West Virginia
Medical
JOURNAL

October 2020
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West Virginia State Medical Association

The Voice of
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Medical student **Mercy O. Babatope**, **Class of 2021**, saw an opportunity to support current and future minority medical students by formalizing a Student National Medical Association chapter at Marshall. As its founding president, Mercy and her fellow students have helped address bias and racism and are working to ensure medical education and services are culturally sensitive to the needs of diverse populations.

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JOAN C. EDWARDS SCHOOL OF MEDICINE

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WVSMA's New President, Dr. Brad Hall and Mrs. Marlene Hall

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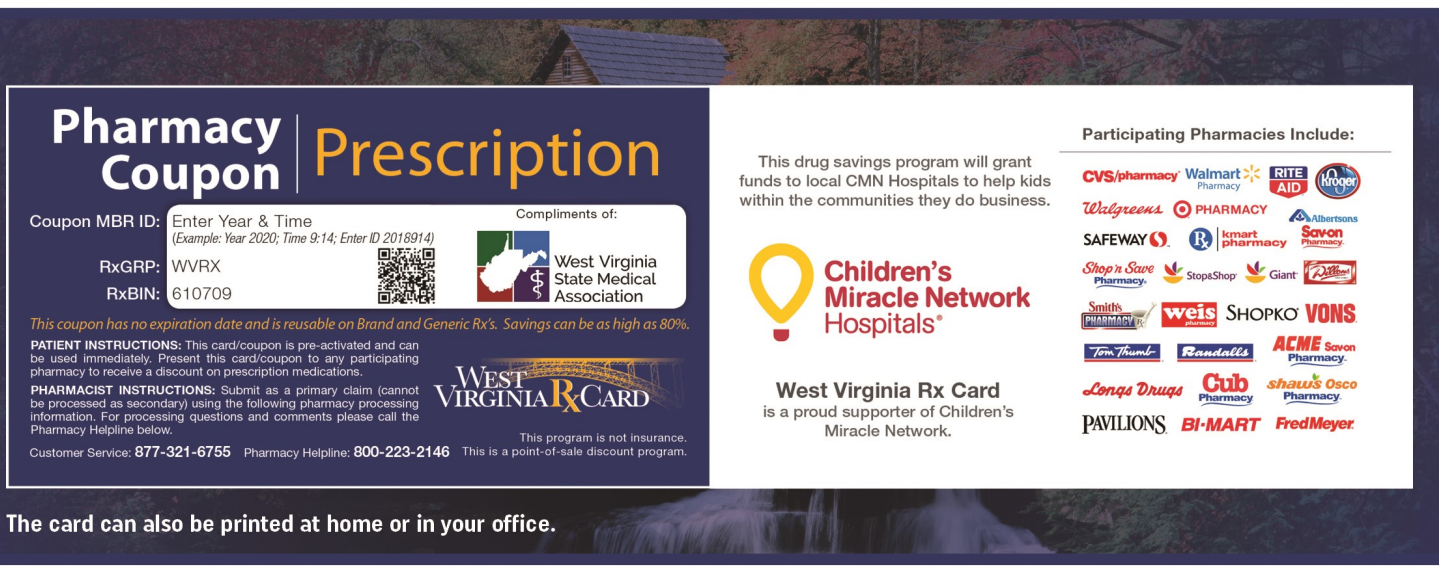

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PUBLICATIONS COMMITTEE

3rd/4th Quarter, October 2020

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MEDIA KIT

Please visit the WVSMA website, or contact Bethany Kinder for more information.

Meet WVSMA's New President, Brad Hall, M.D., DABAM, DFASAM, MROCC, AAMRO

Making a Difference in the Lives of Others

Why would I, as a very busy Past-President of the Federation of State Physician Health Programs (FSPHP) and current Executive Medical Director of the West Virginia Medical Professionals Health Program (WVMPHP), chair of the Appalachian Addiction and Prescription Drug Abuse Conference (AAPDAC); become the 154th President of the West Virginia State Medical Association (WVSMA) ? Because I, a third-generation West Virginia Physician, have a passion for helping professionals recover from potentially impairing illnesses, become all they can be, including *making a difference in the lives of others*. Every physician I have helped to-date touches, in a very special way, tens of thousands of the lives of others; at work, at home, socially and with their patients having a ripple effect of healthy and wholehearted living.

Phillip W. Hall, M.D.

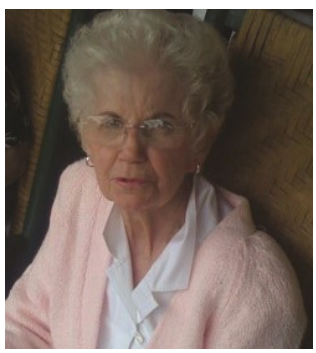
Jay Pierce, DPM

In 1951, my father Phillip W. Hall, M.D. was serving in Korea as an Army Medic. He spent 30 -years married to medicine as a pediatrician in Clarksburg, West Virginia. That same year, my maternal grandfather Jay H. Pierce, DPM passed away after serving years in the local healthcare community, inclusive of being the "team physician" where I ultimately graduated high school in 1980 and later served in the same role of team physician. My paternal grandfather, Sobisca S. Hall, M.D., retired military WWII veteran and Otolaryngologist in Clarksburg, West Virginia, served as the 85th President of the WVSMA in 1951. He retired from medicine when I was in second grade. That same year, I set a number of goals which included "becoming a physician like grandad."

Becoming a doctor had become an expectation of me, which I myself had become unsure. The "impostor syndrome" continued into my third year of medical school when I had a patient experience assisting her anxiety ridden fears of ventilator dependency with an ultimate discharge free of all artificial breathing assistance of any type. I knew then I was destined for medicine and healing. It obviously was in my blood.

Sobisca S. Hall, M.D.

In 1988, I graduated medical school with the presence of my biggest fan and harshest critic, Sally Pierce Hall, my mother who raised me. She passed in 2017 and there are too many life lessons to share beyond the most important of which is "persistence." Always noting "this too shall pass" and "keep the faith" in turbulent times and these serve me well, even today.



Sally Pierce Hall

It was in residency I first met Joe Selby, M.D., esteemed WVSMA Past-President and current Chairman of the Board of the WVMPHP. During training I was honored to meet Linda Nield, M.D., who is the new *West Virginia Medical Journal* Editor in Chief. After completing my chief resident year in 1991, I returned home to Clarksburg where I practiced family medicine, occupational medicine, urgent care and sports

(L-R) Joe Selby, M.D., Mrs. Joan Selby, Brad Hall, M.D. and Mrs. Marlene Hall

medicine in a large multi-provider private practice inclusive of 120 staff. Looking back, I was a burned-out physician before I had ever heard of, let alone understand, the term. Ultimately, I sold the practice, shifted to addiction medicine and establishing the WVMPHP as its founding Medical Director, the Board recognized physician health program for both allopathic and osteopathic licensure boards.

(L-R) Brad Hall, M.D. accepting the FSPHP President's Award from Paul Early, M.D.

I have served as President/Executive Director of the West Virginia Society of Addiction Medicine and am a Distinguished Fellow of the American Society of Addiction Medicine, as well as, a Diplomat of the American Board of Addiction Medicine. I am a certified Medical Review Officer by both the American Association of

Brad Hall Presenting at the AAPDAC, Federation State Medical Boards, and a FSPHP Event

Medical Review Officers and the Medical Review Officer Certification Council. In addition, I am a Board Registered Interventionist with the Association of Intervention Specialists.

Nationally, I am a Board of Director and Past President of the Federation of State Physician Health Programs (FSPHP) and recipient of the President's Award in 2019 and 2020. I have served on numerous committees and currently the Co-Chair of the Accreditation Review Council in the establishment of the FSPHP's Performance Enhancement and Effectiveness Review Program for Physician Health Programs and treatment centers. I am currently a member of multiple American Society of Addiction Medicine committees including Physicians' Health, Legislative and Membership. I have served on the Federation of State Medical Boards Impaired Physicians Committee in the updating of the Impaired Physicians Policy in 2012 and am currently on the Federation of State Medical Board's 2020 Workgroup updating the "Impaired Physician Policy". I have also served as a member of the West Virginia Governor's Advisory Council on Substance Abuse. I have been honored to be a Board of Director of the West Virginia Judges and Lawyers

Meet WVSMA's New President, Brad Hall, M.D., DABAM, DFASAM, MROCC, AAMRO

Making a Difference in the Lives of Others

Dr. Hall and Mrs. Marlene Hall

Dr. Hall and his daughter, Rachel

Assistance Program since 2018. I was a co-author of the Chapter on Physician Health Programs "*Physician Mental Health and Well-Being – Research and Practice*. New York: Springer Publishing" and Absolute Addiction Psychiatry Board Review Chapter on Professionals.

Most importantly, I am a husband, married to Marlene, and father to Rachel, Justin and Crystal and grandfather to Dylan, Olivia, Clara and Grant. No writing would be complete without acknowledging I've had a lot of help from many to get where I am today, most notably and significant is my lovely wife Marlene whom I have worked with for 30-years. My life partner, soulmate and workmate.

So, I've been making a difference in the lives of others since the 1980's and fully intend to continue. I've been an active member of the WVSMA for many years, serving on multiple committees and council. Most recently as a peer reviewer for the WVSMA Journal, Executive Committee, Scientific & Educations Committee, Finance and Resolutions Committees. I am a firm believer that life experiences to-date always prepare us for what's next in the journey. My philosophy for life is that adding value is the secret to life. I believe in solving problems, creating things, helping each other, and getting the most out of life. Life is about taking action. And action leads to more energy, happiness, and a better life. This philosophy is applicable as we face the challenges of today.

In these unprecedented times of COVID-19, physician burnout and moral injury, co-existing with an opioid epidemic, suicide and civil unrest, I believe the importance of the WVSMA to be paramount. The challenges caused by a viral material one-billionth of a meter on the fragility of humanity at the state, federal and global level has created a level of "disorder" new to many. The cycle of order, disorder and reorder has been part of civilization inclusive of the human journey from birth to death. Just as it is in mother nature and the cycle of our seasons, summer through spring.

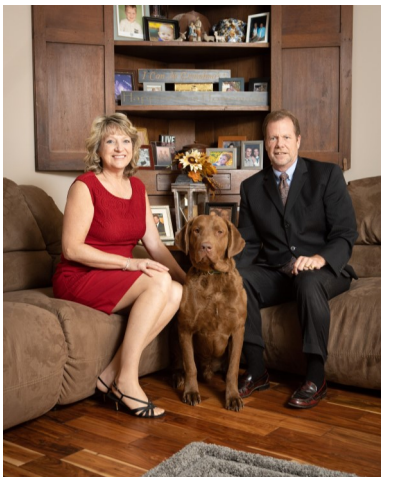
With the addition of psychosocial stressors of isolation, fear, disease and death, disruption of our normal routine with rapid changes in medicine such as telemedicine, the normal physician emergent response is turning into protracted distress and associated potential delayed psychiatric morbidity including burnout and moral injury is wearing on our profession and colleagues.

According to the CDC, we are already seeing evidence of

adverse mental or behavioral health conditions, anxiety and depression, trauma, increased substance use and individual's seriously considering suicide. All of this is superimposed on pre-existing burnout and depression in greater than 40% of physicians. The struggle for healthcare professionals is being unable to provide high quality care and healing. These difficulties are often result of issues beyond their control which negatively impact the moral values of the medical profession/ professional. Control is an illusion and when things are going our way, we have the illusion of being on top of things.

When things fall apart, we often relinquish the only power we have in giving ourselves permission to feel what we need to feel. This includes pausing to contemplate what we can do with the situation we confront. In essence, we started with a disheartened and dispirited workforce challenged with an opioid epidemic, now with a pandemic within a pandemic. All of this is complicated by the financial crisis and the need to manage both acute and chronic stress. Finding ways for professionals to allow themselves to be "human" and at-ease with the dis-ease of human-ness and associated resilience is our greatest challenge.

I believe in the mission and vision of the WVSMA, which includes advancing the health and promoting quality and safety in the practice of medicine in West Virginia by representing the interest of patients, public health and PHYSICIANS. The WVSMA represents the unified voice for the practice of medicine. As leaders with a capacity and willingness to serve, we can create alignment by communication and cultivate momentum by taking action. Leaders inspire belief in a greater purpose and are agents of change in challenging times. This includes not being afraid of yourself, saying what needs to be said and being the voice of many. Leaders recognize every viewpoint is a "view from a point" and we cannot afford to be hypnotized by our life, culture and personalities to stay the same and therefore unconsciously resistant to change. Leaders lead and lean into the discomfort of change. I believe the cycle of order, disorder and reorder is challenging the house of medicine in these unprecedented times of disorder and being catapulted into a period of reorder.



Dr. Hall and Mrs. Marlene Hall

My vision is to utilize the WVSMA to enhance physician collaboration, communication and accountability in these unprecedented times. Reorder always starts at home base with governance, fiscal responsibility, membership and advocacy for the public and membership we serve. With unity of purpose, the WVSMA can make a difference in the lives of others through YOU, who is an "other". The only thing I'm sure of is I can't, but WE CAN. We can make a difference in the lives of others, starting with you as a WVSMA member. The WVSMA can make a difference in our individual lives and the lives of our colleagues and thereby in the lives of patients and public we serve.

If you want to see the future of the WVSMA as a great leader, don't look at the past or even the present organization, but look to the future of where it needs to be in five years and defining the next step in getting there.

Your colleague and friend,

Brad

FEATURE

West Virginia Mutual Insurance Chairman's Corner

***R. Austin Wallace**, MD*
Chairman & CEO
West Virginia Mutual Insurance Company

The COVID-19 pandemic has obviously caused myriad disruptions in our lives and the way we do business. Your West Virginia Mutual Insurance Company (WVMIC) has strived to be a great resource to our insured practicing physicians through advice offered on important pandemic topics, including the expanded use of telemedicine during the crisis and avoiding liability and licensure pitfalls with its utilization. Please view our website for valuable information generated by our team.

So, while our excellent Risk Management people have been busy keeping you informed as the crisis plays out, we have postponed Risk Management site visits, seminars, and staff in-service activities since the beginning of the COVID-19 emergency was declared. WVMIC continues to assess the constantly evolving conditions throughout West Virginia. I know that our insured members have concerns about the premium credits awarded for participation in our Risk Management programs in their current policy while these programs are not available. Please be assured that WVMIC is committed to working with you to maintain your eligibility for these credits, which are being continued while the pandemic state of emergency is still in place. Indeed, any of our policyholders with questions or further concerns about this issue are urged to contact their agent or us at the Mutual.

We certainly will continue our ongoing monitoring of the situation. Our Risk Management team is available to our insured members as a resource for questions about any COVID-19 related matters, including telemedicine and office protocols during the pandemic, and, as always, any non-COVID-related matters as well. As a reminder, any changes in your practice such as the initiation of telehealth services must be reported to the Underwriting Department at the Mutual at 304-343-3000.

As is the case at all times, your entire Mutual team is here to support our insured members in any way possible. During these quite uncertain and unsettled times, always keep in mind that our advantage at the Mutual is that we have a keen understanding about your issues, as we are Physicians Insuring Physicians.

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Strength During Uncertain Times

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SCIENTIFIC

A Comparison of Face-to-Face Versus Tablet-Based Delivery of the Patient Health Questionnaire-2 Screening for Depression in Primary Care

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Conflicts of Interest:

None

Funding:

No additional funding was received for this study.

Institutional Review Board Statement:

This study received Institutional Review Board full board approval from the Charleston Area Medical Center Institute, Research and Grants Administration.

ABSTRACT

Primary care practitioners have long been encouraged to screen adult patients for depression, as reflected by national guidelines from the United States Preventive Services Task Force (USPSTF) and recent federal initiatives aimed at bolstering screening rates. The Patient Health Questionnaire-2, or PHQ-2, is a simple, commonly used tool for depression screening. However, results can be skewed due to variability in the way in which questions are delivered. This study, conducted in seven West Virginia primary care centers from August 2016 to October 2017, evaluated delivery of the PHQ-2 via face-to-face administration by clinical staff compared to a scripted, video-based delivery using a tablet computer, here called the electronic PHQ-2 or ePHQ-2. This observational study finds a significant, increased difference in positive screening results when administered face-to-face by clinical staff compared to a scripted, tablet-based delivery (X^2 (1, N = 655) = 5.32, p = 0.02). Given this important difference between groups, this study highlights the need for further exploration into the fidelity of PHQ-2 delivery and acceptance of such technology among patients and health care providers.

INTRODUCTION

Depressive disorder in the United States (US) is a serious public health issue, ranging from 4.8% to 8.6% prevalence among individuals receiving treatment in primary care.[1] At any given point in the year, about 9.5% of adults age 18 years and older experience depression,[2] with a lifetime prevalence of over 16.0%.[3] Affected individuals often have decreased quality of life indicators, increased health care costs, increased odds for having some form of disability, and experience significant absences from the workplace.[1,2] Primary care has long been encouraged to screen adult patients for depression, as reflected by national guidelines from the USPSTF and recent federal initiatives aimed at bolstering screening rates.[1,4] Yet, depression still often remains undetected in primary care,[2,5–10]

pointing to the need for further attention to and exploration of methods for bolstering screening and detection.

The Patient Health Questionnaire 2, or PHQ-2, is a common, validated tool used in primary care to screen for depression.[11,12] Comprised of two questions, the tool offers standardized questions on the frequency with which patients have experienced a depressed mood over the past two weeks. While PHQ-2 results are not diagnostic they indicate whether further testing is advisable.[13] Potential scoring ranges from 0 to 6, with a score of 3 or greater indicative of further testing.[9] Office staff may administer the PHQ-2 as they triage a patient, or it can be administered by a health care provider such as a physician, psychologist, physician assistant, nurse practitioner, social worker or counselor during an office visit. However, results of the PHQ-2 can be skewed due to variability in the way in which questions are delivered.[14,15] Potential for variability in administration of the tool is an ever-present issue, and exploration of alternative ways of delivering the screening is worthy of exploration.

This observational study, conducted in seven West Virginia primary care centers, evaluated delivery of the PHQ-2 via face-to-face administration by clinical staff compared to a scripted, video-based delivery using a tablet computer, here called the electronic PHQ-2 or ePHQ-2. This study tested for differences in the percentage of positive PHQ-2 screening tests between groups. As our study involved the use of tablets in direct patient care, available literature was reviewed regarding the use of tablets and other comparable computers in direct patient care. This search yielded some research supportive of the use of tablets for informed consent and data collection,[16–18] but no studies at that time in which tablets were used in the manner here proposed – using a series of videos and interactive questions specifically for depression screening. Given the dearth of currently available literature on depression screening in West Virginian or Appalachian settings, this study aimed to add knowledge to the field of depression screening approaches in these settings. No a priori hypotheses were formulated. Rather, the aim of the study was to evaluate for differences in the percentage of positive PHQ-2 screening tests between study arms, traditional versus tablet-based delivery, for the purpose of informing delivery of this common, essential screening in Appalachian settings.

MATERIALS AND METHODS

This observational, prospective study took place in seven West Virginia primary care centers, representing six health systems, from August 2016 to October 2017. Six of these locations are federally qualified health centers, which by design are safety-net clinics positioned in underserved areas of the state.[19] One location is a family practice within a regional hospital. In each case, these locations provide primary care across the lifespan for their respective communities. Further, each participating center is a member of the West Virginia Alliance for Creative Health Solutions, a practice-based research network engaged in local-level investigation and application of data to community priorities.[20] This study was designed and conducted by membership of this research network.

Data collection was organized by two study arms. Participating centers completed each arm of the study in tandem following a standardized research protocol. Coordination in data collection was aided by daily monitoring of survey completions across sites and communication to site leaders by a lead informaticist. Study arm 1 involved face-to-face screening with clinical staff, while study arm 2 involved the ePHQ-2 – a scripted, computerized screening using a tablet. Based on the estimated total population of patients served by the practices participating in the study, a sample size of 313 patients in each arm was determined as necessary to achieve a 95% confidence level of statistical reliability, with a confidence interval of 5% at 80% power.[21] This study achieved 342 subjects in study arm 1 and 313 subjects in study arm 2, appropriately powering the analyses for statistical representativeness of the study population.

Convenience sampling was used by design, so as to not disrupt patient care flow, with clinical staff and providers

A Comparison of Face-to-Face Versus Tablet-Based Delivery of the Patient Health Questionnaire-2 Screening for Depression in Primary Care

Table 1. Participants by Study Arm, with Indication of Depression Screening Results

Study Arm		Screened Positive for Depression	Screened Negative for Depression	Total
Arm 1: Face-to-face delivery	Number	45	297	342
	Percent	13.16	86.84	100.00
Arm 2: Tablet-based delivery	Number	24	289	313
	Percent	7.67	92.33	100.00

*This study achieved 342 subjects in study arm 1 and 313 subjects in study arm 2, appropriately powering the analyses for statistical representativeness of the study population. The relation between screening modality and screening result was significant (X^2 (1, N = 655) = 5.32, p = 0.02). The odds of having a positive depression screen among patients queried using the traditional face-to-face delivery of the PHQ-2 is 1.8 times greater than among those queried using the tablet-based delivery of the instrument (95% CI = 1.08 – 3.07).

alerting presenting patients to the study using standardized protocol. Inclusion criteria mandated that study participants be adult patients, age 18 years and older, with English speaking proficiency, without a diagnosis of depression, presenting to the centers for routine care during the study period and agreeable to take part in the study via informed consent. Patients were excluded if they were less than 18 years of age, or if they had an existing diagnosis of depression as indicated in their medical records. In addition to the PHQ-2 questions, participants were asked to provide select demographic information, including age, gender, race, and insurance status. All clinical personnel taking part in the study earned Collaborative Institutional Training Initiative certification prior to study implementation.

Tablet-based delivery of the ePHQ-2 in study arm 2 was completed using Qualtrics Survey Software.[22] The tablets were pre-loaded with video-based consent into the study, plus video-based delivery of the screening questions using an interactive question format.[23] All videos were produced specifically for this study, using professional staff and production equipment. Each participating primary care center was provided a unique survey tool to help ensure data confidentiality, as well as increased data integrity through ongoing monitoring for data quality and completeness as the study progressed.

The data set was analyzed using JMP Pro Version 14 Statistical Discovery software.[24] Descriptive statistics were used to gain understanding of the patient profiles and general response types. The chi-square test of significance was used to evaluate the relationship between categorical variables across study arms. The significance level α was set at 0.05.

This study received Institutional Review Board full board approval from the Charleston Area Medical Center Institute, Research and Grants Administration.

RESULTS

Of the 342 individuals included in arm 1 of the study, 45 (13.16%) screened positive for depression. In arm 2, of the 313 individuals included 24 (7.67%) screened positive. These findings are within the general range of percent of positive depression screenings found in primary care nationally, cited at between 8.0% to 14.0% of patients screened.[7] A chi-square test of independence was performed to examine the relation between screening method and positive screens for depression. The relation between these variables was

significant (X^2 (1, N = 655) = 5.32, p = 0.02). The odds of having a positive depression screen among patients queried using the traditional face-to-face delivery of the PHQ-2 is 1.8 times greater than among those queried using the tablet-based delivery of the instrument (95% CI = 1.08 – 3.07) (Table 1).

Across the two study arms, patients taking part in the study were comparable to rural West Virginia. Overall, participating patients were primarily: white (93.57% arm 1, 92.65% arm 2, X^2 = 0.21, p = 0.64); female (61.70% arm 1, 58.47% arm 2, X^2 = 3.51, p = 0.17); age 45-64 (45.32% arm 1, 43.77% arm 2, X^2 = 0.89, p = 0.64); with about one-third of patients having Medicare as their primary insurance (33.63% arm 1, 34.19% arm 2, X^2 = 1.12, p = 0.89). Private insurance and Medicaid were also heavily represented in the study sample. (Table 2).

DISCUSSION

This research, taking place in seven West Virginia primary care centers, examined delivery of the PHQ-2 via traditional, face-to-face administration by clinical staff compared to a scripted, video-based delivery using a tablet computer. In light of the potential for results of the PHQ-2 to be skewed due to variability in question delivery, this study evaluated for differences in the percentage of positive PHQ-2 screening tests between study arms. Results indicate a statistically significant difference (1.9 times greater odds) in the number of patients screening positive for depression via face-to-face screening relative to the novel, tablet-based screening. This significant difference in positive screening results points to the needs for further research into two areas: 1) fidelity in PHQ-2 question delivery by the health care team; and 2) levels of patient and health care provider acceptance of tablet-based depression screening. While these two areas are quite different in scope, better understanding each is essential in knowing with more certainty how the traditional face-to-face questions are delivered and if screening using video-based delivery would be acceptable on both the part of the patient and the provider. In situations in which there may be some type of bias in question delivery, a standardized, tablet-based delivery of the questions could help to alleviate that situation for more accurate screening results. Records from the Qualtrics survey software indicate that it took 3.02 minutes, on average, per study participant to complete the tablet-based delivery of the PHQ-2. This length of time is promising in terms of ePHQ-2 acceptability to the clinical team and patients alike. Further, having the PHQ-2 survey results automatically scored and saved electronically is a promising aid in queuing the PHQ-9 for those patients screening positive and, ultimately, providing treatment and follow-up care as needed. This added level of clinical decision support stands to benefit busy clinicians oftentimes caring for patients with complex health care needs.

There are notable limitations of this study. First, this research is based on a convenience sampling of adult patients presenting for care. While study participants were not randomized, this approach was intentionally chosen so as to avoid potential disruption in care. Secondly, depression screening can be impacted by seasonality factors that were not controlled for in this study. Thirdly, the patient/provider relationship, not controlled for in this research, could also impact depression screening results. Future research using the ePHQ-2 following positively screened patients into the PHQ-9 to determine true positive screenings is also important to more fully inform potential practice and policy implications of this approach.

CONCLUSION

The findings of significant, increased differences in positive PHQ-2 screens when it is administered face-to-face by clinical staff compared to a scripted, tablet-based delivery generates new questions worth exploring. Accounting for fidelity in PHQ-2 question delivery is an important next step in understanding the potential benefits of a scripted, video-based screening delivery. Prior research demonstrates that the way in which the questions are delivered can have a significant bearing on screening results. Understanding patient and health care provider acceptance of and trust in such technology is essential. An acceptance of this technology among rural patients could translate into the ability to augment the screening process in a way that is both

standardized for patient care and sensitive to the myriad of concurrent demands and needs present during an office visit. However, a lack of trust, in particularly on the part of the patients could result in skewed results. Future research efforts will be designed to monitor and evaluate this new screening modality in terms of patient care and primary care center operations, and better control for contextual factors across participating centers.

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Table 2. Demographic Characteristics by Study Arm

		Age Category			
Study Arm		18-44	45-64	65 plus	Total
Arm 1: Face-to-face delivery	Number	83	155	104	342
	Percent	24.27	45.32	30.41	100.00
Arm 2: Tablet-based delivery	Number	86	137	90	313
	Percent	27.48	43.77	28.75	100.00
		Sex			
		Female	Male	Other	Total
Arm 1: Face-to-face delivery	Number	211	131	0	342
	Percent	61.70	38.30	0.00	100.00
Arm 2: Tablet-based delivery	Number	183	128	2	313
	Percent	58.47	40.89	0.64	100.00
		Race			
		White	Black or African American	Other (American Indian or Alaska Native; Asian; Other)	Total
Arm 1: Face-to-face delivery	Number	320	18	4	342
	Percent	93.57	5.26	1.17	100.00
Arm 2: Tablet-based delivery	Number	290	19	4	313
	Percent	92.65	6.07	1.28	100.00

		Primary Insurance					
		Medicare	Medicaid	Dual Eligible	Private	Uninsured	Total
Arm 1: Face-to-face delivery	Number	115	94	11	115	7	342
	Percent	33.63	27.49	3.22	33.63	2.05	100.00
Arm 2: Tablet-based delivery	Number	107	80	14	107	5	313
	Percent	34.19	25.56	4.47	34.19	1.60	100.00

* Study participants were primarily: white (93.57% arm 1, 92.65% arm 2, $X^2 = 0.21$, p = 0.64); female (61.70% arm 1, 58.47% arm 2, $X^2 = 3.51$, p = 0.17); age 45-64 (45.32% arm 1, 43.77% arm 2, $X^2 = 0.89$, p = 0.64); with about one-third of patients having Medicare as their primary insurance (33.63% arm 1, 34.19% arm 2, $X^2 = 1.12$, p = 0.89).

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INSIDE WVSMA

Meet Dr. Linda S. Nield, MD
West Virginia Medical Journal's New Editor

***Devyn Osborne**, WVU School of Medicine, Communications Intern*

EAF Photo by Liz Ferrari

Linda S. Nield, M.D., professor, associate dean for Admissions, and co-director of the Pediatrics Residency Rural Scholars Program, has been appointed to become the new editor of the *West Virginia Medical Journal (WVMJ)*, the official journal of the West Virginia State Medical Association (WVSMA.)

Dr. Nield hopes to work closely with the editorial team and associate editors to accomplish the following: provide high-quality original research articles and case reports, recruit more expert peer reviewers, and engage with novice authors, such as medical students and residents for collaborative purposes. A long-term goal is to get the *WVMJ* indexed once again on PubMed by the National Library of Medicine.

Nield is the first woman to hold the editor position in the 150-year history of the *WVMJ*, according to Bethany Kinder, managing editor of the *Journal*.

"One of my goals is to visit medical schools in the state to encourage the participation of more emerging authors in the medical field. They are the future of the profession and of the WVSMA," Nield said.

The WVSMA works to advance health while promoting the quality and safety within the practice of medicine in West Virginia. The organization is physician-based, where membership consists of active physicians, retirees, residents, and student members.

In addition to advancing the practice of medicine in the state, the WVSMA aims to have a unified voice in evidenced-based health policy in the state to better represent the overall interest of patients, physicians, and public health.

Nield specializes in general pediatrics, and has a board certification from the American Board of Pediatrics. She received her MD from Dartmouth Medical School, and completed her Residency at West Virginia University.

EAF Photo by Liz Ferrari

WEST VIRGINIA MEDICAL JOURNAL MANUSCRIPT GUIDELINES

Original Research

Education, Outcome Studies, Cost-effective Analysis, Interventional Studies, Randomized Controlled Trials, Screening and Diagnostic Test Studies

Guidelines:

- Cover letter: Must include title, statement of value or uniqueness of manuscript to the literature, disclosure of conflicts of interest, attestation that the paper has not been submitted or published elsewhere
- 3,000 words or less (does not include abstract, references or tables)
- 30 references or less
- No more than six authors
- No more than five visuals (figures & tables combined). Each visual must be accompanied by a descriptive caption, near the area it references. Survey forms will not be included but must be referenced by an accurate hyperlink
- Permissions for use of copyrighted material or patient data or photos
- May have an acknowledgment section to thank others who assisted in research or production of the manuscript
- Avoid: repeating data from tables in the body of the manuscript, statements of economic benefit and cost analysis (unless data is included)

Manuscript Components:

- Title page (includes title, short title, author names, titles and affiliations and corresponding author, including mail and email addresses)
- Funding or IRB approval statement
- Abstract (structured headings) 250 words or less
- Introduction
- Materials & Methods, including study design
- Statistics
- Results
- Discussion
- Conclusion
- References (AMA manual of style, 10th ed.)

Review Article

Accumulative results of multiple articles on a subject of interest to a general medical readership

Guidelines:

- Cover letter: Must include title, statement of value or uniqueness of manuscript to the literature, disclosure of conflicts of interest, attestation that the paper has not been submitted or published elsewhere
- Permissions for use of copyrighted material or patient data or photos
- 3,500 words or less (does not include abstract, references or tables)
- No more than three tables which include a descriptive caption above the table and should ap- pear in the manuscript near the area it references.
- 60 references or less
- No more than 4 authors
- May have an acknowledgment section to thank others who assisted in research or production of the manuscript.

Manuscript Components:

- Title page (includes title, author names, titles and affiliations and corresponding author, including mail and email addresses)
- Funding or IRB approval statement, if applicable
- Abstract (unstructured) 250 words or less
- Methods used to select, locate and extract data from existing publications
- Section headings are topic dependent (See the Table in Writing for the Clinical Literature: Step-Wise Guide for the Novice Author)
- Summary (300 words or less)
- References (AMA manual of style, 10th ed.)

FOR ALL SUBMISSIONS:

Please submit your manuscript to a Plagiarism Checker and state in your cover letter that no more than 10% plagiarism was detected. You may include the plagiarism report in your submitted documentation.

Submit a line numbered Word document and an unnumbered PDF file at 1.5 spacing. Each file must include tables with titles, and figures with captions, in place within the applicable document area. Image files in .jpg format (300 dpi). References should exactly appear as they do in JAMA. Superscripts must follow punctuation in the body of the manuscript, without the use of parentheses or brackets.

Case Report

Reports that are unique, present challenges and provide learning points for a general medical readership. Submissions which do not add to the literature or present anything unique will be rejected without peer review.

Guidelines:

- Cover letter: Must include title, statement of value or uniqueness of manuscript to the literature, disclosure of conflicts of interest, attestation that the paper has not been submitted or published elsewhere
- Permissions for use of copyrighted material or patient data or photos
- 1500 words or less (does not include abstract, references or tables)
- 20 references or less
- No more than 4 authors
- No identifying information about the patient, or written consent from the patient will need to be provided

Manuscript Components:

- Title page (includes title, short title, author names, titles and affiliations and corresponding author, including mail and email addresses)
- Abstract (unstructured) 250 words or less
- Case Presentation
- Discussion
- Conclusion
- References (AMA manual of style, 10th ed.)

SUBMIT YOUR MANUSCRIPT TO WVSMA.ORG/SUBMIT-AN-ARTICLE

FEATURE

Marshall University Joan C. Edwards School of Medicine

New physician assistant program at Marshall University earns accreditation-provisional status

The Accreditation Review Commission on Education for the Physician Assistant, Inc. (ARC-PA) has granted accreditation-provisional status to the new physician assistant program at Marshall University Joan C. Edwards School of Medicine. Accreditation was an essential next step for the new program, which is accepting applications for the new program, which will enroll its first cohort of students in January 2021.

"We intentionally built this program as part of our medical school using the medical school training model because physicians and physician assistants work so closely as part of a health care team, especially in rural settings," said Bobby L. Miller, M.D., vice dean of medical education at the School of Medicine. "Shared faculty, collaboration and joint clinical rotations will go a long way in helping prepare both our physician assistant and medical students for the real-world experiences that lie ahead."

Marshall's physician assistant program, housed in the Robert W. Coon Education Building on the campus of the Hershel "Woody" Williams Veterans Affairs (VA) Medical Center in Huntington, includes both didactic and clinical components and takes 28 months to complete.

Marshall School of Medicine 1 of 9 schools to offer Mission Act scholarships to veterans

Marshall University Joan C. Edwards School of Medicine was selected as one of nine medical schools to offer a new scholarship for veterans pursuing a career in medicine.

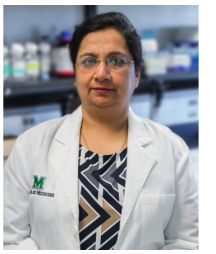
The Veterans Affairs Mission Act of 2018 created several programs to assist veterans in paying for medical school through scholarships and loan repayments, including the Veterans Healing Veterans Medical Access and Scholarship Program (VHVMASP).

Marshall University was selected to award up to two scholarships per year to qualifying veterans beginning with the incoming class of students in 2020. To qualify for VHVMASP, applicants must have completed their military service no more than 10 years from the time of application. They cannot receive the GI Bill or Vocational Rehabilitation funding while receiving the scholarship.

The scholarship is renewable for up to four years and covers tuition, fees, equipment and books; a stipend; and costs for two rotations at a VA facility during the senior year of medical school. In return, recipients must meet several obligations, including agreeing to complete residency training in a specialty that is applicable to the VA and become board-eligible in their specialty. They must also agree to become a full-time clinical provider at a VA facility for at least four years after their training.

The Marshall School of Medicine was established in 1977 through federal legislation, known as the Teague-Cranston Act, that authorized the creation of five new medical schools in conjunction with existing VA hospitals. Marshall maintains its partnership with the VA through pre-clinical and clinical learning opportunities for medical students.

New grant awards to further cardiomyopathy, addiction research

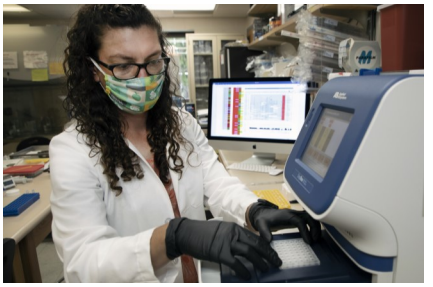


Dickson (L) and Sodhi (R)

Marshall University researcher Price Dickson, PhD, who joined the School of Medicine's biomedical sciences faculty in June, was awarded a $750,000 grant from The National Institute on Drug Abuse (NIDA) to further his research on the genetic relationship between stress and addiction. Dickson will use advanced mouse resources to identify and characterize the genes and mechanisms in brain reward pathways.

Associate Professor Komal Sodhi, MD, has been awarded a $444,000 grant from the National Institutes of Health (NIH) to further her research in cardiomyopathy associated with chronic renal failure. Through this three-year NIH Research Enhancement Award (R15), Sodhi aims to reveal more about the activation of sodium pump, or Na/K-ATPase, signaling specifically in fat cells known as adipocytes.

WVSOM researcher received grant to study coronavirus



Crystal Boudreaux, Ph.D.

While some scientists are hard at work trying to create a vaccine for COVID-19, other scientists, like Crystal Boudreaux, Ph.D., are researching the virus to better understand how the virus replicates in living cells.

Boudreaux, an assistant professor in the Department of Biomedical Sciences at the West Virginia School of Osteopathic Medicine (WVSOM), was awarded a West Virginia Clinical and Translational Science Institute (WVCTSI) grant in the amount of $30,000 in July. The one-year grant will be used to study the mechanisms of ribonucleic acid (RNA) virus infections, such as coronavirus and rotavirus.

The research is a result of the pandemic, as the WVCTSI placed a call for proposals for its COVID-19 pop-up grant with the hope that the analysis could be translated to treatment or medicine.

"We're not looking at human subject studies or a population of people we know are infected with SARS-CoV-2. This is the basic science aspect of the research," Boudreaux said. "Our findings will contribute to the biological understanding of how these viruses interact with host proteins to provide better targeted treatments."

The objective of the proposal is to determine if regulation of serine threonine kinase 11 interacting protein (STK11IP) predicts mechanistic target of rapamycin (mTOR) expression as a determinant of viral titer. Information gleaned from the pandemic so far proves that it is important to understand how RNA viruses like coronavirus interact with host proteins to effectively produce infectious progeny. This knowledge could help to identify signaling targets that could present opportunities for the development of new therapeutic options.

The model used in this study includes infecting cultured laboratory cells with live strands of a version of coronavirus that causes the common cold and evaluating its replication cycle. The strands, which are safely studied in a controlled environment, might also be evaluated through the use of fluorescent microscopy and with gene expression at the nucleic acid level and at different protein levels.

Though the research is primarily focused on coronavirus, Boudreaux will also be conducting parallel experiments for rotavirus. The two viruses basic biology is similar, but their pathogeneses are different.

"Rotavirus and coronavirus are both RNA viruses. If you study the host factors involved in virus replication more broadly, then the higher probability of identifying a possible antiviral treatment would be because that treatment could span multiple virus families," she said.

Boudreaux said that as a virologist she is eager for the opportunity to study a virus that has a current broad impact on the world.

"We can all say we would never have thought we've lived through a pandemic. You hear about the pandemics in Africa, in South America and in Asia — with SARS, MERS and Ebola — and any contribution of science during a pandemic excites and terrifies you. You don't dream of being in the midst of a pandemic, but as a virologist and scientist it's exciting to contribute to the scientific community and that makes it immediately meaningful."

The WVCTSI is a program aimed to increase research capacity in the State of West Virginia and to improve the health of West Virginians. The WVCTSI is funded by an NIH (NIGMS) grant, #5U54GM10492-04.

Gaiters do no harm: WVU toxicologists find coverings help contain the spread of exhaled droplets

Testing by the WVU Center for Inhalation Toxicology on the effectiveness of the gaiter face covering shown here found that it provides a respiratory containment of exhaled droplets comparable to a common over-the-ear cloth mask. (WVU Photo/Dave Ryan)

Experts with the West Virginia University (WVU) Center for Inhalation Toxicology found that – assuming it's a good fit - a gaiter will, despite recent reports, provide a respiratory containment of exhaled droplets comparable to a common over-the-ear cloth mask.

"Nothing is 100 percent effective," said Timothy Nurkiewicz, director of the WVU Center for Inhalation Toxicology, or iTOX. "But we all need to be wearing masks to protect those around us. If we can properly educate people in this regard, we consider that a win."

While gaiters, like most masks, do not provide filtration/respiratory protection to the user from inhaled aerosols, they did afford opposition to the spread of exhaled droplets, according to tests conducted at the WVU Inhalation Facility. This means that the gaiters work more effectively shielding others from the wearer's exhaled air.

"We've been operating on the principle all along that anything is better than nothing," said Nurkiewicz, also chair of the Department of Physiology and Pharmacology.

A viral mask study that has filled news cycles and social media feeds prompted iTOX to conduct its own tests. The study in question claims that a gaiter, a stretchy fabric that hangs around the neck and covers the mouth and nose, could be worse than wearing no mask at all, and that instead of blocking droplets that may contain SARS-CoV-2 (the virus that causes COVID-19), gaiters split large droplets into an array of smaller droplets.

In his analysis, Nurkiewicz referenced the Centers for Disease Control and Prevention which illustrates that when droplets pass through pores of fibrous materials such as those in masks, one of four outcomes occur as supported by existing literature: inertial impaction, interception, diffusion and electrostatic attraction.

"Dispersion is not one of these," Nurkiewicz said. "When a droplet hits a mask, it does not break into two. It doesn't happen."

The iTOX team tested a gaiter made of 100 percent polyester. This particular WVU-branded gaiter has been offered to students, faculty and staff who complete their return-to-campus COVID-19 test.

Gasping for Evidence

Two types of tests were conducted on the gaiter: a fit test, which evaluates how well a mask protects the person wearing the mask, and a materials test, in which the ability of the fabric alone to filter air passing through it was tested.

For the fit test, researchers filled up a room with saline droplets and sampled the air in real time. They then measured the concentration of droplets on the inside and outside of the mask, Nurkiewicz said.

The WVU gaiter scored a "1" on the fit test. A score of 100 is necessary to pass a N95 mask.

The gaiter polyester scored a "3" on the materials test, indicating that it filtered out two-thirds of the droplets when airflow passed through it. Adding another layer of the material did not improve the outcome, the team found.

These scores are comparable to common face coverings currently in use, such as cloth masks, said Travis Goldsmith, iTOX senior research engineer.

They also performed fit and material testing on the two-layer, 100 percent cotton WVU mask, which is also offered to the WVU community upon return-to-campus COVID-19 testing. The mask scored similarly to the gaiter. Nurkiewicz added that "cotton has an advantage over polyester in that it absorbs droplets and has the potential to hold on to them better."

"With any type of loose-fitting mask, even a surgical mask, aerosols are going to easily come around and through the

gaps, like the spaces around the nose and the sides," Goldsmith said.

"But since the mask is close to the mouth, high-velocity flow events from the mask user, such as coughing or talking, will cause many expelled droplets to impact the inner surface of the mask. Further, any mouth covering dissipates and spreads the flow velocity from the user, which will cause aerosols to travel shorter distances."

The main purpose of the viral study, Nurkiewicz said, centered around a low-cost, efficient means for non-scientists to test masks and their effectiveness. The result was a novel technique based on a laser plane on a cell phone.

"It's really neat, and they should be commended for developing this," he said. "You can point a camera and exhale particles across the plane and those particles light up and you can take pictures of it. Then a computer counts the dots in each frame."

The problem with the investigators' dispersion claim, however, is that the findings are based on estimates from photos with limited resolution and pixel sizes, rather than direct measures of actual droplets in real-time, Nurkiewicz said. In the WVU tests, researchers directly measured the size of aerosolized droplets in real-time with multiple state-of-the-art pieces of equipment.

Mask Up

After their series of tests, iTOX researchers contend that a mask/gaiter combination provides a much-improved level of protection for the user and for those within proximity of the user.

Goldsmith said a gaiter worn over a disposable mask proved more effective in filtering and containing droplets.

"This does add some heat stress to the user, but it is estimated that it would be tolerable/wearable for multiple hours of low-effort activities (such as attending class)," the team wrote.

In the end, any face covering is better than nothing and provides reasonable opposition of droplet transmission between two people within close proximity.

"We see no reason to stop distributing the WVU gaiter," Nurkiewicz said. "The evidence just isn't there. It's not doing any harm.

"It isn't just that you're wearing a mask to protect yourself. If five people are in a room and we're all wearing a mask, we're collectively decreasing the energy and the direction of particles that are being mixed. If one of us takes a mask off, we're suddenly putting the others at risk."

Preventing a Convergence of COVID-19 Pandemic and Influenza Epidemic on West Virginia's Residents and Healthcare System

FEATURE

Elaine Darling, *MPH, Senior Program Director at the Center for Rural Health Development*

As the COVID-19 pandemic progresses, the health of West Virginians could be at greater risk when the pandemic converges with seasonal influenza (flu). With the potential overlap of influenza and COVID-19, two diseases that share similar symptoms, preventing and reducing the severity of influenza will play an especially important role in reducing outpatient illnesses, hospitalizations, and intensive care unit admissions due to flu and, subsequently, reduce the stress on our state's public health and healthcare systems.

Influenza has resulted in 140,000-810,000 hospitalizations and 12,000-61,000 deaths in the U.S. each year since 2010. In past seasons, it has been capable of overwhelming healthcare systems on its own. Unfortunately, during the 2018-2019 flu season, only 55.2% of children ages six (6) months to 17 years in West Virginia were vaccinated against influenza, which was the 7th lowest vaccination rate in the nation. In addition, only 39.1% of adults, ages 18-64, in West Virginia received their flu vaccine during the same timeframe. For adults in that same age range who are at high risk for influenza – many of whom are also at high risk for COVID-19 – only 49.1% had received their flu vaccine that season. Further, about 30% of adults 65 years of age and older in West Virginia did not get their flu vaccine that year.

The Centers for Disease Control and Prevention recommends routine annual influenza vaccination for individuals 6 months of age and older, unless contraindicated. This season, it is especially important to administer influenza vaccine to essential workers, including healthcare and public health personnel and the critical infrastructure workforce, which includes critical manufacturing, energy, food and agriculture, and 13

FEATURE

(Continued) Preventing a Convergence of COVID-19 Pandemic and Influenza Epidemic on West Virginia's Residents and Healthcare System

Elaine Darling, *MPH, Senior Program Director at the Center for Rural Health Development*

other sectors; patients at high risk of severe illness from COVID-19, such as long-term care facility residents, adults 65 and older, and certain ethnic and racial minorities; and individuals at high risk for influenza complications, such as pregnant women, infants and young children, and other patients with certain underlying medical conditions.

To help improve influenza vaccination rates and reduce the burden of flu in your community during COVID-19, please consider:

- Implementing or updating standing orders for influenza vaccination to streamline your clinic's workflow.
- Assessing the vaccination status of patients at every health care visit, strongly recommending the vaccines that they need, and administering or referring for vaccination to avoid missed opportunities. However, vaccination of persons with suspected or confirmed COVID-19 should be delayed.
- Communicating with patients about how they can be vaccinated safely in your clinic during the pandemic. Vaccine administration has declined during the pandemic due in part from disruptions in the healthcare system and to patient concerns of exposure to SARS-CoV-2 in healthcare facilities. Frequently communicating the steps that your clinic has taken to prevent healthy patients' exposure to COVID-19 is an essential step to alleviate their concerns.
- Ensuring that the employees in your clinic receive their flu vaccine to protect both patients and themselves from the influenza and reduce influenza-related workplace disruption.
- Documenting all influenza vaccines administered to children and adults in the WV Statewide Immunization Information System (WVSIIS). Although it's not required in WV for adult records to be entered in the registry (with the exception of pharmacist-administered vaccines), entering the records into WVSIIS helps to ensure that a patient is not unnecessarily revaccinated at another location.
- Adding or updating your clinic's information in Vaccine Finder (vaccinefinder.org). The CDC will be promoting this site to the general public in their upcoming nationwide influenza communication campaign as a source for individuals to find local flu vaccination services and the West Virginia Immunization Network will be using this site as it promotes influenza vaccination throughout West Virginia.

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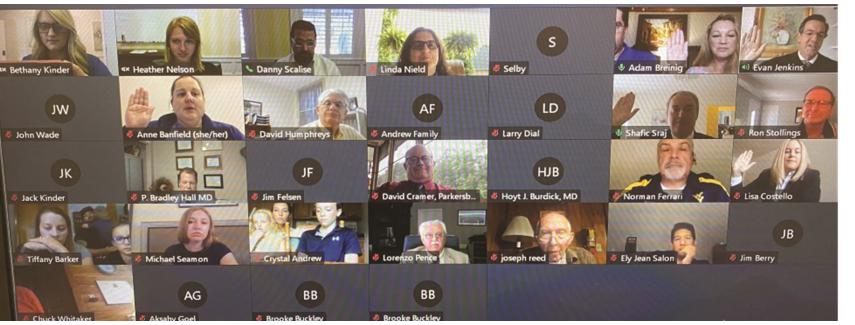
INSIDE WVSMA

WVSMA's Virtual Business Meeting



This year's Healthcare Summit was cancelled in-person, due to the COVID-19 pandemic. WVSMA staff facilitated a virtual business meeting via the GoToMeeting platform.

WVSMA's new officers were sworn-in virtually by Justice Evan Jenkins.

WVSMA's 2020-2021 Officers:

- **President:** Dr. Brad Hall
- **President-Elect:** Dr. Shafic Sraj
- **Vice President:** Dr. Lisa Costello
- **Treasurer:** Dr. Anne Banfield
- **Council Chair:** Dr. Sherri Young
- **Senior-Councilor-At-Large:** Dr. Bradley Henry
- **Junior-Councilor-At-Large:** Dr. Paula Taylor
- **Delegate to the American Medical Association:** Dr. Hoyt Burdick
- **Alternate Delegate to the American Medical Association:** Dr. Bradley Henry

The following resolutions were passed:

RESOLUTION 20-1 West Virginia State Medical Association is the WV House of Medicine

Introduced by Monongalia County Medical Society

NOW, THEREFORE IT BE RESOLVED, that West Virginia State Medical Association, shall enhance its efforts to serve as the unifying voice of all West Virginia physicians,

BE IT FURTHER RESOLVED, that West Virginia State Medical Association, shall enhance its efforts to increase representation of the West Virginia physician community by continuing to recruit West Virginia physicians,

BE IT FURTHER RESOLVED, that West Virginia State Medical Association, shall enhance its efforts to identify new mechanisms to foster increasing active participation of its members,

BE IT FURTHER RESOLVED, that West Virginia State Medical Association, shall enhance its efforts to serve as the voice of the House of Medicine for the state of West Virginia.

RESOLUTION 20-4

Introduced by Monongalia County Medical Society

NOW, THEREFORE IT BE RESOLVED, that West Virginia State Medical Association, shall support timely, accurate, and useful sharing of documentation,

BE IT FURTHER RESOLVED, that West Virginia State Medical Association, shall recognize that patient instant access to medical documentation that is not intended for their consumption may have unintended consequences,

BE IT FURTHER RESOLVED, that West Virginia State Medical Association, shall advocate that medical information shared with patients should be authored for patients, using appropriate reading and health literacy levels.

FEATURE

WVU Rockefeller Neuroscience Institute expands pioneering Alzheimer's treatment to wider region of the brain

A hospital nurse for 33 years, Nanette Miller would call her husband Frank at the end of each shift to let him know she was coming home. On Dec. 7, 2018, the phone call came with a somber declaration: "I can't do this anymore."

Miller had to help on another hospital floor that day. She didn't know how to get back.

Several months later, she was diagnosed with what she and her husband had feared —early onset Alzheimer's disease.

But now, not even a year removed from her official diagnosis, Miller is already on a road to potential recovery due to the expansion of a groundbreaking technique crafted by the West Virginia University Rockefeller Neuroscience Institute (RNI.)

Using focused ultrasound, Dr. Ali Rezai, executive chair of the RNI, and his team successfully opened the blood-brain barrier in a clinical trial with Miller, 54, of Mill Run, Pennsylvania.

By opening the blood-brain barrier, which separates the bloodstream from the brain tissue and restricts medicines, immunotherapy, gene therapy and other therapeutics from entering the brain, researchers hope it can reduce plaques and lessen Miller's symptoms.

Rezai and his team previously made waves by being the first in the world to open the hippocampal blood-brain barrier in Alzheimer's patients. With Miller, doctors took it a step further by targeting other parts of the brain, namely the parietal lobe, insula and precuneus.

"Because our first trial with opening the blood-brain barrier was successful, we were able to treat larger parts of the brain," Rezai said. "These other parts of the brain, broadly the parietal lobe, are involved in knowing where you are within your environment and surroundings, and in thinking and processing of memory."

Doctors with the WVU RNI monitor a clinical trial in action on Nanette Miller, a 54-year-old Alzheimer's patient. (WVU Photo/ Greg Ellis)

During this study, doctors injected microscopic bubbles into the patient's bloodstream, and exposed the bubbles to focused ultrasound from a treatment helmet attached to the MRI, temporarily causing the blood brain barrier to open.

The gradual decline

Forgetting how to return to her work floor was not the only memory setback for Miller. She struggled with number combinations to secure areas of the hospital containing medicines

A coconut cake she made mistakenly wound up in a cupboard. By the time, they found it, it had molded. And, as an organist at Indian Creek Baptist Church in Mill Run for several years, Miller can no longer play the instrument.

According to the Mayo Clinic, Alzheimer's disease is a progressive disorder that causes brain cells to waste away and die. It is the most common cause of dementia — a continuous decline in thinking, behavioral and social skills that disrupts a person's ability to function independently.

But because of Miller's relatively young age at 54 (most Alzheimer's patients first experience symptoms after 60), her family and doctors are hopeful they caught it early enough to effectively stabilize or weaken her symptoms. There is currently no cure for Alzheimer's.

"If I can at least stay on a level plain like I am right now, I'd call that a success," Miller said.

Frank Miller finds it quite a coincidence that his wife helped countless people over the years as a nurse, and now the tides have turned.

"She helped so many patients," he said. "And years ago, she and her mother would bake 400 dozen cookies for people for Christmas. Now she's relying on the help of others and her doctors.

"We do realize this is a study. Nothing's guaranteed. But we feel we're helping them out just as much as they're helping Nanette."

RNI doctors will monitor Miller for five years as part of the study. They also plan to conduct the trial on additional patients.

"Given the fact that we're able to treat larger parts of the brain gives us better opportunities to see improvements in symptoms of Alzheimer's," Rezai said. "I would say if you're stable, you're good. If you improve, that's fantastic."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Concurrent Development of Septic Arthritis of the Acromioclavicular Joint and Osteomyelitis of the Acromion in a Pediatric Patient

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ABSTRACT

The acromioclavicular joint is a rare location for the development of septic arthritis and osteomyelitis. If left untreated, these conditions are rapidly destructive and can cause significant morbidity. Individuals who are immunocompromised, use intravenous drugs, or have a history of shoulder trauma are at higher risk of developing septic arthritis. Having a high degree of suspicion is important in making a timely diagnosis and implementing appropriate therapy. We hereby describe a previously healthy 13-year old patient who presented with concurrent septic arthritis and osteomyelitis of the acromioclavicular joint.

CASE REPORT

A 13-year old previously healthy male was transferred to our hospital from an outside facility with an eight-day history of worsening right shoulder pain, progressively decreasing range of motion in his right shoulder, and intermittent fevers. Treatment with acetaminophen and non-steroidal anti-inflammatory drugs did not improve symptoms. He denied any recent trauma or injuries. He initially sought medical attention at an urgent care facility where a radiograph of his shoulder was obtained which showed Grade 3 acromioclavicular (AC) joint separation. Because of his intermittent fevers, blood cultures had been obtained which grew methicillin sensitive *Staphylococcal aureus* (MSSA), and he was started on empiric antibiotics. He received two doses of ceftriaxone and later completed a course of amoxicillin-clavulanate. Given his lack of clinical improvement, he was transferred to our facility for further management.

Upon admission to our facility, he was active and alert. He was afebrile and his vitals were within normal limits, however he appeared to be in mild distress due to pain. Physical examination revealed mild erythema over the superior aspect of the right shoulder and tenderness to palpation over his distal right clavicle. He had decreased range of motion in his right shoulder secondary to pain, however he had full range of motion in

his right elbow, wrist, and hand. There were no neurovascular deficits in his extremities.

His laboratory studies revealed elevated inflammatory markers, with a C-reactive protein (CRP) of 247.5 mg/L (normal <8 mg/L) and erythrocyte sedimentation rate (ESR) of 91 mm/hr (normal 0-15 mm/hr). The rest of his laboratory studies were unremarkable. A repeat radiograph of the right shoulder showed cortical erosions of the acromion near the AC joint (Figure 1). Magnetic resonance imaging (MRI) of the right shoulder was performed and showed findings consistent with septic arthritis of the AC joint and osteomyelitis of the right acromion with early abscess formation in the surrounding soft tissue (Figures 2 and 3). He subsequently underwent incision and drainage of the right acromion and arthrotomy of the AC joint. He had been started on cefazolin on admission and this was continued during his hospital stay as the MSSA was sensitive to cefazolin.

Due to our concern for systemic involvement, an echocardiogram was performed which did not show any evidence of vegetations or demonstrate any other abnormalities. His inflammatory markers trended down during his hospital stay. He was transitioned from intravenous (IV) cefazolin to oral cephalexin to complete a six-week course of antibiotics. His pain, swelling, and erythema all improved during his hospitalization and he was discharged home on the fifth day following admission. His symptoms eventually completely resolved. At his follow-up outpatient clinic visit two months after discharge, he continued to remain asymptomatic and had full range of motion in his right shoulder. On repeat imaging, he had a small amount of osteolysis over the right AC joint, but had no other osseous abnormalities.

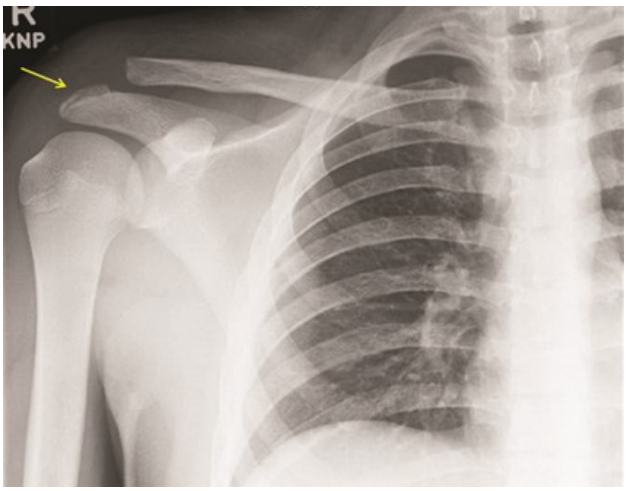

Figure 1: Radiograph of the right upper extremity revealed cortical erosions in the distal end of the acromion as well as disruption of the AC joint.

DISCUSSION

Septic arthritis of the AC joint is a rare condition that most commonly affects immunocompromised patients, although it can occur in healthy individuals as well.[1-3] At the time of our literature search, only thirty cases of AC joint septic arthritis have been reported.[4] The concurrent development of septic arthritis of the AC joint and osteomyelitis of the acromion is extremely unique, and only two cases have been described in the literature and none have been reported in the pediatric population at the time of our literature review.[5,6] Patients who develop AC joint septic arthritis often have risk factors including IV drug use, chronic steroid use, recent shoulder trauma or surgery, or other conditions that lead to an immunocompromised state.[1,7] Of the two previous patients described in the literature with concurrent septic arthritis and osteomyelitis, one had a recent history of shoulder trauma while the other had acquired immunodeficiency syndrome.[5,6] In contrast, our patient was previously healthy and did not have any known risk factors. Dutt et al. reports the only other known case of AC joint septic arthritis in an immunocompetent pediatric patient.[2] Additionally, the vast majority of patients who developed AC joint septic arthritis were adults, with a mean age of 51 years at the time of diagnosis based on one review of 30 patients by Hashemi-Sadraei et al. This same study revealed only one pediatric patient, who was 17 years old at the time of diagnosis.[4] To our knowledge this is only the third case of AC joint septic arthritis in a pediatric patient.

Most cases of septic arthritis present in the weight-bearing joints of the lower extremities, such as the hips and the knees.[8,9] Less than 20% of cases involve the upper extremities and only 3-5% of cases affect the shoulders.[10-12] The differential diagnosis of shoulder pain in this patient included septic arthritis, osteomyelitis, pyomyositis, cellulitis, and

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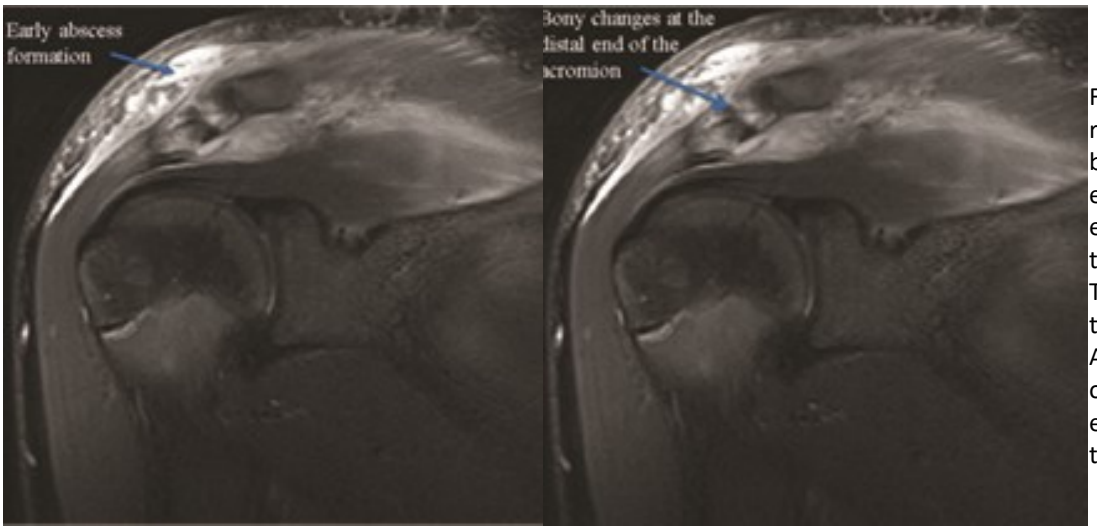

Figures 2 and 3: MRI of the right shoulder revealed bony changes at the distal end of the acromion and edema and inflammation in the surrounding soft tissue. These changes are suggestive of septic arthritis of the AC joint and osteomyelitis of the right acromion with early abscess formation in the surrounding soft tissue.

traumatic synovitis.[2,13] Septic arthritis of the AC joint may be difficult to differentiate from septic arthritis of the glenohumeral (GH) joint or sternoclavicular (SC) joint as the clinical presentation may be similar. Both GH and SC joint septic arthritis are also rare, accounting for 3% and 0.5 -1% of all cases of septic arthritis, respectively.[8,14] Patients may be initially misdiagnosed as having GH joint pathology rather than AC joint pathology, given the proximity of the two areas. However, the former is more commonly seen in infants and elderly patients, while the latter is more commonly seen in middle-aged adults.[8,15]

Septic arthritis of a particular joint should always be suspected in patients who present with fever and associated symptoms.[16] Many patients often initially present with pain and swelling over the AC joint with decreased passive and active range of motion of the affected extremity.[1,2] However, the shoulder joint range of motion may be relatively preserved in some individuals. On physical examination, patients may experience pain with palpation or with provocative maneuvers including cross-arm adduction.[1] Constitutional symptoms including fever are commonly observed. The duration of symptoms can be quite variable, with some patients having a more subacute or chronic presentation.

Healthcare providers should be cognizant that many patients may have associated comorbidities. Hashemi-Sadraei et al.'s review of 30 patients reported that 17% had a history of IV drug use and 20% had diabetes mellitus. Only 13% of the patients had no comorbid conditions.[4] A history of joint disorders such as rheumatoid arthritis or gout may be noted. Patients should also be asked about a history of injection into the joints, as local injections into the AC joint have also been found to be a risk factor for the development of septic arthritis.[7]

Early diagnosis is critical because the size of the AC joint puts it at high risk for rapid destruction of the soft tissues around the joint as well as possible bone involvement. There is also a risk of local spread, especially to any contiguous joints including the GH joint.[3] Inflammatory mediators generated by infection, along with increased pressure from the presence of effusions, further hasten joint damage.[17,18]

Radiographic imaging may help in the diagnosis of septic arthritis. A shoulder radiograph is often initially obtained, which may reveal separation or erosion of the AC joint and

soft tissue swelling.[9] However, these radiographic changes may not present until later in the disease course. Ultrasound can provide an early diagnosis, however, it is also operator-dependent and lack of familiarity with the condition may result in underdiagnosis. If septic arthritis of the shoulder is suspected and the GH joint is found to be normal, the AC joint should then be carefully examined. Findings on ultrasound which support the diagnosis include distension of the joint capsule, widening of the joint space, and increase in echogenicity.[7,19-21] Additionally, a distance of less than 3 mm between the joint capsule and the bone is likely to indicate an absence of joint inflammation.[19]

MRI is highly useful for the diagnosis of septic arthritis and has a high sensitivity and specificity. Typical findings on MRI include joint effusion, perisynovial edema, and synovial enhancement.[22] Compared to other imaging modalities, MRI offers several advantages. Firstly, MRI can detect changes suggestive of septic arthritis even within one day of onset of the infection and therefore allows clinicians to establish an early diagnosis.[9,22] Secondly, MRI is effective in differentiating AC joint from GH joint pathology and can help to avoid misdiagnosis. Finally, MRI is particularly effective in detecting abnormal findings in patients with both septic arthritis and osteomyelitis, as was seen in our case. Karchevsky et al. reported that an abnormal marrow signal on T1-weighted imaging was suggestive of coexistent osteomyelitis.[22] Aspiration of the joint and examination of the synovial fluid still remains the gold standard for diagnosis of septic arthritis. Synovial fluid with a white blood cell count of greater than 50000/µL with polymorphonuclear cell predominance should lead to suspicion of a bacterial cause.[16,23] However, negative cultures can be seen in 18-48% of cases, with reports as high as 70%.[24] Mono-articular involvement in septic arthritis is due to a bacterial cause in up to 90% of cases.[9] The most common organisms causing septic arthritis of the AC joint are *Staphylococcus* and *Streptococcus*, although gram-negative organisms comprise approximately 20% of all cases.[3]

Martínez-Morillo et al. reported that of 22 patients diagnosed with septic arthritis of the AC joint, 55% grew *Staphylococcus* while 27% grew *Streptococcus*.[25] Hematogenous dissemination was seen in 67% of cases and should be suspected as the mode of spread in those who have not had previous injuries or surgical manipulation of their shoulder.[25] Management includes both antibiotics as well as surgical management. Empiric broad-spectrum IV antibiotics should be started and subsequently de-escalated based on microbial sensitivities. Cephalosporins and clindamycin are suitable options for septic arthritis in pediatric patients, however vancomycin should be used in places with a high clindamycin resistance.[16] *Kingella kingae* should be suspected in children under the age of 3 years.[26] Antibiotic regimens in adults are similar, however *Salmonella* should be suspected in patients with sickle cell disease and *Neisseria gonorrhea* should be suspected in sexually active individuals.[27] In the previously reported cases of AC joint septic arthritis, one frequently used regimen was a penicillin and a fluoroquinolone, either used individually or in combination.[4]

Inflammatory markers may help to guide therapeutic response, and ESR and CRP should be followed closely during the course of treatment.[18] Procalcitonin is also sensitive and specific in the diagnosis of septic arthritis, although it is much less frequently used than CRP.[28,29] The recommended duration of antibiotic treatment is four to six weeks.[2,25,30] There is evidence that antibiotic treatment for less than two weeks did not result in worse outcomes or increased risk of complications compared to antibiotic regimens lasting four weeks in pediatric patients.[31] However, longer courses of antibiotics may be needed if inflammatory markers are slower to normalize.[9]

Studies provide evidence that transitioning from parenteral to oral antibiotics early during a prolonged course of therapy is effective and safe.[31,32] Ballock et al.'s study of pediatric patients with septic arthritis revealed that early conversion to oral antibiotics within 7 days of starting therapy resulted in similar clinical outcomes compared to a later transition at 18 days.[30] Indications to convert to oral antibiotics include

improving clinical symptoms, resolution of fever, and improving inflammatory markers. Transitioning to an oral regimen also requires identification of the organism, ability to take the medication, compliance with therapy, and availability of the antibiotic.[30] Early transition to oral medications lessens the risk of central venous catheter complications and lowers treatment costs.[33]

For patients who do not respond to antibiotic therapy or who have persistent symptoms, surgical management to drain and debride the septic joint may be necessary. There are two main surgical options. Open arthrotomy allows complete debridement of the area, but is associated with increased complications. Arthroscopic surgery has lower morbidity and allows for lavage and decompression, but may not allow for full removal of debris. For AC joint septic arthritis, initial irrigation and debridement followed by distal clavicle resection is frequently performed.[2] This approach is felt to have lower morbidity and risk of complications compared to other more invasive techniques.[34] Blankenstein et al. reported a patient in whom the entire AC joint was resected instead of only the distal segment of the clavicle.[35] Joint aspiration alone, without additional surgeries, is another potential treatment with the lowest rate of complications but may not completely drain the joint.[36] Repeat aspirations may be needed in some cases, and this allows monitoring of synovial fluid cultures to assess for therapeutic response.[37] Peltola et al. reported that joint aspiration in addition to antibiotics led to recovery in most of the pediatric patients in the study without need for additional debridement or resection.[31] Similarly, Smith et al. reported that additional surgeries such as arthrotomy might not confer any additional benefit over simple joint aspiration.[36] Weston et al. reported poorer outcome with surgical intervention, especially open surgery.[38] Nevertheless, operative management is still indicated for patients with multiple comorbidities or more advanced disease.

Patients with AC joint septic arthritis may also be at higher risk of developing systemic complications. Although rare, infective endocarditis has been described in cases of AC joint septic arthritis, and echocardiography should be performed if there is suspicion of the condition.[4,7,39] Hashemi-Sadraei et al. reported only two cases of endocarditis in a review of thirty patients, while echocardiogram was performed in four individuals. Having a low threshold to perform additional investigation in these patients is important, as they may have poor outcomes and develop significant complications including septic emboli and valvular insufficiency.[4]

Potential orthopedic complications include the development of bone erosions and osteomyelitis.[34] Hematogenous dissemination can lead to meningitis and sepsis.[40] Follow-up is important to ensure the adequacy of therapy as well as to monitor for the development of any complications. The mortality rate varies based on the organism, but is approximately 10-20% in adults.[18] Mortality rates in pediatric patients is unclear, and has been reported to be as low as 0% in one large study of 82 children with pneumococcal septic arthritis.[40] Caksen et al. reported a mortality rate of 7.5% in a study of 40 pediatric patients.[41] The overall prognosis is good in pediatric patients with the vast majority of individuals having complete resolution of their septic arthritis with no sequelae.[42]

CONCLUSION

At the time of our literature search, this is only the second case of AC joint septic arthritis presenting in an immunocompetent pediatric

patient. Additionally, it is only the third patient and only child presenting with concurrent septic arthritis and osteomyelitis of the AC joint. As this condition can be rapidly destructive, establishing an early diagnosis and implementing appropriate therapy is critical to improving long-term outcome and minimizing complications.

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WVU Medicine Children's Complex Care Pediatrics Clinic makes a big difference for families

FEATURE

Children who have complex medical conditions, often from being born premature or with congenital anomalies, require specialized care. The West Virginia University (WVU) Medicine Children's Pediatric Complex Care Clinic coordinates whole-person care for kids with multiple health problems.

Complex care pediatricians consult with primary pediatricians and specialists to oversee the well-being of children with multiple medical conditions requiring chronic and technology-dependent care. In the past, families had few options, and many of these patients were unable to leave the hospital. Now, these patients can thrive at home with their families.

"There are more children now who are surviving with a good quality of life from extreme prematurity, but they come with a lot of medical needs," Linda Friehling, M.D., WVU Medicine Children's Complex Care pediatrician, said. "What we've done in the last 15 to 20 years is to create a medical home model for delivering care to these children."

The WVU Medicine Children's Complex Care Pediatrics Clinic is accessible around the clock through tele-medicine for parents who have questions or concerns. One of the goals of the Clinic is to reduce the number of hospital stays and emergency department visits. Giving parents a point of contact that can help them reach doctors or nurse practitioners to help them solve their problem or to determine if the child requires urgent medical attention provides critical peace of mind to these families.

"It's been something that families have loved," Dr. Friehling said. "It fills a role, especially for families that live far away or have high risk patients in their homes who need to avoid exposure to illnesses."

The Clinic also plays a large educational role, teaching families how to manage medical equipment, such as feeding tubes and ventilators. The Complex Care Pediatrics team is trained in intensive care, and team members have worked in both pediatric and neonatal intensive care units, providing a specialized skill-set to take care of issues and troubleshoot problems that parents of these children face.

The clinic started in 2018, and Friehling said she looks forward to the growth of the Complex Care Pediatrics Clinic with the construction of the new WVU Medicine Children's Hospital.

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SCIENTIFIC

Evidence-Based Strategies to Prevent Eating Disorders and Obesity in Children

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ABSTRACT

Eating disorders (EDs) and obesity (OB) are both chronic health problems that often emerge during childhood and adolescence. Both conditions are difficult to treat and may pose serious medical and behavioral health effects. In the following review article, prevalence and common health consequences of both EDs and OB in youth are presented, followed by a summary of literature describing the interaction between the two conditions. Best practice prevention strategies and specific physician action steps are then outlined. These include (1) discouraging restricting diet behavior and using behavioral strategies to encourage nourishing eating habits (including 5-2-1-0 plan), (2) promoting positive body image, (3) eating frequent family meals, (4) encouraging and modeling positive body talk and (5) addressing weight stigma and bullying related to weight.

"I can remember the trigger for my eating disorder clearly: It was when my pediatrician told me that I had a 'buffalo hump'" – *teen female patient in an outpatient eating disorder treatment center*

"In school, there was a presentation about the amount of sugar in beverages. My daughter came home, terrified of poisoning her body with sugar. And she stopped eating." *– mother of 10-year-old patient in a residential eating disorder treatment center*

APPEAL FOR INTEGRATED APPROACHES TO PREVENT TWO CHRONIC HEALTH CONDITIONS

In West Virginia and beyond, there is need for an integrated approach to the prevention of two of the top three most common chronic health conditions in adolescents: eating disorders (ED) and childhood obesity (OB).[1,2] These disorders often co-occur, and they share risk factors, including individual, family, peer, school, community, and social influences.[1] Although most adolescents with EDs were not previously obese, some develop EDs in attempts to lose weight;[3] thus, some children misinterpret the meaning of

"healthful eating" and use disordered eating behaviors to achieve weight loss goals, including skipping meals or dieting. In some cases, OB prevention efforts may trigger ED behaviors if evidence-based practices are not used.[4] For instance, some OB prevention programs focus exclusively on behavior change and weight loss, with little research attention to body image, disordered eating, or unhealthy weight loss behaviors.[1] Similarly, most ED prevention programs have not been explicitly studied to determine their impact on OB.[1] Providers need practical tools to identify behaviors that predispose to both OB and EDs, and effective guidance for prevention of both disorders, including a focus on healthful lifestyle changes rather than on weight.[4] The promotion of evidence-based clinical guidance that prevents a broad spectrum of weight and eating problems may also reduce costs and health burdens of both disorders.

The following sections outline the prevalence and common health consequences of both EDs and OB in adolescents, specific to West Virginia when data is available. An explanation of the interaction between OB and EDs follows, and the article concludes with best practice guidelines for prevention of both conditions. Data was extracted through detailed literature reviews by both authors using PubMed and consensus statements from relevant professional organizations. The scope of this review is limited to behavioral interventions for these conditions.

OBESITY

Clinicians have long recognized challenges related to caring for people with OB (defined as BMI equal or greater to the 95th percentile for age), internationally and most certainly in the Appalachian region. West Virginia has the highest adult OB rate in the nation (39.5%), and the second highest OB rate for youth ages 10 to 17 (20.3%).[5] Data collected in state for the CARDIAC project from 1998 through 2014 indicates that 18.7% of 5th graders screened in West Virginia had overweight (equal or greater than 85% percentile), and 28.4% had OB.[6] Data from the Center for Disease Control (CDC) Youth Risk Behavioral Survey in 2017 indicated that in West Virginia 60.8% of middle and high school girls and 29.4 % of boys said they were trying to lose weight.[7] Prevalence of OB, severity of disease, related OB healthcare burden, and costs are growing over time.[8]

Assessment for OB in children is based on behaviors, family history, review of systems, medical tests, physical examination, and body mass index (BMI) weight classification. Youth with OB have numerous health consequences affecting physical and emotional domains (see Figure 1). Furthermore, children with obesity experience significant stigma from multiple parties, which causes direct and indirect harm.[9] Though some societal views suggest that shame may motivate children to lose weight, the stigma children with OB experience contributes to a cascade of problematic behaviors including disordered eating, poor health behaviors (e.g., less physical activity), avoidance of health services, and increased weight gain / worsened OB.[10,11] Thus, it is exceptionally important for physicians to model nonpejorative and sensitive language for youth with OB, screen effectively for both physical and emotional comorbidities associated with OB, examine their own weight biases, address weight stigma in clinic and with staff, and work to shift the culture for their patients to one supportive of sustainable health behavior change.[9] For further reading, see Pont and colleagues' expanded description of the health consequences of weight stigma.[9]

EATING DISORDERS

EDs affect children and adolescents across the world, and incidence has increased over the last few decades.[12,13] Onset of ED symptoms is usually during adolescence, especially for girls, though EDs are also being diagnosed in younger children.[14] In recent years, greater attention is also given to diagnoses in males and patients in minority populations, which have likely been under-reported in the past due to inequitable sampling techniques. Data from the Youth Risk Behavior Surveillance survey from 2013 indicate that in West Virginia 21.0% of girls and 6.9% of boys have fasted for at least 24 hours in an attempt to lose weight; 10.8 % of girls and 4.2%

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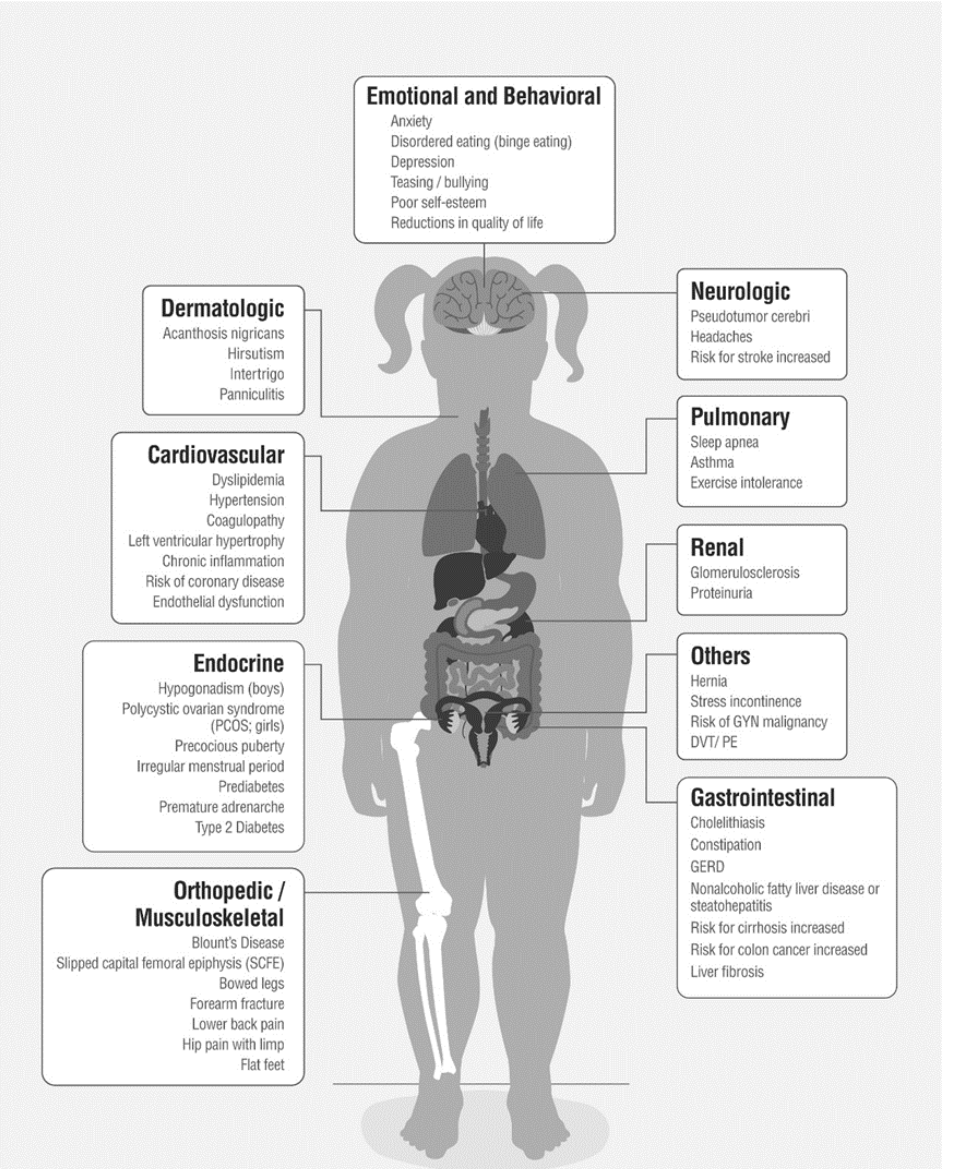

Figure 1. Potential Health Consequences of Obesity in Youth

of boys took diet pills, powders, or liquids; and 5.5% of girls and 2.4% of boys endorsed purging by self-induced vomiting or laxative use.[15] This is the most recent data to date, since the CDC has since removed these items from their survey.

DSM-5 criterion for common eating disorders are listed in Table 1.[16] Generally, criteria necessary to meet diagnostic indication of ED have become less stringent with the most recent changes to the DSM-5. BMI is no longer explicitly used to diagnose low weight for patients with anorexia nervosa; instead "significantly low body weight" is determined by a multitude of medical, psychosocial, and contextual/cultural factors. The threshold for frequency of binge eating episodes has decreased from twice per week to once per week for patients with bulimia nervosa. Also, binge eating disorder (BED) is now officially a diagnosis, requiring binge eating episodes once per week but with no accompanying compensatory behaviors (e.g., vomiting, excessive exercise). There are a myriad of other diagnoses to capture patients who are significantly distressed, but may not meet criteria for more well-known EDs, including other specific feeding or eating disorder (which can be utilized for atypical anorexia), and avoidant/restrictive food intake disorder.

Multiple quick screening instruments are also available, including the SCOFF.[17] The 5 screening questions include:

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 (approximately 14 pounds) in a 3-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?

Table 1. DSM-5 Primary Diagnostic Criterion for Eating and Feeding Disorders

Anorexia nervosa
> Restriction of energy intake leading to significantly low body weight
> Intense fear of gaining weight or becoming fat; behavior interfering with weight gain
> Body image disturbance; lack of recognition of seriousness
> Restricting type (diet, fasting, excessive exercise) or Binge-eating/Purging type
Bulimia nervosa
> Binge eating episodes at least once per week, characterized by both:
> Eating an excessive amount of food in a 2-hour time period
> Sense of lack of control over eating during the episode
> Recurrent compensatory behaviors to prevent weight gain (vomiting, laxative use, medications, fasting, excessive exercise), occurring at least once per week
> Self-evaluation unduly influenced by shape and weight
Binge eating disorder
> Binge eating episodes (see characterization above in BN) at least once per week, which causes significant distress
> Episodes have 3 or more of the following:
• Eating much more rapidly than normal
• Eating until uncomfortably full
• Eating large amounts of food when not physically hungry
• Eating alone because of embarrassment about the binge eating
• Disgust, depression, or guilt afterwards
> No compensatory behavior associated
Other specified feeding or eating disorder
> Includes Atypical Anorexia Nervosa; Purging Disorder; Night Eating Syndrome
> Includes subclinical presentations of other eating disorders
Pica
> Eating non-nutritive nonfood substances over a period of 1 month+
> Inappropriate to developmental level; not culturally supported or socially normative
Avoidant/restrictive food intake disorder
> Eating or feeding disturbance leading to malnourishment, including 1+ of the following:
• Significant weight loss or failure to achieve weight gain/growth
• Nutritional deficiency
• Dependence on enteral feeds or oral nutrition supplements
• Interference with psychosocial functioning
> No body image disturbance or clinical ED diagnosis, not caused by a medical condition

Source: DSM-5[16]

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Two or more affirmative responses indicate the need for further assessment of an ED.[17] Table 2 lists common signs and symptoms of EDs. Medical complications as a result of malnutrition, erratic eating, and unhealthy weight-control behaviors are very important to assess and screen.[4] For more detailed information on medical complications and screening, the reader may download the Academy for Eating Disorders Medical Care Guidelines.[18]

Table 2. Presenting Signs and Symptoms of EDs

General	**Gastrointestinal**
• Marked weight loss, gain, fluctuations or unexplained change in growth curve or body mass index (BMI) percentiles	• Epigastric discomfort • Abdominal bloating • Early satiety (fullness) • Gastroesophageal reflux (heartburn)
• Cold intolerance	• Hematemesis (blood in vomit)
• Weakness	• Hemorrhoids and rectal prolapse
• Fatigue or lethargy	• Constipation
• Dizziness / fainting	**Endocrine**
• Sweating episodes	• Amenorrhea or oligomenorrhea (absent or irregular menses)
Oral / Dental	• Low sex drive
• Oral trauma / lacerations	• Stress fractures
• Perimyolysis (dental erosion on posterior tooth surfaces)	• Low bone mineral density • Infertility
• Dental caries (cavities)	**Neuropsychiatric**
• Parotid (salivary) gland enlargement	• Depressive / anxious / obsessive / compulsive symptoms and behaviors
Cardiorespiratory	• Memory loss
• Chest pain	• Poor concentration
• Heart palpitations	• Insomnia • Self-harm
• Orthostatic tachycardia / low blood pressure	• Suicidal thoughts, plans, or attempts • Seizures
• Shortness of breath	
• Edema (swelling) in extremities	
Dermatologic	
• Lanugo hair	
• Hair loss	
• Carotenoderma (yellowish discoloration of skin)	
• Russell's sign (calluses or scars on the back of the hand from self-induced vomiting)	
Dry brittle hair and nails	

* Source: Permission for use granted by the Executive Director of the Academy of Eating Disorders[18]

CO-OCCURRENCE OF ED AND OB

Adolescents with OB may have atypical or sub-clinical ED criterion because of excess body weight or difficulty assessing body image.[19] Patients who were previously overweight or obese and who have lost weight may have delays in recognition of the ED and subsequent ED treatment,[19] often because their risk is minimized and symptoms are underrecognized by health providers. Treatment delays occur when patients are obese at the time of initial symptoms versus when patients are normal weight at time of first symptoms.[3]

In the National Longitudinal Study of Adolescent Health, those teens who identified themselves as overweight across genders also endorsed high rates of unhealthful behaviors to lose weight.[20] For instance, 19.5% of girls and 12.9% of boys skipped meals; 9.4% of girls and 2% of boys purged or used diet pills; and 11.1% of girls and 6.6% of boys engaged in binge eating behaviors.[20]

Longitudinal data demonstrates that youth who have OB likely experience weight based teasing by family and peers,[21] which can lead to binge eating and other problems that result in increasing risk of OB and EDs.[22] Media use, perpetuation of the thin beauty ideal in our culture, and other ecological variables also contribute to body dissatisfaction in OB children.[21] Other risk factors specific to the patient include overestimation of weight,[23] body dissatisfaction regardless of BMI,[21] adverse childhood experiences and early trauma,[24] poorer social skills and rigid thinking,[23] attention-deficit hyperactivity disorder (risk factor specific to BED),[25] and having parents with a history of BED or parents who restrict food.[26]

Many EDs begin with adolescents attempting to eat healthy.[27] But those youth who misunderstand or misinterpret OB prevention messaging may eliminate entire foods or food groups that are considered "bad" or "unhealthy." Furthermore, children who are overweight may begin to use disordered eating behaviors in an attempt to lose weight. Cross sectional research has demonstrated that vomiting and laxative use as purging/weight control methods are more frequently endorsed in children with overweight and OB than their non-overweight peers.[28] Longitudinal, population-based data demonstrates that initial ED symptoms in children at age 7 years and 9 years old predicted even more ED symptoms in both sexes at 12 years old, with concurrent levels of problematic body dissatisfaction.[29] As symptoms become pervasive and more distressing, some youth develop clinical EDs.[27] Attempts to lose weight may eventually lead to severe restriction of intake, skipping meals, fasting, excessive purging, misuse of medications (e.g. diet pills), and compulsive exercise.

Youth with EDs who were previously overweight or obese are more challenging to treat.[27] Weight loss is often praised at first by friends, family, and health providers, providing a powerful positive reinforcer. Ongoing obsessive weight control behaviors may lead to isolation, mood shifts, problems with body image and concentration, and extreme fear of re-gaining weight.[27] For physicians, it may be easy to overlook ED behaviors in an OB teen who is losing weight, and health providers may unintentionally reinforce ED behaviors.

It can be especially relevant to inquire about specific ED presentation in adolescents with OB. For instance, binge eating behaviors most often emerge during childhood.[30] Drilling down further, loss-of-control eating (one component of binge eating) is an even more specific indicator of problematic eating in youth[19] and may precede a diagnosis of BED.[31] Of patients with OB, those with BED have more severe OB, early dieting behaviors, and earlier onset of overweight.[32] Furthermore, both full and sub-clinical cases of bulimia nervosa increase across both genders as BMI increases.[33]

PREVENTION STRATEGIES AND PHYSICIAN ACTION STEPS IN ADDRESSING ED AND OB IN CHILDREN

1. ***Encourage nourishing eating habits and discourage dieting behavior.*** Restricting calories with the goal of weight loss is a risk factor for both

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OB and EDs.[4] Dieting is counterproductive to weight management efforts, and it can predispose to EDs. Extensive research has demonstrated that dieting behaviors do not lead to desired weight changes, but instead may lead to episodes of overeating and binge eating and skipping meals.[36] One population-based cohort study showed that children who severely restricted food intake and skipped meals were 18 times more likely to develop an ED than those who did not diet; children with moderate dieting were five times more likely to develop an ED.[37] Furthermore, there were strong associations in EAT longitudinal results demonstrating that dieting leads to later weight gain and OB. Adolescent dieters were twice as likely to be overweight at five-year follow up than non-dieters.[38] Other prospective studies show greater weight gain and binge eating in both girls and boys who dieted.[39]

Action Step 1: Physicians should educate families that dieting puts them at risk for weight gain over time, not weight loss, and redirect to more effective long-term behavioral strategies. Explicitly encourage, educate, and support alternative behaviors, including eating more fruits/vegetables, adjusting portion sizes, tuning into hunger and satiety cues, and increasing sustainable types of physical activity. The AAP has excellent resources, including the "Let's Go! 5-2-1-0" OB prevention program,[40] and the AAP Pediatric Obesity Clinical Decision Support Chart.[41] Counsel families to follow these healthy behavior guidelines each day:

- Eat 5 or more fruits or vegetables
- Engage in 2 hours or less of recreational screen time (no TV / computer in bedroom)
- Engage in 1 hour or more of physical activity
- Drink 0 sugary drinks (more water and low fat milk).

2. ***Promote a positive body image.*** Body dissatisfaction is a risk factor for both EDs and OB. In Project EAT, those adolescents with worse body dissatisfaction had more dieting behaviors, reduced physical activity, more frequent binge eating episodes, and unhealthy weight-control behavior.[42] Results further demonstrated that body dissatisfaction did not predict more healthful behaviors. It actually predicted poorer behaviors in some groups, such as less physical activity in girls, more binge eating in boys, and more dieting in both genders.[42] Finally, overweight girls who were dissatisfied with their bodies gained the most weight over time, despite researchers adjusting statistically for baseline weight status.[43]

Action Step 2: Physicians should intentionally promote body satisfaction. Avoid using body dissatisfaction as a motivator to change behavior. Instead, reframe with the adolescents the need to nurture his/her body by eating in healthful and nourishing ways, engaging in physical activity, and using positive self-talk. Talk with families about this as well. Research has demonstrated that children with more positive body images had parents who encouraged healthful eating and exercising for wellness (not just weight loss). These same children reported less dieting, weight-concerns, or disordered eating behavior.[44]

3. ***Eat frequent family meals.*** This recommendation is especially important to prevent EDs and to encourage health behaviors which will help to prevent OB. Project EAT results showed that among girls, an inverse correlation exists between frequency and enjoyment of family meals and lower risk for unhealthy behaviors like purging, using diet pills or laxatives.[45] These results remained significant even in five year follow-up data,[36,45] demonstrating the lasting effect of family meals on health behaviors in young women beyond adolescence. Families who eat meals together

have better dietary and nutritional intake, in part because parents can model healthful eating behaviors.[46] They also have more fruits, vegetables, grains, fiber, calcium-rich foods and less carbonated beverages.[47] Family meals have a direct effect in preventing EDs, including inverse effects on purging, binge eating, and dieting behaviors in children.[48] Finally, family meals are a time for families to interact, and for parents to monitor children's eating habits and general emotional health more broadly.[34]

Action Step 3: Physicians should encourage families to sit down at a table for meals together as often as possible, and to make the meals as enjoyable as possible.

4. ***Encourage positive body talk and discourage weight talk in families.*** Weight talk includes parents' comments about their own dieting and weight, discussion of others' weights, explicit encouragement of a child to lose weight/diet, or weight-related teasing. Most often, weight talk is perceived as harmful to children. Weight talk is counterproductive to well-intentioned efforts to help children with weight management.[19,34] Furthermore, weight talk increases risk for both OB[49] and EDs,[50] and these co-relationships continue beyond adolescence, per follow up results from Project EAT.[34] Parents who engage in weight talk were more likely to diet, binge eat, and exhibit other ED behaviors.[50]

Action Step 4: Physicians should explain to parents and families that they can facilitate healthful eating and physical activity at home much more effectively without weight talk. Techniques to support healthful eating and physical activity include increasing the availability of fruits and vegetables, removing televisions from the bedrooms of adolescents,[51] and encouraging parents to model healthful eating. Tell families that having conversations about healthful eating leads to less dieting and ineffective weight control behaviors in adolescents.[50]

5. ***Assume youth with overweight or OB have been bullied.*** Size and weight-related teasing is common and prevalent among both girls and boys with overweight and OB,[52] and this teasing has longitudinal effects on overweight and OB into adulthood.[53] Children with overweight frequently experience direct and intentional mistreatment, are excluded from some social groups, and experience both explicit and implicit bias from others (e.g., labeled lazy, unclean; others assume they must eat too much).[54] Teasing occurs at school and at home,[54] but there is evidence that family teasing is especially predictive of problematic eating behaviors.[55] In Project EAT, weight teasing by family predicted overweight status, binge eating, and extreme weight control behaviors in girls; teasing predicted overweight status in boys.[36,55] Children who were teased about their weight were twice as likely to be overweight at five year follow-up, even after statistically controlling for weight at baseline.[56] Teasing and mistreatment leads to a variety of psychosocial problems, including body dissatisfaction, low self-esteem, and depression in youth.[10]

Action Step 5: Physicians should address this topic directly with the child and family, advocating for the child and actively discouraging weight-based teasing (especially from family members). Recognize that many health providers avoid discussing weight stigmatization. One national survey found that less than half of registered dieticians, pediatricians, and other health providers who treat youth with overweight discuss the stigmatization of size bias with their patients.[57] Physicians should be cognizant of this reluctance to address such an important issue.

SUMMARY

Both EDs and OB have multifactorial causes, some of which overlap. It behooves the prudent clinician to consider opportunities with children to prevent these conditions by adapting language, expanding domains of assessment, and considering inherent weight bias and stigma in patients, families, and health providers. Primary care providers are invaluable in preventing EDs and OB by encouraging healthful nutrition and physical activity, monitoring and actively discouraging unhealthy emphasis on weight and dieting,[19,58] and closely monitoring changes in health status (including BMI among other markers) closely.[4]

Inevitably, some children will continue to struggle with OB and EDs, even

if best practices are followed. In these cases, physicians should continue to screen for problem behaviors. In some contexts, motivational interviewing techniques (e.g., reflective listening, developing discrepancy between goals and current behavior, etc.) may help to move families to make important behavioral changes.[4,34]

The AAP web and mobile app called "Change Talk: Childhood Obesity" (http:// ihcw.aap.org/ resources) uses an interactive virtual practice environment to train practitioners about the basics of MI. More broadly, policy, system, and environmental changes are necessary to more effectively advocate for healthful behaviors and primary prevention efforts.

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FEATURE

Sex Discrimination in Healthcare After *Bostock v. Clayton County*

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On June 15, 2020, the Supreme Court of the United States in *Bostock v. Clayton County*[1] held that Title VII — which prohibits employment discrimination based on race, color, religion, sex, and national origin — protects people against discrimination on the basis of sexual orientation and gender identity. Justice Neil Gorsuch authored the 6-3 majority opinion, in which the Court determined that discrimination on the basis of sexual orientation or gender identity is discrimination "on the basis of sex." It is important to emphasize that the decision in *Bostock* is limited toTitle VII and the only question before the Supreme Court was "whether an employer who fires someone simply for being" gay or transgender has unlawfully discriminated because of sex.

Before *Bostock*, whether Title VII gave federal pro-tection against employment discrimination to LGBTQ+ people was disputed, and protection at the state level varied. However, by early 2020, 21 states had statutes that explicitly protected LGBTQ+ (lesbian, gay, bisexual, and transgender) employees from discrimination on the basis of sexual orientation and gender identity.

Currently, West Virginia does not offer any type of employment discrimination protections for the LGBTQ+ community at the state level. In light of *Bostock*, however, individuals in all states can now seek recourse for employment discrimination based on sexual orientation and gender identity through the Equal Employment Opportunity Commission (EEOC) and the federal courts.

The *Bostock* decision has potentially far-reaching implications for the healthcare industry. Section 1557 of the Affordable Care Act (ACA) applies several federal civil rights laws — including Title IX of the Education Amendments of 1972 (Title IX) — to federally funded health programs, facilities, and insurers to prohibit discrimination based on race, color, national origin, age, disability, or sex. The Department of Health and Human Services (HHS) is responsible for enforcing these existing civil rights laws and regulations to healthcare. Section 1557 applies to any health program or activity that receives federal financial assistance. HHS has defined "health program or activity" to include only healthcare entities — entities that are principally engaged in the business of providing healthcare. This includes hospitals, nursing facilities, hospices, community health centers, doctors, and physical therapists. Section 1557 also applies to insurers, but only to the operations or programs that receive federal financial assistance. By requiring these entities to comply with Section 1557, HHS is able to prohibit discrimination in both the delivery of and payment for care.

In May 2016, under the Obama administration, HHS adopted a rule interpreting the definition of "sex" in Section 1557 to include "gender identity." The 2016 rule defined gender identity as "one's internal sense of gender, which may be male, female, neither, or a combination of male and female." Several religious healthcare providers and state attorneys challenged the Obama interpretation in federal court in Texas. In October 2019, the district court agreed with the challengers and issued a national injunction against the enforcement of the new provision.[2] Citing the Texas district court's ruling, HHS, under the Trump administration, signaled that it would not consider gender identity as a form of sex discrimination for purposes of Section 1557.[3] Just three days before the Supreme Court published the *Bostock* decision, HHS published its final rule on Section 1557, which excluded gender identity from the definition of "sex."

(Continued on top of next page)

Title VII and Title IX are often interpreted hand-in-hand, which is why, in August 2020, a federal district court found that the Trump administration's final rule on Section 1557 could not stand in light of the Supreme Court's decision in *Bostock.* The court granted a preliminary injunction against the enforcement of HHS's final rule, finding that the administration's plan to remove gender identity from the ACA's anti-discrimination provisions would constitute illegal sex discrimination under Section 1557. This case represents one of the first instances where the Supreme Court's ruling in *Bostock* has been extended to other areas of federal civil rights law outside of Title VII.

The Supreme Court's ruling on Title VII in *Bostock* sets a clear precedent that federal sex nondiscrimination protections extend to LGBTQ+ people. This holding will certainly be a significant factor in the development of future case law on Section 1557 and Title IX. As it stands, the current injunction against the enforcement of the 2020 final rule allows the HHS to resume enforcing Section 1557 consistently with the *Bostock* ruling. However, under the current administration, it seems unlikely HHS will take this path voluntarily.

Going forward, we anticipate litigation challenging HHS's final rule interpreting Section 1557. But for now, this means that healthcare providers that receive federal financial assistance and/or work for a healthcare entity that receives federal financial assistance cannot discriminate based upon LGBTQ+ status.

[1] *Bostock v. Clayton County, Georgia*, 140 S. Ct. 1731 (2020).

[2] *Franciscan Alliance, Inc. v. Azar*, 414 F. Supp.3d 928 (N.D. Tex. 2019).

[3] *Walker v. Azar*, 2020 WL 4749859 (E.D.N.Y. Aug. 17, 2020).

SCIENTIFIC

Spinal Flexion Distraction Injuries: Chance Fractures and Posterior Ligamentous Equivalents in Children and Adolescents

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ABSTRACT

Flexion-distraction injuries (FDI) are uncommon and often serious due to the mechanism of injury. Although originally described as a bony lesion in the thoracolumbar spine, these injuries can be purely bony, purely ligamentous/soft tissue or a combination at all spinal levels. Because of the forces involved, associated non-spine injuries can occur. Data on patients age 0-18 years with spinal injuries over a ten-year period were retrospectively reviewed and patients were classified into two groups, those with FDI and those with a spinal fracture other than FDI. Cervical and thoracic FDI, Chance fractures and posterior ligamentous equivalents, all considered FDI in this study, occurred in 22/301 spinal injured patients. The highest incidence considering all spinal injured patients was in the under 10 years old group (31.6%; p=0.004). A motor vehicle collision was the most common mechanism of injury. Statistically significant differences between patients with FDI compared to those without were respectively : average age (13.7 vs. 15.6 years), length of stay (10.2 days vs. 4.0 days), follow-up (1.7 years vs. 0.5 years), spinal surgery (78.3% vs. 15.5%), intra-abdominal organ injury (26% vs. 11%) and neurological deficit at presentation (43% vs. 10.4%) and at final follow-up (22% vs. 4%). Five patients without neurologic deficit did not undergo surgery. Seventy-two percent (13/18) of FDI patients having surgery required instrumentation. There was no association between injury level and FDI incidence or neurological deficit. FDI are most common in younger children with high likelihood of associated injuries, including intra-abdominal and neurological. FDI patients most often require surgical treatment, have an increased length of hospital stay and require longer-term follow-up.

INTRODUCTION:

Spinal fractures in adults resulting from a flexion-distraction mechanism were first described by Chance in 1948[1]. Pediatric spine fractures of any type are rare and account for less than 5% of all pediatric fractures.[2-4] Flexion injuries, including

flexion-distraction injuries (FDI), represent the majority of these fractures and can lead to devastating outcomes for patients. Flexion-distraction injuries are characterized by traumatic hyper-flexion of the anterior spine with posterior structural failure in distraction (Figure 1). They are frequently called "seat belt injuries" because characteristic bruising of the abdomen by the seat belt which serves as the fulcrum of injury mechanism. Specifically, Chance fractures (CF) and posterior ligamentous equivalents (PLE) are prominent FDI in children.[5-7] As first described, CF are a type of FDI that involves transverse splitting of anterior, middle and posterior spinal columns and/or posterior ligamentous structures in the thoracolumbar spine (Figure 2).[1] This same injury pattern, while not termed Chance fractures, can also occur in the cervical and thoracic region as a result of FDI. PLE are similar but do not include bony fracture. The thoracolumbar region is particularly susceptible to FDI.[3,4,8-11] Previous studies have reported that nearly 75% of FDI are caused by motor vehicle collisions (MVC) and are usually due to poor seat belt restraints; other common causes include sports injuries and falls from significant heights.[2-4,8,11,12]

Children have a higher risk of sustaining FDI due to their head/body ratios, premature musculature and inadequately developed iliac crests, thereby distributing a

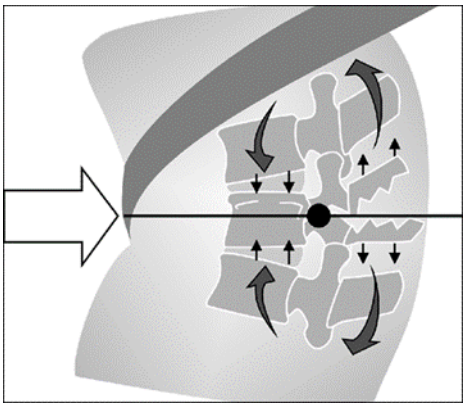

Figure 1. Typical mechanism of flexion distraction injuries.

decelerating force to the lumbar region and abdomen as opposed to the pelvis[3,11] leading to a high concurrence of intra-abdominal injuries. Previous reports indicate that greater than half of all FDI have concurrent intra-abdominal injuries, complicating treatment and increasing the overall severity of the injury.[9,10,12] Further, mechanisms of FDI and the higher center of gravity seen in children also expose the spinal cord to tension loading and greater distraction, leading to concomitant neurological deficit.[10,13] The incidence of neurological deficits, including paraplegia, weakness, numbness and leg pain, has been reported to occur in approximately 25% of children with FDI.[3,10,12-14]

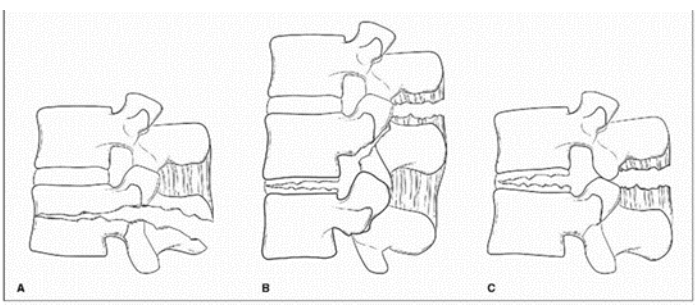

Figure 2. Types of flexion-distraction injuries. A) Purely bony injury (classic Chance Fracture). B) Bony and soft tissue injury. C) Purely soft tissue.

Despite the severity of FDI, literature reporting incidence, treatment and outcomes is limited in pediatric populations. Therefore, the purpose of this retrospective study was to describe a level-1 trauma center's experience with pediatric FDI and how FDI compares to patients with other fracture types in relation to associated injuries and demographics. For the purposes of this paper and to be consistent, CF and PLE will be called FDI.

METHODS

With approval from the Institutional Review Board, the records of patients age 0-18 years who sustained spinal fractures and were treated at West Virginia University Hospital between January 2006 and December 2016 were retrospectively reviewed. Standard demographic data were collected, and patients were stratified in reference to years of age (0-10, 11-13, >13) to represent prepubescent, initiation of puberty and adolescent groups. The cause of injury was recorded and categorized as one of nine potential causes. The regions of spinal injury involved [Cervical, Thoracic (T1-T10), Thoracolumbar (T11-L1), Lumbar (L2-L5), Sacral] and the types of fractures were noted. Patients were then categorized into one of two groups based on fracture type: one group for those specifically sustaining an FDI which resulted in a CF-like fracture (cervical and thoracic region), a "true" CF or PLE, and

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another group for those with any other type of spinal fracture. Intra-abdominal injuries at time of presentation were recorded and stratified based on organ system(s) injured. Neurological status at time of presentation and at most recent follow-up were collected. Operative and non-operative treatments for spinal fractures and associated injuries were recorded. The total length of stay (LOS) was recorded from time of presentation to time of discharge, and the length of follow-up was recorded from time of discharge to the most recent follow-up with West Virginia University Departments of Orthopaedics , Neurosurgery or Trauma Surgery.

STATISTICAL ANALYSIS

Standard statistical analysis was performed using the GraphPad QuickCalcs software and consisted of student's t-tests (for continuous data) and two-tail Fischer's exact tests or ANOVA (for categorical data) where appropriate. Significance was based on a p-value of less than 0.05.

RESULTS

There were 343 pediatric spinal trauma presentations in the study period, of which 301 patients met the inclusion criteria of a spinal fracture diagnosis. Keywords and phrases used to describe FDI in initial histories and physical examination records, and records from subspecialty consults, radiology impressions and operative reports varied in terms of injury classification. Therefore, radiographs of all patients were reviewed and criteria were established to identify FDI. Only patients who met those criteria were included in the FDI group.

Twenty-two (7.3%) of the 301 patients were diagnosed with FDI, 12 of which were purely osseous, seven osseous with ligamentous disruption and four purely PLE. The other 278 patients were diagnosed with a variety of fractures (Table 1), and several patients had multiple types. Mechanisms of injury are recorded in Table 2. By far, MVC was the most common mechanism.

***Table 1**: Fracture types other than flexion-distraction injuries*

Fracture Type	Number
Transverse process	74
Burst	61
Compression	60
Sacral	44
Vertebral body	34
Cervical F/D*	2
T-L[+] F/D*	2
Thoracic	1
Endplate	34
Spinous process	27
Facet	12
Lamina	5
Odontoid	6
Coccyx	2

** Fracture/Dislocation*

[+] Thoracolumbar

There were statistically significant differences between patients with FDI and patients without FDI in terms of demographics and other measures. (Table 3) There was no significant difference in loss to follow-up between groups. The patients included in this study were classified into three age groups to demonstrate the incidence of FDI by age from the entire cohort. (Table 4)

The distribution of the injuries by spinal region were: 68 cervical, 79 thoracic (T1-T10), 83 thoracolumbar (T11-L1), 87 lumbar (L2-L5) and 56 sacral fractures with FDI incidence of 3, 8, 4, 7 and 0, respectively. Six of the 12 purely osseous FDI had a neurological deficit at presentation and five of the 11 with posterior ligamentous disruption had a neurological deficit at presentation. At final follow-up, four of the patients with ligamentous disruption still had a neurological deficit and one of the purely osseous FDI patients still had a neurological deficit (p=0.081). Table 5 outlines the differences in neurological deficits between the FDI and non-FDI groups.

There were 19 spleen, nine kidney, eight liver, four small bowel, two large bowel, one adrenal and one pancreatic injuries in the FDI group and all occurred from injuries in thoracolumbar or lumbar regions. Small bowel (n=4) and large bowel injuries (n=2) were found in the FDI cohort.

All patients with FDI in the cervical and thoracic regions underwent spinal fusion surgery, and instrumentation was used in two of three and five of eight, respectively. Three of four patients with thoracolumbar FDI and four of eight with lumbar FDI underwent surgery, and instrumentation was used in two and three, respectively. The five FDI patients who did not undergo spinal surgery were purely osseous and had normal neurological status at presentation. Two received thoracolumbarsacral orthoses (TLSO), one received a Risser cast, one received a Jewett brace and the other did not receive a brace. Only seven (38.9%) patients that underwent surgery had a normal neurological presentation. There was no significant difference in neurological status between patients who underwent surgery with or without instrumentation. Three patients had their instrumentation removed at a later date. Three instrumented patients were lost to follow-up.

DISCUSSION

The 7.3% incidence of overall pediatric traumatic spinal fracture presentations found in this study is lower than reported in previous studies.[5-7] It is widely understood that these injuries are most prevalent with two-point restraint lap-belt use.[4,14-16] The lower incidence in this study could be related to advancements in the safety of car restraints compared to older case series. Despite a wide range of incidence, these injuries have high implications in overall morbidity. The 27% incidence of abdominal organ injury (AOI) and 43% incidence of neurological deficit in this cohort indicate the severity of FDI, especially when comparing to the 11% and 10% rate in those without FDI, respectively. Previous studies have reported similar incidences ranging from 30% to 69% in AOI and 23% to 43% in neurological deficit.[3,10,14] To our knowledge, this study is the first comparing differences in baseline demographics, associated morbidity and short-term outcomes between patients with FDI and patients with all other spinal fracture types.

The younger mean age of 13.7 years in FDI patients compared to 15.6 years in patients with fracture types other than those caused by FDI is consistent with the idea from previous studies that these fractures are most common in the young pediatric population.[3,17,18] This finding suggests that higher clinical suspicion and a thorough evaluation should be completed in all patients, but especially in the younger pediatric population.

Our study found a wide range of terminology in describing the spinal column fracture before receiving the final diagnosis of fracture due to FDI, suggesting that these injuries are not fully understood by all clinicians or easily recognizable initially. Andras et al. found high rates of initial misdiagnosis upon presentation (71%), stating that the average time to correct diagnosis was three months with a 14% rate of mistreatment – yet this case series was small (n=7).[2] Bernstein et al. described the methods that should be used to diagnose CF when looking at computed tomography (CT) scans.[19] However, the final diagnosis is often missed during the initial trauma workup (radiograph/CT), and may require the use of magnetic resonance imaging (MRI). Posterior

***Table 2**: Mechanisms of spinal fracture injury*

	Flexion-distraction	All other fractures
MVC	10	133
ATV accident	6	58
Fall from Height	-	32
Motorcycle accident	2	24
Sport Injury	3	23
Other	2	16
Physical altercation	-	6
Watercraft accident	-	5
Pedestrian versus vehicle	-	4

ligamentous equivalents are harder to diagnose, as they require MRI which was not always obtained in our case series. A recently developed MRI based classification system by de Gauzy et al. for CF/PLE has the advantage of being much better able to detect growth-plate and soft tissue injury than traditional radiograph and CT protocols.[20] Limited access, higher cost and longer time requirements make MRI much more difficult to obtain, but these scans may be necessary. The high rate of neurological deficit with these injuries signifies that spinal column stability and structure is often compromised, and delay of diagnosis can be detrimental to the chance for full recovery. Therefore, a combination of conventional radiography, CT and MRI would be needed to thoroughly diagnose FDI. The MRI would add information regarding the spinal soft tissue injury that cannot be demonstrated by CT. Additionally, evaluation of the contents of the spinal canal is very important in patients with neurological deficit. MRI should be readily available in centers providing care for these patients.

In select cases, non-operative treatment in the form of external bracing may be the best management plan, typically in purely osseous FDI fractures and those without significant neurological deficit or associated AOI.[13] Our study supports the claim that purely osseous FDI fractures can be managed non-operatively with extension casting and support orthotics (TLSO brace, Risser cast, Jewett brace) in the correct setting. Bony FDI fractures with additional ligamentous injuries most often require surgical reduction, fusion and instrumentation as these do not heal as well and have higher likelihood of instability.[2,21,22] Another indication for surgery includes the presence of kyphosis, ranging from any angle greater than 17-20 degrees, which has been proven to more commonly be associated with neurological deficit as well as worsening of the angulation over time and instability.[23,24] While non-operative treatment has its role, surgeons should be aware that progression of kyphosis has been described in previous studies and may later require instrumentation.[3,10] With the limited numbers available for study, we were unable to show that patients with posterior ligamentous disruption are more likely to have neurological deficit at presentation than those with purely osseous FDI (p=0.149); however, there was a trend for higher incidence at final follow-up (p=0.081).

Table 3: Demographics of patients with flexion-distraction injuries compared to all other fracture types

Variable	Flexion-distraction	All other fractures	p-value
Total	22 (7.3%)	278 (92.4%)	<0.001
Gender (female)	6 (26.1%)	108 (38.8%)	0.269
Age (years)	13.7 (5-18)	15.6 (3-18)	0.002
Length of Stay (days)	10.2 (0.91-60)	3.95 (0.08-33)	0.001
Follow Up (years)	1.69 (0-7.75)	0.54 (0-6.08)	0.001
Abdominal organ injury	6 (26.1%)	31 (11.2%)	0.048
Neurological deficit at presentation	10 (43%)	29 (10.4%)	0.001
Neurological deficit at follow up	5 (21.7%)	13 (4.7%)	0.003
Spinal surgery	18 (78.3%)	43 (15.5%)	<0.001
No follow up	4 (17.4%)	70 (25.2%)	0.61

Data presented as: number (%) for categorical variables; mean (range) for continuous variables

Table 4: Incidence of flexion-distraction injury by age group

Age (years)	**Flexion-distraction**	**Total**	**Incidence**
< 10	6	19	31.6%
10 - 13	1	34	2.9%
> 13	15	248	6.5%

Patients in traumatic presentations are often comatose and unable to describe their symptomatology, information about what caused the trauma and, in cases of MVC, if they were wearing their seatbelt. Many case reports and meta-analyses have reported on lap-belt injuries and the seatbelt syndrome.[25-27] A recent case series by Chapman et al. described the presence of a "seatbelt sign" (abdominal wall ecchymosis) as being strongly correlated with underlying AOI (88%), spinal cord injury and thoracolumbar FDI (45%).[10] In our study, often there was no mention of a seatbelt sign in archived charting notes; due to the retrospective nature of this study, it was difficult to adequately assess if there was presence of the seatbelt sign. Nonetheless, presence of the seatbelt sign should always warrant further detailed clinical investigation to determine underlying injury.

While a rarer form of spinal fracture in the pediatric population, FDI pose a significant burden on patients and the healthcare system. The long average LOS, length of follow-up and high percentage requiring surgery makes these injuries much more burdensome than almost all other spinal fracture types. It has been proposed that neurological deficits occur more often in pediatric FDI than in adults which could be due to the fact that children have immature spinal ligaments and bones that may be able to stretch much more than the spinal cord (up to four times).[14,28]

This study has the inherent limitation of any retrospective study; 74 patients were lost to follow-up (24.6%). This study is observational; given the small sample size of FDI (n=22), major conclusions on treatment modalities or overall outcomes following fractures resulting from FDI cannot be drawn. It appears that FDI in the cervical and thoracic regions are more likely to require surgery, but once again, the small sample size makes drawing any conclusions difficult. Nonetheless, these data highlight the potential severity of FDI in the pediatric population and emphasize the importance of thorough work-up to properly characterize the injury and to identify any associated injuries.

CONCLUSION

Despite FDI being rare, they can be serious and are often unrecognized initially. Advanced imaging may be required to correctly diagnose them. They are commonly associated with neurological deficit (especially when posterior ligamentous disruption is present) and intra-abdominal organ injury. Younger children appear to be at higher risk of developing these fractures. Clinicians should have a high index of suspicion for these injuries when the mechanism of injury is known and promptly institute appropriate imaging studies to accurately identify them.

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Table 5: Neurological deficit by level of spinal fracture

Level	**Flexion-distraction**		**All other fractures***		**P-value**
	Deficit	**Total**	**Deficit**	**Total**	
Cervical	2 (66.7%)	3	6 (8.8%)	68	0.036
Thoracic	4 (50.0%)	8	9 (11.4%)	79	0.023
Thoracolumbar	1 (25.0%)	4	8 (9.6%)	83	0.038
Lumbar	3 (43.0%)	7	4 (4.6%)	87	0.002

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SARS CoV 2 Pandemic and Depression

FEATURE

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The SARS-CoV-2 pandemic (also known as COVID-19) has brought changes to our everyday lives that most of us never expected. It also shed light on an illness that is all too familiar to some of us: depression. Whether having to isolate for days due to exposure to the coronavirus, or finding businesses closed due to the pandemic, many people have experienced feelings that they have nowhere to go, including even a visit with friends. This has caused many of us to feel lonely and symptoms of depression to develop.

People who have never thought of themselves as being depressed have suddenly found they are more sad, anxious, and even irritable, while others already in treatment are requiring more medications and counseling. For some, telemedicine and Zoom calls have offered relief, but that may not be enough for others. Local responders have noted that fatal overdoses may be increasing in West Virginia, which is similar to reports from other states. Suicides have also increased 25.4% nationally, according to America's Health Rankings.[1]

As reported by the National Alliance on Mental Health:

- 75% of all people who die by suicide are male.
- Although more women than men attempt suicide, men are nearly four times more likely to die by suicide.
- Suicide is the second leading cause of death for people 10-34 years of age, and the fourth leading cause of death for people 35-54 years old.

46% of people who die by suicide had a diagnosed mental health condition. Many healthcare experts and associations are recommending that healthcare professionals include check-ins with patients regarding their mental health as a part of routine visits. This is a good opportunity to reinforce preventive care, like immunizations. Mental health can also be included as part of the preventive care checklist. Healthcare professionals do not necessarily need to perform a formal psychosocial exam, but it's good practice to ask simple questions on patients' mood, sleeping, eating, and home environment to see if they are coping well in their daily lives. Many long-time patients will often confide in their family physicians more than other providers.

Depression can be the result of a combination of factors including genetics, biology, and psychological factors. Individuals may be at higher risk if there is family history or have experienced major life changes. During this time, patients may also face food insecurity, lack of healthcare access, substance use disorder, and abusive relationships, indicating a need for treatment.

During the pandemic, telemedicine is a critical tool, but some patients may not be comfortable with the technology. In addition to discomfort with the technology, providers may not know who may be near the patient and what that person may be able to hear. To providers, always be mindful of this possibility by checking with the patient before asking personal questions. It may be difficult and frustrating at times to gather information, but do not give up. If there is a possibility that the patient is not providing the information the provider needs, it may be because the patient has not been asked personal questions before and sharing intimate details can be intimidating. Give them time. Time is sometimes the best medicine a provider can give a patient.

Depression is everywhere, just like the virus, and it may require treatment with medication or counseling. Although depression may affect everyone at some time, stigma remains associated with the diagnosis. Asking patients about their mental health will help reduce this stigma and will help to lift everyone's spirits during this time.

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[1] Explore Suicide in the United States/2019 Annual Report/AHR. www.americashealthrankings.org/explore/annual/measure/suicide/state/all