advancing the art & science of medicine in the midwest

WMJ

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TREE STAND SAFETY

A look at spine injuries and treatment in hunters after a fall

Also inside:
Remembering Earl Thayer 1922-2017

SHATTERING MYTHS

a story of addiction & hope

April 13, 2018

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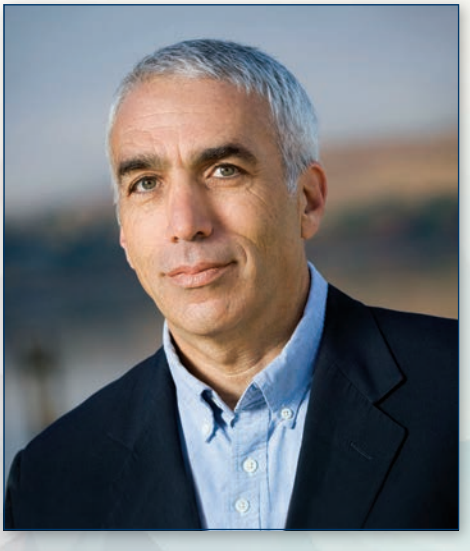

David Sheff

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COVER THEME
Tree Stand Safety

Deer hunting is popular in much of the United States and use of tree stands by hunters is common—but not without injury. A study in this issue of *WMJ* takes a closer look at spine and spinal cord injuries and treatment in hunters who experience a fall.

Cover design by Jane Lee

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‘Are You the Man?’ and ‘Patriotism’

L. M. Warfield, MD, Editor

Editor’s note: The following editorials, which were first published in 1917 in WMJ, *Volume 16, issues 5 and 6, provide an interesting glimpse at sentiments expressed shortly after entering World War I—and which in many ways, at least in terms of the "Patriotism" piece, are still the source of debate 100 years later.*

ARE YOU THE MAN?

It seems evident to the attentive observer in these trying times that men have not yet grasped the full significance of our country’s action in declaring war on Germany. There are still those who are in doubt as to the reasons which led congress to take such a drastic step. Far out here, well protected in the center of our great land we do not realize that we are at war with the most brutal, most ruthless, best equipped military power in the world. It is time we woke up from our trance and considered what part every one of us must play. For win we must, else we degrade to a mass of peons lorded over by a tyrant class.

Our country is calling, yes, begging, for physicians to care for the mighty army which even now is being raised. Who should go to the troops and who should stay with the civil population, for both must be cared for. Obviously, some cannot go. They are too old, they are physically incapacitated for military service, or their going would place their families in such a state of financial embarrassment that the family would actually suffer. Then there are a few in Public Health work who should not go and a few who are absolutely essential to the teaching force of medical schools. Also there are a few who by their peculiar fitness for home organization should do their part at home. Possibly there are a very few more who for most valid and excellent reasons had best do their work where they are.

Who are left? Manifestly nearly all of the graduates of three years ago, very many of five years ago, and many of ten years ago. Some who have families but who have laid away a competence can also go. There are others besides these groups. Now, doctors, how does it strike you? To which class do you belong? Are you afraid to sacrifice a little business at this time? Is your conscience quite clear that you are more needed at home than in the army? Are you quite sure of it? Can you go among your friends with your head high in the knowledge that everyone knows you are doing your full duty? These are searching questions, but so are these terrible times. Choose ye now. He that can possibly go should make haste to enlist. Doctors cannot be conscripted we are informed on good authority. Ask yourself not, “If I do go, will I lose money by enlisting,” but, “How can I arrange my affairs so that I may go?” Your country needs you, is calling you. Are you the man?

PATRIOTISM

We can say with Thomas Paine in one of his “Crisis” essays, “These are the times that try men’s souls”. We are losing our grip on ourselves as a nation. We are letting “lip patriots” move us to acts of foolishness or to acts which we may regret in our sober moments. Truly patriotism is prostituted in the hands and minds of some people.

As we conceive patriotism it is not insistence on the playing of the Star Spangled Banner on every musical program; it is not the flaunting the flag in the face of every passer-by; it is not howling about our dear country and possibly sneaking around to boost the price of flour or bacon; it is not a spirit of intolerance to one whose opinion on all matters is not the same as that of the wrought-up majority; it does not express itself in forcing a man to kiss the flag, or to beat up a man who may have expressed an opinion contrary to the majority’s. No; patriotism is not of the lip, it is of the heart, the soul, the very fiber of one’s being. Patriotism cannot be forced down a man’s throat, he has to grow into it by feeling that his country has been fair to him.

We must not lose sight of the fact that much talk of patriotism on the part of some is but camouflage to conceal actions which are unpatriotic. So we deprecate the spirit of intolerance which is abroad in the land. We protest that patriotism does not consist in a constant repetition of spell-binding. This world’s work has ever been actually done by the men and women who did not have time to tell everyone day in and day out how much they are doing. So we suspect that the man who so constantly cries out his patriotism is the one who bears watching. The true patriot serves with his body and mind, not with his voice alone.

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Wisconsin Medical Society

Remembering Earl Thayer

Susan L. Turney, MD, MS

Editor's Note: Earl R. Thayer, 95, who served the Wisconsin Medical Society in various roles from 1947 to 1987, passed away on October 25, 2017, in Madison following a brief illness. He was born in 1922 in Palmyra, Wisconsin, served in World War II and attended the University of Wisconsin-Madison. Following graduation, he pursued journalist positions at various newspapers before joining the Society staff as a writer in 1947. He served as executive director of the Society's affiliated political action committee from 1963 to 1967. He remained with the Society until his retirement in 1987, serving the last 15 years as secretary and general manager.

Earl Thayer

It was my privilege to have known Earl, to call him a colleague and friend–and it was an honor to be called upon to pay tribute to him at his memorial service. I first got to know Earl when I became CEO of the Wisconsin Medical Society in 2004. He had been retired for 17 years by then, but was one of the first to call me and offer help, and he meant it. I started having lunch with him a few times a year, and when things got hectic, he always listened carefully and helped me put it all in perspective. And if he thought I was off track with something, he would tell me. At the same time, he was so well-mannered, polite and kind, yet he was tough. We could agree to disagree, but he would always be respectful and never allowed it to affect our personal relationship. That was just who he was.

After his retirement, Earl was passionate about maintaining a healthy body and mind, which he demonstrated one of the first times we went to lunch together. When I asked if he would like to take the elevator to the third floor dining room, he said, "No, let's take the stairs," and literally ran up three flights of stairs.

Even more important than his physical health was his mind – it always needed to be stretched. In his late 80s, Earl was still traveling internationally, giving talks in places like Prague on health care and health care policy. He had an incredible quest for knowledge and advocacy, and was driven and passionate about the way physicians take care of patients. As one person said of him at the time of his retirement "…Earl R. Thayer has embodied the spirit of this art of healing. It is a spirit fired by compassion, steered by integrity, and guided by knowledge. Though he may never have practiced medicine, his leadership and dedication have helped thousands of Wisconsin physicians better practice theirs."

Even at 94, Earl still was interested in learning about and participating in Wisconsin health care. When Marshfield Clinic was celebrating its 100th anniversary last year, Earl came for the weeklong event focused on education, research, health care advocacy and policy – all things about which he was passionate.

True to his nature, he was honored and thankful to have been invited to the event, but it was the people who knew him that were grateful he attended. They all made a point to talk with him because he had done something for each of them at some point in their lives. Each one had a story about Earl, which really sums the person he was and the legacy he leaves.

Earl made countless contributions to the Society and the profession of medicine, he was unflappable, and despite having a lot of power in his long life, he used it wisely. As was said about him at the time of his retirement, "…Earl has demonstrated a humility that transcends titles and leadership that promotes rational, human resolution of problems."

In my experience, that was because Earl was very kind and had complete reverence and respect for all things. His faith was a guiding influence in his life and he always had a peace about him that he was able to bring to others. That is how he will be remembered.

• • •

Susan L. Turney, MD, MS, FACMPE, FACP is CEO of Marshfield Clinic Health System. She served as CEO of the Wisconsin Medical Society from 2004 to 2011.

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Climate Change and Agriculture: Future Implications

Joseph J. Mazza, MD

Our world is faced with the prospect of rising temperatures, ie, global warming. The implications associated with this climate change are many and will require ongoing adjustments to the world's ecosystems. One significant concern will be the availability of adequate food and water.

Climate changes that are predicted to continue through the next century will present new complex patterns in precipitation, agriculture, food security, and migration patterns. They will also have an impact on weeds, insects, and disease as the environmental ecosystems change.

The uncertainty of all these predictions makes it difficult to design an effective paradigm to meet the basic needs of society, ie, food, water, and health. These changes will be regional and will result in positive or negative impacts on crop growth and food production. It will require adjustments and perhaps radical changes in the way we plant, harvest, and consume food supplies to minimize economic stresses. Safety issues with planting and harvesting must also be addressed to improve efficiency, along with the working environment of the farmer, rancher, and their families. However, food production will not be limited to terrestrial products only, and will include those harvested from the oceans and inland waterways.

Precipitation changes will be a key factor and will again be regional and will dictate the necessary adjustments to maintain economic profitability.

The major uncertainty is which geographic regions will benefit from the changes ahead and which areas will lose or be devastated by storms, drought, or floods. It is a daunting task for climatologists to develop more accurate climate models that are more consistent with natural climate variability. Climate models are driven by supercomputers that are capable of capturing and simulating weather systems all over the world and are true to the basic earth-science laws that control the dynamics of our planet. Thus, will the northern reaches of the temperate zone of the northern hemisphere, such as Canada, Russia, and Northern Europe, experience increased temperatures in the future; will the lower latitudes and tropical areas become savannas with limited crop and livestock environments? Speculation abounds but hard evidence and accurate modeling are currently lacking.

If predictions of climate change hold, it will be imperative to search for food crops that will be tolerant to the increased temperatures as well as the alterations in the insect population and soil content. Only 2.5% of our planet's water is fresh, and only a small fraction of that water is available for human, plant, and animal subsistence, so conserving this vital resource is imperative.

All of these factors should be viewed together when considering basic needs such as food and water that must be available to the 9 billion inhabitants who will be living on the planet in the next 30 to 50 years. Obviously, the details of the changes that ensue will require in-depth research on all aspects of how to live and cope with climate change and will apply to both developed and developing countries of the world.

The implications associated with this climate change are many and will require ongoing adjustments to the world's ecosystems. One significant concern will be the availability of adequate food and water.

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As an approved Portfolio Program Sponsor, the Wisconsin Medical Society has been approved by the ABMS Portfolio Program to approve QI Efforts for MOC Part IV through Oct. 1, 2020.

Wisconsin Medical Society

The Changing Face of Hospital Medicine

Sarina Schrager, MD, *WMJ* Associate Editor

Gone are the days of Marcus Welby, where the primary care physician makes house calls, sees all patients in the hospital as well as the office. In Welby's world, the world of a small town doctor, patients were seen wherever they needed to be seen, the hospital, the office, the nursing home, or even the grocery store. People connected with their doctor and counted on him/her to be present for major life milestones and health changes. Doctors were on call 24/7. Patients were satisfied but many doctors got burned out.

The idea of a hospitalist, ie, someone who exclusively sees patients in the hospital regardless of who their primary care clinician is, was born in the early 1990s. The hospitalist movement was a product of changes in reimbursement for primary care clinicians rounding in the hospital and changes in the desire for outpatient only practices for many graduating internists and family physicians. Since the mid-1990s the hospitalist movement has drastically changed the landscape of American medicine.

Prior to the 1990s, the vast majority of hospitalized patients were seen by their primary care physicians or a designee (their partner or someone in the call group). The benefits of this arrangement included continuity since the physician knew the patient, their history, and what was going on in their family. The continuity greatly improved both the in-hospital experience (the patient saw their regular doctor or their doctor's partner) and the continuity of follow-up (the in-hospital doctor was able to facilitate follow up without a lot of sign-outs). Downsides of this hospital rounding model included (1) decreasing reimbursement for hospital visits, making physicians less inclined to do rounds since they could earn more by increasing their outpatient visits; (2) lifestyle issues—doctors could not predict if and how many patients they needed to see in the hospital each day, which made their clinic start times variable; and (3) many physicians only saw patients in the hospital infrequently, which could lead to unfamiliarity with hospital procedures, personnel, and updated clinical guidelines.

The concept of physicians specializing in caring for people in the hospital was a new one 20 years ago. Traditionally physicians had specialized based on clinical concern or organ system. Hospitalists were the first to specialize based on place of care. From being nonexistent 2 decades ago, the hospitalist movement has grown exponentially, now encompassing almost 50,000 physicians in over 75% of all US hospitals.[1]

The hospital care provided by hospitalists is excellent. Hospitalists are responsible for shorter lengths of stay, improved outcomes, and equivalent patient satisfaction.[1] Many hospitalists are integrally involved in hospital policy making and quality improvement efforts. It is unclear, however, how the hospitalist movement has affected longitudinal relationships between patients and their primary care clinician.[2] Being hospitalized is often a major life event, and now many patients around the country are experiencing this event with a hospital clinician whom they do not know and who does not know them.

Many fellowships are now available to train physicians in hospital medicine. They focus on leadership, quality improvement, and hospital systems in addition to more in-depth training on high acuity hospital medical conditions.

From being nonexistent 2 decades ago, the hospitalist movement has grown exponentially, now encompassing almost 50,000 physicians in over 75% of all US hospitals.

The paper in this issue by Hyder and Amundson describes an innovative hospital medicine fellowship in North Dakota.[3] The fellowship described aims to both train physicians in hospital medicine and encourage the graduates to stay in North Dakota or other rural areas. Sixty percent of the graduates of the fellowship have remained in North Dakota.

This fellowship is innovative because it is located at a rural, critical access hospital but the fellows also have appointments at the University of North Dakota School of Medicine and Health Sciences. The premise behind this joint appointment is that if physicians had an academic appointment and a relationship with a tertiary care center, they would be more likely to stay at the rural site. The fellowship has been a very successful part of the Workforce Initiative program led by the University of North Dakota focused on staffing rural hospitals with hospitalist physicians.

Continued on page 227

Wisconsin Firearm Mortality, 2000-2014

Wen-Jan Tuan, MS MPH; John J. Frey III, MD

ABSTRACT

Background: Despite low firearm mortality rates in Wisconsin, overall firearm fatalities continue to rise in recent years. In 2013, the statewide age-adjusted death rate due to firearms was 9.6 per 100,000 persons, the highest mark since the new millennium. This raises not only public safety concerns, but also raises questions regarding ongoing gun violence.

Objectives: To describe the population and geographic characteristics of firearm mortality rates on population and geographic characteristics in Wisconsin.

Methods: Mortality data for firearm deaths caused by suicides, homicides and other death intent were obtained from the Wisconsin Interactive Statistics on Health (WISH) query system from 2000 through 2014. The probability of firearm fatality was analyzed through log-linear Poisson regression models to assess the variations of firearm mortality risks in relation to a person's sex, age, race/ethnicity, and region.

Results: Firearm violence is responsible for 14% of injury-related deaths in Wisconsin. Seventy-two percent of firearm-related deaths were attributed to suicides; the majority of decedents were white men aged 45 years or older. The proportion of homicides by gun to all homicides increased from 63% in 2000 to 72% in 2014. Disproportionally high firearm homicides were found among black men aged 18 to 34 years in southeastern Wisconsin, accounting for 38% of the entire gun-related murder deaths.

Conclusion: Our study shows that the association of the demographic and geographic characteristics with mortality rates differs among suicides, homicides and the other intent. Understanding characteristics associated with firearm related-deaths is the first step toward addressing them.

INTRODUCTION

In 2013, the nation's overall age-adjusted firearm mortality rate was 10.3 per 100,000 population compared to 10.4 per 100,000 who died from motor vehicle traffic accidents,[1] despite the fact that 90% of American households have access to motor vehicles versus only one third of American households owning a gun.[2,3] Along with public safety and criminal justice concerns, the public health community has increasingly recognized gun violence as a serious public health problem. Over 30 years ago, the director of the Centers for Disease Control and Prevention (CDC)) advocated for addressing violence as a public health issue.[4] Firearm-related injuries and deaths affect not only health care expenditures, but also societal productivity and general well-being from the loss of lives and the creation of a climate of fear.[5,6]

There has been growing concern about increasing gun-related deaths in Wisconsin. Although the state has shown lower firearm mortality rates than the national average and other Midwestern states (with the exception of Minnesota and Iowa),[1] over the past 15 years the overall firearm-related mortality in Wisconsin has continued to rise. In 2013, the statewide age-adjusted death rate due to firearms was 9.6 per 100,000 persons, reaching the highest mark since 2000.

Literature on firearm violence indicates that gun-related fatalities have fluctuated over time and related to economic hardship, population composition, access to firearms, and mental/behavioral-related disorders.[7-9] This prompted our interest in assessing geo-demographic factors that might be responsible for Wisconsin's rising deaths due to firearms.[10-12] Our goal is to contribute empirical information essential to the future development of gun safety policies and programs that will educate the public on the responsible use and storage of firearms and may reduce firearm mortality throughout the state. To gain a better under-

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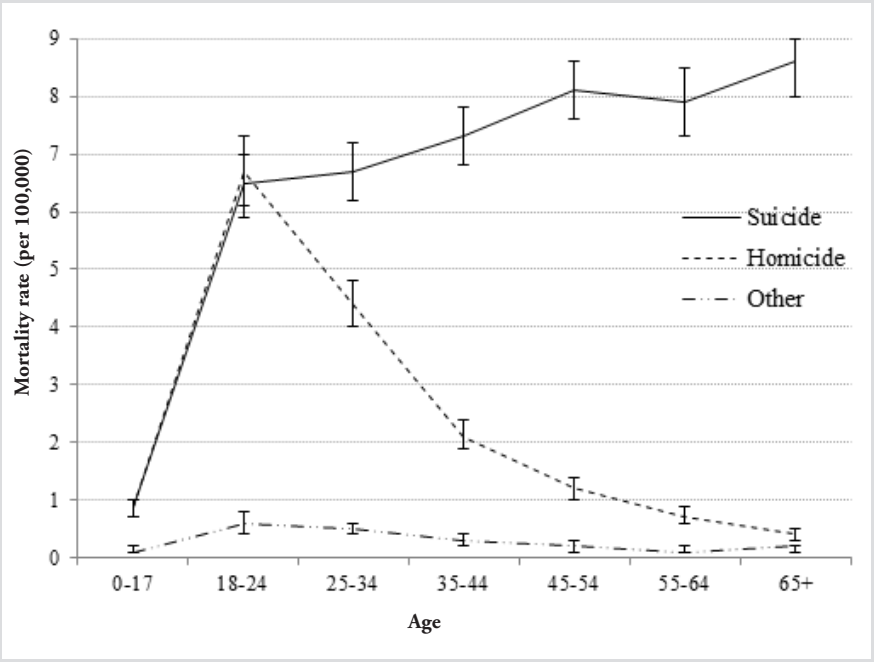
standing of the relationship between firearm deaths and population characteristics, we assessed the pattern of the gun-related mortality rates by the reason (homicide, suicide, and other) of deaths, age, sex, race/ethnicity, and region in Wisconsin.

Figure. Age-specific Firearm Mortailty Rates by Intent in Wisconsin: 2000-2014



METHODS

This study examined the patterns of firearm-related death rates in Wisconsin from 2000 through 2014 (the latest year data were available). Mortality data were obtained through Wisconsin Interactive Statistics on Health (WISH) query system, based on population death certificate records maintained by the Wisconsin Department of Health Services. Because WISH is a statewide public use database available in the public domain and does not contain personal identifiable information, this study is exempted from the University of Wisconsin Institutional Review Board prior approval requirements.

Overall firearm mortality was reported based on the age-adjusted death rate against the year 2000 standard US population. Firearm-related fatality was identified using the International Classification of Disease-10th Revision (ICD-10) code set developed for CDC's injury mortality reports (ie, suicide: X72-X74; homicide: X93-X95, U01.4; others - unintentional, legal intervention, and undetermined: W32-W34, Y35.0, Y22-Y24).[3] The intent of death analyzed in the study included the suicide, homicide, or other category. Unintentional, legal intervention and undetermined causes of death were grouped into the other intent category. Age intervals for descriptive analysis include ≤17 years, 18 to 24 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, and ≥65 years. The geographic variable consisted of 5 major regions specified by Wisconsin Department of Health Services. To best approximate firearm fatality on race and ethnic groups, this study classified the population into 4 racial/ethnic groups: Hispanic, non-Hispanic white, non-Hispanic black, and other. American Indian, Asian, and other ethnicities are aggregated into the other race category due to small numbers to produce stable rates in each group.

To better characterize the pattern of firearm mortality, we further applied multivariate log-linear Poisson regression models to assess the effects of population characteristics on firearm-related fatalities by homicide, suicide, and other intent.[13] The regression analysis reconstructed the age groups into 5 levels: ≤17 years, 18 to 24 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, and ≥55 years. Individuals aged 55 and older were merged into an age group to ensure sufficient observations for statistical modeling. The backward reduction process was applied to eliminate factors with the least impact on the overall fit of the model, until the most parsimonious model for the mortality rate was identified. Contrast analysis also was performed to calculate relative risks (or risk ratios) and confidence intervals of firearm mortality in order to compare the likelihood of gun deaths among levels of a specific characteristic. All of the statistical analyses were performed using PROC GENMOD procedure (SAS Institute Inc).

RESULTS

In 2000-2014, about 14% (6,966 cases) of all injury-related deaths in Wisconsin were caused by firearms. The statewide age-adjusted firearm mortality was 8.1 per 100,000 persons, ranked fourth among all injury-related deaths in Wisconsin during 2000-2014, after falls (13.9 per 100,000), motor vehicle crash (11.7 per 100,000), and accidental poisoning (11.2 per 100,000).

The vast majority of firearm fatalities were due to suicides and homicides, accounting for more than 97% of the total firearm deaths since the new millennium. In 2000-2014, 48% of the 10,510 suicides and 64% of all homicides (2,692 cases) in the state were due to firearms. Overall, the number and rate of gun deaths by suicide consistently outnumbered homicides and other reasons in the past decade.

Overall Firearm Mortality

The overall firearm morality rates in suicide, homicide, and other intent by demographic characteristics are presented in Table 1. Individuals who died by firearms were predominately

Table 1. Firearm-related Death Count and Rate by Intent and Demographic Characteristics

	Suicide		Homicide		Other Intent	
	#	Rate[a]	#	Rate[a]	#	Rate[a]
Total Deaths	5,020	5.8 (5.6-6.0)	1,723	2.1 (2.0-2.2)	223	0.3 (0.2-0.3)
Sex						
Male	4,534	10.4 (10.4-11.1)	1,409	3.3 (3.2-3.5)	203	0.5 (0.4-0.6)
Female	486	1.1 (1.1-1.2)	314	0.8 (0.7-0.8)	20	0.0 (0.0-0.1)
Race/ethnicity						
Hispanic	42	1.0 (0.7-1.3)	131	3.0 (2.5-3.5)	9	0.2 (0.1-0.3)
White	4,752	6.6 (6.4-6.8)	529	0.7 (0.7-0.8)	160	0.2 (0.2-0.3)
Black	141	2.6 (2.2-3.1)	1,007	18.8 (17.6-20.0)	45	0.8 (0.6-1.0)
Other	85	3.2 (2.5-3.8)	56	2.1 (1.5-2.6)	9	0.4 (0.2-0.7)
Region						
Southern	942	5.9 (5.5-6.2)	123	0.8 (0.6-0.9)	33	0.3 (0.2-0.4)
Southeastern	1,495	4.8 (4.6-5.1)	1,381	4.4 (4.2-4.7)	93	0.3 (0.2-0.4)
Northeastern	1,138	6.3 (5.9-6.6)	89	0.5 (0.4-0.6)	41	0.2 (0.2-0.3)
Western	839	7.4 (6.9-7.9)	69	0.6 (0.5-0.7)	39	0.3 (0.2-0.5)
Northern	605	8.2 (7.6-8.9)	61	0.8 (0.6-1.0)	17	0.2 (0.1-0.3)
Age group[b]						
0-17	172	0.9 (0.7-1.0)	171	0.9 (0.7-1.0)	27	0.1 (0.1-0.2)
18-24	545	6.5 (5.9-7.0)	562	6.7 (6.1-7.3)	50	0.6 (0.4-0.8)
25-34	718	6.7 (6.2-7.2)	476	4.4 (4.0-4.8)	53	0.5 (0.4-0.6)
35-44	858	7.3 (6.8-7.8)	252	2.1 (1.9-2.4)	35	0.3 (0.2-0.4)
45-54	1,013	8.1 (7.6-8.6)	151	1.2 (1.0-1.4)	26	0.2 (0.1-0.3)
55-64	704	7.9 (7.3-8.5)	69	0.7 (0.6-0.9)	13	0.1 (0.1-0.2)
≥65	974	8.6 (8.0-9.1)	42	0.4 (0.3-0.5)	19	0.2 (0.1-0.2)
Year						
2000	304	5.6 (5.0-6.3)	111	2.1 (1.7-2.4)	16	0.3 (0.2-0.4)
2001	315	5.7 (5.1-6.4)	133	2.4 (2.0-2.8)	25	0.5 (0.3-0.6)
2002	308	5.5 (4.9-6.1)	122	2.2 (1.8-2.6)	15	0.3 (0.1-0.4)
2003	310	5.5 (4.9-6.1)	137	2.5 (2.1-2.9)	19	0.4 (0.2-0.5)
2004	305	5.4 (4.8-6.0)	92	1.7 (1.3-2.0)	12	0.2 (0.1-0.3)
2005	301	5.3 (4.7-5.9)	160	2.9 (2.4-3.3)	13	0.3 (0.1-0.4)
2006	299	5.3 (4.7-5.9)	110	1.9 (1.6-2.3)	15	0.3 (0.1-0.4)
2007	335	5.8 (5.1-6.4)	132	2.3 (1.9-2.7)	18	0.3 (0.2-0.5)
2008	343	5.8 (5.2-6.5)	78	1.4 (1.1-1.7)	19	0.3 (0.2-0.5)
2009	344	5.8 (5.2-6.5)	103	1.9 (1.5-2.3)	9	0.2 (0.1-0.3)
2010	377	6.4 (5.7-7.0)	105	1.9 (1.5-2.3)	17	0.3 (0.2-0.5)
2011	349	5.9 (5.3-6.5)	85	1.6 (1.3-1.9)	7	0.1 (0.0-0.2)
2012	346	5.8 (5.2-6.4)	123	2.3 (1.9-2.7)	10	0.2 (0.1-0.3)
2013	436	7.3 (6.6-8.0)	115	2.1 (1.7-2.5)	16	0.3 (0.1-0.4)
2014	348	5.7 (5.1-6.3)	117	2.1 (1.7-2.5)	12	0.2 (0.1-0.3)

[a]Age-adjusted mortality rate per 100,000 persons, and its 95% CI.
[b]Age-specific mortality rate per 100,000 persons, and its 95% CI.

Table 2. Final Log-linear Model of Firearm Mortality Risks

Factor	df	Suicide	Homicide	Other
Sex	1	3724.5[a]	6.2[b]	174.1[a]
Age	5	568.1[a]	1012.4[a]	61.8[a]
Race[c]	3	156.3[a]	2338.8[a]	49.4[a]
Region	4	28.1[a]	34.7[a]	
Year	11	32.6[a]	77.8[a]	
Sex x Age	5		37.4[a]	
Sex Race[c]	3		160.7[a]	
Age x Region	20	40.3[a]	46.2[b]	
Race[c] x Region	12	30.5[a]		

[a]$P<0.01$, [b]$P<0.05$.
[c]Race represents the race/ethnicity factor.

male, regardless of the type of intent. Among racial/ethnic groups, whites showed a greater age-adjusted death rate from suicide, whereas African Americans and Hispanics had much higher mortality rates from homicide. The suicide-intent firearm death rate was significantly greater than firearm death rates by homicides and other intents in the southern, northeastern, western, and northern regions in Wisconsin. The southeastern region had the highest firearm-related homicide rate in the state.

Large variations in gun-related fatality were found across age groups (Figure). For individuals younger than 24 years old, statistics showed a slightly lower firearm-related mortality rate in suicide than in homicide. Individuals aged 18 to 24 years had the highest death rate from firearm homicide and the rate rapidly declined from 6.7 to 1.2 per 100,000 persons with increasing age until age 44 years. The firearm homicide death rate continued to decrease at a slower pace for people older than 45 years, in contrast to the increasing firearm suicide rate among older adults.

Multivariate Log-linear Regression

The results of the log-linear regression models for the effects of year, sex, age, race/ethnicity, and region on the gun-related suicide, homicide, and other intent mortality rates are provided in Table 2. Both the suicide and homicide rates fluctuated over time. The individual's sex showed a substantial effect on the firearm suicide rate. Age and race/ethnicity had strong effects on the firearm homicide rate.

Multiple two-way interactions were found to be statistically significant among sex, race/ethnicity, regions, and age groups for the firearm suicide mortality and the firearm homicide mortality. The firearm mortality due to other intent was mainly affected by sex, race/ethnicity, and age groups. There were no significant interaction effects in the model for firearm mortality due to other intent.

Suicides

In 2000-2014, 72% of gun-related deaths were attributed to suicides. The trend analysis showed that the suicide rate gradually

Table 3. Risk Ratios for Firearm-related Suicides and Homicides on Age Group and Race/Ethnicity by Region

	Southeastern		Northeastern		Northern		Southern		Western	
	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
Suicide										
Age group										
0-17 years	1.00		1.00		1.00		1.00		1.00	
18-24 years	15.6	10.4 - 23.4	5.96	4.23 - 8.41	5.95	4.06 - 8.72	7.41	5.09 - 10.8	7.96	5.52 - 11.5
25-34 years	15.2	10.2 - 22.7	7.10	5.04 - 9.99	5.25	3.17 - 8.69	4.63	2.94 - 7.30	7.09	4.45 - 11.3
35-44 years	13.1	8.79 - 19.5	5.48	3.46 - 8.67	5.90	3.83 - 9.10	6.39	4.07 – 10.0	6.00	3.88 - 9.28
45-44 years	14.7	9.86 - 21.8	10.3	6.76 - 15.7	10.1	6.89 - 14.8	8.54	5.71 - 12.8	5.67	3.72 - 8.63
≥55 years	16.4	11.1 - 24.3	7.39	4.97 – 11.0	7.27	4.89 - 10.8	7.54	5.12 - 11.1	7.17	5.09 - 10.1
Race/ethnicity										
White[a]	1.00		1.00		1.00		1.00		1.00	
Black[a]	0.63	0.52 - 0.76	0.27	0.06 - 1.18	1.63	0.37 - 7.1	0.70	0.34 - 1.44	0.63	0.15 - 2.71
Hispanic	0.17	0.11 - 0.26	0.45	0.19 - 1.06	0.46	0.06 - 3.44	0.54	0.25 - 1.17	0.24	0.03 - 1.78
Other	0.42	0.27 - 0.66	1.79	1.01 - 3.19	1.88	0.90 - 3.94	0.54	0.23 - 1.27	2.86	1.49 - 5.50
Homicide										
Age group										
0-17 years	1.00		1.00		1.00		1.00		1.00	
18-24 years	11.0	8.93 - 13.5	6.91	2.97 - 16.1	9.69	4.26 – 22.0	10.7	4.32 - 26.6	13.4	5.11 - 35.1
25-34 years	7.58	6.12 - 9.39	17.5	6.97 – 44.0	2.15	0.84 - 5.54	4.70	2.07 - 10.7	6.29	2.57 - 15.4
35-44 years	3.53	2.76 - 4.50	1.65	0.53 - 5.10	3.93	1.51 - 10.3	3.93	2.09 - 7.39	2.09	1.06 - 4.13
45-44 years	2.18	1.65 - 2.90	1.86	0.87 - 3.97	2.83	1.35 - 5.93	3.19	1.35 - 7.52	2.02	0.65 - 6.28
≥55 years	0.90	0.63 - 1.29	0.94	0.29 - 2.99	1.46	0.44 - 4.84	2.36	0.72 - 7.79	2.78	0.86 - 8.97

[a] Non-Hispanic whites; non-Hispanic blacks.
Abbreviation: RR, risk ratios; CI, confidence interval.

declined in the first half of the millennium, followed by an upward trend till reaching its highest point in 2013 (7.3 per 100,000 population). The firearm-related suicide rate was stable over the years, with the exception of a large spike in 2013 (Table 1).

Men had a substantially greater risk of deaths by firearm suicides than women (Risk Ratio (RR)=8.75, 95% CI, 8.00-9.58). The magnitude of the firearm suicide risks among age groups varied by geographic region in Wisconsin (Table 3). The northern, northeastern, and southern regions consistently showed the greatest suicide risk among people aged 45 to 54 years. Young adults aged 18 to 34 years and older adults tended to have a higher likelihood of dying from firearm-related suicides in the southeastern and western regions.

The effect of the racial/ethnic group on firearm suicide mortalities also differed by geographic area (Table 3). Blacks showed a lower risk of firearm-related suicides than whites, except in the northern region. Firearm-related suicide rates for Hispanics also were consistently lower than whites across all regions in Wisconsin. In the southern and southeastern regions, the non-Hispanic minority group was found with considerably lower risk of firearm-related suicide than its white counterpart. However, individuals in the other race group showed much greater firearm-related suicide rates than whites in the northern, northeastern, and western regions.

Homicides

Firearm-related homicide mortality fluctuated over the years (Table 1). Homicide deaths by gun went up slightly from the new millennium and reached the highest rate of 2.9 per 100,000 population in 2005. The annual firearm homicide rate declined afterward, but gradually rose again since 2012.

Interaction effects between sex and age, sex and race/ethnicity, and age and region, were found on firearm homicide mortality rates. The variations of firearm homicide rates of the men and women by age group and race/ethnicity are shown in Table 4. Men aged 18 to 24 years and women aged 25 to 34 years were more likely to be homicide victims, compared to individuals in other age groups. Firearm homicide rates decreased in both men and women as they became older; however, both men and women consistently showed a greater firearm homicide rate than teens, except for those aged 55 years and older.

Black men were 20 times more likely to be firearm victims than their white counterparts, and black women were 3.2 times more likely to be firearm victims than white women. The risk of homicide by firearm for men in the Hispanic and the other ethnic groups were at least 2-fold higher than white men. Hispanic women had a lower risk of dying from firearm-related homicides than white women, though the homicide rates between Hispanic and white women were not statistically significant.

For most regions in Wisconsin, the 18 to 24 year age group had the highest gun-related homicide rate compared to other age groups, except the northeastern region where the highest firearm homicide rate occurred among individuals aged 25 to 34 years (Table 3). The likelihood of being murdered by gun usu-

Table 4. Risk Ratios for Firearm-related Homicide on Age Group and Race/Ethnicity by Sex

	Male		Female	
	RR	95% CI	RR	95% CI
Age				
0-17 years	1.00		1.00	
18-24 years	11.0	8.91 - 13.5	3.43	2.40 - 4.90
25-34 years	7.56	6.11 - 9.36	3.72	2.68 - 5.16
35-44 years	3.51	2.75 - 4.48	2.25	1.57 - 3.23
45-54 years	2.16	1.63 - 2.87	1.54	1.03 - 2.30
≥55 years	0.89	0.62 - 1.27	0.85	0.57 - 1.27
Race/ethnicity				
White[a]	1.00		1.00	
Black[a]	20.4	17.9 - 23.4	3.22	2.12 - 4.87
Hispanic	3.32	2.67 - 4.11	0.77	0.40 - 1.47
Other	2.69	1.94 - 3.74	1.31	0.67 - 2.56

[a] Non-Hispanic whites; non-Hispanic blacks.

Abbreviations: RR, risk ratio; CI, confidence interval.

Table 5. Risk Ratios for Other Firearm-related Deaths

	RR	95% CI
Sex		
Male	1.00	
Female	0.10	0.06 - 0.16
Age group		
0-17 years	1.00	
18-24 years	4.24	2.68 - 6.69
25-34 years	3.60	2.29 - 5.67
35-44 years	2.10	1.27 - 3.46
45-54 years	1.63	0.96 - 2.77
≥55 years	1.37	0.83 - 2.27
Race/Ethnicity		
White[a]	1.00	
Black[a]	3.75	2.69 - 5.24
Hispanic	0.74	0.36 - 1.51
Other	1.55	0.81 - 2.94

[a]Non-Hispanic whites; non-Hispanic blacks.

Abbreviations: RR, risk ratio; CI, confidence interval.

ally declined with age, though the magnitude of change varied by region. Younger adults were about 4-fold to 5-fold more likely to die of gun-related homicides than older adults, however there were regional variations with higher risks of the firearm homicide rates persisting in the older adult population among the northern, southern, and western regions.

Other Firearm-Related Deaths

Table 5 shows the risk ratio of firearm-related mortality due to other intent. Males, young adults aged 18 to 24 years, and African Americans showed substantially greater mortality rates in each demographic category. Similar to homicides, the gun-related other-intent death rate declined with increasing age. Non-Hispanic minorities were more likely to be killed by gun than their white counterparts, due to unintentional, undetermined, or legal reasons. The other gun-related mortality did not show significant fluctuation over time.

DISCUSSION

Our study shows that, despite media attention to firearm homicides, three out of four gun-related deaths in Wisconsin actually resulted from suicide and that the preponderant risk group for firearm suicides were white men, particularly in rural regions and small towns. The statewide firearm suicide-to-homicide ratio is higher than the national ratio; gun suicides accounted for approximately 60% of the total gun deaths in the United States.[1] The disproportionate ratio may relate to contextual factors in Wisconsin, or reflect the greater number of gun homicides in other states. These trends continue the direction of gun-related suicides in Wisconsin described by Fox and colleagues 20 years ago.[14]

The number and rate of deaths by firearm suicide generally rise with age. In Wisconsin, the majority of firearm suicides were men aged 45 years or older. By age of 55, men are 10 times more likely than women to kill themselves by firearm. Research indicates a strong association between firearm suicide and access to a firearm at home in the elderly population,[10] and older adults are at a greater risk of firearm-related suicide when there is an additional history of a mental or physical illness.[15] Social isolation, especially for individuals recently losing significant relationships such as spouses or longtime companions, also increases the risk of suicide.[16]

Our data also support what has been called the "rural mortality penalty," which has demonstrated disparities between overall increased rural mortality compared to urban and suburban regions.[17] The suicide rate for rural regions in the state is almost twice that of the southeastern urban region. A recent article highlighted the increasing mortality of middle-aged white rural populations with one of the causes, an increase in suicide in men.[18] An Australian article on suicide in men showed that young rural farm workers were at greater risk from suicide by firearm; further investigation showed that access to firearms was the major variable distinguishing them from young urban men.[19]

Forty-five percent of people who died by suicide saw their primary care provider within 1 month of their death.[20] These individuals also visited primary care physicians twice as often as mental health specialists, suggesting that primary care may play a pivotal role in suicide prevention. Despite the findings of the US Preventive Services Task Force that there is no strong evidence for the effectiveness of suicide screening in adolescents and adults,[21] incorporating protocols in the patient-centered medical home for screening, intervention, and referral for depression and suicide risk may offer some hope.[22] Suicide risk management may be more effective in a collaborative model of primary care physicians with behavioral health professionals.[23]

The firearm-related homicide rate in Wisconsin remains below

the national average, but has continued to rise in recent years. The overall percentage of the firearm homicides to all homicides increased from 63% in 2000 to 72% in 2014. There is also a large racial disparity in firearm homicide prevalences, and specifically, high gun homicide rates exist among young African Americans in the southeastern region compared to other regions and races and ethnicities. This continues the trends outlined a decade ago by Shiffler and colleagues in adolescent suicides and homicides in the state, which showed the same regional distribution as our study.[12]

Factors affecting firearm homicides are manifold, such as household gun ownership, income inequality, race/ethnicity, and neighborhood crime rate.[24] Research in gun regulatory laws shows licensing and background checking are correlated with lower firearm homicide rates.[25] This is of importance for Wisconsin with large gun ownership,[25] particularly when the firearm homicide rate increases by 0.9% for each 1 percentage increase in the proportion of household gun ownership.[24] Interventions that might reduce firearm-related homicides should involve regulations in firearm acquisition, storage and carrying, as well as economic and social changes that might address racial inequality. In addition, having police and public safety using a public health approach to addressing homicides has the potential to address root causes.[26]

Gun violence has been linked to mental illness such as schizophrenia, alcohol abuse disorder, or severe depression, and also has been connected with domestic violence. Primary care is likely to be the first and often only source of mental health care for most patients. Primary care clinicians should assess for firearms as a risk factor in their practices. Based on the result of the assessment, they can promptly offer counseling and/or medication essential for individuals with mental health issues (eg, depression, alcohol abuse disorders),[27] and help them access behavioral specialists and other necessary social services. Counseling could be particularly beneficial to patients showing high risk of aggressive or impulsive behaviors during vulnerable time periods.[28]

The firearm homicide rate among minority populations that is 26 times that of whites underscores ongoing statewide concerns in gun violence by race. Our analysis shows that in 2000-2014 a total of 650 black men aged 18 to 34 years were murdered by guns in southeastern Wisconsin, accounting for 38% of the entire firearm-related homicides in the state. The disproportional deaths in the minority population often are attributed to economic hardship or geo-culture of the population. Many victims are from disadvantaged neighborhoods that historically lack access to jobs, housing, educational opportunities, and health care. Individuals living in disenfranchised communities tend to repeatedly experience violent crimes nearby to their home or workplace, which affect their stress levels and risks of mental health issues and increase the likelihood of engaging in or being victimized by violent behaviors in the future.[29]

Meta-analysis on crime prevention policies and programs has shown promising effects of multidimensional community-based initiatives on reducing firearm violence and increasing community safety.[30] Many community interventions aiming to reduce firearm homicide rates incorporate firsthand insights from community members about harms associated with gun violence, allowing people to develop practical strategies and intervention plans.[25] People participating in programs with community-level components show increasing accountability and commitment to a healthy way of living.

Several data limitations may affect the findings of our study. The firearm mortality rates extracted from WISH were obtained in an aggregate level by sex, age group, race/ethnicity, geographic region, and time period, as opposed to individual-level data. The use of group data restricted our ability to control other demographic and socioeconomic factors at the individual level. Moreover, there were a relatively small number of observations in deaths due to other intent and deaths in the other racial/ethnic group. Because they could lead to possible small-estimation biases in logistics regression modeling, the results of the firearm mortality risk estimates and rate ratios should be interpreted with caution.

We also recognized analysis limitations about combining the unintentional cause with the legal and unknown causes of firearm death into 1 group. Understanding the unique pattern of the unintentional firearm fatality could help us develop more effective educational or licensing courses to improve firearm safety, especially for the recent expansion of gun access, such as concealed carrying and youth hunter mentorship program.

DISCUSSION

Firearm violence is the fourth-leading cause of injury-related deaths in Wisconsin behind falls, motor vehicle crashes, and accidental poisoning. Over 85% of firearm-related fatalities occurred among individuals younger than age 65 years, suggesting a great loss of years of potential life that could be productive and beneficial to society. Moreover, a disproportional number of gun fatalities are due to firearm suicides (72%), compared to firearm homicides (25%).

Firearm mortality imposes a wide array of health, societal, and financial problems on many vulnerable populations. Solutions will require changes in public policy and finding effective preventive strategies used by community-based clinicians, public health agencies, and public interest organizations. In the study, we hoped to show characteristics associated with gun deaths as the first step toward addressing them. More research and innovative clinical and community interventions are needed to identify high risk and determine interventions that are most effective.

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Spine and Spinal Cord Injuries After Falls From Tree Stands During the Wisconsin Deer Hunting Season

Kimberly Hamilton, MD; Brandon Rocque, MD, MS; Nathaniel Brooks, MD

ABSTRACT

Background: Deer hunting is popular in much of the United States. In Wisconsin, use of tree stands for hunting is common. Spine surgeons at a Level 1 Trauma Center observed a high incidence of spine and spinal cord injury due to falls from tree stands while hunting. This study's purpose is to systematically characterize and classify those injuries.

Methods: We reviewed the University of Wisconsin Hospital and Clinics' trauma database for tree stand-related injuries from 1999 to 2013. We collected and analyzed data pertaining to hunters' demographics, comorbidities, type and mechanism of injury, injury severity, and management.

Results: We identified 117 patients evaluated after a tree stand fall. Sixty-five (ages 16-76) suffered spine fractures that occurred at all levels, from occipital condyle to sacrum, with thoracolumbar compression and burst fractures being most common. Fractures occurred in the following locations: cranio-cervical junction (8.7%), cervical spine (7.6%), cervical-thoracic junction (6.5%), thoracic spine (32.6%), thoracolumbar junction (33.7%), and lumbar spine (10.9%). Twenty-one patients (32%) experienced a single spinal fracture; 44 patients (68%) suffered multiple spinal fractures. Twenty-five patients (38%) required surgical fixation; 19 patients experienced loss of neurologic function: 5 complete spinal cord injuries (SCI), 5 incomplete SCI, 2 central cord syndromes, and 8 radiculopathies. Two mortalities, both of cardiopulmonary etiology, were noted—one in a patient without a spine fracture and the other in a patient with a complete spinal cord injury at T4.

Conclusions: The majority of spine fractures are treated nonoperatively. However, enough patients require surgical intervention that consultation with a neurosurgical or orthopedic spine surgeon is prudent. It is more common to have multiple spine fractures from a tree stand fall, therefore, it is recommended that if 1 fracture is identified the entire spine be evaluated for additional fractures. For safety, it is recommended that hunters wear and use safety harnesses appropriately. Additionally, keeping the height of the tree stand at 10 feet or less is associated with a lower likelihood of spinal cord injury. Further study is needed to determine additional interventions such as education that might reduce the injury frequency in this population.

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BACKGROUND

Wisconsin supports a widely popular hunting program, with a 9-day firearm deer season in November and a 5-month bow and arrow season extending from September to January. Recreational hunting in Wisconsin dates back to 1851, with the first documented deer season. According to the Wisconsin Department of Natural Resources, nearly 500,000 Wisconsin residents have obtained deer hunter licenses per year for the last 15 years. Despite hunting regulations written into law, 12 deaths related to firearm injury occurred during the hunting season of 1900.[1] The most recent analysis of Wisconsin's hunting trauma included review of the hunting accidents seen at the University of Wisconsin Hospital from 1999 through 2004. These authors reported 24 hunters requiring inpatient treatment, including 8 patients injured by firearm accident and 16 patients who suffered from tree stand falls.[2] This series included 6 head or spine injuries and 2 fatalities.

Our study highlights the importance of tree stand falls as a key contributor to the overall morbidity of recreational hunting in Wisconsin. Similar studies reviewing hunter injury, trauma, and disease have shown the significant morbidity stemming from spinal cord injuries secondary to falls from a significant height.[3-9] We characterize the spinal injuries and treatment modality pursued after a fall from a tree stand.

METHODS

This is a retrospective chart review, with focus on spine and spinal cord injuries secondary to tree stand falls during the Wisconsin

hunting season. The University of Wisconsin Hospital and Clinics (UWHC) trauma registry database was used to identify patients whose injuries were related to falling from a tree stand. Beginning in 1999, the UWHC trauma database classified "tree stand fall" as a specific chief complaint. All such events between January 1, 1999 and February 19, 2013 were reviewed, and all charts with this chief complaint were included in the study. There were no exclusion criteria. Institutional Review Board exemption was granted for this study as a medical records review.

Charts were reviewed via the electronic medical record (EMR). A database was created for information abstraction and documentation with study identification numbers used to protect patient anonymity. The following data points were entered, when available, for each patient: sex, age, body mass index (BMI), diagnosis of diabetes mellitus, heart disease, coagulopathy (intrinsic or secondary to medical therapy), history of tobacco use, admission Glascow Coma Scale score, use of safety harness, height of fall, mechanism of injury (circumstance surrounding fall, if known), involvement of alcohol or other drugs, total list of traumatic injuries, spinal fracture level and type, presence of neurologic dysfunction, surgical interventions, hospital length of stay, intensive care unit (ICU) length of stay, and inpatient complications. Injury severity scores were calculated for each patient. Data abstraction and score calculation was completed by 1 researcher to ensure consistency. Information regarding hunters' years of experience and the type of tree stand in use was not found for any patient in the EMR and, therefore, was not included.

Further analysis of spine and spinal cord injuries included classification of the fracture type and location, details of the treatment pursued, and overall hospital course. Spinal fractures were identified and categorized into the following types, as fracture pattern affects stability and management: fractures of the posterior elements, including the transverse processes, spinous processes, or lamina; facet fractures; compression fractures; burst fractures; Chance (3-column distraction) fractures; and fracture dislocations. Fracture location was identified as cranio-cervical junction (including the occipital condyles, C1, and C2), subaxial cervical spine (C2-3 disc to C6-7 disc space), cervicothoracic junction (C7-T1), thoracic spine (T1-T9-10 disc), thoracolumbar spine (T10-L1-2 disc space), lumbar spine (L2-L5-S1 disc), or sacrum. Statistical analyses were performed between groups using unpaired 2-tailed *t*-tests.

RESULTS

One hundred seventeen patients were identified as suffering trauma related to falls from a tree stand. Of these patients, 65 (55%) were identified with 1 or more spinal fractures. These patients were predominantly male (63 of the 65), with an average age of 45 (range 16-76). Three had history of diabetes, 19 had heart disease, and 5 reported daily aspirin, clopidogrel, or warfarin. Fourteen patients endorsed chronic tobacco use (unknown history for 10 patients), and 7 admitted to using alcohol the day of their accident (negative blood alcohol levels for 39 patients, and unknown use in 19). Only 4 patients (3.4%) reported use of a safety harness, and also reported that they believed the harness to have malfunctioned during the fall.

Trauma records documented any known events surrounding the fall, as well as reported estimated fall height. Patients suffering spinal fractures were noted to have landed on their head or neck in 5 cases, their buttocks or back in 19 cases, or the chest or side in 6 cases. Eleven patients were thought to have experienced transient loss of consciousness after their fall. Patients reported having lost consciousness prior to their fall in 4 cases; 5 additional patients fell asleep and subsequently fell from their stands. Four patients reported mechanical failure of their stand, such as the tree branch breaking or collapse of the stand. Four patients reported failure of their safety harness during their fall. Six patients noted they were performing stand maintenance at the time of their fall, while 2 patients noted they fell in the process of entering or exiting their stand. The cause of fall is unknown for 40 patients.

Fall height ranged from 6 feet to over 30 feet, with the majority of falls occurring from a height of 11 to 20 feet. Falls from less than 10 feet were associated with less severe neurologic injury (focal radiculopathy or no neurological deficit). However, falls from any height greater than 11 feet were seen in conjunction with more severe neurologic injuries, including radiculopathy, central cord syndrome, and spinal cord injury.

Spine fractures commonly occurred in multiples, with 68% (44 of 65) of patients experiencing 2 or more spine fractures. While 1 patient was noted to have as many as 9 spinal fractures, most patients suffered from 2 or 3 fractures. Compression fractures and fractures of the posterior elements (lamina, spinous process, transverse processes) were the most commonly seen fractures across multiple levels. Only 5 patients experienced a single level compression fracture, while 11 patients experienced multiple levels of compression fractures. No patient was noted to have a single level of posterior element fracture, while 8 patients suffered multiple level posterior element fractures. Compression fractures were seen in conjunction with a higher-energy injury such as a burst fracture, Chance fracture, or fracture dislocation in 18 patients. The incidence of fractures in isolation versus combination are displayed in Figure 1.

In 35 cases, patients suffering spinal fractures had additional injuries including rib fractures, pneumothoraces, extremity and pelvic fractures, and organ and closed head injury. Patients' Injury Severity Scores (ISS) were calculated with consideration for all documented traumatic injuries.[10] The ISS ranged from 4 to 43 for all patients with spinal fractures, with an average of 17. For patients whose spinal injury required surgical intervention (25 of 65 patients), the ISS range was 9 to 42 and the average was 23. The difference in ISS for patients with spinal fractures compared

to those with no spinal injury was statistically significant; the spinal fracture group averaged an ISS of 17 while the group without spinal fracture averaged only 11 (P = 0.0006; CI, 2.33 to 8.32). Patients who did not sustain any injury to the spine, either fracture or neurological deficit, reportedly were hunting from stands at an average height of 15.4 feet. Patients who suffered a spine injury fell from an average height of 18.3 feet, which nears statistical significance (P=0.0523; CI, -5.7 to 0.0289). Two mortalities were noted in our series: one secondary to pulmonary embolus and cardiac arrest, the other due to respiratory failure following massive blunt chest trauma in conjunction with a complete spinal cord injury at the level of T4.

Neurologic dysfunction was noted in 19 of the 65 patients (29%) with spinal fractures. Five patients suffered complete spinal cord injury (SCI), and an additional 5 patients experienced an incomplete spinal cord injury. For 9 of the 10 patients, SCI was seen in conjunction with burst or fracture dislocations; 1 patient experienced incomplete SCI due to a cervical facet fracture in the setting of ankylosing spondylitis. Central cord syndrome was documented in 2 patients: one with no associated cervical spine bony injury, one with C2 facet and C5-7 posterior element fractures. Eight patients experienced focal radiculopathies that were caused by compression or facet fractures in 71% of the cases.

Treatment of the spinal fractures and neurological injury varied greatly. Twenty-five patients (38%) underwent surgical intervention for their fractures. Forty patients underwent conservative management: 32 patients (49%) were braced and 8 patients (12%) required no treatment. Patients who suffered neurological deficit were more likely to undergo a surgical intervention (P = 0.0001; CI, -0.83 to -0.39) for decompression of the neural elements, stabilization of the fracture, or both. Four patients who were originally braced required surgery on a delayed basis for instability documented on follow-up imaging (Figure 2). These patients had experienced a variety of fractures including cervical facet fractures, thoracic fracture dislocation, and fracture through a cervical anterior osteophyte.

Figure 1. Patients With Single Versus Multiple Fractures, N=117

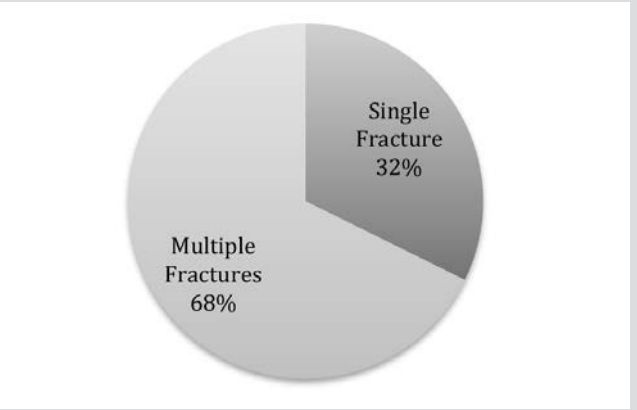
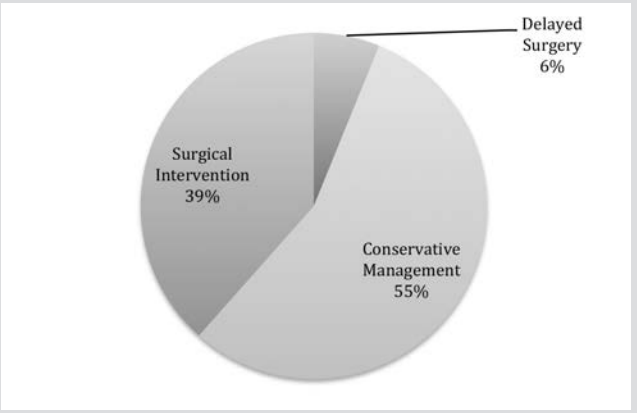


Figure 2. Management of Spinal Injury



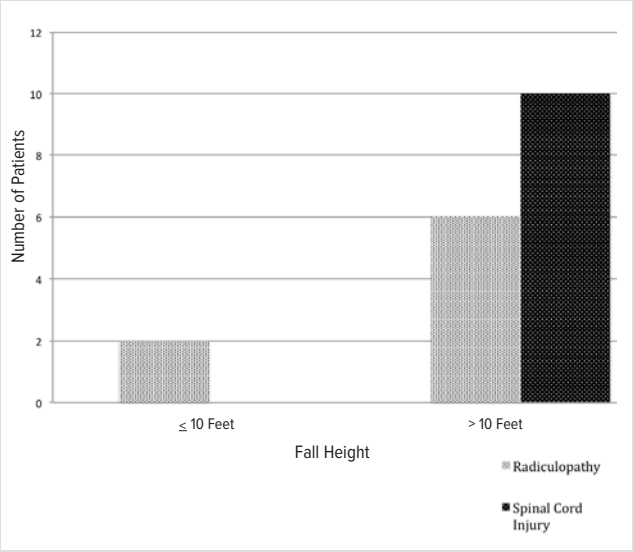
DISCUSSION

Falls from tree stands are multifactorial in nature. Our patient series reflected a variety of fall etiologies, including both syncope and falling asleep while hunting. Other similar studies have found a wide range of contributing factors, including fatigue, exposure, mechanical falls while entering and exiting the stand, failure to wear a safety harness, use of drugs and alcohol, use of hunter-constructed tree stands and inexperience with a certain stand.[3-5,7,9] Additionally, several studies reported significant delays from the time of injury to presentation in the emergency department, which increases the risk for complications such as hypothermia and negates immediate intervention for spinal cord injury.[4,11] Even with use of safety restraints, the recommended full body harnesses are still a potential cause for injury if the hunter must remain suspended for more than 30 minutes.[2]

Our results reflect minimal use of harnesses, as well as cases of improper use or harness malfunction. Notably, however, a study conducted in Louisiana found a significant decrease in the incidence of tree stand falls following a public information campaign that included pamphlets detailing the risk of disability distributed to hunting clubs and sport and hunting supply stores. For 3 years thereafter, the state had zero reported spinal cord injuries associated with falls from tree stands.[12] This supports the positive effects that education, awareness, and use of safety harnesses have on lowering the rate of tree stand falls and associated injuries.

Previous studies on the dangers of hunting with tree stands also found serious morbidity among this patient population. From Ohio, more significant injuries were seen in those who had fallen from a tree stand than from hunters suffering an accidental gunshot wound.[3] Several groups have reported similar rates of spine fractures following tree stand falls: 52% by Metz et al,[6] 59% by Crockett et al,[3] and 36% by Gates et al.[5] The overall injury severity was significantly worsened when spinal injury was experienced at the time

Figure 3. Neurological Injury Associated With Tree Stand Height



of the fall, as evidenced by the strong difference in injury severity scores for the patients with spinal fracture versus without (P = 0.0006).

Unfortunately, our data analysis did not identify any modifiable risk factor associated with patients suffering spinal fractures versus those who did not. However, the majority of patients who suffered any spinal fracture actually experienced multiple levels of spinal injury. If 1 spine fracture is noted on trauma evaluation, the remainder of the spine should also be imaged. Interestingly, our series of 117 patients revealed only 4 patients who suffered from closed head injury, making this traumatic patient population unique from those experiencing trauma due to motor vehicle accidents.

Tree stand falls clearly carry a significant risk of spine and spinal cord injury. Based on this study, 56% of the patients (65/117) who fall from tree stands sustain a spine fracture, and 29% of those with spine fractures (19/65) sustain a neurologic injury. Patients with neurological deficit were significantly more likely to undergo surgical intervention for their spinal injury (P = 0.0001) for decompression of the affected neural elements, stabilization of the fractured level, or both. Therefore, any patient with suspected neurological injury following fall from tree stand should be transferred to a facility with a spine surgeon. Eight percent (10 of 117) of all patients falling from tree stands suffered a spinal cord injury in our series; 100% of these patients were noted to have fallen from tree stands at a height of greater than 10 feet (Figure 3).

The morbidity following injuries involving the neurological system is significant, leaving patients with potentially lifelong disabilities. Thus, prevention measures should not only focus on reducing the frequency of falls from tree stands, but also reducing the likelihood that patients experience neurological deficit from the injuries they sustain. The most effective management would be primary prevention of tree stand falls. This could include safety classes, videos, and educational literature specific to tree stand use, as well as general health education and physical examination to ensure cardiovascular wellness prior to the physical exertion of hunting. In addition, hunters should be counseled on the importance of safety harnesses and how to use them properly. Hunters must also be made aware the dangers of hunting while either sick (as dehydration can lead to syncope), cardiovascularly deconditioned, or under the influence of drugs or alcohol. Additionally, given the increased incidence of spinal cord injury with the use of tree stands at greater than 10 feet in this study, suggesting use of tree stands at 10 feet or less could be considered.

According to the Wisconsin Department of Natural Resources,[13] current Wisconsin law requires anyone born after January 1, 1973 to complete hunter education coursework prior to obtaining a state hunting license. The Wisconsin Hunter Education website provides study guides for both firearm[14] and bow hunting,[15] including safety instructions for use of tree stands and safety harnesses. The importance of hunter safety education should be emphasized with all patients who engage in hunting sports.

Once hunters suffer from a tree stand fall, treatment must be optimized from the time of the emergency response call. Training hunters and first responders to recognize the importance of meticulous spine precautions at the scene and during extraction and transport from the accident site is critical. Additionally, these patients should be transferred rapidly to a trauma center with neurosurgical or orthopedic spine capabilities, and attempts should be made to maintain cord perfusion en route. Early contact from first responders to the accepting hospital should be made to ensure spine and trauma surgeons are awaiting the patient's arrival. The surgeon may even guide spinal cord management by phone. Treatment at a facility such as a Level 1 trauma center is ideal for the complex care required by these patients. Many patients will have concurrent injuries, and some surgical interventions may also require assistance from general or vascular surgeons.

CONCLUSION

Injuries sustained from tree stand falls are a significant source of spinal injury and neurological dysfunction, leading to lifelong morbidity. The majority of spine fractures are treated nonoperatively; however, enough patients require surgical intervention that consultation with a neurosurgical or orthopedic spine surgeon is prudent. Because it is more common to have multiple spine fractures from a tree stand fall, evaluating the entire spine for additional fractures is recommended if one fracture is identified.

The primary treatment of tree stand injuries is prevention. Educational initiatives published previously demonstrates that increased public awareness of the risks associated with hunting and tree stand use led to fewer tree stand falls associated with spinal cord injury.[12] It is our hope to lower the rate of tree stand falls in Wisconsin through increased patient education and pub-

lic awareness, and to see a secondary decrease in the number of traumatic spinal injuries in hunters. Physicians participating in the care of this patient population can help by promoting hunter education; the routine, appropriate use of safety harnesses; and the fabrication of tree stands at 10 feet high or less.

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Impact of Obesity on Cesarean Delivery Outcomes

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ABSTRACT

Background: The rate of cesarean delivery has increased over the last 2 decades. Obesity is a risk factor for complications during pregnancy and cesarean procedures. The objective of this study was to evaluate cesarean delivery outcomes in patients with vs without obesity, and determine the impact of obesity on complications.

Methods: The medical records of patients who underwent a cesarean delivery from 2010 to 2014 were reviewed. Patients were grouped by body mass index (BMI) into obese (≥30kg/m^2) and non-obese (<30kg/m^2) cohorts for comparison.

Results: Nine hundred seventy-one patients were included; 432 whom had obesity, and 539 did not have obesity. The rate of gestational diabetes was increased among patients with vs without obesity (15.3% vs 5.8%; *P*<0.001). Obesity was associated with an increased incidence of surgical site infections (8.1% vs 2.4%; *P*<0.001), yeast infection (2.8% vs 0.2%; *P*<0.001), and seroma (2.8% vs 0.4%; *P*=0.002). Obesity was an independent risk factor for surgical site infections, regardless of wound closure technique (adjusted odds ratio=3.24, 95% CI, 1.66-6.32; *P*<0.001).

Conclusions: Obesity is a risk factor for wound infections after a cesarean delivery. As obesity rates increase, it is important to be aware of these risks after performing a cesarean delivery.

INTRODUCTION

The prevalence of physicians performing cesarean delivery has increased as medical care has become more accessible. Barber et al reported that the rate of cesarean delivery operations increased by over 40% from 2003 to 2009.[1] In addition, obesity is considered to be a major problem of epidemic proportions. It is a major risk factor for several health complications, specifically an increased risk of developing a surgical site infection (SSI) after general surgeries.[2] Additionally, more women with obesity are becoming pregnant than recorded at any other period of time.[3] Obesity was determined as a major risk factor to undergo a cesarean delivery rather than a vaginal delivery.[4-8] As cesarean deliveries become more common, the risk of obesity should be considered, and appropriate SSI prevention techniques implemented.

Recent literature has demonstrated that there is an association between obesity and increased rate of surgical site infections (SSIs) after undergoing a cesarean delivery.[9,10] Prior rates of developing a SSI in patients with obesity vs those without obesity have been reported as 11.71% vs 1.06%; 15.92% vs 7.82%; and 19.70% vs 9.96%, respectively.[8,9,11] These studies were conducted in major health systems rather than a hospital with a focus on serving a large population of patients living in rural areas. Additionally, literature illustrates obesity as a risk factor for developing gestational diabetes, preeclampsia, and/or pregnancy-induced hypertension.[5-8,12] Women with obesity also have a higher incidence of a previous cesarean delivery and the delivery of a macrosomic/higher weight infant.[7,12] Finally, both Basha et al and Johnson et al reported that the use of staples rather than sutures for skin closure during a cesarean delivery led to a higher rate of wound complications but not necessarily wound infection.[9,13]

The objective of this study was to evaluate cesarean delivery outcomes in patients with obesity compared to patients without obesity in a community teaching hospital to determine whether obesity was an independent risk factor for developing a SSI when adjusting for wound closure technique. We hypothesized that the rates of SSI and other risk factors after cesarean delivery would be observed at higher rates in the population with obesity.

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METHODS

A retrospective review of the electronic medical records of all patients who underwent an elective or scheduled cesarean delivery from January 2010 to May 2014 within a single health system was completed after receiving Institutional Review Board approval. Our health system is an integrated, multispecialty group practice with 27 regional clinics, serving 19 counties over a 3-state area. The primary medical center includes a 325-bed teaching hospital. The patient population served by our health system is a large rural community, with a population of approximately 50,000 in the primary medical center location, with an additional 65,000 in the surrounding area of the county. Preoperatively, all cesarean delivery incision sites were prepared and draped in the usual sterile fashion. Antibiotics were administered within 1 hour of skin incision. Upon completion of cesarean delivery, skin and fascial closure techniques were based on obstetrician discretion.

Patients were grouped according to their prenatal or first trimester body mass index (BMI). The group with obesity included patients with a BMI ≥30 kg/m^2 (obese group), while the group without obesity included those with a BMI <30 kg/m^2 (non-obese group). Patients who did not have a prenatal or first trimester BMI available were excluded from analysis. The obese and non-obese groups were compared by several demographic variables, past medical histories, preoperative complications, perioperative variables, postoperative outcomes, and infant birth weights. The primary endpoint was the incidence of SSIs diagnosed and treated within 30 days of delivery. SSIs were classified as superficial, deep, and organ space in accordance with the Centers for Disease Control and Prevention definitions.[14] Statistical analysis was performed using chi-square, Fisher's exact test, Wilcoxon rank sum test, student's t test, and a multivariate logistic regression. A *P* value <0.05 was considered significant.

RESULTS

During the study period, 1,026 patients underwent cesarean delivery. Fifty-five were excluded from further analysis due to unavailable prenatal weight. Overall, 971 patients were included in the study. Of the 971 patients included, 432 (44.5%) had obesity while 539 (55.5%) did not. The mean age was 30.5 ± 5.3 and 29.4 ± 5.4 years in the obese and non-obese groups, respectively. The prevalence of Type 2 diabetes mellitus, polycystic ovarian syndrome, history of a prior cesarean delivery, and gestational diabetes was higher in the obese vs non-obese group (Table 1).

Trial of labor occurred at a lower rate in the obese vs non-obese group, while labor was induced in a higher proportion of the obese group that tried labor (Table 2). Perioperative data including the mean length of stay, presence and duration of ruptured membranes, presence of meconium, and diagnoses of chorioamnionitis were similar in the 2 groups (Table 2). The types of anesthetic (general, spinal, or epidural) were used in similar proportions in each group (Table 3). During the operation, a vertical incision was used for a similar proportion of women with obesity vs women without obesity, and the mean estimated blood loss was also similar between the 2 groups, regardless of the type of incision (Table 3). Patients with obesity required a polydioxanone suture (PDS) rather than a vicryl suture for fascial closure at a

Table 1. Preoperative Characteristics for Obese and Non-obese Patients

Variable	Obese Group	Non-obese Group	*P* value
	N (%)		
Type 2 diabetes mellitus	29 (6.7)	1 (0.2)	<0.001
Polycystic ovarian syndrome	33 (7.6)	3 (0.6)	0.017
Previous cesarean delivery	211 (48.8)	222 (41.2)	0.017
Tobacco use			0.250
Current	59 (13.7)	62 (11.7)	
History	136 (31.6)	151 (28.4)	
Never	235 (54.7)	319 (60.0)	
Gestational diabetes	66 (15.3)	31 (5.8)	<0.001
Pregnancy-induced hypertension	25 (5.8)	22 (4.1)	0.220
Preeclampsia	34 (7.9)	27 (5.0)	0.068

Table 2. Labor, Delivery, and Perioperative Data for Obese vs Non-obese Patients

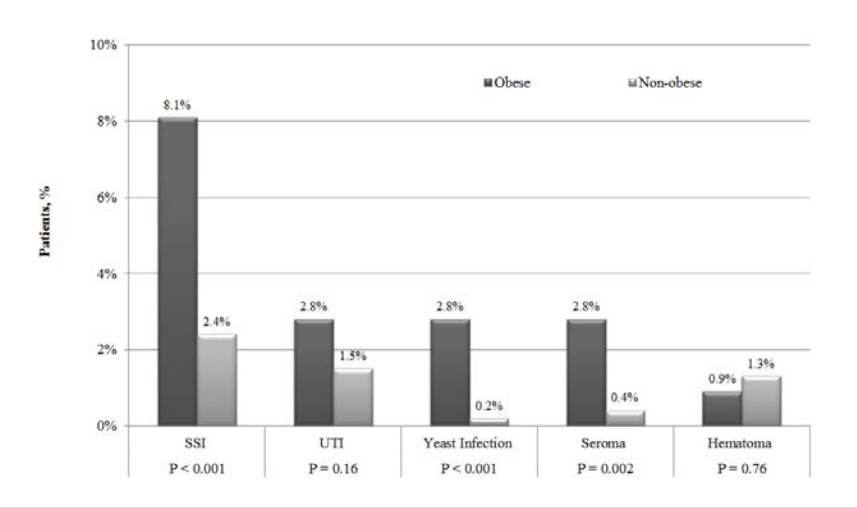
Variable	Obese Group	Non-obese Group	*P* value
Mean length of stay, days	3.7 ± 3.7	3.4 ± 1.6	0.700
Labor, n (%)	162 (37.5)	240 (44.5)	0.027
Induced labor technique, n (%)			
Cytotec	37 (8.6)	26 (4.8)	0.018
Foley	33 (7.6)	22 (4.1)	0.017
Prostaglandin	5 (1.2)	3 (0.6)	0.480
Pitocin	70 (16.2)	68 (12.6)	0.110
Scheduled C-section, n (%)	241 (55.8)	269 (49.9)	0.068
Pitocin Augmentation, n (%)	32 (7.4)	71 (13.2)	0.004
Rupture of Membranes (ROM)	154 (35.7)	217 (40.3)	-
Median time from ROM to delivery, hours (Interquartile range)	10.9 (4.3-10.9)	10.4 (5.0-17.9)	0.990
Meconium, n (%)	66 (15.3)	87 (16.2)	0.710
Chorioamnionitis, n (%)	19 (4.4)	39 (7.2)	0.064

Table 3. Operative Data for Obese and Non-obese Patients

Variable	Obese Group	Non-obese Group	*P* value
Vertical incision, n (%)	21 (4.9)	14 (2.6)	0.060
Mean EBL, cc	746.0 ± 380.6	754.1 ± 388.3	0.090
Anesthesia, n (%)			0.830
General	36 (8.3)	41 (7.6)	
Spinal	289 (66.9)	356 (66.2)	
Epidural	107 (24.8)	141 (26.2)	
Fascial closure, n (%)			0.006
Vicryl	133 (31.1)	213 (39.7)	
PDS	295 (68.9)	324 (60.3)	
Skin closure, n (%)			<0.001
Staples	20 (4.6)	3 (0.6)	
Sutures	412 (95.4)	536 (99.4)	

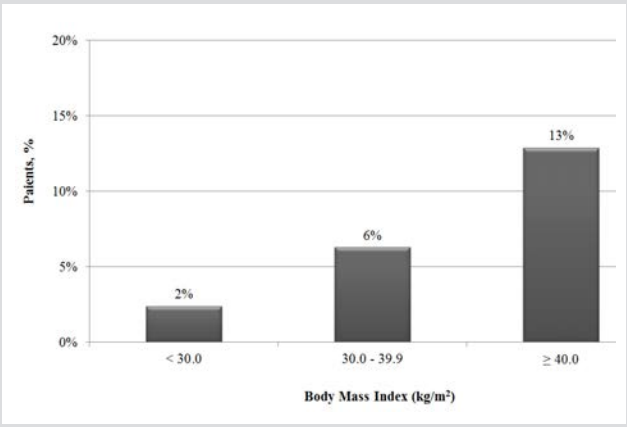
Abbreviations: EBL, excess blood loss; PDS, polydioxanone sutures.

Figure 1. Postoperative Complications in Obese and Non-obese Patients



Abbreviations: SSI, surgical site infections; UTI, urinary tract infections.

Figure 2. Surgical Site Infection Rate by Body Mass Index (BMI)



higher rate than patients without obesity. Additionally, the obese group had a higher proportion of patients requiring staples rather than sutures for skin closure. Overall, women with obesity delivered infants with a heavier mean delivery weight (3.50 ± 0.73 kg vs 3.36 ± 0.69 kg, *P*=0.003) and had a higher rate of delivering a macrosomic infant (25.0% vs 15.2%, *P*<0.001) compared to women without obesity.

Several postoperative complications were observed at higher rates in the obese group as compared to the non-obese group (Figure 1). When stratified further by BMI category, the SSI rates were 0, 7 (2%), 6 (3%), and 35 (8%) for patients with a BMI <18.5 kg/m^2, 18.5 to 24.9 kg/m^2, 25.0 to 29.9 kg/m^2, and ≥30 kg/m^2, respectively (*P*<0.001). Patients with obesity had higher rates of seromas, yeast infections around the wound, and SSIs (Figure 1). Additionally, with each 10-point increase in BMI, a corresponding increase in SSI rate was observed, with patients with severe obesity (≥40.0 kg/m^2) having the highest incidence of SSIs as compared to patients with obesity (30.0-39.9 kg/m^2) and patients without obesity (<30.0 kg/m^2) (Figure 2). Among the 48 patients with an SSI, the rates of superficial (62.9% vs 46.2%), deep (14.3% vs 30.8%), and organ space (22.9% vs 23.1%) SSIs were similar between the obese and non-obese groups, respectively (*P*=0.40). Seven (1.3%) patients in the non-obese group and 4 (0.9%) in the obese group received a blood transfusion (*P*=0.76). The SSI rate was 3% (n= 15) for planned cesarean delivery vs 7% (n=33) for unplanned cesarean delivery (*P*=0.003).

When comparing patients who had an SSI vs those who did not, regardless of BMI group, fascial closure with PDS was associated with an increased incidence of SSI vs fascial closure with vicryl (6.1% vs 2.9%, respectively; *P*=0.026). Skin closure with staples resulted in a higher rate of SSIs than closure with sutures (26.1% vs 4.4%, *P*<0.001). On multivariate logistic regression, after controlling for planned vs unplanned cesarean delivery, as well as skin and fascial closure techniques, obesity was an independent risk factor for developing a SSI (adjusted odds ratio=3.24, 95% CI [1.66-6.32], *P*<0.001).

DISCUSSION

Obesity continues to be prevalent in the United States among women of childbearing age. This study presents a comprehensive review of both preoperative variables and postoperative outcomes relating to the risks of obesity in pregnancy with a specific focus on complications after cesarean deliveries, including SSIs. We hypothesized that obesity would increase the chance for developing a SSI after a cesarean delivery as that correlation has been reported in prior general surgery literature.[2] Overall, obesity illustrated an increase in several complications prior to delivery, as well as increasing the chance of developing postoperative wound complications, especially the development of a SSI.

Maternal obesity was associated with increased diagnoses of Type 2 diabetes mellitus, gestational diabetes, polycystic ovarian syndrome, previous cesarean delivery, and higher weight infants. Each of these complications has been reported previously at higher rates in patients with obesity.[4-8,12] Furthermore, obesity led to a higher rate of developing a yeast infection of the wound or a wound seroma, which supports the findings reported by Basha et al.[13] Similar to previous studies observing SSI in cesarean delivery patients with obesity, SSIs were significantly more prevalent in the population with obesity in our study. Moreover, SSI rates increased incrementally with

each increase in BMI, where the highest rates were observed in patients with severe obesity (BMI ≥40.0 kg/m^2). This trend concurs with obesity as an independent risk factor for developing a SSI regardless of the type of fascial closure. These results follow similar patterns as studies that have recently proposed that obesity leads to higher rates of SSI after cesarean delivery.[8,9,11] Our study illustrated that obesity was an independent risk factor for developing a SSI regardless of the type of fascial closure, and that the use of staples for skin closure was associated with an increased rate of developing a SSI. However, there was an inadequate sample of patients with stapled skin closure to develop a multivariate model to determine whether the type of skin closure is another risk factor of developing SSI, in addition to the established risk factor of obesity. Interestingly, the SSI rate among patients with obesity in our series was 8.1%, slightly lower than other reports from more urban United States and international medical centers, with SSI rates ranging from 11.7% to 19.7% in patients with obesity. The reasons for this are largely unknown, though improved hand hygiene and SSI prevention practices (consistent preoperative skin preparation, antibiotics, and insulin drip for patients with diabetes) may account for some contributing factors.

These results ascertain that obesity is a major risk factor for patients having a cesarean delivery. Obesity may lead to increased risk of SSI based upon several factors. First, the greater amount of fat between the fascia and skin could cause disruption of or decrease blood flow to the wound leading to increased risk of infection.[10] Second, although it is difficult to measure or quantify, the pannus of a woman with obesity could obstruct the wound area from exposure to air leading to a moist and viable environment for microbes/infection to propagate. Finally, a large pannus places additional stress on the wound, which could lead to an opening in the wound where infection can more easily set in.

This study contains several limitations including the inherent limitations of a retrospective study design and being a single institution series. There was no prior standardization of the data for this study, which was abstracted from our electronic medical record system and included multiple obstetricians over a 5-year period. Future research to expand the sample size with the inclusion of patients from several institutions could further confirm these results. Finally, a randomized prospective study could further determine the association of SSI with regards to obesity, incision type, and closure type.

Overall, this study illustrates that additional precautions should be taken while performing a cesarean delivery and treating the wound area in patients with obesity. Such precautions could include using the pfannenstiel incision (low transverse incision) in all anatomically possible cases, using vicryl sutures for fascial closure and sutures for skin closure, and increasing emphasis on cleaning/treating the wound for the prevention of infection.

CONCLUSIONS

Obesity was associated with higher rates of gestational diabetes, diabetes mellitus, polycystic ovarian syndrome, previous cesarean delivery, macrosomia, yeast infection, and seroma formation following cesarean delivery. Surgical site infections were more prevalent in patients with obesity regardless of the type of fascial closure. As the obesity rate continues to rise and medical care becomes more accessible, health care providers, particularly in rural areas, should be aware of the impact of obesity on cesarean delivery outcomes. Further research is needed to identify the impact of obesity on skin closure and surgical site infections after cesarean delivery.

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Adolescent Preferences for Topics Addressed During Well Visits

Eugene C. Lee, MD

ABSTRACT

Background: Current evidence is limited regarding the topics adolescents want to discuss with clinicians during routine well visits. High school students were surveyed to determine potential adolescent discussion topics, barriers to discussion, and ways to promote dialogue.

Methods: Surveys were distributed between October 2014 and January 2015 to 102 students in the Verona Area High School in Verona, Wisconsin.

Results: Of the topics presented, teens preferred to discuss vaccines and mood/stress with their clinicians. Young women were more likely to prefer gender congruent clinicians, especially when discussing sex or body image. The majority of teens felt that information discussed with their physician would be revealed to parents or the authorities.

Conclusions: In limited time with teens, it is important for clinicians to reinforce confidentiality to gain their trust. Clinicians can improve rapport with adolescents by revealing information about themselves, conveying genuine caring, and considering community involvement. Male clinicians need to work on improving rapport, especially when talking with female adolescents about sex, body image, stress, and mood. Clinicians should consider including mood, stress, and vaccine discussions in their adolescent well visits.

INTRODUCTION

The American Academy of Pediatrics (AAP) recommends that adolescents have a preventive visit yearly,[1] however 1 study estimates that only 40% of adolescents between ages 13 and 17 have a yearly preventive visit, while 33.3% of adolescents between the ages of 13 and 17 do not have a yearly visit at all.[2] Another study found that preventive visits declined in middle to late adolescence compared to early adolescence.[3] Furthermore, it is estimated that only 33.3% to 40% of children get the indicated preventive care or anticipatory guidance during their preventive visit.[4,5]

Bright Futures, an AAP-led health promotion and prevention initiative, estimates that a child preventive care visit lasts 28 to 30 minutes, with the physician spending an average of 17 to 20 minutes with the patient.[1] Clinicians have the opportunity to engage adolescents in their own health, but currently there are insufficient recommendations for how clinicians can do so.

Goldenring and Cohen initially derived a mnemonic for clinicians to use as a general guideline for topics to discuss with teenagers: HEADSS - Home, Education, Activities, Drugs, Sex, Suicidality.[6] This mnemonic has expanded to HEEADSSS to include Eating and Safety. Yet, regarding several of those topics, the US Preventive Services Task Force has insufficient evidence to support screening for those issues in teenagers. See Table 1 for Grade A and B recommendations for adolescents.[7]

Adolescents might not want to discuss HEEADSSS topics with their clinicians. Every adolescent is different, but common adolescent discussion topics should be identified. The purpose of this exploratory study was to determine what topics and approaches teens preferred in hopes of improving clinician guidance and rapport between clinicians and adolescents.

METHODS

Population: Students in 3 classes at Verona Area High School (VAHS) in Verona, Wisconsin were surveyed at 2 different times with an anonymous questionnaire regarding several topics. The

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classes included 2 sections of "Principles of Biomedical Science" and 1 section of "Biotechnology." The students in the Principles of Biomedical Science remained the same, while the students in the Biotechnology class differed between the 2 surveys. These classes consisted mainly of freshmen and sophomores with few juniors and seniors. The students at VAHS come from the southwest portion of Madison, Fitchburg (a suburb of Madison), and Verona (a suburb of Madison that used to be a farming community). In September 2014, 27.7% of the students at VAHS classified themselves as nonwhite.

Table 1. Grade A&B US Preventive Services Task Force and Category A Advisory Committee on Immunization Practices Recommendations for the Nonpregnant Adolescent

Grade/ Category	Recommendation
A	Folic Acid: Supplementation – All women planning or capable of pregnancy
A	HIV: Screening – Adolescents (starting at 15 years old) and adults
A	Syphilis: Screening – Men and women at increased risk
A	Tobacco Smoking Cessation: Behavioral interventions – pregnant women
A	Vaccines: human papillomavirus (HPV), Tdap, meningococcal, influenza
B	Chlamydia: Screening – Sexually active women
B	Depression: Screening – Adolescents aged 12-18 years
B	Gonorrhea: Screening – Sexually active women
B	Hepatitis B: Screening – Nonpregnant adolescents and adults at high risk
B	Intimate Partner Violence: Screening – Women childbearing age
B	Obesity: Screening – Children and adolescents aged 6-17 years
B	Sexually Transmitted Infections: Behavioral counseling – Sexually active adolescents and adults
B	Skin Cancer: Behavioral counseling – Children, adolescents, and young adults aged 10-24 years
B	Tobacco Use: Primary care interventions – Children and adolescents

Survey Instrument: The initial questionnaire consisted of 10 questions designed to determine if clinician interaction with adolescents in a classroom might improve: (1) comfort level in speaking with clinicians about adolescent topics, and (2) human papillomavirus (HPV) vaccination rates. Because HPV vaccination rates were determined to be above Wisconsin's averages in the first survey (73.6% of participants had begun the HPV series and Wisconsin's 2015 at-least-1-dose HPV vaccination rate averaged approximately 45% for 13 to 18 year olds[8]), this portion was not focused on in analysis. The second questionnaire consisted of 12 questions and elaborated on topics from the initial questionnaire. The questionnaires can be viewed in the Appendix, available online at https://www.wisconsinmedicalsociety.org/_WMS/publications/wmj/pdf/116/4/WMJ%20116no4_Lee_Appendix.pdf. Paper questionnaires were distributed to all students present in class that day.

This survey was exempt from institutional review board review as it did not constitute research defined under 45 CFR 46.102(d).

RESULTS

The study population, shown in Table 2, remained consistent between the surveys (P <0.05), so no distinction was made between the 2 survey groups. The majority of teens surveyed had a physician who shared the same gender. Female teens preferred female physicians (93.3%), whereas only 28.6% of males preferred a male physician (P <0.005). Topics where gender congruency mattered are shown in Figure 1. More than 50% of the surveyed adolescents preferred discussing body image and sex with a gender-congruent clinician. Close to a third of teens felt that the congruency of clinician gender mattered in discussing depression, anxiety/stress, and sexuality.

Topics within the HEADSS mnemonic, additional topics of interest determined by the investigator, and teenager preference for learning about those topics are included in Table 3. Some students preferred multiple ways to learn about topics. The 2 topics most adolescents (>70%) preferred to discuss with physicians were vaccines and mood/stress, which included anxiety and depression. Write-in topics from teens included obesity, steroids, and cutting.

Table 2. Study Population

	Male (%)	Female (%)	Other (%)
Survey 1 (n = 53)	18 (34.0)	34 (64.2)	1 (1.9)
Survey 2 (n = 46)	14 (30.4)	30 (65.2)	2 (4.3)
Clinician is same gender as patient	9 (64.3)	24 (80.0)	0 (0.0)
Patient prefers same gender clinician	4 (28.6)	28 (93.3)	0 (0.0)

The majority of teenagers (86.8%) surveyed talk about topics with friends. Additionally, 49.1% of teens would talk with parents or older family members, and 37.8% said they would talk with cousins or siblings. Medical professionals rank fourth at 34.0%, followed by school officials and religious leaders (tied at 17.0%). Students are least comfortable (5.7%) with civil service agents like police officers and firefighters.

In the free response area, teenagers noted being more likely to discuss topics with their physician if there was an assurance of confidentiality and privacy. In response, teenagers were asked about doctor-patient confidentiality and their understanding of confidentiality. When asked if clinicians requested that their parents leave the exam room during a general check-up, 45.7% of students stated yes and 10.9% of students said that it depends on the situation.

Table 4 shows what topics adolescents thought clinicians would keep confidential from parents and the police. The majority of teens indicated that if there was harm to themselves or others, that physicians would inform their parents or authorities. Several teens felt that physicians are required to inform the police if they revealed that they drank alcohol, smoked cigarettes, or used drugs.

Figure. Percentage of Teens Per Topic Where Clinician Gender Congruency Matters

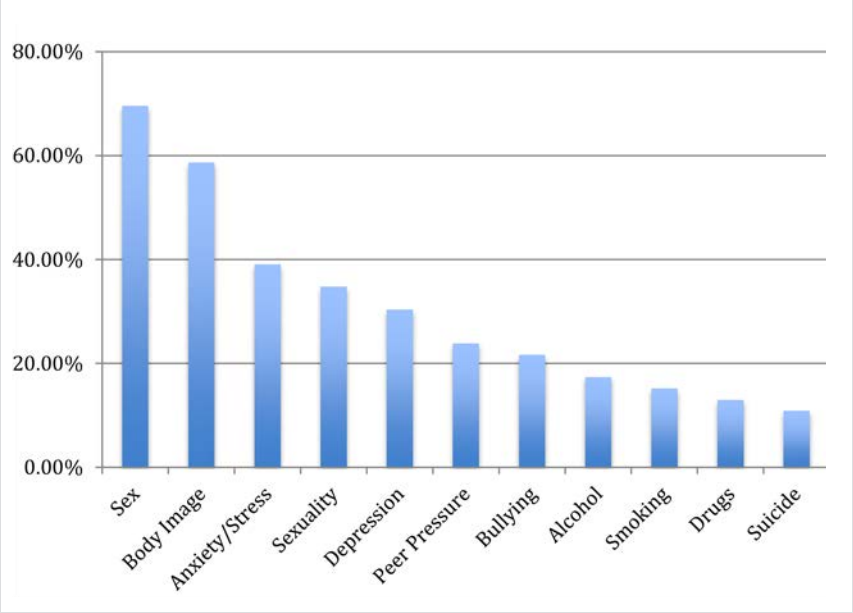

Table 3. Ways Teenager Prefer to Learn About Certain Adolescent Topics, N=53

	Teens Who Prefer to Discuss With a Physician (%)	Teens Who Prefer to Discuss With Another Person (%)	Teens Who Prefer to Self Learn (%)
Vaccines	44 (83.0)	8 (15.1)	3 (5.7)
Mood/stress	38 (71.7)	25 (47.2)	9 (17.0)
Drugs	24 (45.3)	26 (49.1)	20 (37.7)
Alcohol	21 (39.6)	19 (35.8)	23 (43.4)
Smoking	21 (39.6)	22 (41.5)	16 (30.2)
Sex	18 (34.0)	24 (45.3)	16 (30.2)
Peer pressure	14 (26.4)	24 (45.3)	17 (32.1)
Suicide and death	12 (22.6)	27 (50.9)	8 (15.1)
Bullying	8 (15.1)	23 (43.4)	14 (26.4)
Sexuality	6 (11.3)	12 (22.6)	20 (37.7)
Sexting	5 (9.4)	13 (24.5)	17 (32.1)
None	1 (1.9)	6 (11.3)	11 (20.8)

Table 4. Topics Teens Felt Would Not Remain Confidential if Disclosed to Their Physician, N=46

	No. Students Who Believe Physicians Must Inform Parents (%)	No. Students Who Believe Physicians Must Inform Police (%)
Going to hurt yourself	43 (93.5%)	24 (52.2%)
Going to hurt someone else	42 (91.3%)	42 (91.3%)
In danger	42 (91.3%)	Not asked
Using drugs	23 (50.0%)	14 (30.4%)
Drinking alcohol	18 (39.1%)	6 (13.0%)
Smoking cigarettes	16 (34.8%)	5 (10.9%)
Depressed	18 (39.1%)	0 (0.0%)
Anxious	10 (21.7%)	0 (0.0%)
Having sex	9 (19.6%)	0 (0.0%)
Want birth control	15 (32.6%)	Not asked
Pregnant or wants pregnancy testing	12 (26.1%)	Not asked

On topics of substance use, mood, and sex approximately 20% to 50% of teens felt that clinicians would inform their parents.

Students also wrote that they would open up more if they were comfortable with their physician and if the physician revealed personal information. As a result, teenagers were asked about ways they could get to know their clinician. Most (43.5%) teenagers felt that more clinic visits with the same clinician would improve comfort level. Additionally, 32.6% reported that a community presence would help, 19.6% preferred that their physician be a sports team doctor, and 15.2% wanted their physician to speak to their class. The other options of being available in the school's nurse's office, talking at a school assembly, and seeing their physician on TV or in the newspaper carried no statistical significance.

DISCUSSION

This study found that outside of friends and family, teenagers identified medical professionals as the next most likely group with whom to discuss issues. This reinforces the work found by another study that highlighted the importance of physicians being a key influence for adolescents[9] and supports our claim to determine high yield anticipatory guidance. As determined by this study, if the adolescent does not request specific guidance, an appropriate topic to start with might be mood, stress, or vaccines. Our results also show that there are several barriers to teens discussing topics with their clinician, mainly patient understanding of confidentiality and familiarity of/comfort with the clinician.

With respect to confidentiality, adolescents understand that if self-harm or harm of others is involved, then confidentiality is broken, but substance use becomes a nebulous area. Many fear their parents will be informed of these behaviors and, due to the illegal nature of substance use, some fear law enforcement involvement. Topics of mental health and sexuality were associated with less fear

of being revealed to parents, although some students still had concerns. Explicitly stating the policy on confidentiality with both adolescents and their guardians can increase understanding for both parties, especially regarding police involvement. Two studies have found that discussion of confidentiality itself may be a rapport-building tool with teens and suggests starting early in adolescence.[10,11] Some examples of how one might reinforce confidentiality are provided by Rosen and Goldenring in their discussion of the use of the HEEADSSS mnemonic[12] and Bright Futures' written statement on their previsit adolescent questionnaire.

Lack of familiarity and comfort with the clinician were found to be barriers in adolescent care. Clinicians sharing information about themselves and initiating conversation on sensitive topics can improve comfort. Schaeuble and colleagues found that supporting adolescent independence and conveying genuine care promoted positive interactions with adolescents.[13] They recommended that the clinician in an office visit not conduct the interview with checklists/computer boxes.

On the topic of clinician familiarity, the majority of surveyed teens preferred interacting with their clinician in the clinic setting. Those who preferred outside clinic interaction favored the clinician participating in the local community or engaging with the adolescents at school. Clinicians interested in adolescent engagement outside of the clinic might opt for one of those avenues.

When looking at clinician gender preferences, data suggest that female adolescents disproportionately prefer a same gender clinician as opposed to male adolescents, to whom gender congruency matters significantly less. This is consistent with the findings of other studies that looked at physician gender preferences in adolescents.[14,15] Male clinicians should be aware that they might need to work harder than their female counterparts in achieving a level of comfort that will elicit honest responses with female adolescents. They especially may consider reinforcing confidentiality, revealing information about themselves, and conveying concern if they know they will be discussing sex, body image, stress, sexuality, or mood with female adolescents. Gender congruence did not impact discussion of substance use, but as mentioned previously, a reassurance of confidentiality would likely benefit the conversation.

This study was an exploratory study to see what topics adolescents wanted to discuss and how to best engage with them. Knowing this information, future studies may look at the sample scripts/questions provided by the authors of the HEEADDSSS interview or by Bright Futures and determine which questions would yield the most information or greatest effect on rapport building. One might also look at why vaccines were a topic adolescents wanted to discuss with their clinician. Is the impact an increase in confidence in their clinician, is it an expectation, or is there another function vaccine discussion serves? Future studies also may look at mood and stress preventive strategies and if the time spent with clinicians is enough for such strategies to create an impact.

Limitations

The population studied is fairly typical of much of Wisconsin, as Verona has a mix of rural and suburban students, but the sample size is quite low. Thus, surveying more schools and increasing the number of participants would provide a more accurate representation of adolescent viewpoints. The majority of students are white, similar to the demographics of Wisconsin, but having more diversity in race would allow for better generalizability. In addition, the surveyed population interests included science, technology, engineering, or medical field for their careers. Obtaining the student's personal history with well visits would help in determining if their replies were based on conjecture or experience. Finally, despite anonymity, a handful of teens did discuss how they answered the questions with a nearby classmate, which may have skewed some of the responses in a particular direction.

CONCLUSIONS

This study reinforces prior studies that looked at the importance of emphasizing confidentiality during visits, enhancing adolescent familiarity with the clinician, and acknowledging the impact of clinician-adolescent gender congruence on patient comfort in a Wisconsin school-based system. These findings supplement previous research by looking at specific topics adolescents wished to discuss with their clinician, and how confidentiality and clinician-adolescent congruence affected those topic discussions. Knowing that mood, stress, and vaccines are topics that adolescents may be more willing to discuss can help clinicians during the well visit, but more work needs to be done to look at the best intervention strategies and ways to initiate a positive discourse. This is important because adolescence is a time of great change. If clinicians can partner with patients at this stage of life, it may help create a healthier future.

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Case Report of an Ectopic Molar Pregnancy in the Presence of an Intrauterine Device

Deborah A. Simon, MD; Angela L. Smith, MA; John R. Holzhauer, MD

ABSTRACT

Background: Ectopic molar pregnancy is a rare phenomenon and has not been reported in the presence of an intrauterine device (IUD). Clinical diagnosis of molar pregnancy is challenging and requires careful follow-up.

Case: A 25-year-old woman (gravida 2, para 0) with a copper IUD in place presented with a positive pregnancy test. Diagnosis of the complete hydatidiform mole was pathologically confirmed after surgery following clinical and sonographic investigations that identified a left-sided ectopic pregnancy.

Conclusion: Gestational trophoblastic disease (GTD) presenting as an ectopic pregnancy is a very rare occurrence. This patient recovered without event through a combined management and follow-up for ectopic pregnancy and gestational trophoblastic disease. Appropriate identification and management of this clinical problem is essential in order to prevent initial complications as well as subsequent malignant sequelae.

INTRODUCTION

Ectopic gestation is a fairly common phenomenon, whereas ectopic molar pregnancy is extremely rare, affecting between 1 in 10,000 and 1 in 200,000 pregnancies.[1] Main risk factors for molar pregnancy include a history of gestational trophoblastic disease (GTD) and increasing age.[2] Other risk factors include a history of spontaneous abortion, long-term use of oral contraceptives, being of Asian or American Indian descent, or being African American.[3] Complete moles occur when an empty ovum is fertilized by a single sperm that undergoes complete reduplication of the haploid genome immediately after entering the egg, or it can occur when an empty ovum is fertilized by 2 sperm.[4] This most commonly results in a 46 XX trophoblast.[5] Trophoblastic proliferation is associated with diffuse villous edema and the absence of fetal tissue. A wide range of nonmalignant complications in a patient is possible including anemia, infection, hyperthyroidism, pregnancy-induced hypertension, and coagulopathy, and less frequently, pulmonary complications.[6] Some variation of these associated issues is seen in approximately 25% of patients diagnosed with GTD. Malignant sequelae is seen 20% of the time following evacuation of a complete molar pregnancy. The likelihood of malignant outcomes for a patient can be determined by use of a prognostic scoring system.[5]

Risk factors for ectopic pregnancy include a history of ectopic pregnancy, previous tubal surgery, in utero diethylstilbestrol (DES) exposure, and documented tubal abnormalities. Less important risk factors are a history of pelvic infections, a history of infertility, and more than 1 lifetime sexual partner.[7]

Clinical diagnosis of molar pregnancy is challenging and judicious follow-up monitoring is required. Herein we describe the first case known to us of an ectopic molar pregnancy with a copper IUD in place.

CASE PRESENTATION

A 25-year-old woman (para 2, gravida 0) presented to her local family planning clinic 6 weeks after her last menstrual period with a positive pregnancy test. She had a copper IUD in place at the time of presentation, which was subsequently removed. A few days later, she had an ultrasound that demonstrated no sonographic evidence of an intrauterine or ectopic pregnancy.

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Figure 1. Ultrasonographic Appearance of the Left Tubal Ectopic Mass

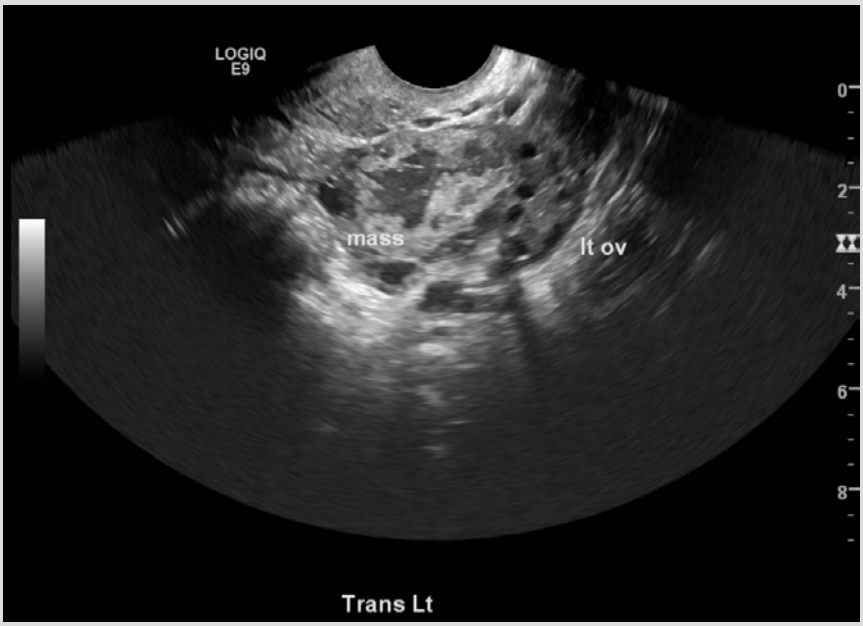
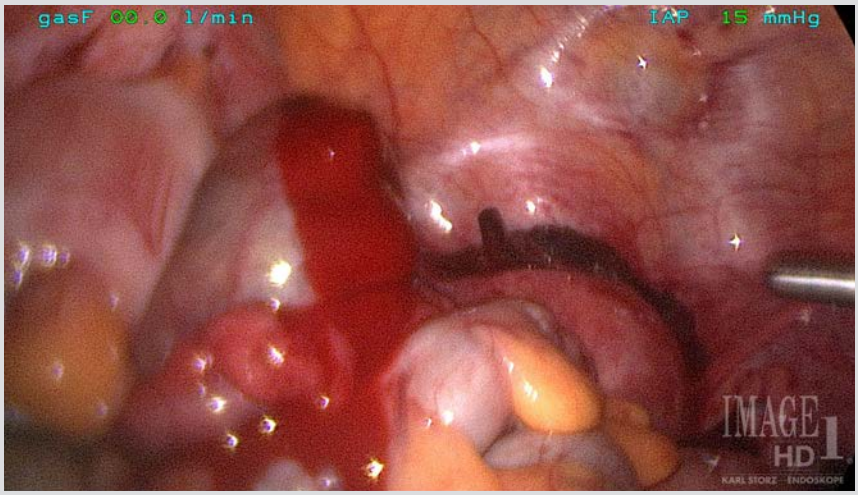


Figure 2. Intraoperative Photograph Showing Bleeding of Mass in Left Fallopian Tube



However, she was contacted later in the day with her quantitative β-human chorionic gonadotropin (hCG) results of 40,000 U/L and was instructed to present to her local emergency department. Once there, she was advised she most likely had had a miscarriage and she was instructed to follow up in obstetrics/gynecology clinic. At that time, she denied any pain and her vaginal bleeding was minimal.

A pelvic ultrasound (Figure 1) was obtained 2 days later at her scheduled clinic follow-up. The sonographic findings of a left-sided ovarian mass were consistent with a left-sided ectopic pregnancy. Laboratory investigations indicated a quantitative βhCG of 31,356 U/L. She was sent to the hospital immediately for surgical management of presumed ectopic pregnancy.

Laparoscopy revealed a small amount of blood in her pelvis and dilation of the ampulla of the left fallopian tube. With gentle examination of the tube, profuse bleeding occurred (Figure 2), and the decision was made by the obstetrician-gynecologist to perform a salpingectomy. Subsequent pathology findings revealed a ruptured ectopic pregnancy with complete hydatidiform mole.

Gynecologic Oncology at the regional university hospital was consulted. They recommended suction dilation and curettage (D&C) to ensure no molar tissue was found in the uterus. The patient underwent an uncomplicated D&C the following week, and pathology was negative for molar tissue. Follow-up included weekly blood draws to track quantitative βhCG values down to zero, after which time monthly blood draws were completed to ensure βhCG values remained negative for 6 months. She was instructed about the importance of reliable contraception during the follow-up period, and was given a prescription for oral contraceptive pills.

DISCUSSION

Ectopic GTD is an exceptionally rare occurrence. The presence of a copper-containing IUD with a molar pregnancy makes this case even more exceptional, and to our knowledge, this has not been reported previously in the literature. Only 0.8% of women experience pregnancy in the first year of use of a copper IUD, making it one of the most effective forms of contraception available.[8] The risk of ectopic pregnancy is higher in women who become pregnant with an IUD in place compared with women who do not have an IUD. However, ectopic pregnancies occur less often in IUD users than in women using other methods of contraception or not using any contraception, because IUDs are highly effective at preventing pregnancy.[9] In a previous prospective study, Honore´ suggested a selective suppression of molar pregnancy development by the presence of an IUD.[10] The researchers examined pathology from all spontaneous abortions during the study period and found there were no molar pregnancies in the group that had IUDs in place.

It is proposed that the management and prognosis of ectopic

GTD is similar to that of ectopic pregnancy and GTD combined. There is some literature to suggest that ectopic GTD has a higher likelihood of rupture at the time of presentation versus nontrophoblastic ectopic pregnancy.[11] If there is suspicion for molar ectopic pregnancy preoperatively, salpingectomy should be considered over salpingostomy to ensure removal of all of the molar tissue. Use of a laparoscopic bagging device to remove the ectopic pregnancy from the patient would be beneficial to prevent spillage into the abdomen.

This case demonstrates successful management and follow-up of ectopic GTD without recurrence of disease or malignant conversion by combining the recommendations for the management of ectopic pregnancy and gestational trophoblastic disease. The confluence of extremely rare circumstances surrounding this molar tubal ectopic pregnancy in the presence of a highly effective contraceptive device is remarkable and virtually unknown in the medical literature. Though ectopic GTD is extremely rare, the possible complications from missing this diagnosis and having inadequate treatment and follow-up highlight the need for conclusive pathologic investigation of all removed gestational tissue, whether intra- or extra-uterine.

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Hospital Medicine and Fellowship Program in Rural North Dakota – A Multifaceted Success Story

S. Shiraz Hyder, MD; Mary Amundson, MA

ABSTRACT

Introduction: Recruitment of hospitalists and primary care physicians for Critical Access Hospitals and tertiary care hospitals in North Dakota is difficult. To address this challenge, 2 programs were implemented in Bismarck, North Dakota.

Methods: St. Alexius Medical Center created a hospitalist fellowship training program in collaboration with the University of North Dakota School of Medicine & Health Sciences and physicians willing to work in Critical Access Hospitals were offered a joint appointment to teach hospitalist fellows and obtain a clinical academic appointment at the university.

Results: Since it was created in 2012, 84 physicians have applied for 13 fellowships. Of the 11 fellows who have completed the program, 64% (7/11) remained in North Dakota to practice.

Conclusions: Physicians are more likely to work in a rural Critical Access Hospital if they spend time working at a tertiary care center and have clinical academic appointments. Where recruitment is challenging, hospitalist fellowship programs are helpful in meeting the health care workforce demand.

INTRODUCTION

The Association of American Medical Colleges has studied the supply and demand of physicians in the United States and recently predicted a shortage of 46,000 to 90,000 physicians by 2025.[1] Physician recruitment remains a major challenge for health care facilities in North Dakota.[2] Other investigators have noted the workforce crisis in primary care and conducted research to discover strategies to improve recruitment and retention of primary care physicians.[3]

Primary care physicians are always needed in Critical Access Hospitals,[4] perhaps even more so in North Dakota due to its unique challenges in recruitment and retention. These Critical Access Hospitals, as defined by the Health Resources and Services Administration, have no more than 25 inpatient beds, an average length of stay of no more than 96 hours for acute inpatient care, offer 24 hour/7-day-a-week emergency care, and must be located in a rural area at least 35 miles from any other hospital. To help address the shortage of physicians, North Dakota Senator Kent Conrad introduced federal legislation in 1994 to allow international medical graduates—students who have come to the United States for medical education on a J-1 visa—to be recruited to underserved areas throughout the country. Once medical education is completed, the physician either returns to their home country or obtains a waiver under the Conrad 30 Waiver program, which allows them to work in the United States under certain conditions that include working full-time (40 hours/week) in an underserved area or serving populations from designated shortage areas.

Not only is there a demand for traditional primary care physicians in North Dakota, but the need for inpatient care (hospitalists) at tertiary care hospitals is equally dire. There is a new need for hospitalist training programs to address the increasing trend for employing these providers, particularly in states where it is difficult to recruit.[5,6] Henkel has shown how hospitalists demonstrate value through an expanded scope of care on inpatient services and

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admitting patients to the hospital for the primary care providers.[7] The role of hospitalists is evolving to admit a full range of hospital patients, provide physician leadership, and partner with hospital management to improve clinical quality, and patient and staff satisfaction.[8]

St. Alexius Medical Center (St. Alexius), located in Bismarck, North Dakota, is a 309-bed tertiary care Level II Trauma Center. As a teaching hospital, medical staff serve as mentors for family practice residents and medical students from the University of North Dakota School of Medicine & Health Sciences (UNDSMHS). As the state's only medical school, the primary purpose is to train health care providers for North Dakota. Working with the state legislature, the UNDSMHS implemented a Healthcare Workforce Initiative and put forth a request for proposals for graduate medical education programs to recruit and retain health care providers with appropriate training to meet the needs of North Dakota. The purpose of this brief report is to describe and discuss the outcomes of the hospitalist program.

METHODS

The need for a hospitalist fellowship program is supported in studies documenting the impact of increasing use of hospitalists in small rural hospitals.[9] Recognizing the challenges in meeting full medical staffing needs, St. Alexius responded to the Healthcare Workforce Initiative led by University of North Dakota by submitting a proposal to train its own hospitalists through the development of a fellowship training program in collaboration with UNDSMHS. The proposal was accepted and this university/hospital collaboration resulted in the hospitalist training program launched in July 2012 with the recruitment of 2 fellows.

The hospitalist training program was structured using the Accreditation Council for Graduate Medical Education guidelines and with assistance from the UNDSMHS's Graduate Medical Education committee. The program objectives are as follows: (1) improve skills in the practice of hospital-based medicine including critical care skills (at least 2 months in intensive care unit training), (2) improve skills in procedures commonly performed in the practice of hospital medicine (central line, abdominal paracentesis, thoracentesis, lumbar puncture, etc), (3) increase knowledge base in the core competencies in hospital medicine (6 months on the medical floor and emergency department while participating in teaching rounds, grand rounds, didactic lectures and presentations), and (4) develop skills in medical management (participating in and getting exposure to organized medical staff activities such as quality/performance improvement, utilization review, bioethics, credentialing, peer review, regulatory compliance, and risk management). Fellows are invited to participate in physician leadership education and training opportunities such as those available through the American College of Physician Executives. A full curriculum for the program is available from the authors on request. To be considered for the program, the physician must have successfully completed an Accreditation Council for Graduate Medical Education-approved internal medicine or family medicine residency program and be eligible for licensure in North Dakota. If the candidate is not a US citizen, they must have, or be eligible for, a visa waiver. Preference is given to applicants with ties to North Dakota or those willing to stay and work in this state.

RESULTS

An E*Value program is used to evaluate the program. The fellows are evaluated by the attending physician after their rotations. The fellows also evaluate their rotation and the attending physician. Evaluations completed by the fellows indicate that they appreciate learning from complex medical patients and feel even better prepared for becoming hospitalists when given limited autonomy to cover nights with attending backup. The hospitalist attending physicians also report that having a fellow take first call decreases their call burden and improves their work/life balance. This positive evaluation led the hospital administration to approve 2 additional fellows for the next 2 years with no program modifications needed at this time. The program so far has a success rate of retaining 64% (7/11) of the graduates in North Dakota following their training.

The Critical Access Hospital recruitment program is another example of collaboration in health care. It is structured as a partnership to facilitate international medical graduates requiring a visa waiver to work in federally designated Health Professional Shortage Areas or Medically Underserved Areas/Populations as primary care providers. The hospitalist training program provides an incentive for primary care physicians to consider North Dakota by providing services approximately 160 hours every 4 weeks to the Critical Access Hospitals that have not been able to successfully recruit primary care physicians. These physicians have the opportunity to work (over and beyond 40 hours/week) at St. Alexius. This elective rotation in a tertiary care facility allows physicians working in Critical Access Hospitals to maintain their skills in managing complex medical patients, interact with multiple specialists, and stay in touch academically through teaching fellows, residents, and medical students. They are also eligible to apply for clinical faculty status at the UNDSMHS with the opportunity to access the university's library and other resources.

Because of this collaboration between Critical Access Hospitals and St. Alexius, there has been a significant improvement in the provision of medical services in rural facilities as patients are now able to receive care for mild to moderately complex medical issues locally in the rural Critical Access Hospitals. Complex patients are transferred to the tertiary care center under

Table. Hospitalist Fellowship Training Program Population

Academic Year	No. of Applicants	No of Applicants Accepted	Practice Location	
			North Dakota	Other
2012-2013	25	2	1	1 (Illinois)
2013-2014	15	4	4	1 (initially went to Wisconsin but returned to ND)
2014-2015	13	4	1	3 (North Carolina, Nevada, New Hampshire)
2015-2016	18	1	1	
2016-2017	13	2	In Process	
Total to Date	**84**	**13**	**7**	**5**

the care of specialists who are familiar with rural physicians as they have developed a relationship with the physicians during their rotation at the tertiary care hospital.

CONCLUSIONS

The hospitalist training program is part of the Healthcare Workforce Initiative at the UNDSMHS and is now in its fifth year. From 2012 to present, the program has received over 80 applications with funding opportunities for 13 fellows. All fellows who completed the program chose careers as hospitalists and more than 60% were retained in North Dakota (see Table).

This program also has helped bring physicians to Critical Access Hospitals, which fills a longstanding void for many rural communities and is an asset to the hospitalist training program because it helps cover time off needed by the core hospitalist faculty. Ranji et al have indicated a need to appropriately train hospitalists, not only to improve hospital care but to provide well-trained physicians for Critical Access Hospitals.[10]

The positive results described in this report offer a new approach, through partnerships with tertiary care urban hospitals and medical schools, to recruiting and retaining physicians for the benefit of both rural and urban institutions. Long-term studies will determine if this fellowship program results in retention of physicians in rural areas.

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Joseph E. Kerschner, MD

The United States' Research Enterprise

Joseph E. Kershner, MD

The research enterprise in the United States has been discussed previously in these pages, and points have been made regarding the economic impact for the state of Wisconsin. To recap, each dollar awarded to our academic institutions in Wisconsin by the National Institutes of Health (NIH) generates approximately $2.21 in new state business activity, and each new research grant results in 7 new jobs.[1]

The Medical College of Wisconsin (MCW), with its emphasis as a research-intensive medical school, has built a top-100 research enterprise.[2] Our faculty and staff work extremely hard to generate NIH funding as well as peer-reviewed research funding from other federal, foundation, and philanthropic sources.

Several recent developments in Washington, DC, require further commentary on this topic to ensure that all who care about the health of Wisconsin and the nation are provided additional data. One "solution" to decrease federal expenditures was to reduce the amount of money that could be paid to scientists from federal government awards. A second "solution" suggested that reducing funding received by institutions to support facilities and administration (F&A) costs associated with research grants would result in either a decrease in federal expenditures or an increased amount of funding for "actual" research rather than funding the F&A.

It is important that all understand that each of these ideas will have only one effect on the research enterprise: reducing the ability to conduct research – not only in Wisconsin (especially research providing health solutions for the future, conducted at the state's two medical schools), but across the country. Each of these "solutions" will translate into fewer scientists conducting research in Wisconsin, and, ultimately, fewer cures for our citizens and diminished economic impact for the state as noted above.

Regarding the limitation of salary for those conducting research supported by federal grants, although scientists at our research universities are well-compensated, many have dedicated decades of their lives (after their university education), in much lower-paying positions, to obtaining the skills needed to bring new knowledge forward in the biomedical sciences. This country is fortunate to have this elite group of academicians engaged in finding solutions to the world's health problems.

The market for a PhD or MD scientist conducting this work is further influenced by economic opportunities in other sectors of the economy. Also, it is not possible for the medical schools (where most of these researchers are concentrated) to simply "make up the difference" in the dollars needed to compensate talented researchers, compared to what would be allowed by the suggested new federal guidelines. Our medical schools already provide substantial cross-subsidy for each dollar received from the federal government to allow for this life-saving research. A recent study by the Association of American Medical Colleges noted that approximately 53 cents was needed for each dollar received from the NIH from universities to allow successful completion of the planned research. With other pressures (including decreasing clinical revenues and increased costs to provide outstanding medical education), there is no additional revenue stream to supplement this envisioned decrease in federal

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salary support.[3] The result simply would be that most institutions would need to downsize their respective research enterprises to reduce the needed additional cross-subsidization.

The proposal to limit F&A is equally misguided, as it presumes that the dollars awarded to institutions for facilities and administration of research are simply "extra" dollars that institutions have to build new buildings or support administrative staff engaged in efforts other than research. The reality is completely the opposite. The F&A received by research institutions does not nearly cover the costs of maintaining a competitive research program. The reason for the need to supply an additional 53 cents on every dollar received is largely related to the fact that this F&A is inadequate, and research institutions are using other operating funds to sustain the buildings, equipment and administrative support needed to ensure that research is conducted in an ethical fashion (when it involves human subjects) and a humane fashion (when it involves animals and to maintain the required regulatory conditions). Similar to the discussion above related to salary, should the federal government seek to decrease the F&A awarded to research institutions, it would result in a reduction in our overall ability to conduct research as well as a shrinking of research abilities across the United States. Again, there is no other solution to replace these funds at most institutions.

Research institutions in the United States must continue to look at their responsibility to provide solutions to the cost of research – and most institutions are taking this seriously. At MCW, we have met with our legislative officials to look at ways to streamline regulations to enhance research efficiency. Institutions also need to collaborate with each other regarding ways to share expensive equipment and space. One such solution in Wisconsin has been the recent creation of a joint department of biomedical engineering between MCW and Marquette University, designed specifically with the issues of cost and shared resources in mind. Institutions increasingly are sharing resources and conducting research across multiple organizations to address these same issues, and MCW has relationships with many schools of medicine and universities – including the University of Wisconsin School of Medicine and Public Health – to accomplish these goals.

We at MCW look forward to an ongoing dialogue regarding managing the country's research portfolio in a responsible manner, and are delighted that both houses of Congress recently passed legislation demonstrating their understanding that the proposed "solutions" noted above would not result in solutions, but rather a reduction in our country's world-leading research enterprise.

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Antibiotic Stewardship in the Outpatient Setting

DeAnn Richards, RN, BSN

In September 2014, President Barack Obama issued an executive order titled National Action Plan for Combating Antibiotic-resistant Bacteria (2015),[1] and in November of 2016, the Centers for Disease Control and Prevention (CDC) released Core Elements of Outpatient Antibiotic Stewardship.[2]

These Core Elements provide a framework for antibiotic stewardship for outpatient locations that routinely provide antibiotic treatment. The Core Elements were developed through a combination of consolidating evidence-based antibiotic stewardship practices and expanding or adapting best practices for antibiotic stewardship across other clinical settings. The 4 core elements for outpatient locations include commitment, action, tracking and recording, and education and expertise.

Ultimately, there are 2 key aspects of antimicrobial stewardship – prescribing and seeking behavior. The decreased pressure of antimicrobials in the community may decrease the number of community-onset multidrug resistant organisms. Antimicrobial resistance is directly attributed to inappropriate prescribing of antibiotics and antivirals.[3] The Joint Commission added antibiotic stewardship requirements in January of 2017.[4]

Antibiotic resistance is among the greatest public health threats today, leading to an estimated 2 million infections and 23,000 deaths per year in the United States.[5] The most important modifiable risk factor for antibiotic resistance is inappropriate antibiotic prescribing. At least 30% of outpatient antibiotic prescriptions in the United States are considered unnecessary and include antibiotic selection, dosing, or duration that does not follow national guidelines.[5] Sinus infections, middle ear infections, and pharyngitis (sore throat) account for nearly 45 million antibiotics prescriptions each year, yet only half of the individuals with these infections received the first-line recommended drugs when compared to prescribing guidelines.[5]

Antibiotic resistance is among the greatest public health threats today, leading to an estimated 2 million infections and 23,000 deaths per year in the United States

Antibiotic treatment is the most important risk factor for *Clostridium difficile* infection (CDI). In 2011, an estimated 453,000 cases of CDI occurred in the United States, approximately one third of which were community-associated infections. As much as 35% of adult and 70% of pediatric CDI are community associated.[6] One study estimated that a 10% reduction in overall outpatient antibiotic prescribing could reduce community-associated CDI by 17%.[7]

How do you know if your practice reaches an "A" for Antibiotic Stewardship? The following are ways to up your game:

- *Address your patients/parents requests for antibiotics by creating a plan with them to provide symptomatic relief.* A great resource is the CDC viral prescription pad available at https://www.cdc.gov/getsmart/community/downloads/Systematic-Relief-for-Viral-Illness.pdf. By addressing the patient's symptoms, they can feel better more quickly, and by listening to their needs and developing the plan together, it is less likely to affect their perception of the quality of care.
- *Write and display public commitments in support of antibiotic stewardship.* This simple step indicates support for using antibiotics when medically necessary while informing patients why antibiotics are not always the best answer. Using one of the many posters available featuring a clinician stating they are committed to prescribing antibiotics appropriately resulted in a 20% reduction of inappropriate antibiotic orders. A sample poster is available online at http://bit.ly/2I8LfLx.
- *You cannot improve what you do not track.* As simple solution is to determine what percentage of your patient's visits result in prescribed antibiotics. ProPublica has, based upon Medicare Part D claims, how prescribers compared to their peers by practice as well as by antibiotic. On the ProPublica website (https://projects.

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Antibiotic resistance is among the greatest public health threats today, leading to an estimated 2 million infections and 23,000 deaths per year in the United States.[5] The most important modifiable risk factor for antibiotic resistance is inappropriate antibiotic prescribing. At least 30% of outpatient antibiotic prescriptions in the United States are considered unnecessary and include antibiotic selection, dosing, or duration that does not follow national guidelines.[5] Sinus infections, middle ear infections, and pharyngitis (sore throat) account for nearly 45 million antibiotics prescriptions each year, yet only half of the individuals with these infections received the first-line recommended drugs when compared to prescribing guidelines.[5]

Antibiotic resistance is among the greatest public health threats today, leading to an estimated 2 million infections and 23,000 deaths per year in the United States

Antibiotic treatment is the most important risk factor for *Clostridium difficile* infection (CDI). In 2011, an estimated 453,000 cases of CDI occurred in the United States, approximately one third of which were community-associated infections. As much as 35% of adult and 70% of pediatric CDI are community associated.[6] One study estimated that a 10% reduction in overall outpatient antibiotic prescribing could reduce community-associated CDI by 17%.[7]

How do you know if your practice reaches an "A" for Antibiotic Stewardship? The following are ways to up your game:

- *Address your patients/parents requests for antibiotics by creating a plan with them to provide symptomatic relief.* A great resource is the CDC viral prescription pad available at https://www.cdc.gov/getsmart/community/downloads/Systematic-Relief-for-Viral-Illness.pdf. By addressing the patient's symptoms, they can feel better more quickly, and by listening to their needs and developing the plan together, it is less likely to affect their perception of the quality of care.
- *Write and display public commitments in support of antibiotic stewardship.* This simple step indicates support for using antibiotics when medically necessary while informing patients why antibiotics are not always the best answer. Using one of the many posters available featuring a clinician stating they are committed to prescribing antibiotics appropriately resulted in a 20% reduction of inappropriate antibiotic orders. A sample poster is available online at http://bit.ly/2I8LfLx.
- *You cannot improve what you do not track.* As simple solution is to determine what percentage of your patient's visits result in prescribed antibiotics. ProPublica has determined, based upon Medicare Part D claims, how prescribers compared to their peers by practice as well as by antibiotic. On the ProPublica website

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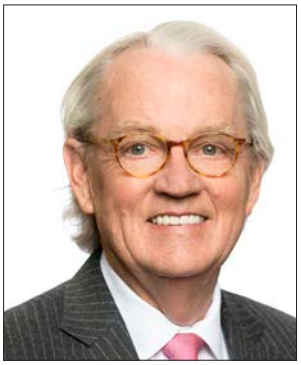
DeAnn Richards, RN, BSN, CIC, is a Project Specialist at MetaStar. This material was prepared by the Lake Superior Quality Innovation Network, under contract with the Centers for Medicare and Medicaid Services (CMS), an agency of the US Department of Health and Human Services. The materials do not necessarily reflect CMS policy. 11SOW-WI-C310-17-60 100617.



W. Stancil Starnes, JD

Physician Advocacy is ProAssurance's Specialty

W. Stancil Starnes, JD

ProAssurance's roots run deep in Wisconsin—back to PIC WISCONSIN's cofounding by the Wisconsin Medical Society—and those roots are anchored in our philosophy then and now: we are unfailing advocates for our insured physicians and indeed the entire the medical community.

In these efforts we are fortunate to have an ally such as the Wisconsin Medical Society, whose leaders share our values and our commitment. The prime example of this is your Member Benefit Plan, which protects insured Society members with enhanced coverage at competitive rates.

In addition to strong professional liability protection, your Member Benefit Plan includes coverage for cyber threats—and added benefits for challenges like an audit of billing practices, a request to appear at a deposition, or a response to a licensing board investigation. Your Member Benefit Plan includes savings on Society webinars, plus ProAssurance Risk Resource services designed to enhance your interactions with your patients while reducing the chances of a medical incident.

I am especially proud of the level of physician involvement in our Wisconsin operations. Today there are 13 Wisconsin physicians serving on our claims and underwriting review panel and another 23 who serve on Regional Advisory Boards to help us shape the coverage and benefits that mean the most to Wisconsin physicians.

Our Physicians in Collaboration (PIC)-Wisconsin program provides valuable peer-to-peer support for physicians facing a medical liability lawsuit. While there may be nothing as daunting as being sued for malpractice, there is nothing more reassuring than receiving emotional support from a colleague who has been through it before. That's a key part of our efforts to be an advocate for you and your colleagues.

ProAssurance, in collaboration with the Society, remains active on your behalf in pursuit of fair treatment in the Wisconsin court system. As you are aware, hard won caps on noneconomic damages in Wisconsin have been struck down by lower courts. The Society and ProAssurance are both mounting aggressive appeals. Other insurance companies may sit on the sidelines, as usual, to reap the benefits of the work done by the Society and ProAssurance, but we are continuing our tradition of advocacy on your behalf.

ProAssurance also shares the Society's focus on physician wellness, taking our company's physician advocacy efforts to a national level. Its cornerstone is our endowment of the ProAssurance Endowed Chair for Physician Wellness at the University of Alabama at Birmingham (UAB). This academic chair is the first of its kind in the United States and underscores ProAssurance's commitment to its role as a leading advocate for America's physicians.

Hard won caps on noneconomic damages in Wisconsin have been struck down by lower courts. The Society and ProAssurance are both mounting aggressive appeals.

The initial $1.5 million gift to the UAB School of Medicine will endow an academic chair and also will support a research team dedicated to addressing health issues that are unique to physicians as they deal with the stress and pressures associated with practicing medicine in today's rapidly evolving health care environment.

The research that will emerge will be groundbreaking. Physicians have always been subject to high levels of stress from a variety of factors such as society's expecta-

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W. Stancil Starnes, JD, is chairman and chief executive officer of ProAssurance Corporation, the parent company of ProAssurance Casualty Company (formerly PIC Wisconsin) and the endorsed medical professional liability carrier of the Wisconsin Medical Society.

tions for successful outcomes, the threat of litigation, and the effect of their professional obligations on the quality of their lives, and their families' lives. As medicine evolves to address the changing dynamic of healthcare in America, we must find ways to address these pressures.

UAB expects to recruit an expert in the field of physician wellness who can implement well-designed interventions to enhance a sustainable culture of physician wellness and provide tools and resources to manage stress and burnout. They plan to make these resources available throughout the nation, resulting in more engaged physicians who can provide the highest-quality care to their patients.

In order to ensure that the research is broadly applied, ProAssurance also expects to give an additional $500,000 to UAB to fund the dissemination of these initiatives in support of physician wellness. The company's Chief Medical Officer, Hayes V. Whiteside, MD, views such programs as a logical extension of ProAssurance's role as a trusted partner with physicians and the nation's health care community. He said, "Assisting physicians has always been a high priority for ProAssurance. Now more than ever, we need to ensure that today's physicians maintain their commitment to our high calling, and that future physicians are equipped to deal with the realities of our vital chosen profession." ProAssurance looks forward to collaborating and coordinating our physician wellness efforts with the Society whenever possible.

As Wisconsin continues to lead the nation in the delivery of cost-effective, high quality healthcare, we work with your Society, advocating for you and providing a Member Benefit Plan tailored to address your liability challenges. The ProAssurance Endowed Chair for Physician Wellness takes our commitment to you—and all US physicians a step further—it's one of the ways we strive to treat you fairly now and into the future.

To learn more about the Member Benefit Plan, contact your Wisconsin Medical Society Insurance & Financial Services Agent at 866.442.3810 or visit www.wisconsinmedicalsociety.org/insurance.

The Changing Face of Hospital Medicine

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Medicine is challenged to find the correct balance between relationship-centered care and maintaining satisfied physicians. Divisions of responsibilities may go a long way in preventing burnout among primary care physicians.

Also in this issue are 2 papers describing violent injuries. The first looks at firearm mortality in Wisconsin between the years 2000 and 2014.[4] Most firearm deaths (72%) in Wisconsin are related to suicides, and firearms accounted for over 70% of all homicides in 2014. The second looks at accidental spine and spinal cord injuries in people falling from hunting blinds between 1999 and 2013.[5] One hundred seventeen people were seen at the emergency department during the allotted timeframe and 25 patients (38%) required surgical fixation of their injuries.

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(https://projects.propublica.org/checkup/states/wisconsin), clinicians can search by their name to find additional information on prescribing practices in the antibiotic category. Adult and pediatric treatment recommendation resources are also available on the CDC's website at https://www.cdc.gov/getsmart/community/for-hcp/outpatient-hcp/index.html.

The Core Elements of Outpatient Antibiotic Stewardship provides a framework for outpatient clinicians and facilities that routinely provide antibiotic treatment. They were developed through a combination of consolidating evidence-based antibiotic stewardship practices and building on or adapting known best practices for antibiotic stewardship across other clinical settings. More information is available at https://www.cdc.gov/mmwr/volumes/65/rr/rr6506a1.htm?s_cid=rr6506a1_w .

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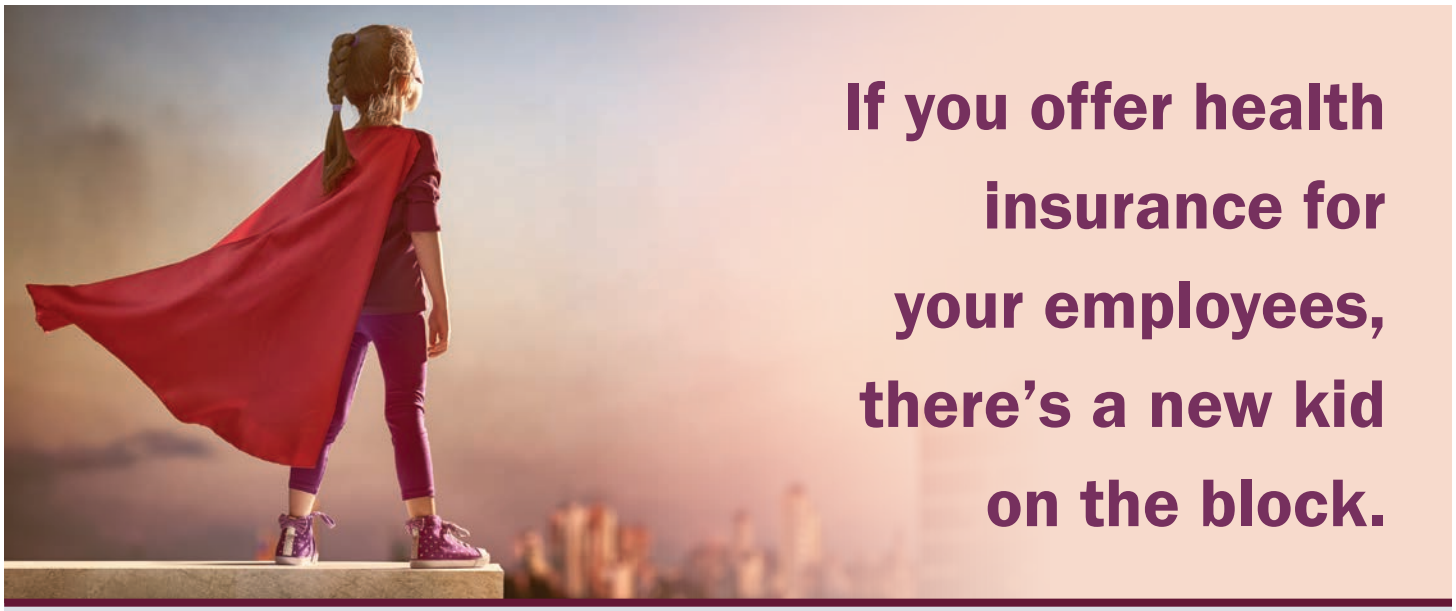

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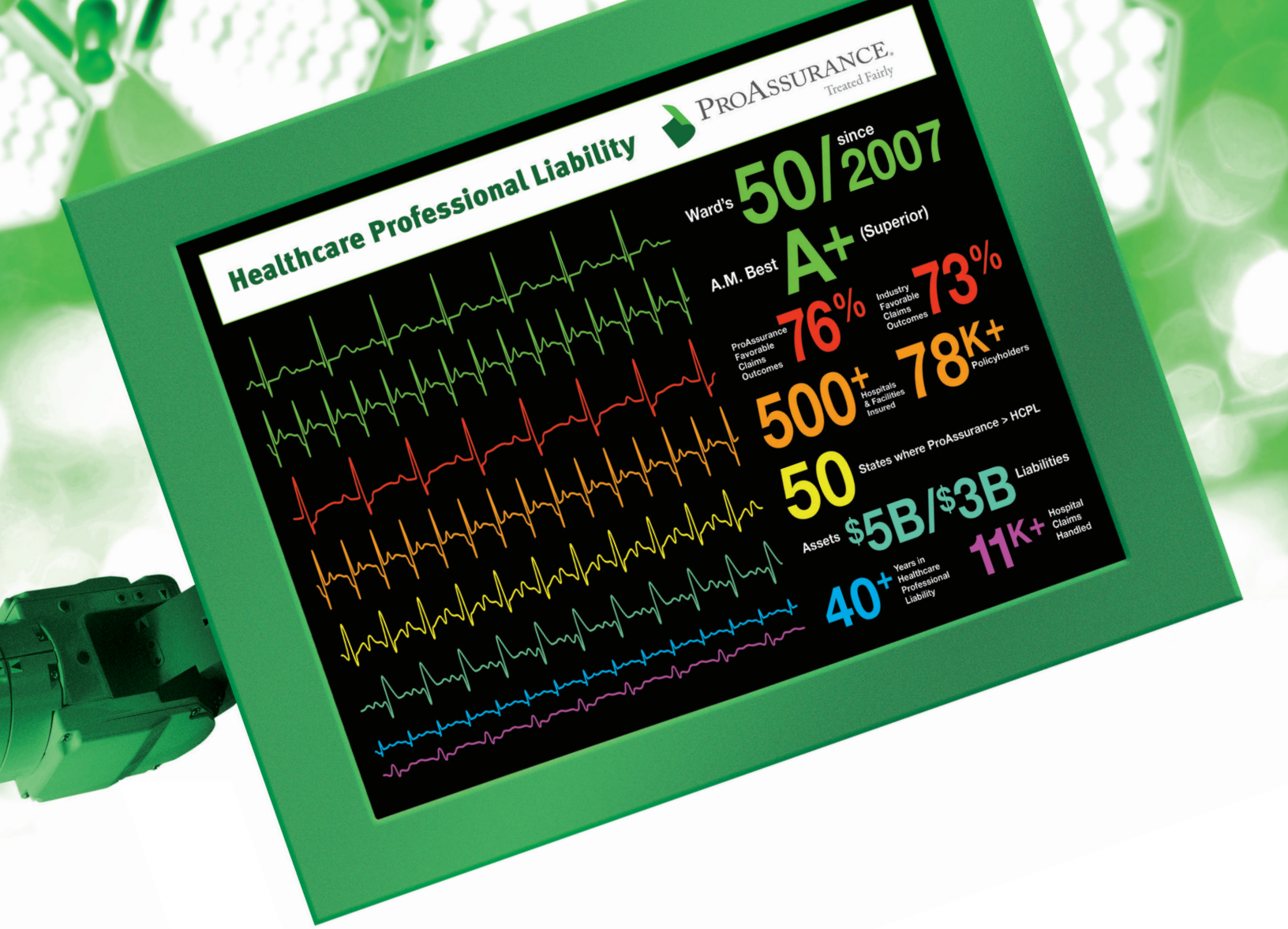

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