bottom of their feet in a rhythmic motion towards your patient, as shown in Image 8. The patient should feel their abdomen giggle.
4. Alternatively, you can grasp their ankle bones and push forward and back in a rhythmic motion, enough for the patient to feel the abdomen giggle.

IMAGE 7:<sup>1</sup>



IMAGE 8:<sup>2</sup>



SOURCE(S): 1. *Atlas of Osteopathic Techniques* 2. ACOFP OMTotal Video Library

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# PATIENT EDUCATION HANDOUT

## Risks of Obesity

Kimia Etemadi, OMS-IV

Ronald Januchowski, DO, FACOFP, Editor • Paula Gregory, DO, MBA, CHCQM, FAIHQ, Health Literacy Editor

Obesity is a medical condition defined by a body mass index (BMI) over 30 kg/m. There are some risk factors out of your control, but you still have the power to stay healthy if you change certain aspects of your lifestyle.

### WHAT IS BMI?

BMI is an index of weight-for-height used to classify overweight and obesity in adult individuals.

- Healthy weight: A BMI between 18.5 kg/m and 24.9 kg/m
- Overweight: A BMI between 25.0 kg/m and 29.9 kg/m
- Obese: A BMI equal to or more than 30.0 kg/m

### BEHAVIORS PUTTING YOU AT RISK FOR OBESITY:

- Eating an unhealthy diet: An unhealthy diet may consist of fast foods, frozen meals and high-sugar content.
- Living a sedentary lifestyle: Most of our jobs require a desk and a chair. Your body needs to burn the foods that you feed it. The less you move, the more energy will be stored and eventually turned into fat.
- Stress: Stress is a risk factor because it can cause overeating in addition to an increase in the hormone called cortisol. This hormone has been linked to weight gain.
- Lack of sleep: A variable sleep cycle without a set schedule can cause weight gain because individuals may eat more than their required caloric needs.

### WAYS TO PREVENT OBESITY:

- Participate in at least 30 minutes or more of physical activity every day, such as gardening, brisk walking, biking or swimming.
- Make a habit to comply with the recommended 2,000 calorie intake diet and make modifications depending on your current fitness goals.
- Pay attention to what you are eating. Incorporate fruits, vegetables and foods low in cholesterol and sodium.
- Develop and maintain a schedule to meditate, sleep and keep up with your mental health needs.

### MEDICAL CARE & TREATMENT OPTIONS

If you have any questions about obesity, please contact your osteopathic family physician. With a thorough history and physical exam, your doctor will help you determine which treatment options will be best for you to achieve healthy body weight. For more information on how to prevent obesity, visit <https://www.cdc.gov/obesity/index.html>.



SOURCE(S): Centers for Disease Control and Prevention

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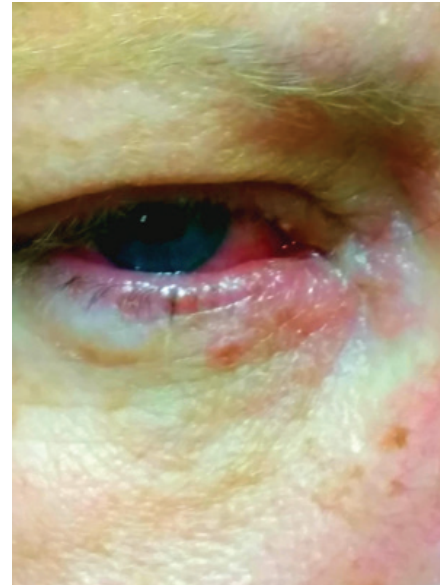
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