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Climate Change

Both the immediate surroundings in which we live and the natural world as a whole can have profound effects on physical and mental health. In this issue of *WMJ*, authors of two studies explore the impact of environmental factors—climate change and music—on health.

Cover design by Kendi Neff-Parvin

The mission of *WMJ* is to provide an opportunity to publish original research, case reports, review articles, and essays about current medical and public health issues. *WMJ* is published through a partnership between the Wisconsin Medical Society, the Medical College of Wisconsin, and the University of Wisconsin School of Medicine and Public Health.

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WMJ

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of medicine in the midwest**

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A message from Wisconsin Department of Justice, Brad Schimel,
Attorney General, and the Wisconsin Department of Health Services



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A Starfish Approach to a Crisis of Dignity

Erik A. Ranheim, MD, PhD

The medical students of the class of 2019 provided me the honor of delivering the keynote address at their commencement ceremony. In my remarks, I sought to acknowledge the difficult times in which we live and the epidemic of health care burnout, while providing what I hope is a useful touchstone to help physicians keep doing our important work. The final section of my address is included below.

• • •

You are entering medicine in a very strange age—one that is more toxic to our patients and ourselves than we care to admit. Somehow, science and logic have become a political position as opposed to simply being truths that one could use to debate competing approaches to problem solving.

Meanwhile, the infant mortality rate for African American babies in Wisconsin is the same as that of Syria. The weekly reports from the Centers for Disease Control and Prevention on infectious diseases look more and more like it is 1919. Indeed, you are graduating following the third straight year of declining life expectancy in the United States, something

• • •

Author Affiliation: University of Wisconsin School of Medicine and Public Health, Madison, Wis (Ranheim).

Corresponding Author: Erik A. Ranheim, MD, PhD, University of Wisconsin School of Medicine and Public Health, 600 Highland Ave, K4/432 CSC, Madison, WI 53792-8550; phone 608.263.0057; email earanheim@wisc.edu.

that hasn't happened since your predecessors received bachelor's degrees in medicine exactly 100 years ago in the midst of a war and an epidemic. The spike in suicides, drug overdoses, and liver disease reflects a new sort of epidemic – one, I would argue, that is driven by a loss of personal dignity. As physicians, you will struggle to help your patients navigate a

news for you. The degree that you receive today, along with the oath you are professing to get that professional degree, comes with enormous power and opportunity to replenish the dignity of your patients and yourselves many times per day—a luxury that you are obliged to take advantage of. An opportunity far more critical to “wellness” and professional

Unlike most of the world, you will interact with many people every day for whom your words, your touch, and your empathy mean a great deal. They can mean the difference between dignity and despair.

world in which the meaning and purpose found in a lifelong job, a lifelong hometown, and a lifelong community will be quite rare.

As you enter residency and act as full-fledged physicians, you too will have moments that chip away at your dignity. Attendings too small to treat you both as a learner and a colleague. Patients that doubt your ability to care for them because of your gender, your skin color, or the pronouncability of your name. You are entering a field in which over 50% of practitioners are burned out, with all sorts of negative consequences for both patients and physicians, one of whom commits suicide every day in America. Think about that state of affairs—the entire graduating classes of Wisconsin's 2 medical schools are needed just to replace that group of lost doctors. And you paid hundreds of thousands of dollars for this?

This all sounds quite grim, but I have good

fulfillment than 100 lunch-time yoga classes, onsite child care, or being reminded to breathe by your damn watch.

Typically, these sorts of speeches are filled with calls to great achievements, curing cancer, saving the world sorts of things. And by all means please, win that Nobel prize and that Lasker medal. Find the intervention that prevents breast cancer from metastasizing, help an accident victim walk again, or if not that, at least, as a personal favor to the Dean and me, reverse male pattern baldness. But that is not my focus today. The vast majority of you—of us—are not going to be in contention for a Nobel prize; so rather than sitting back and thinking this speaker is talking to some of my classmates but not to me, please understand that I am not letting any of you off the hook. I expect you to help restore dignity wherever you can. And you can – unlike most of the

world, you will interact with many people every day for whom your words, your touch, and your empathy mean a great deal. They can mean the difference between dignity and despair. So don't get consumed by cynicism and the reality TV show of our current state. Pay attention to those in front of you and help to restore that dignity with each interaction.

Some of you may have heard my wife and me relate this story from Loren Eiseley, that we kept reminding each other of as we worked to provide a street medicine program serving people who struggle with homelessness in Madison. The scope of the problem was overwhelming to both of us at times. I hope that when you doubt your impact as a physician, you may recall this short parable:

An old man is taking his daily walk along a beach following a large storm. The beach is littered with starfish in both directions as far as the eye can see. He spots a young girl coming towards him, stopping every once in a while to pick one up and fling it back into the sea. When they meet, he asks the girl what she is doing. "I am throwing starfish back into the water – they cannot crawl there on their own and when the sun gets higher, they will die on the beach." "Yes," said the old man, "But there are tens of thousands of them; I am afraid you won't

be able to make much of a difference."

The girl picks up another and throws it into the waves, looks up at him and says, "I made a difference to that one."¹

Naomi Shihab Nye captured the essence of what I'm trying to say in her poem entitled "Famous"² from which I share the final two stanzas:

I want to be famous to shuffling men who smile while crossing streets, sticky children in grocery lines, famous as the one who smiled back.

I want to be famous in the way a pulley is famous, or a buttonhole, not because it did anything spectacular, but because it never forgot what it could do.

Do not forget what you can do – what you will do, is sacred. As functional as a pulley and buttonhole, yes, but sacred. Be famous to the man stripped of dignity in his hospital gown or in his sockless, blistered feet in the shelter. Be famous to the terrified parents of a sick child awaiting the results of biopsies and scans. Be famous to the teenager thinking her life is too painful to continue, or the villager in a distant, poorer place, shaking with malarial fever. You have been entrusted the power, and the obligation to do this every day. This is not setting

the bar of professional fulfillment low to trick you into happiness; this is the key to the whole thing – you are very special pulleys and very special buttonholes. Do not forget what you can do, one starfish at a time. As the newest members of this noble profession, on this 50th anniversary of the publication of Slaughter House Five, a book very much concerned with dignity, I leave you with the life advice of Kurt Vonnegut:

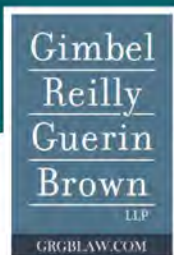
Hello, babies. Welcome to Earth. It's hot in the summer and cold in the winter. It's round and wet and crowded. At the outside, babies, you've got about a hundred years here. There's only one rule that I know of, babies – 'God damn it, you've got to be kind.'³

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Health and the Environment

Sarina Schrager, MD, MS, *WMJ* Associate Editor

Environment (noun) (dictionary.com)

1. The surroundings or conditions in which a person, animal, or plant lives or operates.
2. The natural world as a whole or in a particular geographical area, especially as affected by human activity.¹

Both the immediate surroundings in which we live and the natural world as a whole can have profound effects on health. From the way an office is set up, to the color of the walls in a hospital room, to how many grocery stores or parks are in a neighborhood, to the impact of global warming on clean water supplies, the world around us can impact several aspects of health.

A positive work environment, with low stress levels, may improve performance and decrease burnout. A well-positioned keyboard and chair may decrease incidence of carpal tunnel syndrome. A neighborhood with parks and other green spaces may encourage residents to walk and bike more and experience less environmental toxins. Abundance of grocery stores may provide healthy food for residents, stimulating more intake of fruits and vegetables.

On the flip side, increased pollution may cause worsening of asthma and symptoms of chronic obstructive pulmonary disease. Lead paint on the walls can lead to learning issues and negatively affect brain development in children. Lack of access to healthy food may correlate with more fast food eaten and lower fresh produce intake, leading to higher rates of obesity, diabetes, and heart disease. Lack of clean water from weather changes can lead to higher rates of communicable diseases.

Two papers in this issue explore health effects of the environment. The paper by Quinn-

Lee, et al,² discusses an intervention bringing a personalized music program to a caregiver of someone with dementia. Over 115,000 people live with dementia in Wisconsin, and this number is growing as the population ages.³ Many people with dementia live at home with a caregiver for many years. Living at home is ideal because the familiar environment can be soothing for people as their memory declines. However, many caregivers are not able to keep their family members at home due to the increasing complexity of care, which necessitates admission to a long-term care facility. When that occurs, music therapy has been shown to improve both psychiatric and behavioral symptoms in people with dementia.⁴⁻⁶ Music connects to parts of the brain that are preserved from the changes seen in dementia. There is an imperative to explore nonpharmacologic treatments for dementia because medications have limited effectiveness and sometimes troubling side effects.

Quinn-Lee's study takes the use of music therapy one step further and not only examines the patient, but also explores how music affects the caregiver. They found that a personalized music intervention (based on the previously used Music and Memory program) decreased the caregiver's stress and helped them feel more supported. Both of these findings are important as efforts to prevent caregiver burnout and potentially delay the transi-

tion from home to a long-term care facility.

A second paper in this issue by Temte, et al,⁷ explores patient attitudes toward climate change and correlates attitudes with mood changes. The researchers surveyed almost 600 primary care patients and asked about their attitudes towards climate change and administered validated measures of mood. Twenty-two percent of the patients had dysphoria, and it was closely correlated to worrying about climate change and the future of the environment.

Both of these studies underscore the myriad influences that can impact our patients' health and lives, including our environment. We need to be attentive to those influences and how they affect each person differently.

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A Qualitative Study of Undergraduate Racial and Ethnic Minority Experiences and Perspectives on Striving to Enter Careers in the Health Professions

Jennifer Y. C. Edgoose, MD, MPH; Lisa Steinkamp, PT, PhD, MBA; Kong Vang, MPH; Adrienne Hampton, MD; Natalie Dosch, BS

ABSTRACT

Background: Diversification of the health care workforce by race and ethnicity offers a strategy for addressing health care disparities. This study explored the experiences with pathways programming and mentoring of minority undergraduates aspiring to health professions careers.

Methods: We interviewed 21 minority undergraduates in 4 focus groups. The interviews explored participants' backgrounds; perceptions of racial climate; exposure to health professions careers, mentors, and pathways programs; barriers to success; and desired support.

Results: Many participants described diminished confidence and feelings of isolation due to stereotyping and discrimination; some were empowered to pursue health care careers because of adversity. Common themes included desire for mentorship, earlier career exposure, and college readiness support.

Discussion: Minority students desire health career exposure, mentoring, pre-college advising, and a positive racial climate; unfortunately, these desires often go unmet.

9.1% and 12.0% of public high school students enrolled in the state, respectively.¹⁻³ Many complex socioeconomic factors contribute to these statistics. In a national assessment of child well-being, black children in Wisconsin scored in the lowest quartile in almost every measure reported, such as poverty and reading proficiency; the authors concluded that Wisconsin may be the worst state for an African American child to grow up.⁴ These disparities persist into high school, where Wisconsin has the highest black-white graduation gap in the country.⁵

Enrichment programs, here termed pathways programs, have been developed around the nation to facilitate minor-

ity student matriculation into college and professional schools. (The authors have chosen to use the term “pathways” as adopted by the National Science Foundation instead of the older term “pipeline.”)

There are 4 general components of pathways programs: academic enhancement, motivation, mentorship, and research apprenticeship.⁶ Summer, post-baccalaureate, and preadmissions enrichment programs have shown to be successful at increasing racial/ethnic minority student application and admission rates to health professions programs.⁷ Less is known about which programmatic components make pathways programs effective at achieving these aims. For example, one of the most rigorously studied interventions, the Robert Wood Johnson Foundation Summer Medical and Dental Education Program, found that strong programmatic leadership and faculty engagement were more correlated with outcome than academic characteristics.⁸ Further, given the evidence that the science achievement gap

INTRODUCTION

Diversity of the health care workforce is dependent on the diversity of health professions educational programs. Of the 372 matriculating medical students from Wisconsin in the 2018-2019 school year, only 2.4% were black and 1.6% Hispanic, despite these groups making up 6.7% and 6.9% of the state population and

• • •

Author Affiliations: University of Wisconsin School of Medicine and Public Health (UWSMPH) (Vang, Dosch); Department of Family Medicine and Community Health, UWSMPH (Edgoose, Hampton); Physical Therapy Program, UWSMPH (Steinkamp); Madison, Wis.

Corresponding Author: Jennifer Y. C. Edgoose, MD, MPH, Department of Family Medicine and Community Health, University of Wisconsin School of Medicine and Public Health, 100 Delaplaine Ct, Madison, WI 53715-1896; phone 608.241.9020; email Jennifer.edgoose@fammed.wisc.edu.

starts at a very young age,⁹ there is increasing interest in developing pathways programming for pre-collegiate students.¹⁰

The overall goal of this project was to better understand the educational experience, particularly around pre- and early college pathways programming, of undergraduates who are underrepresented in medicine aspiring to health professions careers. We explored programmatic components as well as contextual variables such as mentoring. Here we define underrepresented in medicine in accordance with the Association of American Medical Colleges as those “racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population.”¹¹

METHODS

We used a descriptive exploratory approach to examine issues around the development of health care workforce diversity. In small focus groups, we asked undergraduate students interested in pursuing health professions careers to provide demographic information, racial climate descriptions, positive exposures to health professions fields and pathway programming, and barriers and desired opportunities regarding their career pursuits. This study was approved by the University of Wisconsin-Madison Education and Social/Behavioral Science Institutional Review Board.

Subjects and Recruitment

Eligibility criteria were age 18 years or older; English-speaking; having grown up in the Midwest; and being enrolled at an undergraduate institution in Wisconsin, interested in pursuing a health professions career, and identified as a racial/ethnic minority underrepresented in medicine. Recruitment material defined underrepresented in medicine using the University of Wisconsin Department of Education’s definition of “targeted minority student,” who are students identified as racially/ethnically underrepresented at the University of Wisconsin.¹² This included African American, Native American, Latinx, Cambodian, Hmong, Lao, and Vietnamese students. We did not exclude any students who self-identified as underrepresented in medicine and did not fall in the category of “targeted minority.” Given acute racial disparities documented in Midwestern states,¹³ we felt it appropriate to understand the experience of Midwestern students who self-identified as underrepresented in medicine.

The primary form of recruitment was through email solicitation. College administrators, scholarship program directors, pre-health advisors, and student organization leaders at a large public Wisconsin educational institution, a small private educational institution, and a technical college served as our primary recruiters. These contacts were asked to forward an email with a digital flyer detailing information about our study to underrepresented in medicine undergraduate students potentially interested in health professions careers. A link to a secured online survey was included in the email for students to indicate interest and provide contact

Box. Focus Group Interview Questions

- If you feel comfortable doing so, please self-identify your racial/ethnic background and gender, along with your preferred pronouns.
- Where did you grow up? Is this urban, rural or suburban?
- How would you describe the racial climate of your school, currently and growing up? How did this affect your pursuit of your career goals?
- What exposure did you have growing up to health professional careers? Were you encouraged to pursue these careers?
- Were you exposed to any pathways programs that helped you navigate the educational pathway growing up? If so, please describe these programs.
- Do you identify mentors who have helped you get to where you are today?
 - If so, how did you become connected with them?
 - How have they supported you?
- What do you identify as the major barriers to your educational progress?
- What sort of support do you wish had been available to you?
- Are there other comments you’d like to share with us?

information. The survey included 3 eligibility questions: (1) Are you currently a student enrolled at a public or private institution in Wisconsin? (2) Do you consider yourself underrepresented in medicine and/or identify as a racial/ethnic minority? and (3) Are you interested in a health professions field either in medicine, pharmacy, dentistry, podiatry, optometry, physician assistance, nursing, occupational therapy, or physical therapy? All students who completed the survey and met the eligibility criteria were emailed by a study team member to schedule a focus group interview. Participants were enrolled in the study on a rolling basis.

Focus Groups

All students who responded affirmatively to our recruitment email participated in one, 1.5-hour-long focus group session. Meals were provided as compensation for participation. Each group included 4 to 6 participants, 1 to 2 facilitators who themselves were people of color, and a research assistant who performed audio recording and documented field notes. Informed written consent was obtained prior to conducting each session. Facilitator(s) asked questions in an inverted funnel scheme, beginning with general background questions and building up to more open-ended questions (Box). One consistent facilitator served as the lead moderator for all 4 sessions to assure consistency in facilitation technique.

Audio recordings were stored in a secure online drive and later transcribed by a study team member. To ensure participant confidentiality, each participant was assigned a code name consisting of their focus group number (1, 2, 3, 4) and letter (A, B, C, D, E, F), which was determined by the order in which they spoke. No identifying information was included in the transcripts.

Data Analysis

We derived codes directly from the text data. Two team members independently read transcript data by question, focus group, and participant to derive codes from words and expressions most commonly used during the interviews. These codes were then

Table. Themes Identified by Participants Regarding Pursuit of Health Professions Careers

Themes	Subthemes/Comments
Racial Climate as Context	<p>Equating not being white with being unqualified to pursue careers in health care.</p> <ul style="list-style-type: none"> • Held back from advanced high school programming by teachers, leading them to think others believed they could not succeed. <p>Experiencing feelings of exclusion, isolation, and lost confidence.</p> <ul style="list-style-type: none"> • Summer introductory college program helpful but stigmatizing. • “You got into [the institution] because you’re black.” • Challenges of intersectionality (ie, being grouped with students based on 1 category such as ethnicity but not fitting in with another such as class.) <p>Feeling isolated when did not qualify for on-campus pathway program but also not fitting in with other students who were from similar academic high schools.</p> <p>Being intentionally placed on a dormitory floor with international Asians with whom he had nothing in common.</p> <p>Enduring stereotypes.</p> <ul style="list-style-type: none"> • “...just another Asian student pursuing medicine...I’ve been called a robot.”
Exposure to Health Professional Careers	<p>Difficulty finding opportunities to shadow health care providers.</p> <p>Few college-preparation courses and programs included exposure to health professions in high school.</p> <p>Most shadowing or mentoring opportunities were found individually.</p>
Exposure to Pathways Programs	<p>Some precollege pathway programs provided exposure to future health professional careers.</p> <p>Both pre- and in-college pathway programs decreased feelings of isolation and increased feelings of connectedness; however, some participants felt these programs exacerbated stereotypes and discrimination by making it appear that underrepresented-in-medicine students only got into college with special help.</p>
Exposure to Mentors	<p>Most mentorship relationships were informal, including family members.</p> <p>Teachers, guidance counselors, and college advisors gave valuable academic and technical advice.</p> <p>People who could relate, support, boost confidence, give positive appraisal, and reaffirmation of pursuits were invaluable.</p> <ul style="list-style-type: none"> • “You can do this. Look at me; if I did it, you can do it.” <p>Mentors in positions of power helped participants believe in their potential.</p> <p>Mentors’ emotional support improved self-esteem, which further positively influenced work ethic, self-efficacy, and other personal and professional behaviors.</p> <p>Relationships could be reciprocal.</p> <ul style="list-style-type: none"> • “I think him knowing me has taught him a lot about other races.” <p>Words used to describe mentorship relationships: “reinforcement,” “trust,” “confidence,” “a safe place.”</p>
Barriers to Educational Success	<p>Prior to college, feeling uninformed about opportunities and resources for assistance of any kind, lacking confidence in writing essays for financial aid, scholarships, and applications.</p> <p>Some mentors and advisors were unsupportive.</p> <ul style="list-style-type: none"> • Parent advised a different career due to the amount of time in training. • Academic advisors said they “wouldn’t make it” and should “just go to [a community college].” <p>Once in college, feeling unprepared for the rigors of college, especially for first-generation college students.</p> <ul style="list-style-type: none"> • No connections or ideas of what to expect once in college. • Had never learned appropriate study habits and struggled to engage in the “critical thinking” expected in college. • Difficulty of not seeing people who look like themselves teaching. <p>Lack of students of color in science, technology, engineering, and mathematics fields makes them feel discouraged.</p> <p>Other commonly cited barriers: language; standardized testing; and finances to pay for college-prep courses, AP tests, and stress regarding college expenses.</p>
Desired Support Pre-college	<p>Access to opportunities such as shadowing and internship programs to gain exposure to health care professional careers.</p> <ul style="list-style-type: none"> • Many felt this exposure should be granted early in elementary school. • People automatically tell us, ‘Oh go to the Army,’...but there’s no recruitment [that states], ‘You should think about being a doctor.’” <p>Academic support from teachers and counselors; support for college success and readiness; pathway programs; mentoring; earlier exposure to collegiate experiences; help with finding resources like scholarships.</p> <ul style="list-style-type: none"> • “I wish I had more advising on how to do scholarships and stuff like that...I think that was because the kids in the top classes [who received this advising] were almost all white kids...in the higher socioeconomic status.” <p>Learning how to ask for help once in college.</p>
In-college	<p>More guidance as a freshman; someone who can direct them to useful resources.</p> <p>Someone who can reassure them when they are struggling.</p> <p>Racial/ethnic groups to join and mentorship by peers.</p>
Resiliency and Motivation	<p>Personally experiencing or witnessing racially/ethnically motivated trauma or humiliation growing up drove them to their career pursuits.</p> <p>Inspiration by minority physicians or older siblings.</p> <p>Independence and assertiveness boosted by military experiences.</p> <p>Witnessing parents struggle.</p> <p>Witnessing the struggle of others who share their racial/ethnic background, such as seeing underserved people at public clinics who experienced inadequate patient-centered medical care.</p> <ul style="list-style-type: none"> • “Motivated by working at free clinics and seeing patient’s needs, the language barrier, and lack of minority role models in medicine.” <p>Experiencing discrimination, intimidation, and isolation in college “pushed them” to succeed.</p> <p>Confidence-challenging situations sometimes a motivator.</p> <ul style="list-style-type: none"> • “I just feel like I have the pressure to be just as good or even better than them [white students].”

categorized into themes, which were verified by the remaining team members.

RESULTS

Sample Characteristics

Twenty undergraduate students from the large public institution and 1 student from the small private institution participated in a total of 4 focus group sessions held between spring of 2016 and fall of 2017. Participants shared demographic information at the beginning of each focus group session. One hundred percent of participants identified as persons of color, and 85% met the formal recruitment definition of underrepresented in medicine. Sixty-two percent were female and 100% cisgender. Nineteen percent of participants were born outside of the United States; 85% had grown up in the Midwest, with 24% identifying an urban and 10% a rural Midwestern upbringing (formal definitions of urban, rural, and suburban were not provided).

Seven themes were identified from 39 independent codes and are reflected in the Table. Acute consciousness of racial and ethnic identity, often coupled with poor confidence and feelings of isolation, were prevalent among participants, especially when they sensed a lack of belonging to any one group of students or available support programs. Although pathway programs countered these feelings, they often made participants feel stigmatized, promoting a sense of isolation. Most mentoring experiences were informal, and in the majority of cases, exposure to health professions was pursued by participants individually. Participants desired mentors and advisors who could provide both professional advice and emotional support, especially when they were struggling. Many participants' decisions to pursue health professions careers were based on personal experiences of witnessing those from similar backgrounds struggle with racial disparities and, similarly, many were driven to succeed secondary to their own experiences with discrimination.

DISCUSSION

This study explored programmatic and other experiences that can promote or inhibit the success of minority students pursuing careers in health professions fields. We chose to investigate these experiences from a racialized context, which the authors feel is often the "elephant in the room" that is not addressed. In addition to the positive and negative effects of pathways programs and mentoring, participants identified many alternative issues that facilitated or inhibited their pursuit of health professions careers.

Lack of diversity and inclusion was clearly tied to feelings of isolation which, in turn, was associated with feelings of internalized racism, described by Camara Jones as the acceptance by members of stigmatized races of negative messaging around their own abilities and intrinsic worth.¹⁴ Even attempts at institutional support, such as admittance and scholarships targeted at students

underrepresented in medicine, often led participants to feel singled out primarily for their minority status, resulting in loss of confidence. Although racial and ethnic diversity at institutions of higher education have improved with the establishment of various scholarship and pathway programs, there are still concerns with the feeling of inclusion by minority students. Similar to other studies, obstacles to success included lack of support personally, institutionally, and financially; discrimination; pressure to represent a culture; difficulties with standardized testing; and poor self-confidence.^{15,16}

There was consensus across focus group participants that there should be more opportunities for exposure to health professions careers and that this introduction should occur at an early age. Several of the participants in our study discovered programs individually or with the help of a single teacher champion. Many also struggled to gain access to exposure to health professions careers through shadowing or volunteer opportunities. In addition, students expressed desire for more formal mentoring opportunities.

One limitation of this study is that our participants were self-selected and were already demonstrating resilience in pursuing their chosen careers in health care. These participants were often highly resourceful, assertive, and self-directed. Given this selection bias, it remains notable that this more resilient group still confronted significant challenges. A further study limitation is that 3 ethnically Chinese students chose to participate despite not meeting our formal definition of underrepresented in medicine. While future studies should more explicitly screen for appropriate participant inclusion during enrollment, we decided to honor participants' self-identification as underrepresented minorities and found that these participants' responses lifted the complexity, and sometimes poignancy, of the discussion. All participants expressed a sense of feeling on the outside of a white majority culture and a shared desire to want to succeed academically and to achieve a sense of belonging. Finally, the generalizability of this study is limited as our sample size was small and, despite efforts to recruit participants broadly from several academic institutions, the majority of those who enrolled in the study attended the large public university and none attended the technical college.

This field of research may benefit from future studies that compare the experiences of underrepresented in medicine students to nonunderrepresented in medicine students from similar backgrounds (ie, affluent, low socioeconomic status, international) to further characterize feelings of discrimination and isolation that may be unique to those who are underrepresented in medicine. It may also be important to hear the perspectives of minority college graduates who considered health professions careers but chose a different path. Additionally, future research questions should address how to develop positive traits, such as independence and motivation, among students underrepresented in medicine. Finally, conducting a study that does not

rely on self-selection may grant a more realistic view of underrepresented in medicine experiences.

CONCLUSION

Minority undergraduates interested in health professions careers desire increased and earlier exposure to such careers, mentors who can lend not only technical but also emotional support, and pathways programs that provide comprehensive preparation for the higher educational experience. While developing pathways programming to promote diversity in the health care workforce, it will be critical to consider and address the challenging racial climate that minority students experience.

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Prevalence and Course of Treatment of Common Hip Diagnoses Presenting to a Sports Medicine Clinic

Lianna Mack, BS; C. Nathan Vannatta, PT, DPT; Cary Rasmussen, MS; Andrew Borgert, PhD

ABSTRACT

Background: Hip-related pain and pathology can have an overall negative impact on health-related quality of life. Prompt diagnosis and treatment of symptoms at the hip may expedite the recovery process and allow for an earlier return to normal activity. Knowing the prevalence of a condition can help facilitate the diagnostic process. However, the prevalence of hip diagnoses and associated courses of treatment have not been described.

Methods: A retrospective study was performed on patients presenting to a sports medicine clinic. Information on demographics, duration of pain, course of treatment, history of previous injury or surgery, and mechanism of injury was collected. Multivariate linear regression and multivariate logistic regression were utilized to describe differences in course of treatment between diagnostic groups.

Results: Six hundred eighteen patients were included in this study, with 641 hips analyzed. Femoroacetabular impingement syndrome (FAIS) was the most frequent diagnosis (212 hips), followed by “musculotendinous pain” and “hip pain, not otherwise specified.” Of those diagnosed with FAIS, 30.1% had secondary diagnoses in other categories. Home exercise programs were the most commonly prescribed treatment, followed by injections and physical therapy. Having a diagnosis of FAIS or chondrolabral pathology increased the odds of surgery.

Conclusion: Femoroacetabular impingement syndrome was the most common diagnosis in our cohort and had the highest frequency of concurrent diagnoses. A combination of a home exercise program, injection, and physical therapy made up the typical course of treatment, while surgery was utilized less frequently.

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Author Affiliations: Author Affiliations: Gunderson Health System, La Crosse, Wis (Mack, Vannatta, Rasmussen, Borgert).

Corresponding Author: C. Nathan Vannatta, PT, DPT, SCS, Department of Sports Physical Therapy, Gunderson Health System, 3111 Gunderson Dr, Onalaska, WI 54650, Mail Stop NC1-002; phone 608.775.8986; email cnvan-nat@gundersenhealth.org.

INTRODUCTION

Hip-related pain has been reported to have a significant impact on overall health status, especially later in life.^{1,2} Injuries to the hip have commonly been reported in young athletes, as well.³ Recognizing and diagnosing hip pathology early on may be important in helping clinicians provide prevention strategies and treatment options.^{4,5} This may be of particular relevance in those athletes whose bony anatomy is consistent with joint morphology associated with femoroacetabular impingement syndrome (FAIS), as this has been purported as a risk factor for developing intra-articular hip injury such as acetabular labral tears (ALT) and osteoarthritis.^{4,6}

Successful treatment of hip-related pain and injury is facilitated by accurate diagnosis, after which recovery can be expedited by prompt treatment or management of symptoms. One aspect affecting the time to treatment is how long it takes to reach a diagnosis. A recent study found that patients may visit, on average, 3.3 providers over a period of nearly 2 years before being diagnosed with a labral tear.⁷ When

making these diagnoses, knowledge of prevalence, results of special tests of the hip, and the strength of these tests may be utilized. Unfortunately, the diagnostic accuracy of hip physical examination tests is variable, making accurate diagnosis increasingly difficult.^{8,9}

One element assisting with diagnostic accuracy is knowledge of the prevalence of a given condition to help establish pretest

probability.^{7,10,11} Combined with the results of physical examination tests, the likelihood of certain conditions can be assessed. The combination of pretest probability and likelihood ratios from established clinical tests can substantially shift the probability of a particular diagnosis being present in an individual and assist with clinical decision making.¹² Studies investigating the prevalence of ALTs identified tears in 69% (n=45) of participants aged 15 to 66 years of age¹³ and 66% (n=100) of patients 17 to 76 years of age.¹⁴ However, no study, to our knowledge, has investigated the prevalence of a variety of diagnoses present at the hip. As little is known about the prevalence of different hip conditions,^{3,15} accurate diagnosis of hip conditions remains a clinical challenge.

Lastly, knowledge of the expected course of treatment for different diagnoses may assist with determining prognosis and educating patients on available treatments and their respective outcomes. Informing patients of the possible courses for their hip problem may help them make informed decisions about their health care and allow them to better control their pain.^{16,17} Therefore, it is the aim of this study to investigate the prevalence of hip-related diagnoses occurring in a sports medicine clinic in patients under the age of 50 to assist in establishing pretest probabilities that may facilitate diagnosis. The secondary aim of this study is to describe the frequency of treatments received by individuals with differing diagnoses.

METHODS

A retrospective review was performed on all patients aged 14 to 49 years with a primary complaint of hip pain seen in the Sports Medicine Department at a medium-sized Midwestern health care system from January 1, 2012 through December 31, 2015. The Sports Medicine Department consists of 2 full-time orthopedic surgeons, 2 part-time nonoperative physicians, 3 full-time physician assistants, and several support staff, including athletic trainers, registered nurses, and medical assistants. The department also has an associated Physical Therapy Department consisting of 9 physical therapists and 6 physical therapist assistants. Referral to this clinic is often through self-referral to the orthopedic providers but can also occur through the health system's internal medicine, family practice, pediatric, and urgent care services.

This study received Institutional Review Board approval. Patients with a body mass index (BMI) greater than or equal to 40 kg/m² at their initial presentation or with pain patterns that may suggest pain pathology associated with other joints, such as iliotibial band syndrome presenting as lateral knee pain or lumbar radicular/referred pain, were excluded. Eligibility criteria were determined to include a younger, more active population. Pain localization criteria were utilized in an attempt to capture diagnoses that were local to the hip joint and associated structures.

Charts were reviewed manually, and the final diagnoses as described within the physician's documentation for each patient were recorded. Diagnoses of labral tear, chondral lesions, fractures,

dislocations, or FAIS were all assisted by the provider's review of imaging studies. Syndromes such as piriformis syndrome, iliotibial (IT) band syndrome, or snapping hip syndrome were diagnosed based on clinical judgement.

Demographic and anthropometric data collected included age, sex, race, and BMI. Hip-specific data included pain laterality, previous injury and/or surgery to the involved hip, duration of pain, and mechanism of injury. Traumatic injuries were defined as those due to falling, twisting, or an outside force.

Prescriptions for treatment were recorded from the evaluating physicians' documentation and grouped to include information on surgeries undergone, injections received, attendance at physical therapy, provision with a home exercise program, or if the patient was lost to follow-up. Only injections that were received for treatment of hip pain were recorded. Other injections, such as those utilized during magnetic resonance arthrograms, were not considered part of treatment. Home exercise programs were defined as exercise prescribed by a physician, athletic trainer, or physical therapist with no additional follow-up. Patients were considered to have had physical therapy if there was a record of them attending at least 1 physical therapy appointment within the clinic system. Finally, patients were designated as lost to follow-up if their provider scheduled them for an additional appointment, physical therapy, or an injection, but the patient did not present for the treatment or provide an update on his or her hip pain. Final treatment outcomes were not consistently reported, and thus are not included in this review.

Statistical Analysis

Associations between demographic factors, clinical outcomes, and hip pathologies were assessed via univariate and multivariate statistical analyses. Univariate tests included the χ^2 and Fisher's exact tests. Multivariate linear and logistic regressions were utilized with a stepwise variable selection technique, with a *P*-value <0.20 required for initial inclusion of predictor variables in the model, and *P*<0.10 required for the variable to remain in the model. All analyses were performed using the SAS v9.4 software suite (SAS Foundation, Cary, North Carolina).

RESULTS

Demographics

Medical records from 709 patients were gathered. After screening for inclusion/exclusion criteria, 618 patients who fit the study criteria remained, with 641 hips being analyzed (Figure). Those with 2 unique episodes of pain were treated as independent incidences of hip pain. Demographic and medical history information of the cohort is included in Table 1.

Diagnoses

There were nearly 50 different diagnoses given by the clinicians (Appendix A). To assist with statistical analyses, 7 broad groups

of diagnoses were formed (FAIS; muscle and tendon pain; chondrolabral pain; arthritis; fracture, dislocation, or contusion; pain, not otherwise specified; and other). FAIS was the most common diagnosis (33.1%). Musculotendinous pain was the second most common diagnosis (30.1%), followed by pain, not otherwise specified (25.9%); fracture, dislocation, or contusion (7.2%); chondrolabral pathology (6.7%); arthritis (5.8%); and other disorders (2.2%). Rates of each diagnosis were similar across sex, although chondrolabral pathology (OR=5.27, CI=2.04-13.65, $P=0.0006$) and pain, not otherwise specified (OR=1.99, CI=1.34-2.95, $P=0.0007$), were more likely to occur in females.

Those with a diagnosis of arthritis experienced the longest duration of pain, with a mean of 16.9±7.5 months. FAIS (15.9±8.8 months) or chondrolabral pathology (16.1±8.2 months) were also more likely to have a longer duration of pain. Those diagnosed with fractures, dislocations, or contusions or musculotendinous pain had a shorter duration of symptoms, with means of 3.8±5.1 months and 6.2±7.4 months, respectively.

Patients with multiple diagnoses at the same hip were included in multiple categories. Of the 641 total hips receiving a diagnosis, 577 (90.0%) were given 1 diagnosis, while the remaining patients had more than 1 identified diagnosis. FAIS and chondrolabral pathology occurred together more frequently than any other diagnoses. Over two-thirds (72.1%) of all hips with chondrolabral pathology concurrently experienced FAIS. Alternatively, only 30.1% of those diagnosed with FAIS had an additional diagnosis at the involved hip, and only 14.6% had chondrolabral pathology (Table 2). Fractures, dislocations, and contusions resulted in a single diagnosis in all cases and a similar trend was seen in pain, not otherwise specified (Table 2).

Course of Treatment

Patients were provided with a home exercise program in 473 (73.9%) of cases. Patients who had pain, not otherwise specified (65.1%), or a fracture, dislocation, or contusion (54.4%) received a home exercise program less frequently (Table 3).

Across all diagnosis categories, 327 (51.0%) patients received at least 1 injection as part of their treatment (Table 3). Those experiencing chondrolabral pathology had the highest rate of injection. Treatment by injection was independently associated with both surgery (OR=5.28, CI=2.62-10.63, $P<0.0001$) and increasing age (OR=1.03, CI=1.02-1.05, $P=0.0002$). Diagnoses of chondrolabral pathology (OR=5.77, CI=1.63-20.59, $P=0.0067$) or FAIS (OR=4.89, CI=2.96-8.09, $P<0.0001$) increased the likeli-

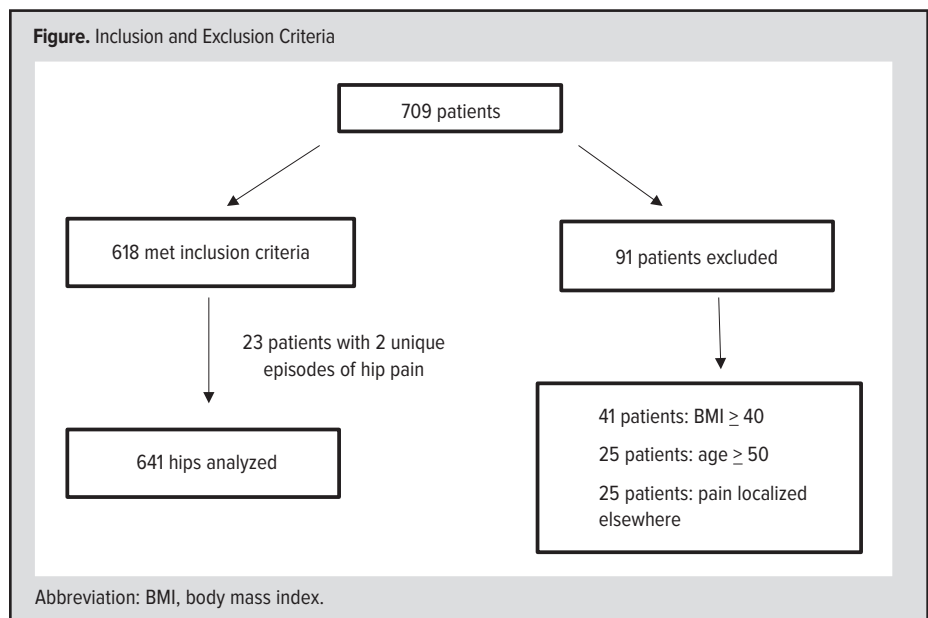


Table 1. Demographics and Medical History

Age (years, mean ± SD)	30.4 ± 11.5
BMI (kg/m ² , mean ± SD)	25.8 ± 5.1
Sex [n (%)]	
Male	225 (35.1)
Female	416 (64.9)
Race [n (%)]	
White	625 (97.5)
Black/African American	6 (0.9)
Asian	4 (0.6)
American Indian or Alaska Native	1 (0.2)
Unknown	5 (0.8)
Pain Laterality [n (%)]	
Right	310 (48.4)
Left	278 (43.4)
Bilateral	53 (8.3)
Previous Injury/Surgery [n (%)]	
Yes	69 (10.8)
No	572 (89.2)
Traumatic Injury [n (%)]	
Yes	95 (14.8)
No	546 (85.2)

Abbreviation: BMI, body mass index.

hood of receiving an injection during care. Meanwhile, diagnoses of musculotendinous pain (OR=0.48, CI=0.31-0.74, $P=0.0008$) or fracture, dislocation, or contusion (OR=0.04, CI=0.00-0.27, $P=0.0014$) decreased the likelihood of injection.

Overall, 325 (50.7%) patients received physical therapy, with patients experiencing chondrolabral pathology or FAIS having the highest rates of therapy (Table 3). Further, attending physical therapy was significantly more likely with a diagnosis of FAIS (OR=1.87, CI=1.26-2.78, $P=0.0018$). A diagnosis of fracture, dislocation, or contusion reduced the likelihood of attending physical therapy (OR=0.35, CI=0.17-0.72, $P=0.0045$). Patients with musculotendinous pain; arthritis; fracture, dislocation, or

Table 2. Incidence of Multiple Diagnoses

	Muscle and Tendon Pain	Arthritis	Chondro-labral Pathology	FAIS	Pain, Not Specified	Fracture, Dislocation Contusion	Other
Muscle and Tendon Pain	193 (100)	---	4 (2.1)	17 (8.8)	1 (0.5)	---	1 (0.5)
Arthritis	---	37 (100)	2 (5.4)	13 (35.1)	---	---	2 (5.4)
Chondrolabral Pathology	4 (9.3)	2 (4.7)	43 (100)	31 (72.1)	---	---	3 (7.0)
FAIS	17 (8.0)	13 (6.1)	31 (14.6)	212 (100)	---	---	3 (1.4)
Pain, not specified	1 (0.6)	---	---	---	166 (100)	---	---
Fracture, Dislocation, Contusion	---	---	---	---	---	46 (100)	---
Other	1 (7.1)	2 (14.3)	3 (21.4)	3 (21.4)	---	---	14 (100)

Cross tabulations of each diagnosis category. Data are displayed as n (%), with the percentage representing the proportion of the patients from the diagnosis category in the column on the left who also have the diagnosis listed in the first row.
Abbreviation: FAIS, femoroacetabular impingement syndrome.

Table 3. Number of Patients in Each Diagnosis Category and the Treatments They Received

	Treatments Utilized				
	Physical Therapy n (%)	Medication n (%)	Injection n (%)	Surgery n (%)	HEP n (%)
FAIS	145 (68.4)	167 (78.8)	183 (86.3)	106 (50.0)	176 (83.0)
Musculotendinous pain	90 (46.6)	91 (47.2)	58 (30.1)	12 (6.2)	150 (78.1)
Chondrolabral pathology	32 (74.4)	34 (79.1)	40 (93.0)	25 (58.1)	39 (90.7)
Arthritis	18 (48.7)	28 (75.7)	27 (73.0)	18 (48.7)	26 (70.3)
Fracture, dislocation, contusion	10 (21.7)	17 (37.0)	1 (2.2)	3 (6.5)	25 (54.4)
Pain, not specified	78 (47.0)	77 (46.4)	67 (40.4)	5 (3.0)	108 (65.1)
Other	7 (50.0)	10 (71.4)	10 (71.4)	4 (28.6)	10 (71.4)

Abbreviations: FAIS, femoroacetabular impingement syndrome; HEP, home exercise program.

Our results indicated differences in the course of treatment and duration of pain between the diagnostic categories. This information may be utilized to assist with estimates of pretest probabilities of certain categories of hip diagnoses. It also may assist clinicians in diagnosing and educating patients on typical treatment courses.

FAIS, chondrolabral pathology, and arthritis were associated with longer durations of pain, whereas musculotendinous pain and fractures, dislocations, and contusions had shorter durations of pain. Thus,

contusion; pain, not otherwise specified; or in the “Other” category received physical therapy in about 50% of cases.

Surgery was used to treat hip pain in 21.4% of patients (Table 3). The most common type of surgery was hip arthroscopy with femoroplasty (107 cases), followed by arthroscopy with acetabuloplasty (83 cases). More than 1 procedure was often performed during arthroscopy, such as femoroplasty with labral repair. Hip arthroplasty was rare in our population.

Patients experiencing chondrolabral pathology had the highest rates of surgery, followed by patients diagnosed with FAIS or arthritis. A diagnosis of musculotendinous pain significantly reduced the probability of requiring surgery (OR = 0.21, CI = 0.09-0.49, $P = 0.0003$), as did pain, not otherwise specified (OR = 0.13, CI = 0.04-0.41, $P = 0.0006$). Diagnoses of arthritis (OR = 2.32, CI = 0.97-5.54, $P = 0.0591$), chondrolabral pathology (OR = 2.43, CI = 1.19-4.95, $P = 0.0147$), or FAIS (OR = 3.79, CI = 1.80-7.97, $P = 0.0004$) were all positive predictors of surgery.

Only 47 (7.3%) patients were lost to follow-up.

DISCUSSION

The purpose of this study was to examine the prevalence of hip-related diagnoses in patients under the age of 50 presenting to a sports medicine clinic. Additionally, we aimed to describe the course of treatment for various diagnoses.

a reported longer history of pain during the clinical examination may increase the clinician’s suspicion of FAIS, chondrolabral pathology, or arthritis.

There was a high rate of co-occurrence between arthritis and FAIS, which further supports the findings of previous literature suggesting an association between the bony morphology of FAIS and subsequent development of arthritic changes¹⁸ (Table 2). Alternatively, patients with pain, not otherwise specified, or a fracture, dislocation, or contusion rarely had any other diagnosis (Table 2). This is not entirely unexpected as there is less ambiguity surrounding the diagnosis of fractures, dislocations, or contusions compared to other diagnoses.

The rate of labral tears and chondrolabral pain found in this study is lower than that reported by other studies. Various studies have found the prevalence of labral tears in those with hip or groin pain to range anywhere from 22% to 55%, with 1 study suggesting rates as high as 90%.¹⁷ However, age has been associated with a higher prevalence of labral tears, and our patients were under age 50.¹³ Another factor leading to the low rate of chondrolabral pain reported may be due to not all patients undergoing advanced imaging for this pathology, and thus the number of patients with asymptomatic labral tears may not have been captured in this study. Nonetheless, females were found to be 5 times more likely to have chondrolabral diagnoses than males, which could be due

to underlying anatomical differences between the 2 groups. This is consistent with previous findings indicating that labral tears occur more frequently in females.¹⁹

Some degree of exercise therapy can be expected for all hip pathologies, as 73.9% of patients received a home program and over 50% of patients received physical therapy. A similar proportion of patients received injections for their hip pain. In our cohort, those diagnosed with chondrolabral or FAIS pathology appear to be more likely to receive this form of treatment as part of their treatment. This seems to reflect current recommendations to trial a period of conservative care prior to surgical intervention for intra-articular pathology.⁸

Patients with a diagnosis of FAIS made up 77.4% of all surgeries and were significantly more likely to undergo surgery as part of their course of treatment (OR = 3.79, 95% CI = 1.80-7.97, $P < 0.001$). Similarly, patients with a diagnosis of chondrolabral pathology were more likely to undergo surgery as part of treatment (OR = 2.43, 95% CI = 1.19-4.95, $P = 0.015$). This is consistent with current trends showing an increase in the use of surgical treatment for the hip.^{6,17,20}

These results may lead to the conclusion that surgery may be an expected result for patients with the diagnosis of FAIS or chondrolabral pathology. However, the results should not be interpreted to mean that surgery is the preferred course of treatment, as comparative studies investigating outcomes between surgical and conservative treatments are lacking.²⁰ There is evidence to support the benefits of early surgical management^{21,22} and evidence to suggest that conservative management leads to clinical improvement with both of these diagnoses.^{23,24} However, this trend of greater likelihood of surgery in those with a diagnosis of FAIS, ALTs, and osteoarthritis does seem to indicate a tendency of surgical treatment being selected in those with abnormal joint morphology.

Limitations

Several limitations must be noted. This study is retrospective in nature and thus only describes the courses of treatment that occurred within this institution and cannot necessarily be used to predict positive outcomes with those treatments. Data on duration of symptoms, previous injury, and trauma were all self-reported by the patient, which may introduce recall bias. Although diagnoses of FAIS, labral tears, and fractures were supported with imaging, we cannot determine the accuracy of these diagnoses or to what extent imaging findings were correlated with the patients' symptomatology. Many of the diagnoses given were under the category of unspecified, or general, pain. It is likely that many of the patients diagnosed with pain actually had a more specific problem at their hip that went undiagnosed and, thus, the prevalence of more specific diagnoses may have been affected. Also, outcomes were not consistently reported and, thus, the treatment courses observed in this study cannot be used to

reflect positive outcomes or "best" practice. We are uncertain of the duration of different treatments or the rates of recurrence of pain. We also had a very homogeneous patient sample with the majority being white and female, which may affect the accuracy of the prevalence reported. Further, the subjects in this study were from a specialty sports medicine clinic which may limit the generalizability of the results.

CONCLUSION

Diagnosis of hip-related pain remains a clinical challenge. Femoroacetabular impingement syndrome was the most common diagnosis in our cohort, followed by musculotendinous pain, and pain, not otherwise specified. The high rate of unspecified diagnoses suggests the need for continued efforts at consensus statements on defining and diagnosing hip pain. Consideration of pain duration may be helpful in the diagnosis of hip pain as FAIS, chondrolabral pathology, and osteoarthritis were associated with longer durations of pain; and fractures, contusions, and dislocations and musculotendinous pain were associated with a shorter duration of symptoms.

Some combination of a home exercise program, injection, and/or physical therapy can be expected as part of a typical course of treatment for all hip diagnoses. Physical therapy was more likely prescribed for those with FAIS or chondrolabral pathology, while those with a diagnosis of fracture, contusion, or dislocation were less likely to receive physical therapy. Injections were more common in those diagnosed with FAIS and chondrolabral pathology. Surgery occurred less often, but diagnoses suggesting abnormal joint morphology, such as FAIS, increased the likelihood of having surgery.

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Correlation Between Climate Change and Dysphoria in Primary Care

Jonathan L. Temte, MD, PhD; John R. Holzhauser, MD; Kenneth P. Kushner, PhD

ABSTRACT

Background: Concern about climate change may affect mental health. We evaluated the relationship between primary care patients' attitudes toward climate change and dysphoria.

Methods: In 2013, we surveyed 571 adult primary care patients in southern Wisconsin. Attitudes toward climate change were measured using a 46-point composite of 9 questions. Dysphoria was measured using a 13-point composite summing the Patient Health Questionnaire (PHQ-2) and the Generalized Anxiety Disorder scale (GAD-2).

Results: Patients frequently reported concern about climate change and 22.5% experienced dysphoria. A significant, positive correlation existed between the composite climate change score and the dysphoria score ($r=0.345$; $P<0.001$).

Conclusion: Primary care patients are concerned about climate change and this concern is positively related to dysphoria. The level to which dysphoria is due to climate change should be elucidated.

of health.³ Little is known, however, about associations between emotional distress and attitudes toward global warming.

The purpose of this 2013 study was to evaluate the relationship between concern about global climate change and dysphoria among adult primary care patients. We tested an a priori hypotheses that dysphoria was associated with recognition of a changing climate, frustration over the lack of action on global warming, and a sense of remorse or dread about the future. The data, however, precede 2 presidential elections and the entry and subsequent withdrawal of the United States from the Paris Agreement on climate change. Accordingly, they provide a baseline for future comparison.

BACKGROUND

Global temperatures in recent decades were higher than any comparable period in the last 400 years. The continued rising trend is mostly attributed to human activity.¹ Moreover, global warming is widely accepted as a major public health concern.²

Direct exposure to extreme weather can lead to posttraumatic stress disorder and other adverse mental health outcomes due to disruptions in social, economic, and environmental determinates

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Author Affiliations: Department of Family Medicine and Community Health (Temte, Kushner), BerbeeWalsh Department of Emergency Medicine (Holzhauser), University of Wisconsin School of Medicine and Public Health, Madison, Wis.

Corresponding Author: J.L. Temte, MD, Department of Family Medicine and Community Health, School of Medicine and Public Health, University of Wisconsin, 1100 Delaplaine Ct, Madison 53715-1896; phone 608.263.3111; email jon.temte@fammed.wisc.edu.

METHODS

Definitions

Climate Change refers to any significant change in climate measurements lasting for an extended time period, including major changes in temperature, precipitation, or wind patterns that occur over several decades or longer.

Dysphoria refers to a mixed state of emotional distress, presenting as inner tension, irritability, aggression, and/or hostility.⁴

23-Item Survey Instrument

We developed 9 attitudinal questions pertaining to climate change based on informal queries with interested individuals, as well as a review of recent literature dealing with climate change and health. Responses to 5 questions predicated by, "In the last 6 months, how often have you been aware of the following?" were indicated on 6-point Likert scales extending from 0 ("Not at all") to 5 ("All the time"). Responses to 4 questions predicated by, "To what extent..." ranged from 0 ("Not at all") to 5 ("A great deal"). Two additional

Table 1. Demographics of Sample and Relation to Affirmation of Climate Change^a

	No. of Respondents (%)	Affirming Climate Change	Univariate Factor vs CC χ^2 , sign	Multivariate Binary Logistic Regression Odds Ratio, [95th %CI], sign
Clinical site			7.42, 0.060	1.00 [0.65-1.53] 0.996
Urban (2)	305 (53.4)	91.0%		
Suburban (1)	146 (25.6)	85.3%		
Rural (1)	120 (21.0)	81.7%		
Age range	18-96 years		13.04, 0.071 ^b	1.24 [0.91-1.69] 0.170 ^b
Mean \pm	46.8 \pm 17.2			
Sex			3.54, 0.170	0.45 [0.18-1.16] 0.098
Female	357 (66.1)	89.7%		
Male	183 (33.9)	84.2%		
Parent of child(ren)			3.90, 0.048	0.73 [0.22-2.50] 0.621
Yes	380 (70.8)	85.8%		
No	155 (28.9)	92.1%		
Race			0.05, 0.820 ^c	0.11 [0.01-1.26] 0.076 ^c
Asian	15 (2.9)	86.7%		
Black	66 (12.6)	84.6%		
Native American	4 (0.8)	100%		
Pacific Islander	1 (0.2)	100%		
White	422 (80.5)	87.4%		
Other	16 (3.1)	100%		
Ethnicity			0.39, 0.533	0.00 [0.00-∞] 0.999
Hispanic	31 (7.5)	93.6%		
Non-Hispanic	378 (92.0)	90.1%		
Income quintile			1.61, 0.803	1.32 [0.90-1.93] 0.156
1st: <\$19,000	119 (24.3)	86.7%		
2nd: \$19K - \$33,999	80 (16.3)	91.9%		
3rd: 34K - \$53,999	91 (18.6)	88.5%		
4th: 54K - \$83,999	102 (20.8)	86.0%		
5th: \geq \$84,000	98 (20.0)	87.6%		
Education status			9.88, 0.042	1.15 [0.69-1.92] 0.594
< High school (HS)	25 (4.6)	81.8%		
High school diploma/GED	115 (21.3)	82.7%		
Some college	173 (32.0)	84.5%		
College (BA/BS) degree	148 (27.4)	91.2%		
Post-baccalaureate study or degree	80 (14.8)	94.8%		
Political affiliation			95.01, <0.001	0.39 [0.27-0.55] <0.001
Very liberal	82 (15.8)	95.1%		
Moderately liberal	112 (21.6)	97.3%		
Slightly liberal	52 (10.0)	97.8%		
Moderate	157 (30.3)	89.5%		
Slightly conservative	39 (7.5)	86.1%		
Moderately conservative	56 (10.8)	57.1%		
Very conservative	21 (4.1)	45.0%		

^aResults pertaining to affirmation of human causation of climate change are not presented.

^bAges were grouped by decade.

^cRacial affiliations were collapsed into white vs nonwhite.

yes/no questions forced responses to: “Is global climate change (Global Warming) occurring?” and “Is global climate change due to human activities such as the burning of fossil fuels (coal, oil)?”

To establish a metric for dysphoria, we used reduced versions of the 9-item Patient Health Questionnaire (PHQ) and the 7-item Generalized Anxiety Disorder (GAD) scale. The PHQ-2 and GAD-2 are screening tools—validated in primary care—that assess symptoms of depression and anxiety.⁵ We identified dysphoria by summing the scores of the 4 individual items on the PHQ-2 and GAD-2, which resulted in a composite dysphoria score (Dys-4) that ranged from 0 to 12 points.

Demographic questions defined respondents by age, sex, race, ethnicity, having children, 5 levels of educational attainment, 5 levels of household income based on Wisconsin quintiles, and 7 levels of political leaning extending from “Very Liberal” to “Very Conservative.”

This cross-sectional study was reviewed and determined exempt by the University of Wisconsin Health Sciences Minimal Risk Institutional Review Board.

Survey Population

We conducted convenience sampling of adult patients in the waiting rooms of 4 primary care clinics affiliated with the University

of Wisconsin Department of Family Medicine and Community Health. The clinics were located in urban (2 sites), suburban (1), and rural (1) areas within Dane County, Wisconsin. Participation was voluntary and anonymous. Eligible participants had to speak English, and be 18 years or older and cognitively unimpaired. Study coordinators approached patients and asked them to complete the 2-page survey. Data were collected without personal identifiers. All surveys were completed during June and July 2013, a period characterized by fairly average temperatures and precipitation.

Data Analyses

We relied on descriptive statistics for initial response evaluations and used chi-square and binary logistic regression⁶ to assess the relationship between demographics and recognition of climate change driven by human activity. Responses to the climate change questions were compared using analysis of variance. We then summed the responses in a single score with a value from 0 to 45. We used Spearman's rank correlation⁶ to compare the climate change composite scores (CCCS) to the Dys-4.

RESULTS

Response Rates and Demographics

Seventy-eight percent (571/728) of the patients approached completed the survey. Reasons for refusal included feeling too ill, being unwilling to complete a survey, "not having glasses," and having limited English language skills.

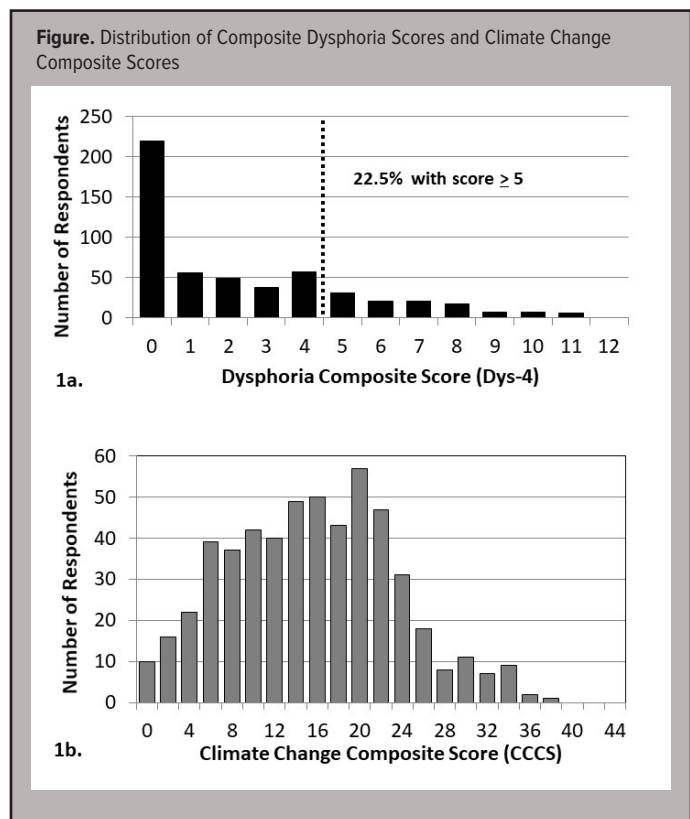
The sample included a broad age range, extending from 18 to 96 years with a mean of 46.8 ± 17.2 (\pm SD) years (Table 1). A majority (70.8%) of respondents were parents. The racial and ethnic profile of our sample was between Wisconsin and United States averages. Income status of participants closely matched income quintiles for Wisconsin. Educational attainment was somewhat higher than national and state averages. Political affiliation was slightly more liberal (mean = 3.41; 4.0 = moderate).

Dysphoria in Primary Care

Responses to the PHQ-2 and GAD-2 were skewed with means (\pm SD) and medians of 1.21 ± 1.58 ; 0 and 1.37 ± 1.72 ; 1, respectively. Using screening cut-offs of 3 points,⁷⁻⁸ 17.8% scored positively for depression and 19.5% for anxiety. The Dys-4 ranged from 0 to 12 points with a mean (\pm SD) and median of 2.58 ± 3.12 and 1 (Figure 1a). Using a screening cutoff of 5 points (either PHQ-2 ≥ 3 or GAD-2 ≥ 3), 22.5% of patients scored positively for dysphoria. The results are similar to the rate of anxiety disorders seen in primary care populations.⁹

Affirmation of Climate Change

Most patients (87.6%) agreed that climate change is occurring. Moreover, most (82.3%) agreed that climate change is due to human activities. When assessed with univariate statistics, parenthood ($P=0.048$), higher education ($P=0.042$), and liberalism ($P<0.001$) were associated with affirmation of climate change and global



warming (Table 1). Significant predictors for human causation were urban clinic affiliation ($P=0.025$), younger age ($P=0.026$), female sex ($P=0.023$), and liberal political identification ($P<0.001$).

Attitudes Toward Climate Change

The mean scores, on the 0 to 5-point scale, of climate change attitudinal questions varied from 1.25 ("Have you noted any health effects in you or your family members from climate change?") to 2.58 ("Paying more attention to changes in climate") (Table 2). Significant differences existed among the mean scores of the 9 questions (ANOVA; $P<0.001$). The value of CCCS ranged from 0 to 38 points with a mean (\pm SD and median of 15.1 ± 7.8 and 15). The distribution of the CCCS approximated a normal distribution (Kolmogorov-Smirnov: $P>0.15$) and is depicted in Figure 1b.

Relationship Between Attitudes Toward Climate Change and Dysphoria

Affirmation of climate change was not associated with positive screens for depression (PHQ-2 ≥ 3 ; $\chi^2=0.178$, NS) or anxiety (GAD-2 ≥ 3 ; $\chi^2=0.441$, NS). Likewise, attribution to human activity was not associated with screens for depression ($\chi^2=0.625$, NS) or anxiety ($\chi^2=0.054$, NS). The correlation between CCCS and Dys-4 was positive and highly significant ($r_s=0.345$; $P<0.001$).

DISCUSSION

Within a diverse set of primary care patients, we demonstrated a positive and highly significant association between an individual feeling concerned about climate change and experiencing dyspho-

Table 2. Survey Questions Pertaining to Attitudes Toward Climate Change and Global Warming in Order of Mean Response Level

Question	Mean ± SD	Median Response	% Indicating Frequently or More Often
Have you noted any health effects in you or your family members from climate change?	1.25 ± 1.34	1	16.7
Feeling sorry about or having remorse for the future	1.35 ± 1.27	1	16.8
Trying not to think about global warming	1.37 ± 1.251	1	13.4
Worrying about or dreading the future	1.59 ± 1.28	1	19.1
Noticing a loss of some seasonal climatic cues	1.78 ± 1.35	2	27.3
Are you aware of environmental changes in your community or state due to climate change?	1.79 ± 1.41	2	27.7
Are you concerned with global climate change?	2.42 ± 1.49	2	46.5
Are you troubled by the lack of action on climate change by leaders?	2.49 ± 1.65	2	49.3
Paying more attention to changes in climate	2.58 ± 1.30	3	54.9

ria. At the same time, patients with positive screens for depression or anxiety were no more likely to affirm global warming or human causation of global warming than patients with negative screens.

We are unable to distill causation from this correlative study. The results suggest that patients with dysphoria may be more likely to have enhanced awareness and concern over global warming or, conversely, patients with heightened awareness and concern over global warming may become dysphoric. Both scenarios are potentially of clinical importance, thus necessitating health assessments and mitigation efforts for the mental health consequences of climate change.

Limitations

Major limitations exist within this exploratory study. The data are from 2013, thus setting a baseline that should be reexamined. We sampled a convenience population that was highly constrained in terms of time and location—patients presenting to clinics affiliated with the University of Wisconsin and located within Dane County, Wisconsin. Dane County tends to be more liberal than surrounding areas. When all liberal-leaning respondents were removed from analyses, however, the correlation between CCCS and Dys-4 persisted ($r_s = 0.414$; $P < 0.001$), suggesting that the relationship was independent of political leaning.

There were also limitations within the survey instrument. We did not define key terms for participants, so understanding of climate change and global warming may vary among individuals. We did not validate the climate change attitudinal questions. Although weather patterns during the summer of 2013 were near average, responses to climate change questions could have been influenced by the intense heat and drought across Wisconsin during the previous summer. As is common within survey research, there can be response bias.

CONCLUSION

We initiated this study suspecting there were individuals negatively affected by the current and projected consequences of global climate change. From a population of adult primary care patients, we discovered high levels of concern regarding climate change and inaction on mitigation efforts by leaders (46.5% and 49.3%, respectively, indicating these concerns frequently or more often).

We also found a significant correlation between patient concerns and dysphoric mood, as detected by validated primary care screening tools. As global warming increases and inaction continues, more dedicated assessments of its consequences on all aspects of human health, including mental health, are needed.^{2,3,10}

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Enteric Fistula Treatment and Management: Results of an Institutional Inpatient Treatment Protocol

Nathan W. Kugler, MD; Samuel Boateng, BS; Travis P. Webb, MD; Colleen M. Trevino, PhD

ABSTRACT

Introduction: Enterocutaneous fistulae (ECF) are abnormal communications between the gastrointestinal tract and skin that may occur following an abdominal operation and result in significant morbidity and even mortality. Standardized care of patients with ECF has not been implemented at the majority of tertiary hospitals. We sought to evaluate the benefits of a multidisciplinary team utilizing an evidence-based clinical treatment protocol for inpatient management of ECF.

Methods: We performed an Institutional Review Board-approved retrospective analysis of outcomes after the implementation of an evidence-based clinical treatment protocol for patients admitted with ECF to the acute care surgical service at a large academic medical facility. Patients managed prior to the established protocol were considered part of the pre-protocol cohort (pre) while patients managed following implementation were included in the post-protocol cohort (post). A review of all eligible patients' hospital and clinic medical records was performed.

Results: In the pre cohort (n=6), the average length of stay was 37 days, ranging from 16-67 days, with a 16% spontaneous closure rate and 60% requiring operative management for closure. A single patient was not offered surgery due to significant comorbidities. The post cohort (n=13) demonstrated an average length of stay of just 16 days, ranging from 4 to 28 days, with an 84% spontaneous closure rate and 16% requiring operative closure.

Conclusion: Utilization of a standardized treatment approach results in high spontaneous closure rates with a decreased hospital length of stay.

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Author Affiliations: Medical College of Wisconsin, Department of Surgery, Division of Trauma and Critical Care, Milwaukee, Wis (Kugler, Boateng, Webb, Trevino).

Corresponding Author: Colleen M. Trevino, PhD, Medical College of Wisconsin, Department of Surgery, Division of Trauma and Critical Care, 9200 W Wisconsin Ave, Milwaukee, WI 53226; phone 414.805.8649; email ctrevino@mcw.edu.

INTRODUCTION

Enterocutaneous fistulae (ECF) are abnormal communications between the lumen of the gastrointestinal tract and skin that most often occur as a devastating complication following an abdominal operation. They occur due to disruption of the intestinal lining as a result of various processes, including spontaneous perforation or transmural necrosis, infection, surgical instrumentation, mechanical trauma, inflammatory bowel disease, or foreign body.¹⁻⁴ ECF are classified based on their anatomic site of origin (eg, gastric, small bowel, colonic) and output volume.^{2,3,5} Management requires a complex, multidisciplinary approach focused on proper nutritional support, sepsis control, and supportive care to maximize spontaneous closure rates.^{3,6,7}

While there has been a focused effort to improve many of the components of care for ECF patients, there has been little emphasis on a comprehensive protocol to aid in the management of these patients.

We hypothesized formation of an evidence-based treatment protocol for ECF management would result in increased nonoperative closure rates.

The basis for many of the components incorporated within our protocol has been previously described and published.^{2,6,8-10} Within our institution, an interprofessional committee formulated a standardized treatment protocol for the management of patients with ECF, utilizing an evidence-based approach. The protocol focuses

on correcting intravascular volume deficits along with early and regular nutritional assessments. An emphasis on wound management, including fistula isolation and output control for prevention of wound-associated complications, is essential.

The aim of this study was to evaluate patient outcomes before and after implementation of this interprofessional treatment protocol.

METHODS

An Institutional Review Board-approved retrospective chart review was performed on all patients with a diagnosis of ECF admitted to or receiving inpatient consultation from the Acute Care Surgery service (ACS) at an urban academic institution between November 1, 2011 and May 15, 2016. All patients with ECF were included, except those who chose to pursue immediate palliative care measures. Patients receiving care prior to implementation of the evidence-based treatment protocol on January 21, 2014 were classified as the pre-protocol (pre) cohort. Patients treated after January 21, 2014 were enrolled in the post-protocol (post) cohort. Patient data recorded and analyzed includes patient demographic information, cause of ECF, anatomic location of ECF (if known), complications of treatment, spontaneous closure of fistula, time to fistula closure, hospital length of stay, and discharge disposition. Unfortunately, due to the small sample size, nonparametric or parametric statistical testing could not be used in this analysis to determine significance. Therefore, descriptive statistics were used to describe the differences in outcomes between the groups.

In the pre cohort, there was no standardized process for managing patients. Each patient was managed by different physicians and their care was dictated by the single physician. This created variability on choices in nutrition, wound care, and medication use. Therefore, some patients received some of the care provided in the later-developed protocol and some received none of it.

Inpatient ECF Treatment Protocol

The protocol contains 8 key components within 4 algorithmic stages designed to optimize management of the hospitalized ECF patient. The protocol is designed for a target discharge of 14 to 21 days following ECF identification. The 8 components within each stage address wound management, infection control, social constructs, laboratory evaluation, patient mobility, nutritional support, fistula output management, and pain control. Each of the stages is defined below. (For complete ECF protocol, see Appendix online at https://www.wisconsinmedicalsociety.org/_WMS/publications/wm/j/pdf/118/2/Appendix-Kugler.pdf.)

Stage 1 (Days 1-3): Identification and source control of intraabdominal fluid collections is carried out with percutaneous drainage and/or antibiotics as clinically indicated. Patients undergo extensive laboratory evaluation, including electrolyte surveillance with a focus on basic metabolic panel, magnesium, phosphorus,

and urine urea nitrogen. Intravascular volume deficits are corrected with attention to electrolyte and acid base status. A 1:1 replacement with half-normal saline is utilized when fistula outputs are greater than 1 liter per 24 hours. Attempts to define the ECF anatomy are made with a fistulagram, considered the gold standard test.¹¹⁻¹³ Fistula outputs are measured and controlled utilizing nasogastric suction and/or proton pump inhibitors when indicated. Baseline nutritional assessments are performed utilizing indirect calorimetry. Early parenteral nutrition (PN) is initiated following control of any underlying sepsis, regardless of the volume of their fistula output. Patients are evaluated by physical and occupational therapy services. Patient and family questions are addressed and an overview of each stage is discussed to help guide patient expectations.

Stage 2 (Days 4-7): Following stabilization and initial evaluation, each of the core components is readdressed continuously. Wound management with refined dressings aimed at fistula isolation is performed. Subcutaneous octreotide therapy is initiated at 200 mcg every 8 hours if outputs remain high and/or hinder isolation, with a goal output less than 1 liter daily, and discontinued if the outputs do not decrease by 100% after 48 hours. Source control should be achieved and antibiotics continued as deemed clinically necessary. Repeat lab evaluation, including nutritional assessment, continues. Total parenteral nutrition (TPN) is continued to optimize nutrition; however, enteral nutritional (EN) access is achieved with initiation of therapy, including oral intake, as able. EN initiation is determined by fistula output volume less than 1 liter and wound care stability. Continuous adjustments in parenteral nutrition should address each individual patient's metabolic needs.

Stage 3 (Days 8-10): Wound management efforts continue with an emphasis on dressing plans that last greater than 24 hours, as transition to outpatient management is the goal. Need for further source control and antibiotic therapy is continuously reevaluated. All unnecessary lines should be removed, including Foley catheter and central venous access unless required for TPN. In the event that TPN must be continued, nutrient adjustments and cycling of infusion over 18 hours provide movement toward an outpatient regimen. ECF output control to less than 1 liter daily is the goal in assisting with fistula isolation, along with nutrition and hydration. Finally, pain management should be transitioned towards maximization of nonnarcotic oral medications with supplemental oral narcotics as needed. Utilization of liquid formulations is typically implemented in the setting of ECF within 90 cm of the pylorus.

Stage 4 (Days 11-14): As wound management is in the final stages of adjustment, dressings commonly remain in place greater than 24 hours without interim need for attention. At this stage, source control has been achieved and antibiotics are stopped as soon as appropriate. All central venous access is transitioned to tunneled

lines, with dual lumen access used only when peripheral lab draws are not feasible. Patients continue to undergo continuous nutritional reassessment even at this late stage with minor adjustments as needed. If tolerated, enteral nutrition and oral intake are maximized to limit need for TPN. Any necessary TPN is now transitioned to 12-hour infusions to aid in potential home regimens. Pain management regimens are finalized with oral narcotic supplements limited as much as feasible.

Negative Pressure Wound Therapy Application

The dressing system utilized within these subjects was comprised of application of a fistula ring made from the VAC GranuFoam sponge covered in the standard drape and sized to incorporate the site of drainage. In circumstances where patients suffer from enteric adherence factor, a single base layer of Acticoat (Smith & Nephew) was placed over the exposed bowel/granulation tissue beneath the VAC GranuFoam sponge with negative pressure wound therapy (NPWT) set to 75 mmHg continuous suction or less. Use of NPWT was determined based on location of the fistula and concomitant abdominal wound rather than fistula output. If the fistula could not be isolated from the wound, a wound manger was used over the entire wound to protect intact skin.

Discharge

Determining discharge destination is at the forefront of patient management, as approval of home health resources or facility placement require planning. As a rule, long-term acute care facilities have been utilized for ECF patients when patients require complex wound care (eg, dressing changes > 30 minutes), with some demonstrating deconditioning and/or need for TPN administration. Inpatient rehabilitation traditionally has been the focus for patients who exhibit a deconditioned state with potential need for TPN but less complex wound care needs. While nursing homes tend to be ideal for deconditioned patients who may or may not require TPN, such facilities typically are not optimal for complex wound management. Finally, in that subset of patients who are capable of returning home, home nursing care is most often deemed necessary for management of TPN and wound care.

RESULTS

A total of 19 patients with ECF who met inclusion criteria were included for analysis. Patient demographics, comorbidities, and fistula characteristics are outlined in Table 1. Overall, the pre cohort was slightly older than the POST cohort (mean age 57 years vs 50 years), with small bowel injury the most common cause of ECF within both groups. Of note, the post cohort included 2 patients with comorbid malignancy, while the pre group had none. Protocol compliance in the post cohort was 100%.

ECF treatment protocol implementation resulted in a decrease in length of stay from 37 days (range: 16-67 days) to 16 days (range: 4-28 days). Additionally, protocol implementation resulted in improved rates of spontaneous closure at a shorter interval. The

Table 1. Cohort Characteristics

	Pre-Protocol n = 6	Post-Protocol n = 13
Age (years)	57 (38-77)	50 (26-81)
Male, n (%)	4 (66.6%)	4 (30.7%)
Comorbidities, n (%)		
Hypertension	4 (66.6%)	4 (30.7%)
Diabetes	2 (33.3%)	5 (38.5%)
Depression/Anxiety	2 (33.3%)	4 (30.7%)
Malignancy	0 (0%)	2 (15.4%)
Malnutrition	2 (33.3%)	2 (15.4%)
Hyperlipidemia	1 (16.7%)	1 (7.7%)
Other	1 (16.7%)	1 (7.7%)
Primary Cause, n (%)		
Small Bowel Injury	3 (50.0%)	4 (30.7%)
Anastomotic Leak	0 (0%)	3 (23.1%)
Pancreatitis	1 (16.6%)	2 (15.4%)
Post Cesarean Section	0 (0%)	1 (7.6%)
Unknown	0 (0%)	1 (7.6%)
VAC Dressing Injury	1 (16.6%)	0 (0%)
Fistula Location, n (%)		
Small Bowel	4 (66.6%)	10 (76.9%)
Colon	2 (33.3%)	3 (23.1%)
Fistula Output, n (%)		
Low (\leq 500 mL/day)	4 (66.6%)	5 (38.5%)
High ($>$ 500 mL/day)	2 (33.3%)	8 (61.5%)

All numbers mean (Range) unless otherwise noted.

Abbreviation: VAC, vacuum-assisted closure.

Table 2. Cohort Outcomes

	Pre-Protocol n=6	Post-Protocol n=13
Length of stay (days)	37	16
Spontaneous closure, n (%)	1 (16.7%)	11 (84.6%)
Time to closure, n (%)	8 months	2.7 months
30-day mortality, n (%)	2 (33.3%)	1 (7.7%)
Complications, n (%)	3 (50%)	3 (23.1%)
MSSA infection	0 (0%)	1 (33.3%)
Urinary tract infection	0 (0%)	1 (33.3%)
Wound infection	1 (33.3%)	0 (0%)
Enterocutaneous fistula	1 (33.3%)	0 (0%)
Deep venous thrombosis	1 (33.3%)	0 (0%)
Discharge disposition, n (%)		
Home	1 (16.7%)	10 (76.9%)
Long-term acute care	4 (66.7%)	1 (7.7%)
Inpatient rehabilitation	1 (16.7%)	1 (7.7%)
Skilled nursing facility	0 (0%)	1 (7.7%)

Abbreviation: MSSA, methicillin-sensitive *Staphylococcus aureus*

pre cohort experienced a spontaneous closure rate of 16.7% with 4 of the remaining 5 requiring operative closure. One patient was not offered operative intervention due to extensive medical comorbidities. Patients managed following protocol implementation experienced a spontaneous closure rate near 85%, with the remaining 2 patients ultimately requiring operative closure. Secondary outcomes demonstrate a decrease in complication rates and improved 30-day mortality. Following implementation of the ECF protocol, a greater percentage of patients were discharged

home (77% vs 17%) with less reliance on facility outpatient management. See Table 2 for complete outcomes.

DISCUSSION

Management of patients with ECF is challenging, resulting in significant expenditure of time and resources within our health care system. Prior to implementing this standardized protocol within our institution, we found that few goals were outlined to ensure progressive care for these patients and that care was extremely disorganized, with little attention paid to ensuring a balanced approach. The majority of patients within the pre cohort did not have the expertise of each of the disciplines represented within the protocol, and much of their treatment was not focused on evidence-based approaches. This study demonstrates that an inter-professional approach with standardized treatment using evidence-based guidelines for ECF management may prove beneficial to patient outcomes. After implementation of our protocol, patients experienced a reduction in the length of inpatient hospital stay, an increase in spontaneous closure rate, and lower morbidity and mortality.

Initial management of ECF requires a comprehensive approach that focuses on the medical aspects of care. To maximize the likelihood of spontaneous fistula closure, factors such as etiology, fistula output, free distal flow, and comorbid disease must be identified, considered, and managed. Researchers and clinicians in the past have described the use of TPN, somatostatin, and NPWT to decrease output and facilitate spontaneous closure.¹⁴⁻¹⁷

This study describes our successfully implemented standardized approach to managing such complex patients. The majority of ECF in our patient population occurred after small-bowel injury. However, other common causes such as anastomotic leak, pancreatitis, gunshot wounds, and vacuum dressing injury were treated, improving the applicability of these findings to multiple patient populations. Interestingly, spontaneous closure of ECF was successful in the majority of patients after implementing the protocol, but was rare prior to implementation. We believe this is a result of the aggressive medical management of this patient group, particularly optimization of nutrition to facilitate healing.

ECF are classified according to output: high (>500 cc/24 hours), medium (200-500 cc/24 hours), and low (<200 cc/24 hours).^{5,18} Often, anatomic location of the ECF has a direct relationship to its output. As high output fistulas are less likely to close spontaneously and are associated with a higher mortality, all attempts at decreasing output are critical to management. Proper nutrition in the setting of ECF is essential to successful management, with TPN utilization being key. TPN has been shown to decrease the enteric secretions and, thereby, fistula output.^{8,19-21} Octreotide, a somatostatin analogue, has been widely recommended to help in ECF closure.^{22,23} However, the success of octreotide in limiting fistula output and increasing spontaneous closure rates remains debated.²⁴⁻²⁷ We chose to utilize octreotide 200 mg every 8 hours

in patients with high-output fistula and those in whom dressings proved difficult due to fistula output. Output was monitored closely, and if no significant decrease in output occurred within 48 hours, the octreotide treatment was stopped. Of note, we observed decreased fistula output in nearly all of our post cohort following initiation of octreotide therapy; however, we were unable to isolate its benefit given the multifaceted approach presented in this study. The high spontaneous closure rates observed in our post cohort compare favorably with rates reported in the literature and likely exhibit the combined benefits of these adjunct therapies.

Prevention of wound complications is essential to successful management of an ECF. Patients with large open wounds are frequently treated with NPWT as a means of isolating the wound and protection from effluent spillage.²⁸⁻³⁰ One of the feared complications of NPWT is formation of an ECF; however, utilization of NPWT within the post cohort demonstrated no subsequent fistula formation. We attributed this to the utilization of a protective Acticoat layer between the bowel and the sponge.

The relatively low mortality rate of 7.7% in the post cohort compared to 33.3% in pre cohort compares favorably with rates reported by other studies.^{3,8,21} An improved mortality outcome is achieved with a focus on early sepsis control, electrolyte correction, and nutritional support. Prevention of organ failure through early identification and treatment of sepsis is essential as sepsis has been shown to be the main cause of death in ECF.^{7,9,31-33}

One of the focuses of this study was reduction in length of stay, as inpatient hospitalizations following ECF formation are often long, translating to a significant expense. Length of stay for the purposes of this study was based solely on hospital days at our institution. This study demonstrates an impressive decrease in length of stay within the post cohort, which we postulate is the result of early identification of ECF patient needs, allowing early arrangements for home health care or long-term treatment when indicated. Decreasing length of stay can be challenging, as it requires substantial communication between the hospital care providers, community facilities, and home care agencies. Additionally, early identification of insurance needs provides adequate time for approval, preventing further delay. Finally, a great challenge in discharge is aligning family and patient expectations with those of health care providers. Prior to implementation of the protocol, discharge planning was a significant challenge given a lack of guidance and organized criteria. The post cohort demonstrates the benefits of this protocol, as discharge is achieved in a safe and timely manner by addressing a patients' clinical, social, and financial needs.

There are several limitations to this study, including its retrospective nature, small size of the study population, and the single institution setting. Utilization of a historical control cohort prior to formation of the treatment protocol provides opportunity for confounding variables in care that are not accounted for in this study. Unfortunately, due to the small sample size, we are unable

to utilize nonparametric or parametric statistical testing to determine significance. Therefore, we chose to use descriptive statistics to describe the differences in outcomes between the groups. Furthermore, it should be noted that none of our patients had an underlying etiology of inflammatory bowel disease, which is also a common cause of ECF. These limitations should be considered when evaluating the generalizability of the data; however, given the success of the current approach, we believe that patients with ECF and the health care system benefit from a standardized approach to this complex problem.

CONCLUSION

Inpatient management plays a pivotal role in the treatment of ECF patients. An interprofessional team utilizing a standardized, evidence-based treatment protocol can lead to reduced inpatient length of stay and improved rates of spontaneous ECF closure, thereby reducing overall morbidity and mortality.

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Effects of Personalized Music on Caregivers of Older Adults With Dementia in the Community

Lisa Quinn-Lee, PhD; Donald Mowry, PhD

ABSTRACT

Introduction: Music is a relatively low-cost and low-risk approach to managing the behavioral and psychological symptoms of dementia.

Objective: This exploratory study provided personalized music for 3 months to 25 older adults with dementia living in their homes with a caregiver and measured how the intervention affected the caregivers, including their perception of distress.

Methods: Caregivers completed the Caregiving Distress Scale (CDS) at pre- and postintervention and also participated in semistructured, in-depth, qualitative interviews.

Results: Quantitative data were analyzed using SPSS; qualitative data were analyzed using NVivo. Paired t-tests revealed a decrease in total CDS scores ($P < 0.01$).

Conclusion: Overall, caregivers believed that personalized music supported them and reduced stress.

INTRODUCTION

Approximately 5.7 million Americans are living with Alzheimer disease and related dementias.¹ In Wisconsin, approximately 115,000 people have dementia, with that number expected to increase to 242,000 by 2040.² As the number of people affected by dementia grows, it is important to develop and expand effective strategies for meeting their needs, as well as the needs of their caregivers.² One strategy involves the use of personalized music, and one such program is Music & Memory.³ The documentary *Alive Inside: A Story of Music and Memory* highlights the benefits of personalized music playlists and the work of the Music and

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Author Affiliations: University of Wisconsin-Eau Claire, Eau Claire, Wis (Quinn-Lee, Mowry).

Corresponding Author: Lisa Quinn-Lee, PhD, Associate Professor, University of Wisconsin-Eau Claire, 105 Garfield Ave, PO Box 4004, Eau Claire, WI 54702-4004; phone 715.836.5405; email quinnllm@uwec.edu.

Memory organization.⁴ The documentary shows how personalized music, which is a selection of music tailored for each individual, connects people with their specific histories, restores emotions, and awakens even long-lost memories. Since music engages the brain (especially areas that correspond to pleasure, movement, and memory) more fully than any other type of stimulus, people who were previously unresponsive were able connect to themselves and others. Music is a relatively low-cost and low-risk approach to managing the behavioral and psychological symptoms of dementia.^{5,6} Dementia has a significant impact on patients, families, and caregivers and can affect quality of life.⁷ As the number of people with dementia increases, family caregivers take on an increasing burden of care, along with the personal costs that entails.

Demanding and difficult behavioral disturbances of a person with dementia and their management frequently induce stress and increase caregiver burden.⁸⁻¹⁰ Often, these behaviors are more challenging to prevent, reduce, or manage than the cognitive decline of the disease.¹¹ Caregivers of those with dementia suffer from higher rates of depression, and the physical and emotional impact of this caregiving is estimated to total billions of dollars in the United States.^{8,11}

While the majority of people with dementia live at home and rely on a family member as a caregiver,¹¹⁻¹² previous research concentrated primarily on Music and Memory programs in institutional settings. The purpose of this exploratory study was to bring the Music and Memory program to older adults with dementia living in their homes with a caregiver in Northwest Wisconsin, and to measure how this 3-month intervention affected the caregivers, including their perception of distress.

METHODS

This study received approval from the University of Wisconsin-Eau Claire Institutional Review Board. The approach for the study was based on the Alzheimer Society of Toronto Music and Memory: iPod Project;⁵ and the authors' county Aging and Disability Resource Center (ADRC) assisted with participant recruitment.

There were 25 pairs of participants. Each pair included a person with dementia living at home and their caregiver. Caregivers provided consent, and participants with dementia either gave consent or assent. Each participating pair received a free iPod Shuffle, free over-the-ear headphones, and a free \$50 iTunes Store gift card to access music of their choice; and caregivers were asked to have the person with dementia listen to personalized music for a minimum of 60 minutes per day.

The researchers made a minimum of 3 home visits, each lasting approximately 1 hour. At the first home visit, consent forms were explained and signed, the Caregiving Distress Scale (CDS) was administered (Time 1), and the researcher asked both the caregiver and the person with dementia about music preferences. Researchers noted specific songs, artists, and genres. After the first visit, they downloaded the preferred music from iTunes into a digital library on a desktop computer, then downloaded the music onto the iPod. Each participant received \$50 worth of music downloads; the researcher used the \$50 iTunes Store gift cards to purchase the music. Each iPod had several hours of music on it.

During the second home visit approximately 1 to 2 weeks later, the researchers trained the caregiver how to use the iPod. Several weeks after the second home visit, the researchers called the caregiver to ask how their loved one liked the music, whether there was any music they wanted to add or remove, and if they had any questions about how to use the iPod. If there were no changes or questions, the researcher called the caregiver again several weeks later to check in. If changes were needed to the music and/or the caregiver had questions on how to use the iPod, another home visit was made. At the final home visit, researchers administered the posttest CDS and asked qualitative interview questions.

Pretest data was collected via the 17-question CDS,¹³ which addressed caregivers' feelings of emotional burden, relationship distress, care receiver demands, social impact, and personal cost (Table 1). Caregivers completed the assessment by rating their perceptions of their relationship with the care recipient on a 5-point Likert-like scale, from zero as "strongly disagree" to 4 as "strongly agree." The maximum possible score was 68 points; the higher the score, the greater the caregiver distress. In addition, demographic information regarding sex, age, ethnicity, language, severity of dementia, and relationship of the caregiver to the person with dementia was collected prior to beginning the music intervention.

When the intervention concluded after approximately 3 months, the CDS was re-administered (Time 2) with a qualitative

Table 1. Caregiver Distress Scale and Subscales

Instructions: Specific aspects of family life are affected by the demands of caregiving. With respect to your current situation as caregiver for _____, please indicate whether YOU personally disagree or agree with the following statements using the 5-point scale below.

0-strongly disagree 1-disagree 2-neutral 3-agree 4-strongly agree

- ____ 1. I take part in organized activities less
- ____ 2. I visit my family/friends less
- ____ 3. I take part in other social activities less
- ____ 4. I feel frustrated with caring for _____
- ____ 5. My relationship with _____ depresses me
- ____ 6. I feel pressured between giving to _____ and others in the family
- ____ 7. I feel that my own health has suffered because of _____
- ____ 8. My relationship with _____ is strained
- ____ 9. Caring for _____ has made me nervous
- ____ 10. I feel _____ can only depend on me
- ____ 11. I feel resentful towards _____
- ____ 12. I feel helpless in caring for _____
- ____ 13. My relationship with _____ no longer gives me pleasure
- ____ 14. _____ tries to manipulate me
- ____ 15. I feel overwhelmed by caring for _____
- ____ 16. _____ makes more requests than necessary
- ____ 17. I feel that my personal life has suffered because of _____

Score range for the overall scale is 0-68.

Emotional burden subscale: sum of items 4, 9, 12, 15 (0-16 points).

Relationship distress subscale: sum of items 5, 8, 11, 13 (0-16 points).

Care-receiver demands subscale: sum of items 6, 14, 16 (0-12 points).

Social impact subscale: sum of items 1, 2, 3 (0-12 points).

Personal cost subscale: sum of items 7, 10, 17 (0-12 points).

Table 2. Participant Demographics (N=22)

	Mean Age	Relationship to Care Receiver		
Caregivers	70.12	Wife 14	Daughter 5	Husband 3
Care Receivers	75.48	Husband 14	Parent 5	Wife 3

interview that included semistructured questions such as: (1) How do you and the person you care for use the iPod? (2) How has the iPod Project affected you and the person for whom you care? (3) To what degree has personalized music brought more pleasure to the patient/client/person? (4) To what degree does providing personalized music for the person help you in caring for her/him? (5) How likely are you to recommend this program to other caregivers? (6) How has this approach affected your quality of life? (7) What else would you like to share about this experience?

SPSS was used to analyze the quantitative data. The researchers only analyzed data from participants who completed the CDS twice (Time 1 and Time 2). A paired t-test was conducted to compare scores for each of the 5 subscales and for the overall CDS score. NVivo was used to code the qualitative data. Data from the open-ended questionnaires were transcribed verbatim into Word and then entered into NVivo for analysis. Data were analyzed using the constant comparative method¹⁴ whereby each word,

Table 3. Descriptive Statistics and *t*-test Results for Mean Differences of Caregiver Distress Scale (CDS) and Subscales

Scale/Subscale	Time 1	Time 2	Change in Mean	SD	<i>t</i>	df	<i>P</i> -value
Overall CDS	29.19	22.74	-6.45	9.61	3.08	21	.006*
Emotional burden	6.70	3.34	-3.36	3.80	4.15	21	.000*
Relationship distress	5.70	2.87	-2.20	3.01	3.44	21	.002*
Caregiver demands	2.42	2.18	.24	2.3	.47	21	.640
Social impact	3.56	3.11	.45	3.47	.614	21	.546
Personal cost	3.31	2.45	.86	2.34	1.73	21	.098

**P* < .01

phrase, and sentence was reviewed to decide what codes fit the concepts suggested by the data. Each code was constantly compared to all other codes to identify similarities, differences, and general patterns. An inductive approach was used, where codes, categories, or theme were drawn directly from the data. Although the categories generally flowed from the questions asked, all data were coded throughout the document relevant to the topic of interest, allowing the themes to emerge freely from the data.

RESULTS

The music protocol was designed to reduce distress and enhance satisfaction with caregiving, while offering the person with dementia the potential to improve mood and psychological state. Twenty-five participants started the 3-month program; 22 participants finished. One was sent to a nursing home facility out of the area, one moved out of the area with a different caregiver and did not return emails, and another declined to participate in the post intervention evaluations. (See Table 2 for participant demographics.)

Paired *t*-tests revealed a decrease in total CDS scores and the subcategories of emotional burden and relationship distress among participants. There was no statistical significance for difference in scores in the subscales for caregiver demand, social cost, and personal cost (Table 3).

Four common themes emerged from the caregiver narratives (Table 4). Overall, results indicated that the caregivers believed that personalized music brought more pleasure to the person with dementia and also helped support the caregivers and reduce their stress. There was wide variation in how often and when they used the music, and no clear associations were found between caregiver distress and frequency and/or timing of the music intervention.

DISCUSSION

Personalized music for long-term care residents with dementia has been shown to reduce agitation¹⁵⁻¹⁶ and anxiety; decrease the use of antipsychotic and anxiolytic medications to control behaviors that challenge staff and family members;¹⁵ increase socialization, broad cooperation, and verbalization; improve behavior; and elevate mood.¹⁶ These findings were also evident in our results and

connected to the themes of better quality of life and improved relationship between care receiver and caregiver. However, despite substantial literature concerning the therapeutic effects of music, surprisingly few rigorous empirical evaluations have been conducted,¹⁷ and the interventions were not well-defined and variable.

Dementia symptoms are usually distressing for both the person with dementia and the caregiver; it is essential to consider

caregivers in planning interventions to improve daily functioning.¹⁸ Personalized music has the benefit of allowing the caregiver and care receiver to both participate—together or apart—and can be done in a home setting.

In response to this growing trend supported by the literature, we sought to expand the personalized music intervention into the community, where most people with dementia live with a family member. There are many facets of dementia and caregiving, and health care workers are especially suited to approach health care holistically and integrate diverse interventions to assist clients and their families. Since the stress and burden of providing care increase with the progression of dementia, interventions that bolster the caregiving relationship over time are essential.

There are some limitations to this study. Since recruitment was done through the ADRC, the study's subset of caregivers may differ from those who do not seek out services, eg, possibly being more motivated or having a higher caregiver burden at baseline. We recommend that future research be completed on a larger scale, and we would do at least 3 things differently: provide external speakers to all participants so they could listen to music with their care recipient (without having to purchase their own speakers), provide a larger iPod because the buttons on the iPod Shuffle were too small for many participants, and have caregivers keep more detailed logs of their close observations and how and when they use the music.

Myriad health care professionals could utilize and/or suggest this intervention when working with patients with dementia and their caregivers; volunteers also could be trained to provide this resource and teach it to caregivers. Since it may help people with dementia to be more verbal and engaged, it could facilitate their interactions.

CONCLUSION

Although more evidence for the efficacy is needed, personalized music has the potential to have a high impact with a low cost. We suggest that this intervention be further implemented with home care patients and hospice patients, and in other settings, including hospice facilities, assisted living facilities, and community centers. The goal of eventually making personalized music a standard of care seems both valuable and possible.

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Table 4. Common Themes and Selected Quotes From Caregiver Narratives

Theme 1. Psychological symptoms improved

- A. For caregiver
- Decreased anxiety
 - Decreased stress
 - Decreased depression
 - Increased happiness
"It improved my mood at times."
"It made me feel less nervous."
"I felt less helpless."
"It makes me happy to see her enjoying the music."
- B. For person with dementia
- Decreased anxiety
 - Decreased stress
 - Decreased depression
 - Increased happiness
 - More relaxed and calm
"It makes him happy to listen to the music."
"It gave him joy and made his life better when he used it."
"She was more relaxed and calm."
"He was enjoying directing the band one day!"

Theme 2. Behaviors

- A. Verbal – increased desired behaviors and decreased undesired ones
- B. Physical - increased desired behaviors and decreased undesired ones
- C. Kept the person with dementia occupied
- D. Helped the person with dementia sleep better at night
- E. Kept the person with dementia occupied
- F. Person with dementia was livelier and more engaged
"The music kept him occupied."
"There were fewer difficult behaviors."
"It was easier to do caregiving tasks."
"It helped her sleep better at night."
"He was livelier and more engaged."
"He had fewer outbursts."

Theme 3. Quality of life

- A. Improved quality of life in person with dementia
- B. Improved quality of life in caregiver
"Music and Memory is definitely a positive program. I appreciate we are a part of it. It is good for both of us. Life is a little better and easier."
"For such a small thing it does give a respite for both of us and improves our quality of life."
"It helps me. I'm able to do things while he listens to the iPod."
"It gives her something to do and keeps her from getting bored."
"It's nice to see him doing something he enjoys."
"I love to watch him with the iPod on. It is pleasant to know he is listening to music he used to like and enjoy and that he still has those memories. It has allowed him to reconnect with songs and that area of his life."
"We enjoy music with the iPod concept that provides pleasure for many hours."

Theme 4. Improved relationship between caregiver and person with dementia

- A. Danced together
- B. Sang together
- C. Shared memories
- D. More engaged
- E. Listened to music together
"It is wonderful to listen to the music together."
"We enjoy listening to the music together while dancing and singing together."
"It allows us to connect and share memories."
"We're both more engaged and more motivated."
"The music helps both of us to interact with a better attitude."

Survey of Southern Wisconsin Needle Exchange Clients Regarding Opioid Overdose and Naloxone Use

Amelia Baltés, BS; Brienna Devo, MPH; Margaret Kaiser, BS; Jen Birstler, MS; Randall T. Brown, MD, PhD

ABSTRACT

Background: Factors surrounding opioid overdose and naloxone use must be explored from the user perspective in order to more effectively combat the current opioid crisis.

Methods: AIDS Resource Center of Wisconsin needle exchange clients were surveyed regarding overdose victim demographics, interventions, experience with naloxone, and overdose outcomes.

Results: Most respondents (102/108, 94.4%) reported either experiencing or witnessing an overdose. While naloxone was often used (64/102, 62.7%), other recommended interventions, such as calling 911 (44/102, 43.1%) and rescue breathing (31/102, 30.4%) often were not. Potential legal consequences were cited as a major barrier for contacting emergency medical services (42.3%).

Discussion/Conclusion: There appears to be a need for education and/or policy change to facilitate appropriate overdose prevention and use of emergency medical services in the setting of opioid overdose.

INTRODUCTION

The opioid crisis continues to intensify in the United States and Wisconsin. Nationally, heroin-related deaths increased 5-fold between 2010 and 2017.¹ In Wisconsin, opioid overdose deaths more than doubled between 2010 and 2017.² In Dane County alone, there were 7 times more heroin-related mortalities in 2016 than 2007.³

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Author Affiliations: Department of Family Medicine and Community Health (Baltés, Devo, Kaiser, Brown), Department of Biostatistics and Medical Informatics (Birstler); University of Wisconsin School of Medicine and Public Health, Madison, Wis.

Corresponding Author: Amelia Baltés, Department of Family Medicine and Community Health, University of Wisconsin School of Medicine and Public Health, 1100 Delaplaine Ct, Madison, WI 53715; phone 608.265.8926; email aabaltés@wisc.edu.

However, from 2013 to 2014, while rates of heroin use remained stable or increased, heroin-related deaths in Dane County actually decreased 30%, likely, at least in part, due to the distribution of lay naloxone (Narcan).⁴ Naloxone is an opioid antagonist that reverses the effects of opioids, thereby correcting life-threatening opioid-induced respiratory depression. Community-based training programs for layperson naloxone distribution and administration have become one of the leading public health interventions used to decrease overdose mortality rates among people who inject drugs.⁵

In 2014, Wisconsin passed the Heroin, Opiate Prevention and Education (HOPE) legislative package. This legislation allows emergency responders to carry and administer naloxone, provides overdose witnesses with limited immunity from criminal prosecutions when seeking assistance for overdose from emergency services, and expands naloxone access to nonmedical personnel or laypeople.⁶

With the passage of HOPE legislation allowing for lay possession and administration of naloxone in Wisconsin,⁷ it is important to evaluate the current experience, knowledge, practices, and perceptions of drug users to appropriately target educational and distribution efforts. The Opioid Overdose Prevention and Naloxone Use Survey aims to clarify education and resources needed for drug users and overdose witnesses.

METHODS

We conducted a cross-sectional study utilizing The Opioid Overdose Prevention and Naloxone Use survey. The survey tool

aims to identify the circumstances regarding naloxone use by nonmedical personnel and the factors that contribute to opioid overdose. The tool was developed through reference to literature regarding opioid overdose risk factors, incorporation of commonly understood social determinants of health (eg, income, sex, education), and description of overdose events and intervention circumstances in other communities and studies. Survey items were further refined through discussion with the community outreach program serving as the study site (AIDS Resource Center of Wisconsin).^{5,8,9} English-speaking clients who received naloxone, clean needles, and/or participated in naloxone training through either the Community Pharmacy in Madison, Wisconsin or one of the two AIDS Resource Centers of Wisconsin (ARCW) mobile needle exchanges in Dane and Milwaukee counties were asked to complete the survey.

The ARCW mobile needle exchanges are vans that drive to and meet with clients in order to provide clean injection supplies. From June 1, 2016 to December 31, 2017 – a similar timeline to that of survey distribution – 7,951,575 syringes were distributed throughout Wisconsin, including 2,086,806 syringes in Dane and Milwaukee counties.

Respondents were considered eligible if they were a client of the needle exchange services. If the client had either experienced or witnessed an overdose, they were asked to complete the entire survey; if they had not experienced or witnessed an overdose, they were directed to the optional demographics section prior to survey termination. Because the vans are mobile throughout their respective counties, clients/survey respondents were scattered geographically throughout Dane and Milwaukee counties.

The survey was available online between July 2016 and July 2017. Business cards with a link to the survey were distributed with clean needle kits in Dane County for the duration of the survey period and in Milwaukee County from January 2017 until July 2017.

To penetrate the largest possible audience, a paper version of the survey also was offered in conjunction with ARCW services at both the Dane and Milwaukee county mobile needle exchanges during the summer months when a research staff member was available for in-person survey administration. Over the 12-month survey period, 66 surveys were collected in person; 54 were collected online.

Survey Tool

The survey consisted of 36 items. To maintain consistency, respondents were instructed to answer the questions based on the most recent overdose they witnessed or experienced personally. Information regarding circumstances surrounding the overdose included which drugs were involved, the type of location in which the overdose occurred, and relationship of the survey respondent to the person who overdosed. Information regarding response to the overdose included whether 911 was called; who responded to

the overdose; whether naloxone was administered and if so, who administered it and how many doses were needed; and whether the victim was revived. Demographic information collected for both the person who overdosed and the survey respondent included age (in range categories) and sex. For survey respondents only, demographic information collected included employment status at the time of the overdose, educational attainment, and race/ethnicity. An open response question also was included to capture “anything else that you would like us to know about your experience with opioids, naloxone (Narcan), or overdose.”

Analytical Approach

Associations between information source and 911 calls were tested using chi-square tests. No significant associations were found and those results are not reported. Therefore, descriptive counts (%) were calculated and used for quantitative analysis. Statistical analysis was performed with R 3.4.0. For qualitative results, coauthors (Baltes, Devo, and Kaiser) independently reviewed the open-ended responses and performed a conventional content analysis to identify and describe common themes.

Institutional Review

Based on review by the University of Wisconsin (UW) Health Sciences Institutional Review Board, this research qualified as exempt for continuing review and satisfied the UW-Madison’s ethical standards for the protection of human research participants.

RESULTS

Quantitative Results

In total, 108 surveys were completed and submitted. Twelve surveys were consented to online, but the participants terminated the survey prior to the collection of any information. Of the 108 completed surveys, 6 respondents had never witnessed or experienced an overdose, 24 described their own overdose, and 78 witnessed an overdose.

Respondent demographic information is detailed in the Table. Nearly half of the respondents were male (49/108, 45.4%), and more than half were white (80/108, 74.1%) and were 25 to 34 years of age (57/108, 52.8%). Less than half had attended some college but did not obtain a degree (31/108, 28.7%) and were employed at the time of the overdose (49/108, 45.4%).

Those who experienced an overdose were typically male (68/102, 66.7%) and were 25 to 34 years of age (54/102, 52.9%). In some circumstances, the person who overdosed had used alcohol (15/102, 14.7%), benzodiazepines (13/102, 12.7%), and/or cocaine/crack (12/102, 12.7%) concomitantly with heroin prior to overdosing. Of those who survived their overdose, 72.9% reported continued opioid use (70/96).

Among respondents who witnessed an overdose, the person who overdosed was often a friend (42/102, 41.2%), overdosing in a house or apartment (65/102, 63.7%). Those who most

Table. Survey Respondents Demographics (N=108)

Demographics/Characteristics	Survey Response No. (%)
Age Groups (years)	
18-24	14 (13.0)
25-34	57 (52.8)
35-44	19 (17.6)
45-54	8 (7.4)
55-64	4 (3.7)
> 64	1 (0.7)
Sex	
Female	52 (48.1)
Male	49 (45.4)
No response	7 (6.5)
Race	
Asian	1 (0.9)
Black/African American	4 (3.7)
Native American	3 (2.8)
Pacific Islander	1 (0.9)
White/caucasian	80 (74.1)
Multiple races	7 (6.5)
No response/unknown	12 (11.1)
Ethnicity	
Hispanic/Latinx	9 (8.3)
Not Hispanic/Latinx	91 (84.3)
No response/unknown	8 (7.4)
Education	
8th grade or less	4 (3.7)
High school, no degree	11 (10.2)
High school graduate	17 (15.7)
GED or equivalent	4 (3.7)
Some college, no degree	31 (28.7)
Associate degree	14 (13.0)
Bachelors degree	14 (13.0)
Graduate school	4 (3.7)
No response	9 (8.3)
Employment	
Working	49 (45.4)
Temporarily laid off/on leave	4 (3.7)
Unemployed, looking for work	11 (10.2)
Unemployed, not looking for work	21 (19.4)
Disabled	8 (7.4)
Student	3 (2.8)
No response	12 (11.1)

commonly responded to the overdose were the survey respondent (65/102, 63.7%), friends or relatives of the overdose victim (51/102, 50.0%), and emergency personnel (39/102, 38.2%).

Actions taken to reverse the overdose included calling 911 (44/102, 43.1%), performing rescue breathing (31/102, 30.4%), and naloxone administration (64/102, 62.7%). Forty-four percent (26/59) of respondents said they had not called 911 because they had resolved the situations themselves, while 49.2% (29/59) did not call because they did not want the person overdosing or themselves to suffer legal consequences. Eleven of the 44 respondents who had either witnessed or experienced an overdose and called 911 said the person overdosing was arrested (25%). In addition, 3 respondents said that both the witnesses and the person who overdosed were arrested at the scene (3/44, 6.8%).

Respondents who did not call 911 were most likely to report having received information regarding opioid overdose and naloxone administration from friends who use drugs (30/59, 50.8%), while respondents who did call 911 received their knowledge from medical personnel (13/44, 29.5%) as often as they did from friends who use opioids (13/44, 29.5%).

In terms of naloxone use, nearly half (27/64, 42.2%) of the overdoses for which it was administered required 2 doses of injectable medication (60/64, 93.8%), rather than the intranasal formulation (2/64, 3.1%). (Two individuals did not know which naloxone formulation was administered [2/64, 3.1%.]) The majority of respondents stated that the naloxone took less than 5 minutes to work (56/102, 54.9%) and that no difficulties arose during its use (56/102, 54.9%). The variation of naloxone dosing and time to effect is influenced by the amount and strength of the opioid ingested or injected.⁸

Of the 108 survey respondents, 59 indicated that they had previously obtained naloxone (54.6%). Forty-one (38.0%) had never purchased it, and 38 reported receiving some for free (38/108, 35.2%), either through the ARCW or other needle exchange programs. The majority had administered their most recently acquired supply on someone else (27/59, 45.8%) or still had it (19/59, 32.2%).

Qualitative Results

The survey included an open-response question at the end for respondents to provide any relevant information that may have been missed. Upon completing a conventional content analysis, 3 major themes were identified:

- The fear of legal consequences hampers the motivation of overdose respondents to call for emergency support services.
- The increase in naloxone availability and accessibility allows for greater overdose response by laypeople.
- An increased prevalence of fentanyl-laced drugs was perceived as increasing the frequency of unintentional opioid-related overdoses.

Respondents often expressed the sentiment that worry regarding potential legal penalties made them less likely to involve police or other first responders. Many also conveyed their appreciation for the expanding availability and use of naloxone in the case of an overdose event. This appreciation was noted especially in the context of the increased incidence of dangerously modified drugs leading to unintentional overdoses. These opinions express barriers that currently exist and warrant further attention from an interdisciplinary team in order to address and potentially eliminate their impact on overdose situations.

DISCUSSION

Several general themes have been gathered from this survey. First, when an overdose occurs, individuals are more likely to try to resolve the situation themselves rather than call 911. Almost half of

respondents cited fear of arrest (either of themselves or the person overdosing) as a major factor in their decision to forgo involving first responders. Additionally, many respondents who chose not to call 911 generally received opioid overdose and naloxone education from friends who use drugs, rather than from a professional entity. Wisconsin has Good Samaritan laws, which, at the time of this survey, provided immunity from drug possession or paraphernalia charges against the person who witnesses a drug overdose and calls 911.⁶ The existence of such laws increases appropriate overdose response, particularly with the increase of fentanyl and analogs in the illicit opioid supply.¹⁰ Despite this, users and witnesses may, in fact, still be at risk for arrest. A portion of these results reflects the need for (1) education of law enforcement and (2) resources other than arrest or incarceration. Education should further include the nature of addiction, plus collaboration between law enforcement and treatment and public health sectors.¹¹⁻¹³

Second, in Wisconsin, injection drug users who have received naloxone training are more likely to report overdoses, potentially leading to higher revival rates.⁹ Given that the minority of respondents endorsed contacting EMS and that fear of legal consequences was cited as a major contributor, there appears to be room for improvement in terms of user education and, perhaps, in law enforcement and criminal justice policy and practice.

Lastly, several open-response answers cited fentanyl-laced drugs as a factor contributing to the increasing amount of opioid overdoses. This aligns with recent reports of increasing overdose deaths over the last 8 years attributable to fentanyl and analogs (66 such deaths in 2010; 288 in 2016).¹⁴ Given this alarming trend, there is clearly a need for enhanced education and preventive interventions to reduce the harm attributable to an increasing supply of synthetic opioids.

Limitations

Limitations of this study includes its relatively small sample size and mostly urban population, with respondents being limited to those receiving services from ARCW and the Community Pharmacy.

CONCLUSION

Despite a small survey sample, our findings point to a need for increased awareness of Wisconsin's Good Samaritan law and the barriers that currently exist regarding naloxone use, as well as enhanced education and preventive interventions to reduce the harm from synthetic opioids.

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A Novel Curriculum to Facilitate Career Choice in an Accelerated Medical Education Program

Sonal Chandratre, MD; Jacob Prunuske, MD, MSPH; Lisa Dodson, MD

ABSTRACT

Introduction: Various specialties face the challenge of resident attrition. Trainees may withdraw due to several factors, including lack of adequate exposure to the specialty prior to joining the program. Making career choices becomes more challenging and stressful for students in an accelerated curriculum.

Methods: The authors created and piloted a novel early clinical course: Specialty Longitudinal Integrated Clinical Experience (SPLICE), which provides an opportunity for clinical enrichment and early career exploration in an accelerated medical education program.

Results: Initial evaluation by student and faculty demonstrate the curriculum's feasibility and acceptability.

Discussion/Conclusion: Further implementation of the curriculum and long-term assessment is needed to determine its impact on career decisions and residency retention.

INTRODUCTION

Of the total 129,720 active US resident physicians in the 2015-2016 academic year, 2,204 residents left their position prior to completion of training, including 843 residents (38%) who voluntarily withdrew from their position.¹ The remaining 62% of residents in the cohort were either dismissed, deceased, or transferred to a different program in the same specialty. This high voluntary

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Author Affiliations: Division of Pediatric Endocrinology, Medical College of Wisconsin-Central Wisconsin (MCW-CW) (Chandratre); Department of Family and Community Medicine, MCW-CW (Prunuske, Dodson), Wausau, Wis.

Corresponding Author: Sonal Chandratre, MD, Site Course Director CW Campus, Foundations of Clinical Medicine, Director of Specialty Longitudinal Integrated Clinical Experience, Director of Acting Internships, Medical College of Wisconsin-Central Wisconsin, Division of Pediatric Endocrinology, 333 Pine Ridge Blvd, Suite 2-730, Wausau, WI 54401-4106; phone 715.870.0900; email schandratre@mcw.edu.

withdrawal rate is not a new trend; it has remained stable for the past decade (37% in 2008-2009). In addition, recent literature shows an increase in residents considering leaving their chosen specialty.^{2,3}

Resident attrition remains prevalent despite relevant changes and reform measures taken by the Accreditation Council for Graduate Medical Education (ACGME), such as work hour regulations, suggesting that the issue is multifactorial. Factors affecting trainees' withdrawal may include concerns about lifestyle, workload, sleep deprivation, inadequate mentoring, work-life balance, and personal issues. Additionally, residents may withdraw

because (1) they are not initially matched into the specialty of their choice, and (2) late realization that their chosen specialty is not a good fit.

Multiple specialties face the challenge of resident attrition. For example, in a recent meta-analysis, overall prevalence of attrition among general surgery residents was as high as 18%, with most trainees leaving voluntarily.⁴ Interestingly, trainees who left certain surgical specialties primarily chose nonsurgical fields for their subsequent career path,^{5,6} raising the question whether earlier and more diverse specialty exposure to both surgical and nonsurgical fields would positively contribute to student certainty in their chosen career path.

During mandatory clerkships, students may find it difficult to gain adequate experiences to make career choices prior to scheduling their final year of medical school and entering the Match. The day-to-day expectations during any clerkship may focus on basic competencies, knowledge, and clinical skills, leaving less time for career exploration and assessment of compatibility with the specialty or related subspecialties. Students find

making specialty choices stressful, and medical student stressors contribute to burnout.^{7,8} Medical students and residents are more likely to exhibit signs and symptoms of depression compared to their nonmedical peers with a considerable variation among different specialties.^{8,9}

What's more, an increasing number of medical schools, including our institution, are exploring accelerated curricular models that allow students to progress from matriculation to residency in less than 4 years. Making career choices may be even more challenging and stressful for students in an accelerated curriculum, which allows less time for elective experiences and requires earlier commitment to a given specialty.

The authors sought to address this issue by creating a novel program to provide exposure to various specialties to medical students early in their curriculum.

METHODS

Given the persistence of voluntary withdrawal of trainees from residency programs, high prevalence of specialty-specific attrition rates despite corrective measures, an increasingly stressful environment for trainees making earlier career choices for a competitive Match process, and concern that medical students may lack adequate knowledge in terms of personal compatibility with a chosen specialty, the authors initiated a novel early clinical course: the Specialty Longitudinal Integrated Clinical Experience (SPLICE). This curriculum provides early mentored exposure to student-selected clinical specialties. It is intended to help medical students gain better and broader perspectives of their potential career paths early in their training and help them prepare to make career choices.

Curriculum Setting

The Medical College of Wisconsin-Central Wisconsin (MCW-CW) is a regional, mission-based campus located in and around Wausau, Wisconsin. MCW-CW was established as a regional campus of the Medical College of Wisconsin in 2016 with the purpose of training community-engaged physicians to serve central and northern Wisconsin. MCW-CW matriculates approximately 25 students annually and allows an option for students to graduate in 3 calendar years using an accelerated curriculum and longitudinally integrated clerkship model.

Course Curriculum

The curriculum was developed in 2017 for second-year medical students (M2) as a required, early clinical, 2-semester course. It provides an opportunity for M2s to gain experience in 2 to 4 medical specialties, specifically exposing them to positive mentoring and allowing them to explore various specialty practices early in their medical education. Prior to this curriculum, students complete the first-year basic sciences courses and 10 weeks of a longitudinally integrated clerkship, which includes

core clerkship experiences in family medicine, internal medicine, pediatrics, surgery, obstetrics and gynecology, anesthesiology, and psychiatry.

The curriculum consists of weekly half-day clinical experiences in at least 2 different specialties across several medical settings, including outpatient, inpatient, consultative, operating room, and emergency department. Based on students' choices, appropriate preceptors in the community are contacted by the course director. Students are assigned 1 attending physician mentor for a one-on-one experience to enhance learning and create opportunities for discussing career paths.

Specific learning objectives include the usual clinical student responsibilities of history-taking, physical exam, and developing assessments and management plans in collaboration with their preceptors. Students are encouraged to engage in procedures with appropriate supervision based on their competence. An important additional explicit expectation of the curriculum is deliberate career mentoring by their community faculty mentor. To minimize the clerical "burden," students are not expected to document in patient charts; however, they are encouraged to closely observe preceptors charting.

Evaluation and Grading

Student experiences are individualized and include completion of course and institutional requirements. The curriculum is graded Satisfactory/Unsatisfactory based on the preceptors' narrative assessments, student participation, student self-assessment, and a written reflection of the experience. Self-assessment and reflection on the specialty experiences are important elements of this curriculum. Students are prompted to include the impact of their clinical experiences on knowledge, attitudes, skills, and perspectives in relation to their individual learning plan and career planning, and they are encouraged to share their assessment and reflection with faculty mentors.

RESULTS

Twenty-two second-year medical students worked with 38 different preceptors during the initial pilot, after which the students were asked to complete a standardized clerkship evaluation form that included questions about the curriculum. Eighteen students (82%) completed the evaluation. Twenty-eight percent rated the course outstanding and 72% rated the course very good, the top 2 ratings of a 6-item scale. Narrative comments highlighted the value of the opportunities and experiences provided by the course and its impact on career choices.

DISCUSSION

The MCW-CW curriculum provides opportunity for both clinical enrichment and early career exploration in our accelerated curriculum beginning in the second year of training. Early attention to career planning and specialty choice may be a method for reduc-

ing student stress related to career decisions and has potential to decrease resident attrition by facilitating informed career choices.

Limitations of this project include its uncertain applicability to schools using a more traditional four-year model, small numbers of students and faculty participants, and limited data in this early stage of implementation.

CONCLUSION

We plan to further evaluate the impact of this curriculum by collecting qualitative and quantitative data from graduating medical students by sending them a follow-up survey after they are matched in a residency program. Additional research may allow us to evaluate whether this curriculum's early specialty exposure influences students' specialty choices, readiness for the Match, and stress associated with making specialty choice, thereby reducing their chances of voluntary or involuntary withdrawal from residency training.

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Corticosteroid-Induced Psychosis After a Single Transforaminal Epidural Steroid Injection

Matt Fischer, MD, MHA; Peggy Y. Kim, MD, MS, MBA

ABSTRACT

Introduction: Neuropsychiatric symptoms are a well-described side effect of systemic corticosteroid therapy and can range from mild to severe.

Case Presentation: We describe a case of substance-induced psychosis following epidural injection of 10 mg dexamethasone. Three days after the procedure, the patient developed symptoms including anger, hostility, insomnia, paranoia, and delusions. Symptoms resolved between 7 and 17 days.

Discussion: In the past 50 years, there have been several case reports of severe neuropsychiatric effects following intraarticular or other interventional pain injections with various corticosteroids. More recent reviews have identified possible risk factors, including corticosteroid dose, patient age, sex, and history of neuropsychiatric disorder, among others, although these conclusions are not duplicated across all studies.

Conclusion: Recommendations for practice include patient and family education on possible adverse effects of corticosteroid administration, utilization of minimum effective doses for interventional procedures, and the consideration of close follow-up and multidisciplinary coordination, especially in high-risk patients.

INTRODUCTION

Corticosteroids are commonly utilized by interventional pain medicine specialists for their anti-inflammatory properties. Neuropsychiatric effects of systemic corticosteroid therapy have been described for decades and range from relatively benign, brief disturbances (eg, mood elevation, insomnia) to depression, mania,

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Author Affiliations: Department of Anesthesiology, University of Wisconsin School of Medicine and Public Health, Madison, Wis (Fischer, Kim).

Corresponding Author: Matt Fischer, MD, MHA, Department of Anesthesiology, University of Wisconsin School of Medicine and Public Health, 600 Highland Ave, B6/319 CSC, Madison, WI 53792-3272; phone 608.263.8100; email fischer.mj96@gmail.com.

delirium and psychosis.¹⁻³ The incidence of severe neuropsychiatric symptoms after a single parenteral injection is a much more rare event. Even within the subset of severe neuropsychiatric effects, mood disorders such as depression or mania are more common than psychotic disorders.³⁻⁴ Here, we present a case of substance-induced psychotic disorder following a single dose of epidural corticosteroid.

CASE PRESENTATION

A 49-year-old white man with chronic low back pain and unilateral radicular pain presented for evaluation in the Pain Management Clinic. He denied resting motor or sensory deficits. His pain regimen included home-based physical therapy, scheduled pregabalin, and oral opioids. He

had previously undergone a transforaminal epidural steroid injection (ESI) with time-limited improvement of his symptoms. Past medical history included anxiety treated with lorazepam as needed up to 1.5 mg daily, diabetes not requiring pharmacologic intervention, and alcoholic cirrhosis status post liver transplant. Physical exam revealed tenderness to palpation over the lumbar vertebral bodies and paraspinal musculature, exacerbation of low back pain by facet-loading maneuvers, positive straight-leg raise on the right, and decreased sensation to pinprick in the right S1 dermatome. Magnetic resonance imaging of his lumbar spine was obtained previously and demonstrated diffuse disk degeneration with moderate foraminal narrowing and compression of the right S1 nerve root.

The patient underwent a right L5/S1 transforaminal epidural steroid injection under fluoroscopic guidance with injectate consisting of 1 mL dexamethasone 10 mg/mL and 0.5 mL lidocaine

Table. Selected Reports of Severe Neuropsychiatric Symptoms Following Interventional Corticosteroid Administration

Authors	Pain Intervention(s)	Symptom(s)	Corticosteroid(s)	Time Course	Previous Neuropsychiatric History
Baloch ⁷ 1974	41-year-old man undergoes bilateral intraarticular injections of shoulder	Excitability, garrulousness, irritability, hostility, delusions	Methylprednisolone 40 mg each side (80 mg total)	Onset: morning after injections, precise timing not reported Resolution: 72 hours	Delusions with systemic corticosteroid therapy
Fishman et al, ⁸ 1996 (A)	57-year-old woman undergoes celiac plexus block	Spending spree, grandiose thoughts, pressured speech, poor judgment	Triamcinolone 100 mg	Onset: 25 hours Resolution: 4 days	Mania with systemic corticosteroid burst as well as intraarticular shoulder injection
Fishman et al, ⁸ 1996 (B)	52-year-old woman undergoes celiac plexus block	Euphoria, insomnia, sexual proclivity, irritability	Triamcinolone 100 mg	Onset: 41 hours Resolution: 7 days	Mania with systemic corticosteroid administration (IV and orally)
Robinson et al, ⁹ 2000	75-year-old woman undergoes intraarticular injection of left hip	Paranoid delusions, visual and auditory hallucinations	Methylprednisolone 80 mg	Onset: 26 hours Resolution: 3 days	Negative
Benjamin et al, ¹⁰ 2008	67-year-old man undergoes cervical epidural, medial branch block x4, trigger point injection x4, tendon injection	Racing thoughts, anger, agitation, pressured speech, paranoia	Methylprednisolone 80 mg, triamcinolone 20 mg, additional unknown quantities	Onset: ~ 7 days Resolution: ~ 7-10 days	Negative
Samala and Ciocon, ¹¹ 2011	82-year-old woman undergoes intraarticular injections of bilateral knees	Visual hallucinations, confusion	Methylprednisolone 40 mg each side (80 mg total)	Onset: 3 days Resolution: 3 days	Anxiety and depression
Lally et al, ¹² 2017	82-year-old woman undergoes intraarticular injection of left knee	Persecutory delusions, auditory hallucinations	Methylprednisolone 80 mg	Onset: 48 hours Resolution: 4 days (partial), 7 days (complete)	Baseline moderate dementia

Abbreviation: IV, intravenous.

10mg/mL. He reported immediate improvement in his low back pain and was discharged from the ambulatory surgery center to home. On postintervention day 3, the patient's sister contacted his primary care physician (PCP) via phone with the concern that the patient was acting "strangely." Reported symptoms included mood swings, anger, hostility, confusion, insomnia, acute worsening of his baseline anxiety, paranoia, feelings of abandonment, and a preoccupation with "a hole in his heart." He was instructed to transiently increase his lorazepam dosage and short-term follow-up was arranged with the patient's alcohol and other drug abuse (AODA) counselor. On postintervention day 6, the patient became acutely intoxicated with alcohol after 8 years of sobriety and was combative with family members. He was transported by ambulance to the Emergency Department for evaluation. Aside from a mild transaminitis, his evaluation was negative and he was discharged to home once sober. On postintervention day 7, he was evaluated in clinic by his PCP. His neuropsychiatric symptoms continued, and he was prescribed quetiapine as needed for insomnia. Short interval follow-up was arranged both with the patient's PCP and with Health Psychology. On post-intervention day 17, he was again seen in clinic by his PCP; by this time, his neuropsychiatric symptoms had resolved. He was started on a serotonin and norepinephrine reuptake inhibitor (SNRI) and a referral was placed to Psychiatry for a more comprehensive evaluation of his baseline anxiety disorder.

DISCUSSION

Neuropsychiatric symptoms are well described in patients receiving chronic systemic corticosteroid therapy. Depending on the specific definitions employed, reported prevalence ranges from less than 1% to 60%.^{3,5-6} Though not precisely quantified, the incidence of severe neuropsychiatric side effects following a single parenteral injection of corticosteroid is thought to be much more rare. A PubMed review identified several case reports of significant psychiatric symptoms following intraarticular or other interventional pain injection with a variety of corticosteroids.⁷⁻¹² (See Table.) Based on the relative paucity of reported cases, it seems clear that severe corticosteroid-induced neuropsychiatric symptoms are rare after a single parenteral injection. Given the potential severity of symptoms, it would be beneficial for clinicians to identify which patients are at increased risk for adverse effects.

Corticosteroid-induced side effects are thought to be dose-dependent. Evidence from the Boston Collaborative Drug Surveillance Program showed an increasing prevalence of psychiatric symptoms with higher doses of corticosteroid: 1.3% in subjects receiving less than 40mg prednisone per day (mg/d), 4.6% in subjects receiving 41 mg/d to 80 mg/d, and 18.4% in subjects receiving more than 80 mg/d.¹³ Subsequent studies have verified the increased marginal risk with a daily dose exceeding 40 mg prednisone or equivalent.⁶

Unfortunately, there are limited data to support clinical factors

predisposing patients to corticosteroid-induced neuropsychiatric symptoms, and many purported risk factors have not been duplicated across studies. These investigations have been thoroughly treated in a number of review articles, the conclusions from which can be summarized as follows: risk for corticosteroid-induced neuropsychiatric symptoms may be increased by female sex, hypoalbuminemia, increasing age, and cytochrome p450 inhibition.^{5,14-16}

Patient history of neuropsychiatric disorder has long been suspected as a predisposing factor for substance-induced psychotic disorder. However, investigations of this relationship have yielded mixed results. Most recently, Fardet et al (2012) performed a retrospective review of 786,868 outpatient prescriptions of systemic corticosteroids over 18 years in the United Kingdom and identified 10,220 incident cases of severe neuropsychiatric disorders; patients with previous history of neuropsychiatric disorder were at elevated risk for substance-induced neuropsychiatric outcomes in this dataset.⁶ These findings contrast previous investigations that suggest neither history of neuropsychiatric comorbidities nor history of corticosteroid-induced neuropsychiatric symptoms increase risk for future corticosteroid-induced neuropsychiatric symptoms, although these previous studies were based on much smaller cohorts (eg, 14 patients by Hall et al, 1979; 13 patients by Clark et al, 1953).^{2,17} Based on the totality of evidence, and given the orders-of-magnitude increase in study subjects investigated by Fardet et al, we are inclined to view history of neuropsychiatric disorder as a potential independent risk factor for corticosteroid-induced neuropsychiatric symptoms.

As it relates to the presented case, the patient had no history of psychosis but did suffer from a neuropsychiatric disorder in the form of anxiety. Moreover, he described a personal history of adverse reaction to high-dose systemic corticosteroids administered around the time of his liver transplant; these symptoms included mild agitation and exacerbation of his underlying anxiety state, although he did not experience symptoms consistent with substance-induced psychosis at that time. In addition, the patient experienced no neuropsychiatric symptoms 12 weeks earlier following his first ESI with injectate including 15 mg dexamethasone, a finding that speaks to the relative unpredictability of adverse neuropsychiatric effects. Despite this unpredictability, recurrent corticosteroid-induced neuropsychiatric effects are a common theme in published case reports of severe adverse outcomes (Table); patients with such a history may therefore warrant treatment by clinicians as having a high risk for recurrence.

Uncertainties surrounding patient-specific risk factors notwithstanding, the data clearly suggest a dose-dependent relationship. Specifically, it seems that daily doses in excess of 40 mg prednisone represent a threshold for increased risk, although these findings are based on investigations of chronic systemic therapy. If the same threshold is applied for single-dose interventional injection, 40 mg prednisone is equipotent to 32.5 mg methylprednisolone or

triamcinolone, and to 6 mg dexamethasone.¹⁸ Opinions differ on dosing strategies for epidural pain procedures, but typical doses of corticosteroid are likely to exceed this threshold despite some evidence of equal efficacy at lower dosages.¹⁹⁻²⁰ And although a complete discussion is well beyond the scope of this review, demonstrated lasting effects from injectate of local anesthetic alone²¹ would allow for complete avoidance of these significant, albeit rare, neuropsychiatric effects.

Timing of injections may also be important due to the theoretical concern for “dose-stacking” that could increase risk for corticosteroid-induced psychiatric effects. Short interval corticosteroid injections are generally not favored by pain medicine physicians, due to concern for paradoxical progression of joint space disease as well as transient suppression of the hypothalamic-pituitary-adrenal axis.²² The 2013 Update to Evidence-Based Guidelines for Interventional Techniques in Chronic Spinal Pain recommends a frequency of epidural interventions no less than 2 months apart for a given region (cervicothoracic vs lumbosacral), or at least 1 to 2 weeks if performed on different regions.²³

It may be prudent to discuss the possibility of substance-induced neuropsychiatric effects as part of the informed consent process prior to procedures that involve the injection of a corticosteroid, especially in patients who are identified as high risk. This discussion should include the possibility of exacerbating existing mood disorders, as well as the possibility of provoking new disturbances altogether. Involvement of family members at this stage would seem appropriate, given the possibility of impaired insight on the part of the patient should severe neuropsychiatric symptoms develop. Short-term follow-up with the patient’s pain physician or PCP, either via phone or in person, may also allow for untoward effects to be recognized early.

Though not reviewed here, pharmacologic strategies for the prevention or treatment of corticosteroid-induced psychiatric effects have been previously described (eg, West and Kenedi, 2014¹⁶). These contingency plans are not dissimilar to those put in place for diabetic patients to help manage transient increases in blood glucose related to parenteral corticosteroid administration. It may be reasonable for high-risk patients to have plans in place with their PCP or mental health provider to manage these effects, should they arise.

CONCLUSION

Neuropsychiatric side effects of systemic corticosteroid therapy are well described. Though significantly more rare, cases of neuropsychiatric symptoms, including psychosis, have also been reported following a single administration of parenteral corticosteroid. Higher doses of corticosteroid confer increased risk for these symptoms, with equivocal marginal risk associated with a history of neuropsychiatric disorder, female sex, hypoalbuminemia, advanced age, and CYP inhibition.

Among the reviewed case reports of severe neuropsychiatric symptoms following a 1-time procedural injection, a history of corticosteroid-induced neuropsychiatric symptoms is a common theme. These reports suggest that physicians may wish to consider such patients as higher risk for similar adverse outcomes. Recommendations for practice include patient and family education on possible adverse effects of corticosteroid administration, utilization of minimum effective doses for interventional procedures, and the consideration of close follow-up and multidisciplinary coordination, or even pharmacologic pretreatment in selected circumstances.

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Rituximab for Salvage Therapy of Refractory Hypersensitivity Pneumonitis

Allison M. Tamm, MSN, AG-ACNP; Karol Kremens, MD

ABSTRACT

Introduction: Hypersensitivity pneumonitis is a complex syndrome characterized by non-Immunoglobulin E-mediated inflammation of lung parenchyma in response to an antigen.

Case Report: A 60-year-old white man presented with acute onset of hypoxia, dyspnea, and nonproductive cough. After extensive workup, he was diagnosed with hypersensitivity pneumonitis. We present the case of a patient with refractory hypersensitivity pneumonitis not responsive to standard immunosuppressive therapy, who was successfully treated with rituximab.

Discussion: Hypersensitivity pneumonitis is a multifaceted syndrome characterized by an exaggerated immune-mediated response to an antigen. Currently, the most common treatment for an acute exacerbation of the syndrome is withdrawal of the offending antigen and systemic corticosteroids. However, despite their widespread use, the efficacy of steroids in treating acute hypersensitivity pneumonitis is poor.

Conclusion: Rituximab could be considered as a salvage therapy in cases of severe hypersensitivity pneumonitis unresponsive to standard therapy, especially in patients with high risk of death.

INTRODUCTION

Hypersensitivity pneumonitis is a multifaceted syndrome characterized by an immune-mediated response to an antigen. It can be divided into 2 categories: acute/inflammatory and chronic/fibrotic,¹ often progressing from acute/inflammatory to chronic/fibrotic after repeated exposure to the offending anti-

gen. Diagnosis can be difficult as it often mimics other pulmonary diseases and is misdiagnosed as idiopathic pulmonary fibrosis or idiopathic interstitial pneumonia.¹ Clinical diagnosis of hypersensitivity pneumonitis can be made based on history, clinical features, imaging, or bronchoalveolar lavage. Classically, a definite diagnosis requires histopathological confirmation,¹ which can be risky for a critically ill patient. Recently, Salisbury et al developed and validated a new point-based model that allows radiologic diagnosis with high confidence when supported by clinical presentation, history, and lack of alternate diagnoses.² Standard treatment consists of systemic corticosteroids and withdrawal of the offending antigen. Despite their historically established use, the efficacy of steroids in treating acute hypersensitivity

pneumonitis is poor. As the search for better treatment continues, 2 studies have shown success with rituximab, a B-cell depleting anti-CD20 monoclonal antibody for treatment of refractory hypersensitivity pneumonitis.^{3,4}

We present a case report of a patient with refractory hypersensitivity pneumonitis not responsive to standard immunosuppressive therapy, who was successfully treated with rituximab.

CASE REPORT

A 60-year-old white man presented to the Emergency Department (ED) with complaints of nonproductive cough, chest tightness, and dyspnea found to be hypoxic. Cardiac workup, including electrocardiogram (ECG), echocardiogram, and troponins, was

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Author Affiliations: Essentia Health, Fargo, ND (Tamm, Kremens).

Corresponding Author: Allison M. Tamm, MSN, AG-ACNP, 3000 32nd Ave S, Fargo, ND 58103; phone 701.364.8000, email amtamm7@gmail.com.

negative. Computed tomography (CT) angiogram of the chest was negative for pulmonary embolism but revealed patchy bilateral ground glass opacities with subpleural sparing and no lobar consolidation. The patient initially was treated with antibiotics for community-acquired pneumonia. Thorough infectious workup was negative; a repeat CT scan was suggestive of atypical pneumonia or interstitial process such as hypersensitivity pneumonitis. Further history revealed he had 2 pet cockatiels at home. He was started on prednisone 60mg daily, improved, was discharged and advised to remove the birds.

Six months later, the patient again presented to the ED with worsening dyspnea, nonproductive cough, and was found to be hypoxic, requiring noninvasive mechanical ventilation. Cardiac workup, including ECG, B-type natriuretic peptide test, echocardiogram, and cardiac enzymes, was negative. CT chest revealed bilateral interstitial infiltrates with crazy paving pattern. Thorough infectious workup was initiated, and antibiotic therapy was started until all cultures were found negative. Further history revealed no fevers, exposure to sick contacts, or recent travel, but the patient had not removed the birds from his house. Clinical diagnosis of acute exacerbation of refractory hypersensitivity pneumonitis was made based on previous exposure, CT evidence, and negative cardiac and infectious workup. Systemic steroids were initiated for treatment of acute hypersensitivity pneumonitis exacerbation.

Despite treatment, the patient developed worsening hypoxic respiratory failure requiring mechanical ventilation on intensive care unit day #5. Bronchoscopy was performed with fungal, bacterial, and viral studies negative. Flow cytometry showed CD4/CD8 ratio of 1.8:1. However, the patient had been removed from antigen for 5 days and received 5 days of steroids, invalidating the CD4/CD8 result. Repeat CT scan showed worsening diffuse airspace consolidation without chronic interstitial findings. Due to his worsening clinical status and profound hypoxia, lung biopsy was entertained but ultimately not obtained. Despite treatment with steroids, he continued to decline as evidenced by increasing hypoxemia, requiring increasing level of fraction of inspired oxygen (FiO₂) via ventilator. Due to the patient's inability to consent, consent was obtained from his family for off-label use of rituximab for treatment of refractory hypersensitivity pneumonitis. He was treated with rituximab 1000 mg IV x1 followed by a second dose 1000 mg IV 2 weeks later. The patient rapidly improved within 5 days after the first dose of rituximab and was successfully extubated. He was discharged home requiring 2 L supplemental oxygen 2 weeks after the first dose of rituximab. Prior to his discharge, his family removed all the birds, and thoroughly cleaned and repainted the house. Follow-up spirometry showed improvement in pulmonary function. As of this writing, he has been followed in our pulmonary clinic, with stable pulmonary function tests for more than a year. (See Table.)

Table. Pulmonary Function Test

	2 Weeks	2 Months	6 Months	9 Months	12 Months
FVC	48%	52%	51%	64%	64%
FEV ₁	54%	55%	50%	65%	66%
FEV ₁ /FVC ratio	85%	79%	76%	76%	77%
DLCO	33%	33%	34%	38%	41%

Abbreviations: FVC, forced vital capacity; FEV₁, forced expiratory volume in the first second of expiration; DLCO, diffusing capacity of the lungs for carbon monoxide.

DISCUSSION

Hypersensitivity pneumonitis is an autoimmune response causing inflammation of the lung parenchyma, alveoli, and terminal airways after exposure to an antigen in genetically susceptible individuals.⁵

Its pathogenesis is not fully understood, and it is thought that both humoral and cell-mediated immune responses play a role in lung damage associated with hypersensitivity pneumonitis.⁶⁻⁸ Soluble antigens and immunoglobulin G antibodies form following exposure to the antigen forming a complex. This triggers the complement cascade, causing macrophage activation. Alveolar macrophages secrete cytokines and chemokines, attracting neutrophils to the alveoli and small airways.³ Patients with hypersensitivity pneumonitis also have an increased number of CD8 lymphocytes. It is thought to be mediated by a decrease in apoptosis, resulting in a decreased CD4+/CD8+ ratio.⁷ Additionally, large amounts of cytokines, such as tumor necrosis factor (TNF)- α and Interleukin-1 (IL-1), are released from macrophages, causing an upregulation of intracellular adhesion molecule-1.⁷

Prognosis, outcomes, and disease trajectory of patients diagnosed with hypersensitivity pneumonitis are highly variable and can vary based on causative antigen. In addition, traditional treatment with high-dose steroids often fails. Currently, the most common treatment is systemic corticosteroids and withdrawal of the offending antigen.^{1,6} Steroids seem to accelerate initial recovery, but they do not alter long-term course. Additionally, steroids do not target the inflammatory cascade that drives the disease.

In our case, we considered not only rituximab, but also previously described cyclosporine and cyclophosphamide. Both have been attempted in treatment of refractory hypersensitivity pneumonitis, but their published track record has been either unconvincing or counterproductive.⁹⁻¹¹ In one case series of 100 patients diagnosed with chronic hypersensitivity pneumonitis, 14 patients developed an acute exacerbation and were treated with high-dose systemic corticosteroids with or without cyclosporine or cyclophosphamide. Out of those 14 patients, 12 died of respiratory failure within 1 month after the onset of the acute exacerbation.⁸ On the other hand, azathioprine or mycophenolate have been shown to be successful only in chronic, rather than acute, cases.¹²⁻¹³

The mechanism through which rituximab interferes with the

progression of fibrosis is not understood. Hypersensitivity pneumonitis pathophysiology involves an accelerated immune response involving mostly T lymphocytes. Rituximab has a high affinity for CD20; rapidly depletes B cells from circulation, thus blocking autoantibody production; acts directly on antibody dependent cellular cytotoxicity; and is involved in complement mediated cell death and signaling apoptosis.^{4,14} It has also been described to attenuate T lymphocyte ratio abnormalities.¹⁵ Because of that, its action could potentially affect both the humoral as well as cell-mediated components.

CONCLUSION

In cases of severe hypersensitivity pneumonitis unresponsive to standard therapy, we think rituximab could be considered as a salvage therapy, especially in patients with high risk of death.

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A Case of Atypical Adult Presentation of Urea Cycle Disorder

Benjamin Wang, MD; Pinky Jha, MD

ABSTRACT

Introduction: Urea cycle disorders are metabolic disorders of nitrogenous waste substances due to either complete or partial deficiency of enzymes. Hyperammonemia associated with urea cycle disorders should be addressed immediately in the acute setting, as it can cause irreversible neurological injury or death.

Case Presentation: We report the case of a 48-year-old woman who presented with lethargy, weakness, and altered mental status following prolonged nausea and vomiting despite an esophageal dilatation procedure 3 weeks prior. Further investigation with assistance from the genetics consult team revealed a partial enzyme deficiency associated with urea cycle disorder.

Discussion: Although many cases of urea cycle disorder present in neonates 24 to 48 hours following birth, a delayed presentation may be observed in female carriers with partial activity of any urea cycle enzyme leading to ammonia buildup. This is the result of stress-related events that form a catabolic state involving protein breakdown within the body that trigger increased ammonia levels.

Conclusion: A diagnosis of urea cycle disorder should be suspected in patients who have had a recent stressor with progressive lethargy and confusion associated with hyperammonemia, so that treatment may begin with intravenous sodium benzoate and phenylacetate initially and hemodialysis at 8 hours if ammonia levels do not decrease to avoid permanent neurologic damage.

INTRODUCTION

Urea cycle disorders are inborn errors of metabolism that can present rarely for the first time in adulthood. They are treatable

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Author Affiliations: Medical College of Wisconsin, Milwaukee, Wis (Wang, Jha).

Corresponding Author: Benjamin Wang, MD, 67 Parkdale, Irvine, CA 92620; phone 949.302.2382, email bwang1107@gmail.com.

but life-threatening causes of metabolic encephalopathy that are underrecognized and underreported. Here we present a case of urea cycle disorder precipitated by poor oral intake and recent infection.

CASE PRESENTATION

A 48-year-old woman with a past medical history of asthma, peptic ulcer disease, fibromyalgia, depression, migraine headaches, and pulmonary embolism presented to the Emergency Department with lethargy, gait disturbance, and weakness. Upon admission, her vitals were stable except for tachycardia. On exam, she was lethargic with dry mucous membrane. The rest of the physical exam was unremarkable. Initial laboratory results demonstrated high ammonia level (more than 400s) and anion gap metabolic acidosis (refer to Table). Other workup, including computed tomographic scan, lumbar puncture, toxicology tests, and liver function test, was normal.

The patient was intubated and admitted to the intensive care unit (ICU) for altered mental status and impending respiratory failure. Upon questioning, her husband reported a history of refractory nausea and vomiting associated with poor oral intake for the past 3 weeks. The patient had an esophagogastroduodenoscopy that showed gastric ulcer and esophageal stricture, which resulted in a dilatation procedure but did not improve her symptoms.

A record review revealed that the patient was admitted to the same hospital 6 years prior with altered mental status and unexplained hyperammonemia. She had extensive workup to rule out

all possible causes, including infection, vasculitis, drugs, toxins, and alcohol. She had quickly recovered from the illness with supportive care and indicated that she thought the episode was precipitated by a viral illness and new dietary program that she had started. Based on clinical improvement with intravenous sodium benzoate, she was referred to a genetics clinic but was lost to follow-up.

During this ICU stay, the patient was treated with sodium phenylacetate, sodium benzoate, arginine replacement, and dextrose 10%-0.45% saline, as recommended by the genetics consult team for possible urea cycle disorder. She also was treated with intravenous antibiotics for pneumonia that developed during her hospital stay. Following treatment, our patient exhibited improvement in mental status and ammonia levels. On day 7, she was transferred out to the medicine floor in stable condition and was discharged home on day 10 with a plan for outpatient follow-up. She underwent genetic testing to investigate the defective urea cycle enzyme; post discharge results showed negative N-acetylglutamate synthase and ornithine transcarbamylase deficiency, but a positive carbamoyl phosphate synthetase deficiency.

DISCUSSION

Urea cycle disorders are metabolic disorders leading to buildup of nitrogenous waste substances due to either complete or partial deficiency of urea cycle enzymes which may include carbamoyl phosphate synthetase I (CPS1), ornithine transcarbamylase (OTC), argininosuccinic acid synthetase (ASS1), argininosuccinic acid lyase (ASL), arginase (ARG1), and/or a cofactor-producing enzyme N-acetyl glutamate synthetase (NAGS), or 2 amino acid transporters: ornithine translocase (ORNT1) and/or citrin. Accumulation of ammonia most commonly occurs because of severe deficiency or total absence of CPS1, OTC, ASS1 and ASL, or NAGS, and presents in neonates within the first 24 to 48 hours of life with failure to feed and somnolence initially with progression to lethargy and coma. These neurologic symptoms, through the proposed mechanism of ammonia-induced brain injury resulting from increased ammonia levels, lead to increased glutamine, which precipitates cerebral edema because of the osmotic effects of increased glutamine levels within the astrocytes.¹

Although approximately 33% of urea cycle disorder cases present during the neonatal period (ie, <30 days of life), a delayed presentation is typically observed in childhood. In patients with partial OTC deficiency or with partial activity of all urea cycle enzymes, the likelihood for a delayed presentation depends on the deficient urea cycle enzyme.² For female patients with OTC deficiency, 29% initially present with symptoms after 12 years of age, with a median age of presentation at 10 years. If the deficient enzyme is CPS1 or ASS1, the initial age of presentation decreases to a median age of 11 months, with 24% and 16% presenting after the age of 12, respectively.³

Patients with a delayed presentation often are symptomatic only when specific situations trigger increased ammonia levels.

Table. Laboratory Study Results of Patient With Urea Cycle Disorder on Admission and 1 Day After Treatment With Intravenous Sodium Benzoate and Phenylacetate

Lab	On Admission	1 Day After	Reference Range
Glucose	96	159	65-99 mg/dL
Ammonia	406	29	11-51 umol/L
Bicarbonate	8	11	22-29 mmol/L
Anion gap	31	17	10-18 mmol/L
Urine ketones	2+	Negative	Negative
AST	13	19	11-33 unit/L
ALT	11	15	6-37 unit/L
Albumin	4.4	3.5	3.8-5.0 g/dL
Alkaline phosphatase	80	68	35-104 unit/L
Barbiturates screen	Negative	N/A	Negative
Benzodiazepine screen	Negative	N/A	Negative
Tricyclic antidepressant screen	Negative	N/A	Negative
Ethanol	<0.01	N/A	<0.01 g/dL
Methanol	<10	N/A	<10 mg/dL
Arterial blood gas	pH 7.27	pH 7.32	7.35-7.45
	pCO2 26	pCO2 23	35-45 mmHg
	pO2 179	pO2 177	80-104 mmHg
	HCO3 12	HCO3 12	21-28 mmol/L
Lactic acid	2.3	2.3	0.5-2.0 mmol/L

Abbreviations: AST, aspartate aminotransferase; ALT, alanine aminotransferase

These scenarios commonly include an increased protein load from a new diet or a systemic catabolic state as a result of illness, pregnancy, surgery, or fasting.⁴ Clinical presentation of patients with partial or atypical urea cycle enzyme deficiency typically demonstrate decreased levels of consciousness, altered mental status, vomiting, a seizure disorder, sleep disorders, or psychiatric illness. In our patient, her lack of a consistent diet due to vomiting led to a state of starvation, likely triggering a catabolic state involving protein breakdown and thus hyperammonemia. In other patients, however, a new vegetarian diet low in protein may lead to catabolism of peripheral proteins resulting in hyperammonemia in addition to poor growth, development, and nutritional deficiencies. Diets high in protein also may result in hyperammonemia as a result of gastrointestinal tract processes, which break down consumed proteins into usable amino acids.

In our patient, hyperammonemia and ketonuria, in combination with her clinical presentation of altered mental status, suggest that she was experiencing symptoms consistent with a urea cycle disorder. Urea cycle disorder typically presents with normal blood pH and anion gap, but the cause of this patient's increased anion gap metabolic acidosis may be a result of poor oral intake and concomitant infection. *Staphylococcus aureus* was isolated in bronchoalveolar lavage obtained on the day following her admission.⁵ In fact, this infection, in addition to her poor oral intake, also may have contributed to her urea cycle disorder exacerbation.

In the acute setting, diagnosis for patients experiencing hyperammonemia due to urea cycle disorder is considered when the plasma ammonia level is greater than 100-150 $\mu\text{mol/L}$. The recommended method of initial treatment includes intravenous (IV) sodium benzoate and phenylacetate with follow-up treatment with hemodialysis at 8 hours if ammonia levels do not decrease.⁷ A newer 2016 protocol, however, suggests a different approach based on the patient's presenting ammonia level. For patients above the limit of normal, but less than 250 $\mu\text{mol/L}$, it was suggested they stop with protein intake and IV glucose be administered to prevent onset of a catabolic state. Nitrogen scavengers, such as IV sodium benzoate and phenylacetate, were suggested to be used within the ammonia levels of 150 and 250 $\mu\text{mol/L}$.⁶ At levels above 250 $\mu\text{mol/L}$, use of hemodialysis or continuous renal replacement therapy were advised instead of peritoneal dialysis due to a lower rate of clearance observed with peritoneal dialysis.⁷

Long-term management for patients with suspected or confirmed partial urea cycle enzyme deficiency should include avoiding activities that contribute to increased catabolic activity (ie, diets with too much or too little protein content) and monitoring fasting ammonia and plasma amino acid levels. For patients who cannot receive the recommended protein amounts due to abnormally high ammonia and/or amino acid levels, nitrogen scavenging drugs should be titrated accordingly. In patients planning to undergo surgery, the recommendations regarding the amount of sodium benzoate, phenylacetate, and protein within the diet vary based on the surgery.⁸

CONCLUSIONS

Prompt diagnosis and treatment is crucial to prevent and reduce the development of permanent neurologic sequelae from hyperammonemia, though current recommendations for altered mental status workup in adults do not incorporate urea cycle disorder as it rarely presents after 24 to 48 hours following birth. A diagnosis of urea cycle disorders should be suspected in patients who had a recent stressor or multiple stressors with progressive lethargy and confusion associated with hyperammonemia.⁹ Long-term management in patients with partial urea cycle disorder focuses on providing adequate nutritional content with monitoring of plasma ammonia levels during known events that create catabolic conditions within the body.

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Minaliza Shahlapour



Helen Zukin



Robert N. Golden, MD

Healthy Classrooms Foundation: An Effective Model for Medical Student Public Health Engagement

Minaliza Shahlapour, Helen Zukin, and Robert N. Golden, MD

After participating in a school-wide gardening program, a middle school student told his teacher that this was the first time he realized food did not simply come from a chain convenience store. Unfortunately, this is not an isolated story. Wisconsin educators have shared many similar iterations of students' health-related knowledge gaps and can identify the painful lack of basic resources that can guide students toward healthy lives.

Statistics show that fewer than a quarter of Wisconsin's children have access to 60 minutes of structured physical activity per day, while 70% are in front of a screen for at least 1 or more hours. Sadly, 6% of teens have not had a serving of fruit in the past week, yet 19% of them consume at least 1 sugary drink each day.¹ Wisconsin's statewide child obesity rate is 14.8%, which doubles to 30.7% for

Wisconsin adults.² These statistics clearly demonstrate the need to teach young people skills for healthy living before adulthood in an effort to decrease the obesity epidemic and future comorbidities.

as the creation of health-promoting clubs, classroom meditation, and yoga electives, as well as a student-run mental health resource fair.

The Healthy Classrooms Foundation was

Statistics show that fewer than a quarter of Wisconsin's children have access to 60 minutes of structured physical activity per day, while 70% are in front of a screen for at least 1 or more hours.

Healthy Classrooms Foundation

There are practical limits to how much education physicians can deliver to their young patients during clinic visits. The largest limitation is the fact that most kids see their doctor no more than once a year. However, children spend the majority of their time at school, where educators can serve as experts in understanding and addressing the health needs of their students. The Healthy Classrooms Foundation (HCF) works to recruit educators as public health allies and provides them with grants to carry out initiatives such

created by medical students at the University of Wisconsin School of Medicine and Public Health (SMPH) in 2008 and gained 501(c)3 status on March 10, 2009. The founders—Ben Weston, MPH '10, MD '11, and Shaun Yang, MD '10—shared a vision of building a bridge that would connect medical students with the community and “bring public health to the public.” Inspired by the teachings and actions of the faculty at the SMPH, the organization's mission is simple yet ambitious: to integrate public health initiatives, in the domains of physical, emotional, and mental health, as well as environmental respon-

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Minaliza Shahlapour and Helen Zukin are fourth-year medical students at the University of Wisconsin School of Medicine and Public Health; they are past co-presidents of the Healthy Classrooms Foundation. Robert N. Golden, MD, is the dean of the School of Medicine and Public Health and vice chancellor for medical affairs, University of Wisconsin-Madison.

sibility, into Wisconsin's primary and secondary school systems.

More than a decade ago, the UW Medical School began its transformation into the nation's first school of medicine and public health.³ A cornerstone of this transformation—including the school's name change to the UW

better. Then, once those initial changes occur, the results snowball.”

Another avenue for community engagement is the annual HCF Public Health Symposium that takes place each spring at the Health Sciences Learning Center, where the SMPH is located. The symposium is free and open to the pub-

lic, serving to facilitate community discussion. It engages community members in informative talks and interactive sessions that focus on promoting youth physical, emotional, and mental health, as well as environmental responsibility.

in community engagement and public health work. Public health leadership opportunities like the Healthy Classrooms Foundation should be ingrained in all medical student curricula, training future physicians to think beyond the clinic walls and focus on the larger well-being of the community.⁵

In the past decade, the Healthy Classrooms Foundation has awarded more than \$100,000 to educators across Wisconsin.

School of Medicine and Public Health—was the commitment to emphasize the ideals of community responsiveness and a duty to serve the state in the training of the next generation of physicians.

Medical Student/Community Partnerships

One ideal that is emphasized throughout the SMPH's curriculum is the importance of community partnerships.⁴ This approach is embodied in HCF grant awards. These grants are aimed at first-time grant applicants and are typically between \$1,000 and \$3,000. The HCF's small grants can provide an educator with a great opportunity to pilot an initiative within their own classroom, and potentially leverage that pilot project into sustainable, ongoing support from within the school's own district and/or other external sources. Although the grants often are “starters,” they have the potential to spark tremendous impact and promote public health leadership among teachers.

In the past decade, the HCF has awarded more than \$100,000 to educators across Wisconsin. Follow-up surveys suggest that more than 80% of the school projects funded between 2010 and 2016 are still ongoing, with the majority of programs impacting at least 100 students per school (Shahlapour and Zukin, unpublished data). One recipient eloquently stated, “The type of support that the Healthy Classrooms Foundation provides functions like a micro-lending project. Their support always seems to provide just enough incentive to encourage our school community to implement changes for the

lic, serving to facilitate community discussion. It engages community members in informative talks and interactive sessions that focus on promoting youth physical, emotional, and mental health, as well as environmental responsibility.

Learning for Leadership

The Healthy Classrooms Foundation is led by a board of directors that is largely comprised of first- through fourth-year medical students. Additional community board members include Dr Weston, one of the foundation's founders; Susan Manning, JD, an attorney; and Jay Affeldt, director of mental, behavioral, and physical health for the Madison School District.

By participating in HCF, medical students apply concepts taught in the classroom, gaining valuable public health and leadership experience. The organization further benefits the students who serve on its board, as described by HCF alumni who are currently in practice. Past board members characterize their involvement as promoting leadership skills and the value of community engagement.

Future Vision

The HCF Board is enthusiastic about expanding the organization's impact to underserved and rural portions of the state. New efforts are underway to involve students from other disciplines throughout the UW-Madison campus and to grow additional funding sources.

At the national level, the Healthy Classrooms Foundation hopes to serve as a model for other medical schools interested in empowering medical students to participate

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Joseph E. Kerschner, MD

Helping to Alleviate the Projected Physician Shortage

Joseph E. Kerschner, MD

The United States is facing a shortage of up to 122,000 physicians by 2032, according to a recent study by the Association of American Medical Colleges (AAMC). The projected shortfall includes both primary care and specialty care physicians. Major factors underlying these predicted shortages include continued population growth and an increase in the proportion of adults over the age of 65.¹

While medical schools have increased enrollment by nearly 30% since 2002, the federally imposed cap on support for graduate medical education (GME) – which has been effectively frozen since 1997 – is a major stumbling block in helping to alleviate this shortfall. Thus, the increase in medical school graduates will do little to help meet the growing demand for physician services.²

The AAMC notes that fixing the doctor shortage requires a multipronged approach, including team-based care to enhance treatment, better use of technology to ensure more effective and efficient care, and groundbreaking research to drive discovery and expand knowledge.²

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Joseph E. Kerschner, MD, is Dean, School of Medicine, and Provost and Executive Vice President, Medical College of Wisconsin, Milwaukee, Wis.

Perhaps most importantly, however, is finding ways to increase GME positions to augment the overall number of physicians trained in the United States annually. I am pleased that the AAMC – of which I will become chair of the board of directors in November 2019 – is work-

ing. The House of Representatives Health, Education and Labor Committee passed a health care package that, among other things, will help the US train more physicians to tackle the opioid crisis by adding 1,000 Medicare-supported GME positions over the next five years in hospitals that have, or are in the process of establishing, accred-

Thirty-seven percent of medical school graduates from Wisconsin's two medical schools remained in the state for residency, while about 45% remained here after residency training.

ing closely with elected officials to address this important issue.

Some progress has been made – although much more is needed. The Veterans Access, Choice and Accountability Act of 2014 directed the Department of Veterans Affairs (VA) to create 1,500 medical residency positions from July 1, 2015 through 2024, with a focus on primary care, mental health, and other specialties deemed appropriate by the VA Secretary – as well as in rural or otherwise underserved areas. As of February 2018, almost 550 new VA residency positions had been created – 70% of which were in primary care or mental health.³

Another critical step toward increasing much needed GME positions occurred in late June 2019 when the House Ways and Means

Committee passed a health care package that, among other things, will help the US train more physicians to tackle the opioid crisis by adding 1,000 Medicare-supported GME positions over the next five years in hospitals that have, or are in the process of establishing, accred-

ited residency programs in addiction medicine, addiction psychiatry, or pain management.⁴ It is hoped this legislation will attain further support in Congress and the White House to achieve its intended purpose.

Further, the bipartisan Resident Physician Shortage Reduction Act of 2019 has been introduced in Congress to provide Medicare support for an additional 3,000 new residency positions each year over the next five years.

Leaders at the Medical College of Wisconsin (MCW) and the VA, as well as our partners and elected officials in the state of Wisconsin, have moved quickly to take advantage of these opportunities to increase GME spots. As discussed in the December 2016 issue of the *WMJ*, in May 2016, MCW received initial

accreditation from the Accreditation Council for Graduate Medicine Education (ACGME) for two new four-year psychiatry residency programs attached to our regional medical school campuses in central and northeastern Wisconsin.

These new programs, which were launched

In total, 70% of all physicians who both attended medical school in Wisconsin and then completed residency in Wisconsin remained in the state to practice.

in July 2017, are training three residents per year in central Wisconsin and four residents per year in northeastern Wisconsin.⁵ Our efforts are already bearing fruit, as four medical school graduates from our Milwaukee campus and two medical school graduates from our regional campus in Green Bay are currently psychiatry residents in these new GME programs. Further, MCW has added GME positions through the VA program in cardiovascular, emergency medicine, gastroenterology, general surgery, hematology/oncology, nephrology, neurology, and pulmonary/critical care. In total, including the psychiatry residencies mentioned above, the VA has added 18 full-time equivalent (FTE) positions – with additional slots expected shortly.

Additionally, in late 2016, MCW received ACGME initial accreditation for a new residency program in family medicine in the Milwaukee area, which will begin to alleviate the current deficit of nearly 200 family medicine/primary care physicians in Wisconsin as well as a projected deficit by 2035 of nearly 750.⁶

This new MCW family medicine residency program, which began on July 1, 2017, is training six residents per year over a three-year period – for a total of 18 new residents in place once the program is up to full speed. The residencies themselves are being undertaken at Froedtert Community Memorial Hospital in Menomonee Falls under the direction of the MCW Department of Family and Community Medicine. Seven MCW-Milwaukee medical school graduates currently are residents in this new program.

We also are in the process of creating a

new family medicine residency program in Green Bay in conjunction with Prevea Health and Hospital Sisters Health System (HSBS) and have recruited a founding program director who will start around September 1, 2019. When fully running, the program will train four

residents per year for three years, with the first residents expected to begin on July 1, 2021. The program will be funded in part by a new residency start-up grant from Wisconsin's Department of Health Services, state funds earmarked for MCW's family medicine GME development in northeast Wisconsin, and the two health care systems.

In addition to creating new residency programs, MCW continues to help alleviate the overall physician shortage in the state via our placement of undergraduate medical education (UGME) students into Wisconsin GME slots. According to the AAMC's 2017 biennial report on state-specific data about active physicians and physicians-in-training, 37% of medical school graduates from Wisconsin's two medical schools remained in the state for residency, while about 45% remained here after residency training. In total, 70% of all physicians who both attended medical school in Wisconsin and then completed residency in Wisconsin remained in the state to practice.⁷

MCW's success in growing both its UGME and GME programs and in placing its medical students in Wisconsin-based GME programs, therefore, is providing an answer for the state's physician shortage. This also is reflected in the fact that more than 50% all of Wisconsin physicians currently practicing in Wisconsin completed some of their training and education at MCW.

It is our expectation that our regional campus model, which strongly emphasizes Wisconsin residents with roots in this state, will have an even greater impact on our efforts to

alleviate Wisconsin's physician shortage. We look forward to providing additional data on these successes in the years to come.

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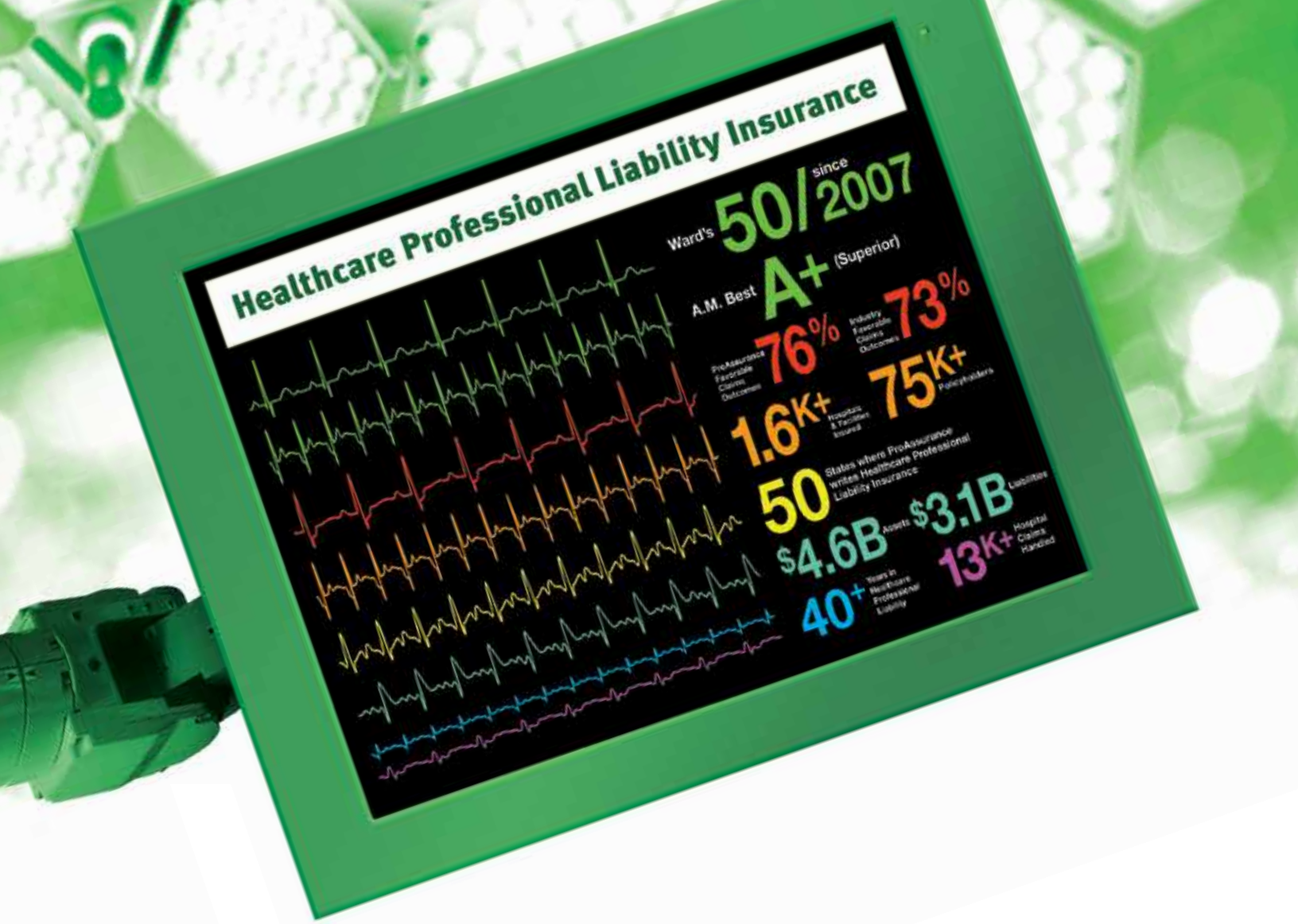
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