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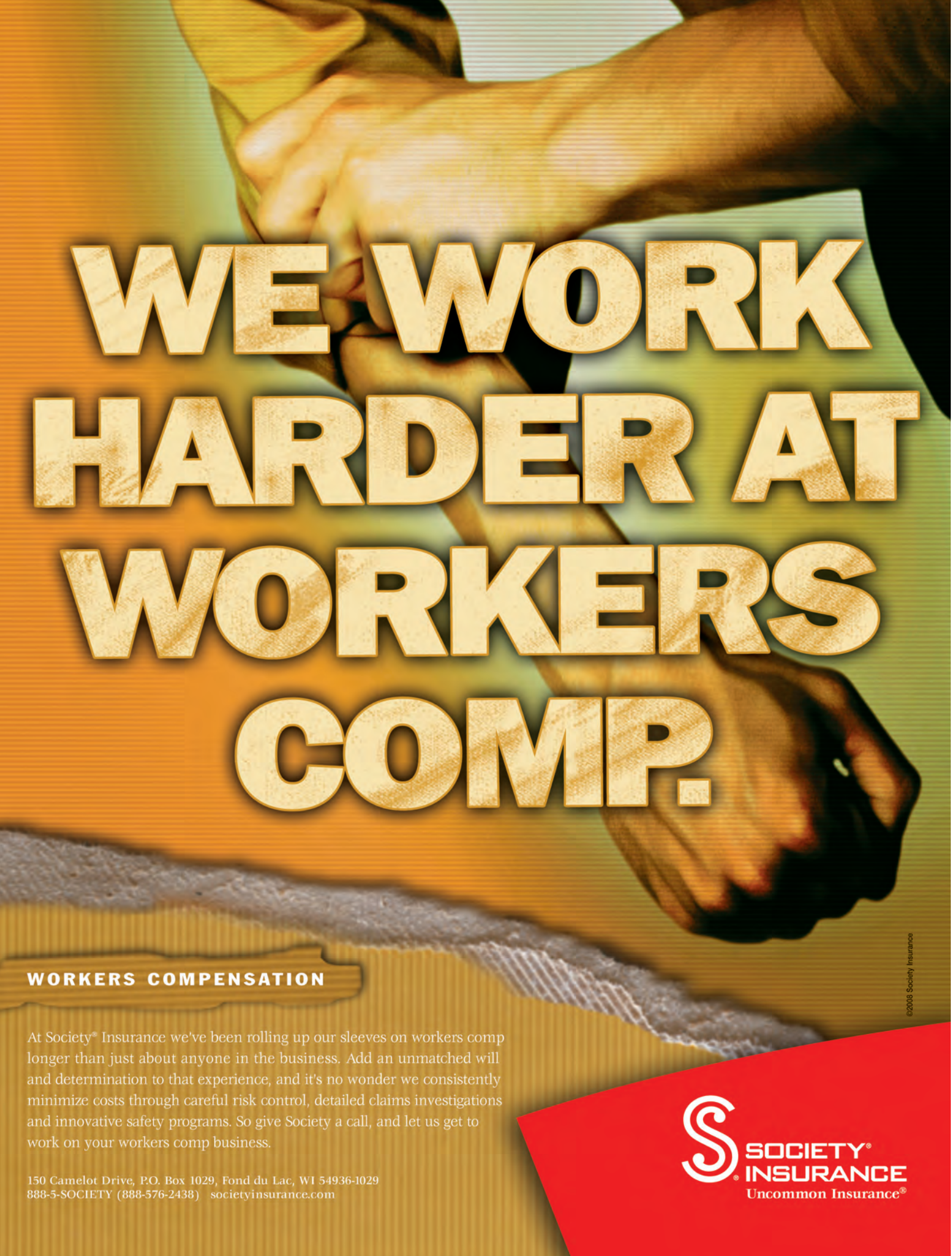
University of Wisconsin Madison School of Medicine and Public Health

100 years of medicine



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WIPHL helps doctors empower patients

I am pleased that Dr Chou has chosen a presidential theme of the importance of helping patients help themselves.[1] His emphasis on promoting healthy behaviors is also most welcome, as 40% of our patients die of preventable behaviors.[2]

Unfortunately, most primary care practices are not currently promoting healthy behaviors in a systematic way. With new billing codes,[3] reimbursement is not the issue it once was, but time remains an issue. It would take the average primary care physician over 7 hours a day to deliver all the preventive services recommended by the United States Preventive Services Task Force.[4] On average, family physicians address 3 clinical problems at each visit.[5] Asking physicians to squeeze more care into their visits simply won't work.

The Institute of Medicine[6] offers a solution: Physicians don't have to do it all. I am the clinical director of the Wisconsin Initiative to Promote Healthy Lifestyles (WIPHL), www.wiphl.org. With funding from the US Substance Abuse and Mental Health Services Administration, our initial goal is to durably enhance the delivery of evidence-based alcohol and drug screening, brief intervention, referral, and treatment services in primary care clinics throughout Wisconsin. Ultimately we will develop a comprehensive mental health and multibehavioral screening, intervention, and referral package for primary care. The key to WIPHL's success is having the clinic staff conduct initial brief screening with written questionnaires and dedicated health educators do the rest. We train our health educators in motivational interviewing,[7] through which patients are assisted empathically and respectfully in making their own decisions about their health-risk behaviors according to their own goals and values, as Dr Chou suggests.

For those physicians who are already strapped for time, WIPHL can help build teams and implement systems in your practices to help empower patients to change unhealthy behaviors. Your patients will be healthier, your practice won't lose money, and you'll still get home for dinner!

Richard L. Brown, MD, MPH
Madison, Wis

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Studies unable to prove prayer is helpful for patients

Regarding Dr Belknap's letter to the editor referencing the "power of prayer," (*Wisconsin Medical Journal*, 2007, Vol. 106, No. 8) the literature does not seem to support his position. At least 10 studies of the effects of prayer have been carried out in the last 6 years with mixed results. The most recent study, led by Herbert Benson, MD, a cardiologist and director emeritus of the Benson-Henry Institute for Mind Body Medicine near Boston, raised serious questions whether patients should be told prayers were being offered for them. The researchers concluded that there was no difference between 2 groups of patients undergoing cardiovascular surgery (1 group was prayed for, the other not), either in rates of complications or successful outcome. Dr Benson is widely known regarding his emphasis on prayer as providing soothing and comfort, but he stops short of claiming that prayer may influence outcomes.

People of faith will continue to believe in the power of prayer, as they should. It is the essence of faith to believe in the unbelievable. Science, on the other hand, does not recognize the legitimacy of faith as a determiner of outcomes.

Therefore, statements like "it is my personal belief that both prayer and advocacy are urgently needed..." are inappropriate for a scientific journal and should be reserved for personal use at home or in church. It will be the hard work and dedication of people (many of whom may be motivated by the power of prayer) that eventually improve access to care and equity in quality.

Paul K. Wegehaupt, MD, FAAP
Rhinelander, Wis

Global warming in Wisconsin

How concerned are Wisconsin people and physicians about global warming?

Although I know of no survey, I would expect there may be less concern in Wisconsin than in much of the country. After all, doesn't a warmer winter sound better (except for those whose businesses depend on the cold)? And a few more days of summer seems worth the winter trade-off.

But let's not fool ourselves. Although "a bit warmer" may not seem worrisome in Wisconsin, temperature volatil-

ity across the world can produce storms locally. After visiting Toronto recently, I learned that they were already preparing for potential waves of "climate refugees" from warmer climates. The potential health risks for Wisconsinites may seem self-evident: in the summer, more heat-related illnesses, new infections, overcrowding, and inadequate health and public health systems. The science substantiating the risk of global warming, as well as human behavior as a major cause, seems well-established by now.

Perhaps Wisconsin should also feel a bit of guilt. We rely so much on coal as an energy source that we contribute more to global warming than states of a similar size.

Like most of the country's physicians, Wisconsin physicians as a group do not seem to have shown much concern about these risks. There may be multiple reasons for this lack of attention. Like everyone else, physicians tend to psychologically deny risks that may be decades away. Our brains are set up to respond to immediate danger by the fight-or-flight response, but there is no comparable response for future risk. Physicians are also beleaguered with increased demands on productivity, leaving little time and energy for anything but basic patient care.

However, we do have an ethical imperative to do more. Our American Medical Association's principles of medical ethics state in Section VII, "A physician shall recognize a responsibility to participate in activities contributing to the improvement of the community and betterment of public health."

So what can Wisconsin physicians do?

As a citizen and potential role model, we can keep up-to-date with the local and national risks. *The Milwaukee Journal Sentinel* has an excellent on-line source at www.jsonline.com/globalwarming. Armed with that knowledge, we can make the necessary adjustments in our homes and workplace.

We can also try to join the Governor's Task Force on Global Warming. Although there are key leaders from many different businesses and professions on the task force, the list does not include any physicians.

We can also pair up with public health. Many of the risks appear to overlap the health concerns of both fields.

Educationally, we need to get the younger generations involved, for it is their future that will be most affected. Especially at a graduate level, our medical and other health care schools need to incorporate this topic.

We can participate in the next Earth Day, April 22, 2008. There is plenty of time to prepare and be creative. How about wearing green coats instead of white? Or, if that's too much, at least green shirts and skirts. When patients and staff ask why, we could have literature on global warming available. Maybe we could even put on a town hall meeting for the public.

H. Steven Moffic, MD
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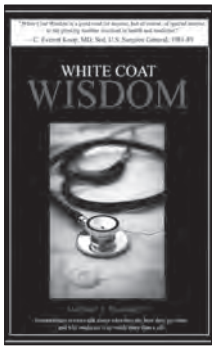

Book Excerpt

White Coat Wisdom

Stephen J. Busalacchi
Publisher, Apollo's Voice, LLC

The following excerpt is from the book, White Coat Wisdom*, in the chapter* Young at Art*, in which LuAnn Moraski, DO, a pediatrician and internist from the Medical College of Wisconsin explains what it takes to learn medicine, as opposed to getting a medical degree.*

Doctor LuAnn Moraski, a residency director, states flatly that she once killed a patient. Not on purpose, of course, and she's making damn sure her residents don't make that same mistake.

Residency is where you learn what you are made of. We admitted a gentleman. His wife brought him in for a headache. It was a progressive headache, and it was a bit worrisome.

On the CT there was this orange where one of the lobes of his brain should have been. Your gut sinks. This would be the medical emergency they talked about. He's having all these danger signs that go with increased intracranial pressure, so I call the neurosurgery resident.

He says, "I'm sorry, but I'm doing an emergency procedure at the other hospital. If he needs a burr hole"—an actual hole in his head to relieve the pressure—"I need to know how chronic this is." I'm pretty hip with a needle, but I'm not drilling holes in people's heads without authorization.

The resident says, "Unless he has papilledema," which is a change in the retina that you see with intracranial pressure, meaning it had been going on for a while, "I'm not going to be able to come over right away."

Well, at the time, the only way to tell if there was a papilledema was with an instrument called an ophthalmoscope. At 11 o'clock at night, you're not going to find an ophthalmoscope. What are we going to do now? One of the guys who cleaned the rooms where the medical teams work, says, "LuAnn, you're a wreck. You need to go home."

"I am, but I don't understand. I'm just going to check this one more time." It was before all the computers. I was there with my nose buried in a book.

"LuAnn, go home. The book will be here in the morning."

You're trying not to cry. That whole girl thing kicks in. "I'm trying to figure it out because if I'm wrong, this guy's going to die and if I'm not wrong, he might die anyway. I don't know what to do."

"LuAnn, I've got keys. Let's go down to the ophthalmology offices."

He took me down and we got an ophthalmoscope, and he did have papilledema. The neurosurgery resident was over in 45 minutes, he was in the OR, and we saved his life. I didn't save that man's life. A janitor did. When you're trying to think about who's going to help you? Who is part of your world? Everybody's part of your world.

How does stress affect you during training?

It's very hard, and you have to learn how to deal with it appropriately because it can be very consuming. I was a second year resident the first time I actually, knowingly, killed somebody. He was a wonderful gentleman who had end stage prostate cancer, who came in for a routine chemo appointment. He was working with a junior medical student who said, "Would you mind just reviewing this stuff with me?" His kidney numbers didn't look right and we did some interventions, but they didn't work because he was really sick. We knew he was sick, but it was one of those communications things where the fellow on call didn't think so.

Rather than calling the attending physician, the fellow said, "No, you're wrong. You're not looking at it the right way." He coded the next morning and he died from hyperkalemia (high potassium)—one of the first things you learn. It's page 37 in the Washington manual. It's something you learn every day, how to manage it and what to do about it. Yet, he still passed because we didn't do it.

When the attending read the notes, she's like, "You did everything right, except the most important thing. When somebody was telling you, 'You don't know what you're talking about,' you should have called me. What would have

happened? You woke me up. What would I have done? Yell at you? Did anybody ever die from being yelled at?"

Medicine is hierarchical, so you have to be a little careful. But again, if you state your case, justify it and have the evidence, you're gonna usually do pretty well.

Why didn't you call the attending physician?

I don't know if it was self-confidence or following chain of command. Now, the students and residents going through are a lot more understanding of the rules. They're more afraid of the litigiousness. Interestingly enough, this family deliberately decided not to sue because they knew how hard we had tried. He had terminal cancer.

If you're worried about being sued, it has a lot to do with (poor) communication. But it weighs on you horribly. There is not a resident here who doesn't understand the treatment of hyperkalemia to this day because of that.

He needed emergent dialysis. Your heart requires a very narrow balance of potassium, and once that's out of control, you can't control a heart rhythm.

It changed my view of medicine in terms of what is really selfless. What was I afraid of? If I would have picked up the phone, something different would have happened. I was afraid I was going to get in trouble, so it changed me in terms of what it means to be an advocate for your patient.

The selfless part of medicine isn't as much about time, anymore. You don't have to be the doc who works 24/7 and stays until all the patients are seen. It really means being an advocate for your patients, regardless of what it takes to do that.

That's one of the things that residency really does for you. When do I call? How do I get help? What do I do when I'm in a situation where I'm in over my head? If you can make hard decisions in the middle of the night, you're going to be able to make hard decisions in the middle of the day.

You develop a confidence and you develop ability. It's easy to get paralyzed by indecision—I'm not going to do anything or I'm going to call somebody else. Sometimes you can't call a specialist. If you call a specialist, it's going to cost the patient another thousand dollars. Do you really need a specialist or do you know it's a benign murmur?

I tell every single group of medical school students that in a couple of years, this is going to happen to them: You walk into the room and the person has already passed. Four o'clock in the morning is the last time the nurses checked, and now it's 6:30. Your first impulse is to absolutely run away, sneak out of the room. Close the door. I was never here. Not call for help. I'm not sure what occurred here. (Laughs) Those are the scary ones.

• • •

I look back at things I did as an intern and if you asked me today, could I do that? I'd tell you no. I could not do that. It's another one of those moments when you know you're in trouble. You worked hard. It was crazy. I distinctly recall procedures that I did working with people all night, multiple codes. Doing stuff like that, if you asked me now, I'd say, I couldn't do it. And I know I did. I was there. I can't imagine a time of such growth. You're in the thick of it. You do what you're supposed to do.

You take all these things that you learned and you apply them, and you dial them down on one person and they get better. There's no rush like that. There's no bank balance or stock ticker that comes up to somebody saying, I feel pretty good because of the order you wrote, because the thing you found. I mean, that's slick.

I remember after graduation, I had started my new job. It had been five or six weeks and I rolled over. It was one of those brilliant moments you have at 2:30 in the morning that you make your spouse participate in.

"Kevin." (whispers)

"What?"

"I get two days off every single week."

He's like, "Uh, huh. They're called weekends.'

"No. You don't understand. Two days of every week I don't have to work."

"Go to bed."

I don't begrudge any of the time I did. Was it hard on my family? Yeah, it was hard on my family. But I'm fortunate enough to be surrounded by people who supported me, and who sacrificed with me, and understood and allowed me to become what I could be. It was as much their gift, as my ability. ▼

Stephen J. Busalacchi is a medical journalist whose work has appeared on Wisconsin Public Radio and National Public Radio. Most recently, he was director of public relations for the Wisconsin Medical Society from 1997-2006, before starting his own health communications firm.

During Busalacchi's time at the Society, he got to know many more doctors on a personal level and developed many friendships. It's from those relationships that White Coat Wisdom *was born. The idea was to personalize the profession by letting doctors candidly explain what they do and how they learned to do it.*

Reflections on a summer internship in public health

Victoria S. Lee, BS

As an aspiring physician, I have tried to understand the role of the physician in health care, and in doing so, determine the role I want to play as a physician. I have always wanted to gain experience in public health. With the Area Health Education Center (AHEC) Community Health Internship Program (CHIP), I saw an opportunity to experience a summer in public health. I also wanted to use my background in research and clinical medicine, and AHEC made every effort to match me with a program that appealed to my interests. I became an intern with the Nutrition and Physical Activity Program which focuses on obesity prevention in the Wisconsin Division of Public Health, Department of Health and Family Services (DHFS).

The first 2 weeks of my internship constituted a period of adjustment. My focus area was worksite wellness, about which I had very little knowledge. My first project, writing a draft of the Governor's Worksite Wellness Award Application, allowed me to become familiar with this area. This award is intended to recognize worksites that have implemented comprehensive wellness programs and to provide an incentive for worksites to focus on wellness. In writing the draft, I became familiar with the action plan for implementing worksite wellness interventions and the use of best-practice and evidence-based strategies. I learned that there was a correct way to implement interventions, substantiated by a wealth of research and proven strategies, that are well-supported by studies. Prior to the internship, I had the misconception that public health was a more nebulous aspect of health care, but my internship allowed me to see the rigorous scientific aspect of public health and the use of epidemiology and biostatistics.

My main project included evaluation of the results of the Healthy Lifestyles Project, in which 6 local nutrition and physical activity coalitions, each receiving a $4000 grant, worked with up to 5 local businesses to develop a worksite wellness program for 1 year. The objective of my work was to complete a paper appropriate for dissemination to community coalitions and also a journal submission. Fresh from clinical research during the school year, I found myself trying to grasp for what I knew—controlled study designs, quantitative data, and statistics—and soon realized that this public health study was a whole different ballgame. Upon reviewing the literature, I found worksite wellness studies that fell into 2 categories: (1) studies that had controlled randomized design and statistical analysis of data, and (2) broad-based interventions that had qualitative data. The former lacked generalizability and the latter lacked scientific rigor, but both also made important contributions to public health research. In my work for this study I used more qualitative data because that was what was available and most useful for dissemination purposes.

I wanted to identify barriers in the coalition-worksite partnership, common features among successful and unsuccessful partnerships, preferred interventions (ie, policy, environmental, or program), and the effectiveness of evidence-based interventions. To collect these data, I learned to employ the technique of formative assessment in conducting the numerous interviews with coalitions and worksites. Good formative assessment requires careful questions specifically designed to elicit the necessary information from the key informant while making the interview seem like a conversation. I found formative assessment challenging, but I was able to acquire some proficiency by the time I conducted my last few interviews. In addition to formative assessment, I looked through surveys and additional documents to reach the conclusions of my study.

The result of my work was a research article on the findings of a broad-based worksite wellness state

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initiative employing an innovative coalition-worksite partnership model to promote worksite wellness at the community level. The study identifies both weaknesses and strengths of the coalition-worksite partnership and provides suggestions for a more effective partnership. Public health entities encourage policy and environmental changes, which tend to have a more lasting impact than program changes. The study contributes to the growing body of research on the use and impact of wellness interventions in different levels of the Social Ecological Model (ie, individual, interpersonal, organization, community, policies) as it explores the behavior of the diverse worksites in the Healthy Lifestyles Project.

Another valuable portion of my internship was job shadowing DHFS employees. I was able to work with an epidemiologist, and I learned the technique of geographic information system (GIS) mapping. My foray into epidemiology helped ease the transition from clinical research to public health. In addition, I was able to attend preliminary meetings of an obesity prevention group forming at the University of Wisconsin–Madison, which was unique in that it spanned across disciplines and linked public health and academia in fields such as medicine, economics, and population health. Through these experiences and working with public health professionals, I have seen the importance of a link between public health and clinical medicine.

Physicians are able to work with patients on the individual level—one at a time. Patients, however, live, learn, play, and work in the community, and therefore public health efforts to initiate policy, ecological, environmental, and behavioral changes that impact entire populations are also important. Physicians and public health professionals deal with obesity prevention in complementary ways and have the potential to form an effective team. As an aspiring physician, perhaps the most important thing I have learned from this internship is the opportunity for physicians to work in the community with local health departments, schools, and businesses, assisting in public health efforts—a lesson I will never forget. ▼

Acknowledgments: The internship was funded by the Wisconsin Area Health Education Center and the University of Wisconsin–Madison Medical Scholars Program. I would like to thank my mentors, Murray L. Katcher, MD, PhD, and Mary Pesik, RD, CD, for their unfailing guidance and support. I would also like to thank Jonathon Morgan and Amy Meinen in the Wisconsin Nutrition and Physical Activity Program for their patience and instruction and Janice Liebhart for introducing me to epidemiology.

University of Wisconsin School of Medicine and Public Health *A Century of Inspiration*

Dian Land; Micaela Sullivan-Fowler; Mary Hitchcock

Editor's Note: This issue of the Wisconsin Medical Journal *commemorates the University of Wisconsin School of Medicine and Public Health's 100th anniversary. All scientific articles in this issue have some sort of connection or affiliation with the school.*

The University of Wisconsin School of Medicine and Public Health (SMPH) is commemorating its 100th birthday with several exhibits and events during the 2007-2008 academic year. From its humble beginnings in the attic of Science Hall, where the first gross anatomy labs were held, to its current home in the bustling Health Sciences Learning Center, the story of the school reads like a best-selling novel—full of narrative twists, political and economic intrigue, fascinating characters, internationally-relevant discoveries, and individual prowess.

The following brief summary and 3 "snapshots" touch on some of the highlights of this "Century of Inspiration." Naturally, for every entry included, dozens go unmentioned. Missing, for example, are Dr Joseph Spragg Evans and his early attempts at a Student Health Service, the 1918 influenza epidemic's effect on campus, the school's association with the State Laboratory of Hygiene, Middleton's Brown Derby, medical student skits, the drama of the Deans and Acting Deans of the '60s and '70s, and the move to the Clinical Sciences Center. Of course the individual faculty who molded hundreds of students, the numerous women who left their marks as students and faculty, the faculty and students who served in the military, and the alumni association are all important pieces of the school's history as well. And perhaps most crucial to the school's longevity is the relationship—which was so important to our first dean Charles Bardeen—between the triumvirate of teaching, research and clinical training and service, which continues to afford the SMPH its lasting national prominence.

Leaders

Charles R. Bardeen, MD, led the school for 28 years. He expanded the 2-year curriculum, begun in 1907, into a 4-year program, approved in 1927. He cre-

A Passion for Medical History

Two years after the school was created, William Snow Miller, MD, an anatomist with a passion for medical history, invited medical students to join him informally, first at the University Club and later in his Madison home, to consider some of the great names and achievements in anatomy. He believed that studying history was a critical part of medical student education. Miller later opened the seminars to faculty members, and for many years an active group of influential physicians and others gave papers on great medical discoveries and heroic doctors. The popular gatherings, which continued well after Miller bowed out, inspired students and physicians alike, and stimulated the creation of the Department of the History of Medicine (now the Department of Medical History and Bioethics), one of the first in the country, in 1950.

ated the highly successful Preceptorial Plan and lobbied hard for the construction of Wisconsin General Hospital. Bardeen's young College of Medicine curriculum earned praise in the 1910 Flexner Report.

For most of his tenure as Dean, 1934-1955, William S. Middleton, MD, judiciously split his time between his administrative duties and clinical and teaching duties. Middleton was heavily invested in his students, both in the classroom and the clinic. Anecdotes abound regarding Middleton's interactions with students, staff, faculty, and fellow military personnel.

Fast forward to Dean Philip Farrell, MD, PhD, 1995-2005, and witness major facility improvements materializing into a vibrant health sciences campus at UW-Madison. Farrell also was responsible for our renaming as the School of Medicine and Public Health.

Robert Golden, MD, who became dean in 2006, promises to maintain SMPH on its current trajectory into its second century.

Learning

The Preceptorial Plan, created in 1926, ensured that students would learn and "practice" at the side of established clinicians. Its innovative approach was adopted by medical schools across the country, and it remains a central part of SMPH student training.

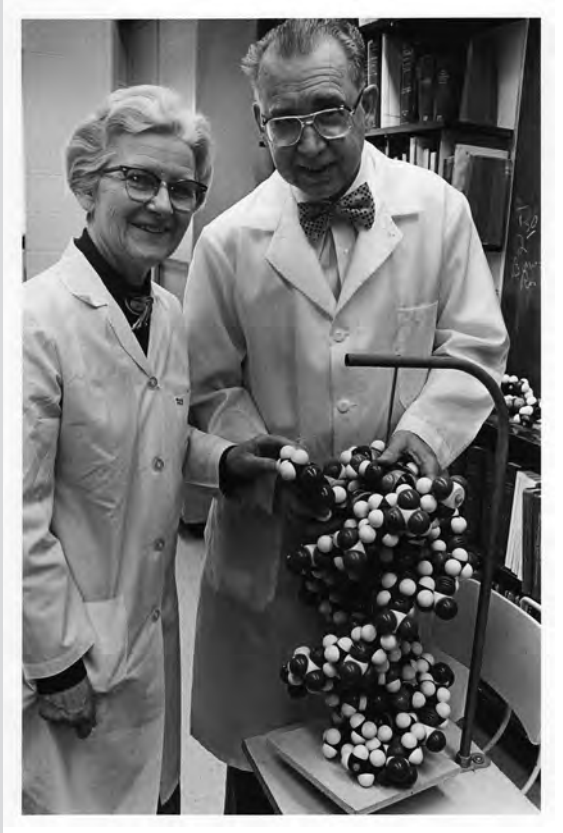
In the early years, students passively memorized the material they were presented. But with growing amounts of information, they later were taught to become life-long learners active in their own ongoing acquisition of knowledge.

Assessment of clinical skills became an important corollary to book learning. Teams began to enhance the curriculum with significant additions of cultural competency, communications, and professionalism. New learning opportunities expanded with the creation of allied health programs. The latest offerings: the master's in public health degree and the rural health medical degree.

Research

Well before the National Institutes of Health (NIH) existed, SMPH pathologists, toxicologists, pharmacologists, and physiologists were making important discoveries. Over the years, the School developed strong research programs in cancer, neuroscience, cardiovascular and respiratory medicine, and ophthalmology. One important indicator of research progress has been the growth of extramural support. In 2007, the School's NIH funding for research was just under $118 million.

Some of the notable breakthroughs at the SMPH: Howard Temin, PhD, discovers reverse transcriptase, explaining how retroviruses cause cancer and AIDS; Folkert Belzer, MD, and James Southard, PhD, develop UW Solution to extend the time organs can be

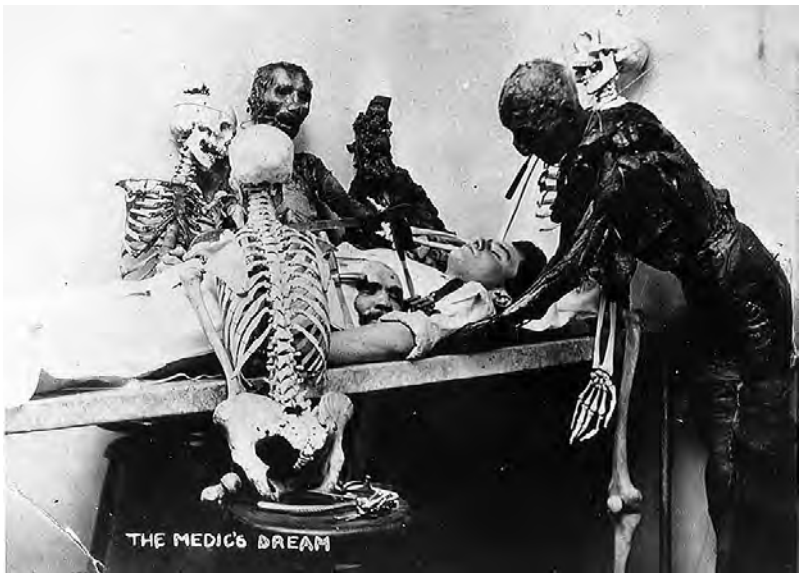


Heady Times for Cancer Research

Elizabeth Miller, PhD, and James Miller, PhD, were part of a cadre of top-notch scientists based at the McArdle Laboratory for Cancer Research during very heady times—the 1950s, '60s, and '70s. Created in 1940, the laboratory was the first basic science cancer center at an academic institution, and it represented a new form of problem-oriented research. The work, centered in the early years on chemical carcinogenesis and the role of viruses, yielded many basic and clinical "firsts," including Howard Temin's Nobel Prize. McArdle's first director, Harold Rusch, MD, went on to lead the UW Paul P. Carbone Comprehensive Cancer Center (UWCCC), one of the first established by the National Cancer Institute in 1973. Today, in addition to its role as an SMPH basic science department, McArdle is an integral part of the UWCCC, which remains at the forefront of cancer treatment and research.

Students and Cadaver-based Humor

Medical students have always been known to push the envelope of cadaver-based humor. One of the best examples may have been Oscar Nadeau, a student during the early days of the College of Medicine. He earned his school expenses by taking and selling photographs, including some classic portraiture of Dean Bardeen. He also earned a reputation as a rascal. The first of his 3 expulsions from the university occurred when he created "The Medic's Dream," which, in a reversal of the usual arrangement, depicted cadavers from the Science Hall "stiff laboratory" hovering over a medical student prone on the table. Was it Nadeau using a self-timer? We will never know. The depiction, while likely lucrative for the student, was not viewed sympathetically by the administration. Nadeau, however, did go on to become a surgical chief at Chicago's Augustana Hospital.



preserved for transplantation; Charles Mistretta, PhD, creates digital subtraction angiography—now the gold standard in medical imaging of blood vessels and the heart; and James Thomson, PhD, isolates human embryonic stem cells, which has opened the door to regenerative medicine.

Bricks and Mortar

Some 20 years following its genesis in Science Hall, the school grew substantially with the opening of Wisconsin General Hospital. This provided a setting for greatly expanded clinical training as well as much needed service for the people of Wisconsin. Abutting the hospital, Service Memorial Institutes was the school's first real home, allowing scientific and clinical staff to work together.

The completion of the Clinical Sciences Center (UW Hospital and Clinics) in 1979 represented unprecedented opportunities for the school's clinical operations. The adjacent Health Sciences Learning Center is the SMPH's new home, housing administrative and educational programs and the Ebling Library for the Health Sciences. With construction on the Interdisciplinary Research Complex well under way, the school looks forward to having most of its family together again in one setting soon.

Partnerships

Since the early days, school leaders have cultivated statewide relationships with physicians, hospitals, and clinics as a way to expand training options and support the Wisconsin Idea, which extends the University to all corners of the state. The school created academic campuses at Marshfield Clinic, Gundersen Lutheran in La Crosse, and Aurora Healthcare in Milwaukee.

A gift from Blue Cross/Blue Shield resulted in the Wisconsin Partnership Program, which joins with local, regional, and statewide groups to address the most important health issues in the Badger state.

With the recent creation of the Institute for Clinical and Translational Research, which aims to more effectively transfer research from academia to communities, SMPH will strengthen its relationships across Wisconsin, now more than ever before.

An exhibit in the Ebling Library through June, 2008—called "Skeletons in the Attic, Life in the Atrium," 100 Years of Medical Education at UW—provides an overview of the "Century of Inspiration." Commemorative panels in the Health Sciences Learning Center atrium and vintage photographs in the third floor of the Ebling add vibrancy to the story of a remarkable institution. For details on the "Skeletons" exhibit and other upcoming events, go to http://100years.med.wisc.edu/.

Thank you to our reviewers

The *Wisconsin Medical Journal* would like to thank those who served as manuscript reviewers this past year. Manuscript review is an important collegial act and is essential to the integrity of the *Journa*l. We are grateful for their help in ensuring authors receive prompt, objective, and insightful feedback on their work.

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Chronic kidney disease (CKD) in Wisconsin: Time to address this public health problem

A. Vishnu Moorthy, MD; Mark V. Wegner, MD, MPH

Over the past 30 years, the number of individuals with chronic kidney disease (CKD) has been growing silently to epidemic proportions, both in the United States and worldwide.[1-2] This increasing burden of CKD, both on patients and the health care system, is readily apparent when examining the significant increase in the number of patients with kidney failure who have required dialysis or kidney transplantation during the past 3 decades. The number of patients developing kidney failure annually in the United States has increased more than 7-fold, from 14,500 cases in 1978 to over 106,912 in 2005, (34.7/100,000 population).[3]

According to the US Renal Data System,[3] there were over 485,000 people living with kidney failure in the United States on December 31, 2005, and Medicare costs for the kidney disease program totaled $21.4 billion. The number of patients requiring dialysis or kidney transplantation in the United States is expected to be more than 661,000 by the year 2010 at a projected annual cost exceeding $28 billion dollars.[3]

In Wisconsin, the number of patients with kidney failure has increased 3-fold, from 8.6 per 100,000 population in 1982 to 27.9 per 100,000 population in 2003 (Figure 1).[4] This is well beyond the *Healthy People 2010* target of 21.7 cases per 100,000. Four new dialysis centers opened in Wisconsin in 2006, and in 2007, nearly 5000 patients received dialysis treatments in 113 Wisconsin dialysis centers. Despite improvement in the quality of dialysis therapy in recent years, patients on dialysis continue to experience significant morbidity, require extended hospitalization, and have a 2-year survival rate of 67% and a 5-year survival rate of 40%.[3]

March 13, 2008, is World Kidney Day.

Although the numbers for individuals with kidney failure are staggering on their own, they represent only a subset of the population with CKD. The number of patients with CKD in the United States has been estimated to be over 19 million.[5] In the United States, approximately 1 in 6 adults (16.8%) over the age of 20 years has CKD, according to the 1999-2004 National Health and Nutrition Examination Survey (NHANES) data. This is an alarming increase from the 1988-1994 NHANES data that indicated a prevalence of 14.5% in US adults.[6] CKD is a bigger problem in older adults. Prevalence of CKD was greatest at 39.4% in adults 60 years and older. It is also estimated that another 20 million Americans are at increased risk for developing CKD.[5]

The effects of CKD are far reaching, and recent data from several large, diverse population studies have shown that patients with CKD are up to 100 times more likely to die from cardiovascular disease than to ever require dialysis or kidney transplantation.[7-8] Despite this large burden, and the fact that the complications of CKD are easier to prevent than to treat, CKD has not been historically recognized as a serious public health problem and patients with CKD are rarely diagnosed until late in their disease. One reason for this is that CKD does not have symptoms in its early stages and can only be diagnosed by laboratory tests.

In recent years, diagnosis of CKD has been defined by the National Kidney Foundation—Kidney Disease Outcomes Quality Initiative.[9] Serum creatinine alone is

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considered inadequate to assess the kidney function. Timed urine collections to measure the creatinine clearance over a 24-hour period have been generally abandoned since they are time consuming, inconvenient, and are an inaccurate measure of the kidney function. The National Kidney Disease Education Program (NKDEP) recommends that equations be used to translate serum creatinine into an estimate of the glomerular filtration rate (GFR).[10] However, formulae to assess kidney function such as the Cockcroft-Gault equation have been found to be less than adequate in the patient with CKD.[11]

Currently the MDRD (Modification of Diet in Renal Disease) formula is the recommended method to estimate kidney function.[10] This formula produces an estimated GFR (eGFR) from the patient's age, gender, ethnicity, and measured serum creatinine level. A diagnosis of CKD is made when a patient has an eGFR of ≤60 ml/min for more than 3 months. Alternatively, a diagnosis of CKD may be made in a patient with any level of eGFR who has structural (ie, polycystic kidney disease) or functional (ie, proteinuria) kidney abnormalities that persist for more than 3 months. Although the MDRD formula is the current best method for early diagnosis of CKD, it is important to note its limitations. The formula is less accurate for estimating the GFR in subjects at higher level of kidney function (ie, GFR>60 ml/min).[12] Also, the formula is designed for use in patients with stable kidney function and thus is not useful in the hospitalized patient whose serum creatinine level can vary for a variety of reasons (due to both renal and extra renal disease). Finally, the need for the laboratory to calibrate the serum creatinine measurement to accepted standards is crucial in estimating the GFR (Table 1).[13]

Another early diagnostic test for the presence of kidney disease, particularly in a patient with diabetes mellitus, is testing for proteinuria. However, the traditional dipstick test for the presence of protein in the urine is insensitive. A protein/creatinine ratio can be useful as a surrogate for 24-hour collection of urine.[14] In the patient with diabetes mellitus, a more sensitive test for kidney damage is the detection of microalbuminuria. This can be detected in a random sample of urine (early morning sample is preferred) and expressed as mg of albumin per gram of creatinine. The urine albumin excretion in healthy individuals generally does not exceed 30 mg of albumin per gram of urinary creatinine. Microalbuminuria is present when urine albumin/creatinine ratio is between 30 to 300 mg of albumin per gram of creatinine. Persistent microalbuminuria is an early marker of kidney damage in the patient with diabetes mellitus and is also a predictor of cardiovascular disease.

An increasing number of laboratories are standardizing the reporting of blood and urine tests to diagnose CKD. Several report the eGFR automatically when a serum creatinine test is ordered. As the ethnicity of the patient is generally unknown to the laboratory, 2 values for the eGFR should be reported, one for African Americans and the second for all other races. Alternately, the physician could multiply the eGFR reported by the laboratory by 1.121 if the patient is of African American ethnicity. African Americans generally have a greater muscle mass and have slightly higher serum creatinine levels at all ages.

Because of low prevalence of CKD in the general population, it is recommended that screening programs for CKD be directed to patients at increased risk for this condition. Diabetes, hypertension, cardiovascular diseases, and a family history of CKD are the most common risk factors for CKD. In the United States, CKD is more prevalent in patients with diabetes (40.2%) than those without diabetes (15.4%), and in those with hypertension (24.6%) than those without (2.5%).[5] CKD is also more frequent in patients with cardiovascular disease (28.2%) than those without (15.4%).[5] The burden of CKD is greater among minority populations, particularly non-Hispanic blacks (19.9%) and Mexican Americans (18.7%).[5] Prevalence among non-Hispanic whites is 16.1%.[5]

Although the risk factors for CKD are well known (Table 2), the diagnosis is infrequently made even in patients at high risk for CKD. Although the risk for development of kidney failure is higher in African Americans, over 43% of African Americans with kidney failure were not aware of kidney disease until 1 week before their kidneys fail entirely.[16] Under-diagnosis was more common in non-Hispanic blacks, men, and those with hypertension. In a recent survey of more than 400 physicians, diabetes and hypertension were widely recognized as CKD risk factors. However, in a survey of 465 primary care physicians in 4 communities, family history of CKD was only identified as a risk factor by 66% of physicians and African American race was only identified by 78%.[17]

Despite the challenges of early diagnosis, it is the key to the management of the patient with CKD. Several large clinical trials have shown that adequate control of blood sugar levels in a patient with diabetes, maintaining blood

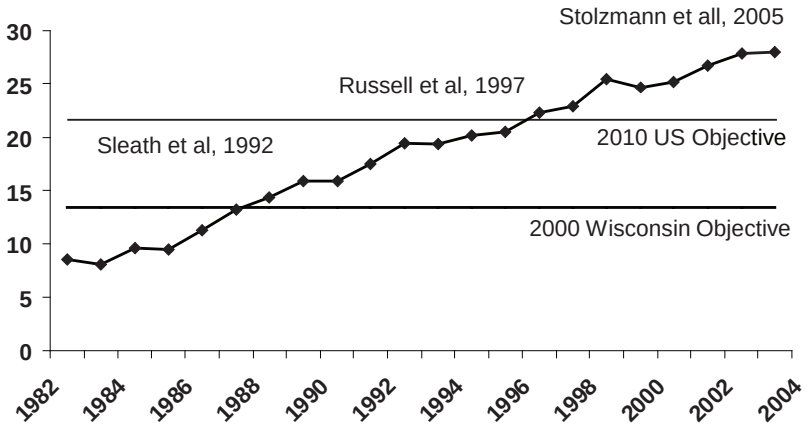

Figure 1. The trends in the age-adjusted end-stage renal disease incidence rate in Wisconsin, 1982-2003. (Courtesy of Patrick Remington, MD, MPH.)

Table 1. Criteria for the Definition of Chronic Kidney Disease

1. Estimated GFR of <60 ml/min/1.73 m^2
2. Abnormalities of the kidneys (with any eGFR) for at least 3 months that could be:
   a. Functional—as noted by urinary abnormalities such as proteinuria (or microalbuminuria in a patient with diabetes)
   b. Structural—such as polycystic kidney disease

National Kidney Foundation Kidney Disease Outcomes Quality Initiative 2005 (Adapted from reference 9).

Table 2. Prevalence of Risk Factors for Chronic Kidney Disease in United States

Risk Factor for CKD	Estimated Prevalence in United States (% of adults >20 years)
Diabetes Mellitus	7.8
Hypertension	24.0
Obesity	19.8
African American	12.3
Hispanic	12.5
Age >60 years	16.5

(Adapted from reference 15.)

pressure (BP) < 130/80 mm Hg in a patient with hypertension, use of medications to block the renin angiotensin system, lowering elevated lipid levels, and smoking cessation can slow the progression of kidney failure and also decrease cardiovascular morbidity and mortality.[18] However, these impressive results from clinical trials have not been generally translated into clinical practice.[19-20]

The enormous number of patients with CKD necessitates that the care of the patient in the early stages of CKD has to be provided by the primary care physician. Thus there is an increasing need for primary care providers to have a greater awareness of CKD risk factors and evidence-based treatment guidelines to care for patients with CKD. Patients with advanced CKD (ie, with GFR <30 ml/min) need to be referred to a nephrologist for management of the patient's medical problems as well as preparation for renal replacement therapy. In 1 recent study, only 17% of patients were seen by a nephrologist more than 3 months prior to starting dialysis.[21] This delay in referral of the patient has been shown to increase medical expense and shorten lifespan in the patient after initiation of dialysis. Kinchen et al studied 828 patients with new onset kidney failure starting dialysis in 81 dialysis facilities in the United States. Compared to patients who were referred to kidney specialists early (ie, >12 months before initiation of dialysis) the patients referred late (ie, <4 months) had a higher risk of early death. The 1-year mortality rate in the late referral group was 13.3% when compared to a rate of 4.3% in the early referral group.[22] Predialysis education of the patient with CKD has been shown to increase survival when dialysis is initiated. Devins et al noted in a 20-year follow up study that 172 patients randomly assigned to predialysis psychoeducational intervention survived significantly longer (mean of 9.36 years) than 163 patients receiving routine care (mean of 5.07 years).[23]

CKD is being recognized as a growing global public health problem. In 2006, the International Society of Nephrology and the International Federation of Kidney Foundations declared that the second Thursday in March every year is to be observed as the World Kidney Day. This is a recognition of the need for greater worldwide awareness of CKD.[24] Recent estimates suggest that the burden of CKD is also high in the developing countries including China and India.[1] CKD has been described as "common, harmful, and treatable."[1] Addressing the growing epidemic of CKD is essential and would be aligned with the government's public health goals in *Healthy People 2010*. ▼

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Wisconsin Firearm Deer Hunting Season: Injuries at a Level I Trauma Center, 1999-2004

Matthew A. Halanski, MD; Timothy E. Corden, MD

ABSTRACT

Context: Hunting continues to be a passion and common pastime for many US citizens, especially in rural areas. Unfortunately, with the large volume of hunters entering the woods each season, hunting injuries continue to be common.

Objective: Review the experience of a level I trauma center during each of Wisconsin's 9-day deer firearm hunting seasons over a 6-year period and identify potential prevention elements based on the findings.

Design: We retrospectively reviewed all hunting-related injury patient data entered into the University of Wisconsin Hospital and Clinic's (UWHC) level I trauma registry from 1999 to 2004, for each 9-day Wisconsin deer hunting firearm season. We compared injury occurrence with Wisconsin DNR statewide hunting-related firearm injury incidence data over the same time frame. The study was conducted at a level I university tertiary referral trauma center. The study included any patient admitted to the UWHC during the study period with a hunting-related injury entered into the trauma registry.

Outcomes Measured: Primary outcomes recorded included patient demographics, mechanism of injury, types of injuries, comorbidities, injury severity scores, and mortality.

Results: Twenty-four patients were treated for hunting-related injuries during the study period. The majority of hunters were male (95%), with an average age of 44.5 years. Treestand injuries accounted for 16 of the 24 injuries treated; the rest of the injuries were firearm-related. Most of the injuries (18) occurred during the first 3 days of the hunting season, with the remaining 6 injuries taking place around the Thanksgiving holiday period. Injury severity scores (ISS) ranged from 1 to 50. Orthopedic concerns accounted for 79% of the injuries, while general surgical was 50%, and neurosurgical was 12.5%. Two fatalities occurred due to complications from injuries caused by falling from a treestand.

Conclusion: Falls from a tree-stand and firearm shootings represent 2 mechanisms for severe hunting-related injuries during the 9-day deer firearm hunting season in Wisconsin. Formal treestand safety instruction should be emphasized during hunting education classes and all hunters need to heed safe hunting recommendations pertaining to firearms and treestands, and be particularly cautious during the first few days of the hunting season.

INTRODUCTION

The US Fish and Wildlife Services estimate that 10.3 million individuals in the United States participate in deer hunting, or roughly 6% of the general population.[1] Hunters spend an annual average of $10 billion in their pursuit of game.[1] In many states, the deer firearm season is the most popular. The deer firearm season usually ranges between 1 and 2 weeks and brings hundreds of thousands of individuals into rural areas. According to the Wisconsin Department of Natural Resources, nearly 695,000 deer firearm licenses were sold in 2000 alone.[2] Due to the sheer volume of individuals with firearms and the methods employed when deer hunting, injuries routinely occur. The most serious trauma injuries are often transported and cared for at a level I trauma center; a center that has been certified by the American College of Surgeons to be capable of providing the highest standard of care to trauma patients. Our study examines all deer hunting-related trauma cases admitted to the University of Wisconsin Hospitals and Clinics (UWHC) level I trauma center during the 5 deer hunting seasons from 1999 to 2004, identifying

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hunting injury mechanism and type, then recommending prevention strategies based on the findings.

METHODS

University of Wisconsin Trauma Registry

The study evaluated data from the University of Wisconsin Hospital and Clinics Trauma Registry, pertaining to all hunting injuries admitted to UWHC for each Wisconsin 9-day deer firearm hunting season from 1999 to 2004. All admissions to the hospital are reviewed on a daily basis for inclusion into the trauma registry. Patients qualify for inclusion into the registry if they sustain a sufficient injury leading to hospital admission for at least 23 hours of observation. Falls from a standing position resulting in open fractures, head injuries, or significant internal injuries are included; falls resulting in an isolated closed fracture are excluded. Minor injuries, emergency department discharges, strangulation events, poisoning occurrences, and patients dead on arrival to the hospital are not recorded in the registry. Patient gender, age, medical comorbidities, mechanism of injury, day of occurrence, type of injury, injury severity, treatment, complications, and outcomes are recorded. Blood alcohol levels are not routinely measured and were not noted in this study. Injury severity was graded based on the Injury Severity Scale (ISS). The ISS is calculated from the Abbreviated Injury Scale (AIS) scoring, which is an anatomically based scoring system.[3-4] Injuries are classified by body region and, based on expert opinion, are assigned values ranging from minor (AIS 1) to currently untreatable (AIS 6). The Injury Severity Score is the sum of the squares of the 3 highest AIS scores in different body regions.

A descriptive analysis of the data was then performed. Two distinct patient groups were identified, accounting for all patients injured by a firearm and all patients injured due to falling from a hunting treestand. A student T-test was used to compare the age differences between the firearm and treestand groups. Study data regarding frequency of injury and specific day the injury occurred within the deer season was also compared to statewide deer hunting firearm injury data collected by the Wisconsin Department of Natural Resources (DNR) over the study timeframe.[5-10] The study was approved by the University of Wisconsin Internal Review Board.

RESULTS

A total of 24 patients with deer hunting-related injuries were identified in the UWHC trauma registry over the study period. Sixteen patients (66%) suffered injuries due to falling from a treestand, and 8 patients (33%) were injured due to a firearm. Sixty-two percent of all injuries occurred during the first 2 days of the season (Figure 1). Males accounted for 23 of the 24 patients. The mean age was 44.5 years, with a range of 12.9-72 years.

The prevalence of patients with comorbidities included 8 with cardiac issues, 6 with pulmonary issues, 5 with diabetes mellitus, and 3 who were obese. The mean severity of injury score was 13, and ranged from 1 to 50. Twenty patients (84%) suffered orthopedic injuries, 12 patients (50%) required general surgical care, and 3 patients (13%) suffered intra-cranial trauma. Two thirds of all patients required operative treatment. Orthopedic injuries included 3 patients with spine fractures, 2 with pelvic fractures, 18 with extremity trauma, and 3 who suffered clavicle fractures. Two patients did not survive (8% mortality); 1 died of complications from a closed head injury and the other died after suffering a pulmonary embolism while being treated for an acetabular fracture and lung contusion. Both victims had fallen from treestands while hunting.

The first 3 days of the deer season proved to be the most dangerous for both the patients injured by firearms and the hunters injured due to treestands. These first days produced 6 of the 8 firearm injuries and 12 of the 16 treestand incidents. The rest of the injuries for both groups occurred on days 5-7, which correlate to the Wednesday, Thursday, and Friday of the Thanksgiving holiday. The clustering of injuries around the opening few days of the season and the Thanksgiving holiday is also reflected in the statewide firearm injury occurrence data reported by the DNR over the same timeframe (Figure 1). There was no statistical difference in age between firearm-injured patients (35 years $\pm$21) and treestand-associated events (49 years $\pm$11); the average ISS was 11$\pm$9 and 13$\pm$11 for the 2 groups, respectively. The majority of the injuries in the treestand group were orthopedic in nature (90%); the treestand group included the 3 patients who suffered intracranial injuries and also contained the 2 patients who did not survive. Injuries in the firearm group were divided evenly between general surgical-assigned treatments and orthopedic pathology.

DISCUSSION

Hunting remains a popular sport in Wisconsin, with thousands of people enjoying the activity each year. Although the absolute rate of injury is low compared to other sports, the potential for sustaining a life-threatening injury is not insignificant. Our study represents a sample of the most seriously injured patients who were

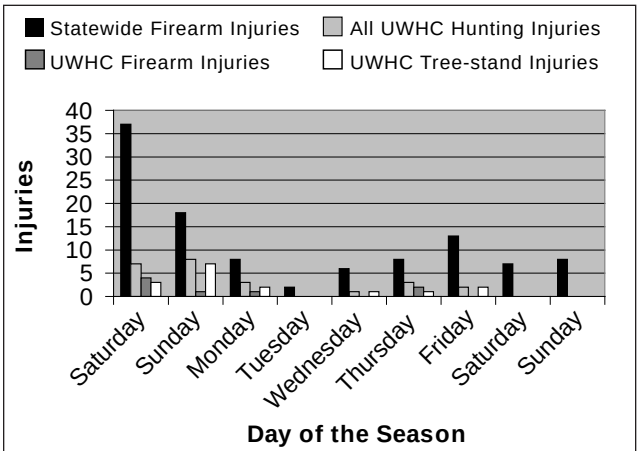

Figure 1. Hunting injuries per specific day of the deer-hunting season. Firearm injuries reported to the Wisconsin Department of Natural resources and injuries identified in the UWHC trauma registry over the study period.

deemed to require care at a level I trauma center. Within this seriously injured sample, only 2 mechanisms of injury were identified: falls from a treestand and wounds inflicted from a firearm. Attempts to reduce serious hunting injuries should apply prevention resources and strategies to the problems presented by treestand and firearm use while hunting.

Firearm Injury Prevention

The first few days of the deer season and the time around the Thanksgiving holiday appear to be the most dangerous time for hunters; these times most likely correlate with the greatest number of hunters in the field, leading to an increased risk for mishap. Hunters need to be particularly careful during these high volume times. Other investigators have focused on firearm-related injuries suffered in Mississippi,[11] Pennsylvania,[12] and New York[13] throughout all hunting seasons, including both small and large game. Factors related to injury were found to be other hunters being mistaken for game, being positioned in the shooter's line of fire or out of the shooter's view, unintentional firearm discharge, and being struck by a bullet's ricochet.

Unintended shootings during "deer drives" accounted for the greatest number of firearm injuries reported to the Wisconsin DNR during the study period. The deer drive method of harvesting animals involves an individual or group of individuals walking through a wooded area, "pushing" deer from hiding areas toward other individuals waiting for an opportunity to shoot. Although deer drives can be very productive, and members enjoy the camaraderie before and after the "drive," great care must be taken by all members involved. Deer are often running, giving hunters only a brief moment to make a critical decision to shoot or not to shoot during a drive. In addition, it is common for the animals to run between members of the "drive." Therefore, unless the exact location of the other hunters is known, and shooters display strict discipline regarding safe shooting lanes, unintended shootings can occur.

In most states, including Wisconsin, hunter education is now required before a hunting license will be issued. The hunting education classes stress the importance of avoiding intoxicating substances while hunting, proper firearm care and transport, and safe practices in the field.

Blaze orange clothing is also required in many states during the firearm seasons to cut down on mistaking hunters for game, especially in low light conditions. Wisconsin requires at least 50% of clothing above the waist be blaze orange and strongly recommends hunters wear 100% blaze orange clothing during a hunt. In only 5% of 117 firearm-related injuries in which hunters were mistaken for game in New York were the hunters found to be wearing blaze orange clothing.[13] In addition, even though we identified the use of treestands as a risk for serious injury due to falls, treestand use is thought to decrease the number of gun-related injuries since they allow better visualization. Table 1A lists firearm safety recommendations.

Treestand Injury Prevention

The Consumer Product Safety Commission reviewed several surveys from *Deer and Deer Hunting* magazine and *The Topeka Capital Journal*. These surveys indicate that 75%-78% of deer hunting time is spent in treestands.[14] Unfortunately, no formal records of treestand-related incidents have been recorded in Wisconsin. In Georgia, a state that mandates the reporting of all hunting-related injuries, the annual rate of deer hunting treestand incidents over a 10-year period was 8.9 injuries per 100,000 hunting licenses sold, 52% of which were associated with a fall.[15] Based on the Georgia figures, Wisconsin would have experienced an estimated 31 treestand fall injuries per year over our study timeframe.

Throughout the medical literature, others have reported on treestand-related injuries. As in our study, orthopedic injuries were the most common pathology reported due to treestand falls, and alcohol was a potential factor in 17%-18% of the cases reported.[16-18] A survey conducted by the International Hunter Education Association (IHEA) in 2002 of 1056 hunters in North Carolina and Vermont found that 7% of hunters reported a treestand related injury within the last 10 years, with 1.5% requiring medical attention. The majority of these accidents (75%) occurred while entering or exiting the treestand. Faulty placement of

stands, use of homemade stands, and failure to wear an approved safety harness are also contributing factors to treestand injuries.

The issue of safety harness use is an evolving topic. Previously, the Treestand Manufacturers Association (TMA) had endorsed single strand safety belts; however, the Consumer Product Safety Commission (CPSC) has reported 8 asphyxiation deaths related to waist belt safety restraints and has called for the banning of these devices.[14] The US Air Force studied several different fall restraint systems, noting that although full body harnesses are safer than single stranded belts, a body harnesses can still cause injury if a person has to hang in the device for more than 30 minutes.[19] In compliance with CPSC, TMA now recommends the use of a full body harness when using a treestand and suggests that hunters practice hanging and extracting themselves from the harness prior to using the device in the field. Hunters should also have a knife readily available to aid in extraction and a cell phone or other means of communication to call for help when assistance is needed. Table 1B lists treestand safety recommendations.

CONCLUSION

Serious injuries are often a result of large transfers of energy to a victim. Our study documents 2 mechanisms for such larger transfers of energy leading to significant hunting injuries: firearm shootings and falls from tree-stands. While the Wisconsin DNR follows firearm incidents closely, the incidence of treestand injuries in Wisconsin is not well documented. To reduce these serious hunting injuries we recommend:

1. Physicians counsel their hunting patients regarding best safety practice for firearm and tree-stand use
2. The inclusion of comprehensive tree-stand safety instructions in Wisconsin's hunting education class
3. Physicians stress that hunters need to be extra vigilant during the opening days of deer season and during the Thanksgiving holiday when the volume of hunters is presumed to be at a peak.

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Table 1. Hunting Safety Recommendations

A. Firearm Safety
Human Factors
Take a hunter's education course
Never carry a firearm when intoxicated
Assume every gun is loaded
Never shoot at movement or noise; identify your target
Only point a gun at what you plan to kill
Only fire when sure of your target and beyond
Keep your finger off the trigger until ready to shoot
Wear hunter blaze orange at all times
Equipment Factors
Keep firearm unloaded during transportation
Service your firearm on a regular basis
Assume every gun is loaded
Secure, locked storage of firearm when not in use
Environmental Factors
Take extra care in low light conditions to identify target
Know what is beyond your target; bullets may ricochet off of water and hard objects
Know the position of other hunters in your area
Always make certain your firearm is unloaded prior to climbing over an obstruction or when walking on a slippery surface
Take great caution when on a "deer drive"; hunters are trusting each other with their lives!
B. Treestand Safety
Human Factors
Choose only healthy, mature, and straight trees in which to place a stand
Always wear non-skid footwear when hunting from a treestand
Never enter a treestand when tired or intoxicated
Take special care when entering and leaving your stand
Be familiar with your equipment and safety harness
Always wear a safety harness; NEVER use a single strap safety belt
Tell others where you will be hunting
Carry a form of emergency communication or signal (cell phone, whistle)
Hunt with a buddy when possible
Equipment Factors
Read and follow manufacturer's recommendations
All surfaces should be covered with non-slip material
Check equipment for wear before each use and as recommended by the manufacturer
Never leave a stand for >2 weeks without checking its safety upon your return
Never modify a manufactured treestand
Understand your fall restraint system and how to extricate yourself
Always use a haul line to raise and lower UNLOADED firearms and equipment
Environmental Factors
Clear all rocks, sticks, and debris from the area below the stand
Take extra care or avoid the use of a stand under wet, windy, or icy conditions
Never place a treestand >20 feet off the ground

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WISCONSIN MEDICAL JOURNAL

Local Public Health Department Funding: Trends Over Time and Relationship to Health Outcomes

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ABSTRACT

Background: Local health departments contribute to population health improvement through the core functions of assessment, policy development, and assurance. Their capacity to perform these functions may be affected by funding and staffing.

Objective: To describe local health department funding and staffing levels and determine the relationship between these measures and county-level health outcomes.

Methods: Ten years of total funding, funding by revenue source, and staffing data from local health departments in all 72 Wisconsin counties were collected from the Department of Health and Family Services and analyzed. Summary measures for county health outcomes were obtained from the *2006 Wisconsin County Health Rankings*, and a correlation matrix was created to determine associations between outcomes and measures of health department capacity.

Results: On average, Wisconsin local health departments spend $20.60 per capita, ranging from $7.50 to $68.30 among counties. While total per capita funding in the state (adjusted for inflation) increased $0.82 per year, a closer look reveals 3 distinct periods: increases of $0.20 per year during 1995-1997 and $1.33 per year during 1997-2001; but a decrease of $0.27 during 2001-2004. Local health departments in counties with worse health outcomes had only slightly higher average funding and staffing levels during 2002-2004.

Conclusion: Levels of health department funding in Wisconsin, already low by US standards, declined slightly in the past 3 years. Although counties with the worst health outcomes had slightly higher levels of public health funding, considerable disparities exist. State policymakers might consider investing more resources in counties with the greatest need, to support evidence-based public health programs and reduce existing geographic health disparities in Wisconsin.

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BACKGROUND

Significant disparities in health outcomes exist between Wisconsin's 72 counties. Premature mortality ranges from a low of 4135 years of potential life lost under age 75 (per 100,000) in Waukesha County to a high of 12,492 in Menominee County.[1] The percent of the population who reported their health as "fair" or "poor" ranges from a low of 5.6% in Florence County to a high of 19.6% in Juneau County.[2]

One potential way to reduce these disparities may be to invest more public health resources in communities with the greatest need, where need is defined in terms of population health outcomes. Decades of population-based research suggests that implementing evidence-based public health programs in the counties with the greatest need will lead to improvements in health outcomes. In other words, counties with the poorest health outcomes may need more public health resources to improve population health. This direct relationship between need and funding is shown in Figure 1. Need should drive funding, and an increase in funding should improve health outcomes, thus reducing need.

Resource allocation decisions in public health have traditionally been based on population size, historical precedent, and competitive grants, whereas other health resources have been allocated according to evidence-based medicine, burden of disease, and cost-effectiveness.[3-5] While all local public health departments require some level of basic funding, connecting resource allocation with need offers a potential route to improved population health and reduced health disparities.

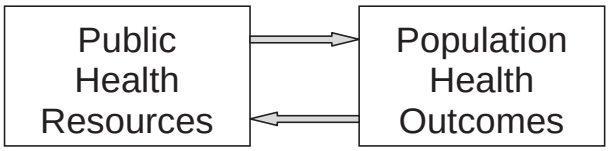

Figure 1. Model of the relationship between public health funding and need.

In this ecologic study we describe measures of population health outcomes as reported in the *Wisconsin County Health Rankings* as a methodology for determining areas of the state with the greatest population health needs.[6] We compare these outcomes to measures of local health department capacity in Wisconsin, defined by levels of funding and staffing, to determine the relationship between need and public health resources.

METHODS

Data Sources: Funding and Capacity

Local health department capacity measures for the 72 Wisconsin counties were gathered, including funding and staffing levels. Data on health department expenditures per capita for 1995 to 2004 from local tax levies, total health department expenditures per capita (including local, state, and federal funds), and number of full-time equivalent (FTE) staff per 10,000 population were compiled from the Wisconsin Department of Health and Family Services (DHFS) County Public Health Profiles.[7] Expenditures were reported by calendar year rather than fiscal year. Some counties have multiple local health departments and no single county health department, while others have local health departments in addition to a county health department, and still others have only a single county health department. Therefore, we used the county-based Public Health Profiles, which combine all health departments in a county into a single county-wide measure of capacity. We refer to all departments as local health departments and report on their data aggregated to the county level.

Data Sources: County Health Status

The county health outcomes index was obtained from the University of Wisconsin-Madison Population Health Institute Web site.[2] The 2 equally weighted components used to represent health outcomes in the *2006 Wisconsin County Health Rankings* are premature mortality and self-reported health status. Years of potential life lost before age 75 were used to measure premature mortality in each county. We used 2002-2004 data, age-adjusted to the 2000 US population, that was obtained from the Wisconsin Department of Health and Family Services' Wisconsin Interactive Statistics on Health (WISH) system. General health status, a measure of self-reported health-related quality of life, was used to determine the percent of the population in each county reported as "fair" or "poor" health. Data for this indicator were obtained from 2 sources: 1999-2005 data from the Behavioral Risk Factor Surveillance System and 1998-2004 data from the Wisconsin Family Health Survey. For each measure, a Z-score was created representing the number of standard deviation units that the place was from the mean of all the counties. Averages of these Z-scores were used to calculate the outcomes summary measure. The health outcomes index is based on an inverse of this summary measure, so that a positive score represents better health outcomes.

Statistical Analysis

The health outcomes index from the *2006 Wisconsin County Health Rankings* was entered into a Microsoft Excel spreadsheet. Data on each county's health departments including total funding per capita from all sources, funding per capita from local taxes, non-local funding, and number of FTE staff per 10,000 population, were then added. For each capacity variable, 10-year averages for 1995-2004 and 3-year averages for 2002-2004 were calculated, as well as standard deviations. Regression coefficients were calculated for the 10-year trends for each variable. Non-local funding was calculated by subtracting local funding from total funding for each health department. Also, the percent of total funding from local taxes was calculated. Missing data were imputed using an average of the value for the previous year and the value for the next year.

The health outcomes index was correlated with the 3-year averages of total, state, and local funding and staffing, and with the 10-year trends in total, state, and local funding using SPSS. Pearson correlation coefficients and *P*-values were calculated for each capacity variable.

RESULTS

Local Health Department Capacity in Wisconsin

To show the distribution of sources of revenue, total local public health department revenues for 2001[8] are presented in Table 1. The mean, range, standard deviation, and regression coefficient for each local health department capacity variable are presented in Table 2. On average in Wisconsin, local health departments spend a total $20.70 per capita, ranging from a low of

$7.50 in Waukesha County to a high of $68.30 in Pepin County. Likewise, local health department funding from non-local sources averages $10.20, ranging from $2.70 in Waukesha County to $47.60 in Pepin County. Total health department funding per capita increased roughly $0.82 over the period of 1995-2004 after adjusting for inflation. Funding per capita from local taxes averaged about 52% of total funding, ranging from 28% in Rusk County to 77% in Menominee County. Average local health department funding per capita from local taxes was $10.40 in the state, ranging from $4.00 in Green County to $21.20 in Iron County (Table 3).

The average full-time equivalent (FTE) local health department staff per 10,000 population was 4 FTE per 10,000 residents, ranging from a low of 1 person in Menominee, Waukesha, and Washington Counties to a high of 14 per 10,000 residents in Pepin County (Table 2).

Trends in Public Health Funding

An analysis of the trend in total local health department funding per capita in Wisconsin from 1995 to 2004 reveals 3 distinct time periods. Total per capita funding increased $0.20 per year during 1995-1997 and $1.33 per year during 1997-2001; but decreased $0.27 per year during 2001-2004 (Figure 2). Comparable analyses of the trend in funding per capita from local taxes and the trend in funding from non-local sources revealed similar patterns. Staffing trends showed a gradual increase from an average of 3.7 FTE staff per 10,000 residents in 1995 to 5.3 in 2002. The average dropped back to 3.8 in 2003, then remained unchanged through 2004.

Trends by County

A quartile distribution of trend in total per capita health department funding from 1995 to 2004 is shown in Figure 3. The counties with no shading have seen the greatest increase in funding over the 10-year period—more than $1.50 per year. The lightest gray counties experienced an increase in funding of about $1.00-$1.50 per year. The next darkest counties saw a modest increase in total funding of about $0.50-$1.00 per year. The counties shaded the darkest gray experienced little to no increase in total funding, with 2 counties, Menominee and Racine, actually seeing a decrease.

The trend in total local health department funding during 1995-2004 is negatively correlated (-0.41) with the percent of funding from local taxes. That is, health departments receiving the highest percentage of funding from local sources saw the least increase in total funding over time.

Table 1. Total Local Health Department Revenues in Wisconsin, 2001

Total Revenues ($121,409,767)	
Local tax levies	53%
Direct or pass-through federal dollars—Maternal and Child Health block grants, CDC tobacco funds, Preventive Health and Health Services block grants, CDC breast and cervical cancer funds, and the Special Supplemental Nutrition Program for Women, Infants, Children (WIC)	22%
Fees for services—license fees, insurance payments, Medicare/Medicaid	17%
State dollars—consisting of childhood lead funds, Well Woman funds, Prevention of Child Abuse and Neglect funds	6%
Grants from non-governmental sources—CAP funds, United Way funds, Robert Wood Johnson Foundation funds, Kellogg Foundation funds	0.7%
Donations	0.3%

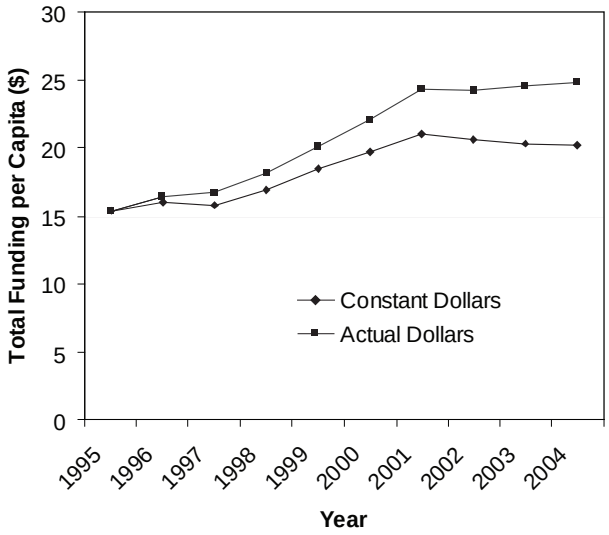

Figure 2. Wisconsin state average of total county health department funding per capita, 1995-2004. Annual total county health department funding as reported by calendar year.

County Health Outcomes

Health outcomes and capacity measures for each Wisconsin county are displayed in Table 3. Health outcomes index scores range from a high of 1.683 (healthiest) in Florence County in 2006, and a low of -1.806 (least healthy) in Juneau County.

Associations Between Capacity and Health Measures

Pearson correlation coefficients are a measure of the

Table 2. Wisconsin State Capacity Measures: Funding and Staffing, 1995-2004

LHD Capacity Measure	Mean	Range	SD	Crude Trend*	Inflation-Adjusted Trend†
Total Funding per Capita	$20.7	$7.5-$68.3	$9.9	$1.2	$0.82
Local Funding per Capita	$10.4	$4.0-$21.2	$4.2	$0.53	$0.33
Non-Local Funding per Capita	$10.2	$2.7-$47.6	$6.7	$0.69	$0.41
Local Funding	52.4%	27.8%-77.0%	11.0	-0.39	N/A
Total FTE Staff per 10,000 Pop.	3.9	1.2-13.8	2.1	0.093	N/A

LHD=Local Health Department; SD=Standard Deviation; FTE=Full-Time Equivalent.
*Using the regression coefficient.
†Adjusting for 2004 dollars.

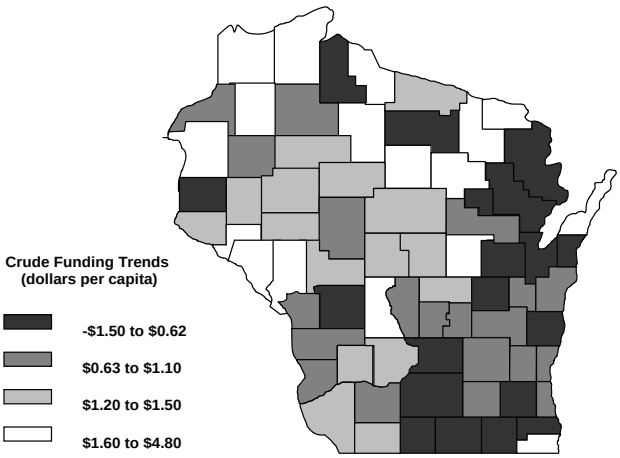

Figure 3. Wisconsin counties by 10-year trend in total health department funding per capita, 1995-2004. Trends in per capita expenditures (dollars per person) were calculated using regression coefficients.

degree of relationship between 2 variables and can range from -1 where 2 variables vary in exactly the same way but in a reverse direction, to +1 where the 2 variables vary exactly in the same direction. Correlation coefficients of 0 or close to 0 imply that there is no relationship between the 2 variables. The correlation matrix revealed small but statistically significant negative associations between health outcomes and local health department capacity measures (Table 4). That is, local health departments in the counties with worse health outcomes have had higher average funding and staffing levels during 2002-2004, and have seen a greater increase in funding from all sources over the past 10 years.

DISCUSSION

One of the priorities of Wisconsin's 2010 State Health Plan is to improve public health infrastructure in Wisconsin through equitable, adequate, and stable financing.[9] However, this analysis revealed evidence of wide variation in local public health funding levels with a decline in actual total funds after adjusting for inflation. These findings are consistent with similar findings from national studies. According to America's Health Rankings,[10] per capita spending for direct public health and community-based health services in the United States ranges from a high of $499 per capita in Hawaii to a low of $59 in Iowa (based on 2003 data from the National Association of State Budget Officers). Wisconsin was ranked 46th with per capita spending of $79.

Health departments with higher percentages of their funding coming from local property taxes experienced the least increase in total funding over time. These local health departments tend to be smaller and more rural agencies. County fiscal policies designed to keep property tax increases down, and the lack of adequate state shared revenues back to counties, contribute to this trend. These agencies also have fewer staff resources to direct toward finding external funds through grant writing or fund raising. This pattern is likely to continue unless a different approach to funding local health departments, such as need-based or state per capita funding, is implemented. More technical support and training in grant writing and more links between academia and practice to support grant writing could also benefit local health department funding.

Despite increased state and federal funding for bioterrorism and emergency preparedness since 2001, the total funding level for public health has not increased. While the focus on emergency preparedness planning has had positive consequences, including opportunities to develop relationships across health departments and system partners, raised awareness of public health functions, and improved infrastructure (generators, protective equipments, laptops with wireless capabilities, and cell phones), it has also had some negative consequences.[12] Emergency preparedness has not increased funding for additional staff and it has shifted time, resources, and attention away from traditional public health functions.[12-13]

This analysis revealed a small but significant rela-

Table 3. Wisconsin County Health Outcomes and Capacity Measures

	3-Year Average (2002-2004)					10-Year Trend (1995-2004)		
County	Health Outcome*	Total $ per Capita	Non-local $ per Capita	Local $ per Capita	# FTE Staff per 10,000	Total $ per Capita	Non-local $ per Capita	Local $
Adams	-1.395	20.3	10.1	10.2	3.2	0.87	0.54	0.32
Ashland	-0.564	14.8	6.2	8.6	4.7	0.16	0.014	0.12
Barron	-0.481	26.9	11.9	15.0	4.2	0.90	0.39	0.51
Bayfield	0.622	31.5	23.1	8.5	6.4	3.0	2.6	0.36
Brown	0.413	13.0	4.6	8.4	2.0	0.33	0.22	0.11
Buffalo	-0.392	33.1	20.9	12.2	5.3	3.0	1.8	1.2
Burnett	-0.478	37.0	16.6	20.4	5.2	1.1	0.23	0.86
Calumet	0.859	17.9	5.0	12.9	3.0	1.1	0.27	0.78
Chippewa	0.025	24.9	13.6	11.4	3.3	1.2	0.85	0.35
Clark	0.063	17.6	9.1	8.5	2.8	1.0	0.65	0.39
Columbia	-0.371	15.1	7.0	8.2	1.8	0.15	0.26	-0.11
Crawford	0.167	16.8	11	5.8	3.1	1.0	0.43	0.57
Dane	1.064	25.7	9.3	16.4	3.4	0.58	0.31	0.27
Dodge	0.366	11.3	5.4	5.9	2.0	0.63	0.27	0.36
Door	0.552	29.9	9.5	20.4	4.4	1.7	0.66	1.1
Douglas	-0.961	28.5	12.6	15.9	3.9	1.6	0.52	1.1
Dunn	0.248	24.3	14.2	10.1	4.4	1.5	1.1	0.39
Eau Claire	1.243	36.5	16.9	19.6	5.2	1.2	0.79	0.45
Florence	1.683	32.1	20.9	11.2	7.7	1.8	1.4	0.40
Fond du Lac	0.375	17.0	10.5	6.5	2.9	0.83	0.58	0.25
Forest	-1.302	33.3	18	15.4	9.0	2.6	1.4	1.2
Grant	0.389	21.4	13.4	7.9	2.6	1.4	1.1	0.30
Green	0.364	10.6	8.2	2.4	2.7	0.14	0.38	-0.24
Green Lake	-0.704	18.2	10.6	7.6	4.2	0.86	0.62	0.24
Iowa	0.653	14.2	9.1	5.1	2.4	1.0	0.85	0.20
Iron	-0.302	54.5	28.8	25.7	7.6	3.1	1.6	1.5
Jackson	-0.471	20.7	9.4	11.3	2.4	1.4	0.54	0.84
Jefferson	0.628	19.1	9.7	9.3	3.3	1.1	0.66	0.45
Juneau	-1.806	30.45	18	12.5	5.1	2.0	1.3	0.69
Kenosha	-0.705	27.9	16.2	11.7	3.2	1.7	1.4	0.32
Kewaunee	0.747	14.9	6.0	8.8	2.6	0.31	0.22	0.084
La Crosse	0.591	29.1	17.4	11.7	5.8	1.1	0.68	0.45
Lafayette	0.312	30.5	14.2	16.3	5.5	1.5	0.42	1.1
Langlade	-0.558	41.6	22.5	19.1	8.0	4.4	2.6	1.8
Lincoln	-0.020	26.5	8.6	17.9	4.2	1.7	0.63	1.0
Manitowoc	0.394	20.7	9.1	11.6	2.9	1.0	0.5	0.51
Marathon	0.854	26.8	9.4	17.4	3.3	1.5	0.38	1.1
Marinette	-1.020	17.5	7.3	10.2	3.3	0.44	0.26	0.18
Marquette	-1.111	21.5	8.6	13.0	4.7	0.69	0.55	0.14
Menominee	-1.531	9.0	-0.36	9.4	1.2	-1.5	-1	-0.49
Milwaukee	-1.427	36.2	18.4	17.8	4.5	1.1	1.2	-0.097
Monroe	-0.603	14.7	8.5	6.2	2.8	0.19	0.07	0.12
Oconto	0.327	16.5	6.9	9.6	3.1	0.53	0.07	0.46
Oneida	-0.380	25.4	17.1	8.3	4.2	0.54	0.38	0.15
Outagamie	0.979	14.0	6.3	7.6	2.3	0.45	0.27	0.17
Ozaukee	1.630	15.1	4.4	10.7	2.4	0.99	0.3	0.69
Pepin	-0.085	71.0	45.6	25.4	16.2	3.5	0.32	3.2
Pierce	0.211	37.3	23.6	13.7	7.6	1.4	1.4	-0.004
Polk	-0.105	46.8	28.6	18.2	8.4	3.1	1.8	1.3
Portage	1.165	24.9	13.9	10.9	3.7	1.4	0.58	0.86

table continued on page 30

Table 3. Wisconsin County Health Outcomes and Capacity Measures (*continued from page 29)*

	3-Year Average (2002-2004)					10-Year Trend (1995-2004)		
County	Health Outcome*	Total $ per Capita	Non-local $ per Capita	Local $ per Capita	# FTE Staff per 10,000	Total $ per Capita	Non-local $ per Capita	Local $
Price	-1.239	64.9	39.5	25.4	11.7	4.8	3.1	1.7
Racine	-0.324	19.3	9.1	10.1	3.2	-0.36	0.28	-0.64
Richland	0.376	21.3	8.9	12.4	3.2	1.5	0.64	0.83
Rock	-0.274	18.8	7.2	11.6	2.8	0.31	-0.14	0.45
Rusk	-0.099	32.3	20.3	12.0	7.3	1.2	0.4	0.78
Sauk	0.427	21.9	11.6	10.3	2.6	1.5	0.83	0.70
Sawyer	-0.540	26.8	16.4	10.4	5.7	0.69	0.52	0.18
Shawano	0.036	16.4	9.6	6.8	3.3	0.63	0.48	0.15
Sheboygan	0.182	20.4	7.8	12.7	5.1	0.069	-0.11	0.18
St. Croix	0.935	18.8	9.1	9.7	2.7	0.51	0.37	0.14
Taylor	0.387	20.5	11.9	8.6	4.5	1.5	0.91	0.60
Trempealeau	-0.200	22.8	11.5	11.3	4.8	1.6	0.86	0.73
Vernon	0.400	15.1	8.4	6.7	2.7	0.86	0.59	0.27
Vilas	-1.264	13.9	5.9	8.0	1.9	1.3	0.6	0.66
Walworth	0.586	10.4	4.7	5.7	1.7	0.30	-0.06	0.36
Washburn	-0.488	38.0	17.6	20.4	6.1	1.7	1.0	0.65
Washington	0.982	10.6	3.6	7.0	1.6	0.75	0.11	0.64
Waukesha	1.636	7.4	2.6	4.8	1.1	0.064	0.038	0.026
Waupaca	-0.897	23.7	15.1	8.6	4.6	2.2	1.6	0.55
Waushara	-0.753	32.7	13.2	19.5	5.5	1.4	0.85	0.58
Winnebago	0.332	19.1	11.1	8.0	3.9	0.48	0.42	0.061
Wood	0.587	24.1	10.8	13.3	3.8	1.3	0.7	0.58
Wisconsin		24.5	12.7	11.8	4.3	1.2	0.69	0.53

*Based on the inverse of the health outcomes summary measure Z-score.

Table 4. Correlation of 2006 Rankings Health Outcomes Index with Local Health Department Capacity Measures, 1995-2004*

	Pearson Correlation	*P*-Value
Total Funding per Capita (3-year average, 2002-2004)	-0.290†	0.014
Non-Local Funding per Capita (3-year average, 2002-2004)	-0.278†	0.019
Local Funding per Capita (3-year average, 2002-2004)	-0.247†	0.038
# FTE Staff per 10,000 Persons (3-year average, 2002-2004)	-0.266†	0.025
10-Year Trend in Total Funding Per Capita (1995-2004)	-0.246†	0.039
10-Year Trend in Non-Local FundingPer Capita (1995-2004)	-0.270†	0.023
10-Year Trend in Local Funding Per Capita (1995-2004)	-0.125	0.299

*Menominee County was excluded from the correlation matrix as its public health system structure is notably different than in other Wisconsin Counties in that most public health services are provided by the Menominee Tribal Clinic.

†Correlation is significant at the 0.05 level (2-tailed).

tionship between local health department funding and public health need, as measured by the population health outcomes measures from the *Wisconsin County Health Rankings.* On average, counties with the poorest health outcomes (or greatest need) demonstrated slightly higher total expenditures, had the greatest increase in funding, and had a higher number of FTE staff per 10,000 residents. While these findings seem counterintuitive, it is possible that when community needs are higher, the local health department responds by successfully advocating for more funding because their population health needs are greater. They may be able to justify more grant funding from external sources because of these greater needs. Since achieving health status improvement at a population level takes considerable time, it may be years before the increased investments this analysis revealed result in health outcome improvements. Continued regular and consistent monitoring of health outcomes and public health expenditures will be needed to test these assumptions.

A number of limitations should be considered when interpreting the results of this study. Comparing the

fiscal resources of county- and city-level local public health systems is limited by the same challenges as comparisons at the state and federal level: lack of consistent definitions of public health services, lack of standardized reporting, unequal distribution of funds, and cross-border provision of services. The quality of these results is directly related to the quality of the data available.

County-level data used in this study were only from each individual county's public health departments, not the entire "public health system" (eg, all the population-based efforts of local health care organizations, employers, schools, and social service agencies). Therefore, public health expenditures for services provided by hospitals, schools, social services, county extension offices, sheriffs' departments, etc. were not taken into account in the measurement of counties' capacity. In addition, some public health services are provided by agencies in other counties. For example, Adams County residents receive Special Supplemental Nutrition Program for Women, Infants, and Children services in Juneau County; consequently, Juneau County's health department expenditures appear higher because not all of the funds are being spent on residents of their county. Ideally, accurate and standardized financial allocations for each of the essential public health services (as performed by the local public health system) would be available for each jurisdiction. Until this is achieved, comparing capacity measures across jurisdictions is difficult.

Along these lines, studies that have attempted to link financial capacity with performance have been limited by non-standard fiscal reporting and by self-reported performance and perceived effectiveness. Honore and Schlechte[14] found no association between expenditures and performance, while Mays et al[13] did find a relationship. Misclassification of expenditures may bias any association between funding and health outcomes. The development of a common definition of "public health expenditures" for private, not-for-profit, voluntary, community-based, and government organizations would aid in the standardization of public health expenditure reporting. In addition, capacity to provide public health services is not the same thing as providing quality services. Some counties with less funding may be using their resources more efficiently and equitably than counties with more funding.

This ecologic study cannot demonstrate the effectiveness of local health department funding, staff, and programs on the health of the population. Carefully designed studies and an increasing literature on evidence-based public health should be used to assess these relationships. Rather, we feel that the data on population health needs should inform state and local public health investments, in an effort to reduce geographic health disparities in Wisconsin.

CONCLUSIONS

This study provided evidence that the Healthiest Wisconsin 2010 public health infrastructure financing priority has not been addressed, and in fact may be moving in the opposite direction. Despite research that links local public health system performance with local, state, and federal funding; staffing; number and breadth of partnerships; and local health department organizational structure;[15-20] and that shows evidence-based public health policies and programs make a difference in improving population health,[21] "equitable, adequate, and stable financing" for local public health remains an unmet goal. Future public health financing research should include an analysis of the impact of emergency preparedness funding on local public health funding and service provision. Standardized reporting of public health revenues and expenditures would greatly enhance the reliability of future research in this area. In addition to investigating ways to increase public health funding, state policy makers should place more emphasis on need in allocation decisions. The *Wisconsin County Health Rankings* may be a useful tool for determining need.

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WISCONSIN MEDICAL JOURNAL

Improving the Accuracy of Payment Classifications Through Use of a Case Management Protocol

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ABSTRACT

Objectives: The purpose of this study is to determine if a Case Management Protocol (CMP) improves the accuracy of assignment of Medicare patients to the appropriate payment classification.

Methods: MetaStar, Wisconsin's Quality Improvement Organization (QIO), invited Wisconsin hospitals to participate in this project; 19 hospitals did so. A CMP enables physicians to enter an order in the medical record to "admit the patient under the case management protocol" when it is not obvious to the physician whether the patient should be admitted as an inpatient or placed in an outpatient status. A trained case management professional accesses the documentation in the medical record and makes a recommendation to the physician as to the appropriate status. The decision is ratified by the physician in the form of a signed order.

Results: In comparing 1-day inpatient stays as a percentage of all hospital stays in a group of hospitals that considered the use of the CMP, to that same percentage in the hospitals that did not consider the use of a CMP, there was a reduction of 1-day stays for the former group that was significantly ($P<.01$) greater than for the latter group; the decrease in target payments for the former group also was significantly greater than that for the latter group ($P<.01$).

Conclusion: The use of a CMP to assign Medicare patients to appropriate payment classifications is an effective method of increasing the accuracy of such assignment.

BACKGROUND

Medicare pays for hospital services based on the financial classification of the patient. Under Medicare rules, the financial status is determined by an order placed in the patient's record by the admitting physician. An inpatient order results in payment under the Resource-Based Relative Value Scale (RBRVS), the payment program based on Diagnosis-Related Groups (DRGs). An order for outpatient services results in payment under the Ambulatory Payment Classification or Observation Services payment program.

The RBSVS, implemented in 1983, reimburses for inpatient care for medical conditions and surgical procedures that should consume similar amounts and types of resources. For example, a payment for treatment of congestive heart failure is the same regardless of the services received and days spent in the hospital.

Observation Status is designed for short stays for patients anticipated to respond quickly to therapy, or to establish a diagnosis and course of treatment when it is not clear that an inpatient level of care is required.

The Centers for Medicare & Medicaid Services (CMS) is concerned that payment intended to cover a multiple-day stay is provided for 1- or 2-day stays. Further, they are concerned that a large number of 1-day stays are billed to Medicare as inpatient, when Observation Status would be the more appropriate financial classification. This inappropriate classification therefore unnecessarily depletes the Medicare trust fund. In addition, patients are concerned that the limited number of Medicare inpatient benefit days might be consumed by 1-day stays when they should instead be billed as outpatient, which would not consume these benefit days.

By contract with CMS, on a quarterly basis, the Texas Medical Foundation issues a report called FATHOM (First-Look Analysis Tool for Hospital Outlier Monitoring). The data provide a comparison of acute care Medicare reimbursed hospitals at risk for payment error using Medicare discharge data. CMS selects target areas to include 1-day stays that are tracked at the hospital level. This provides the QIO the ability to compare hospitals within its state across tar-

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Glossary of Terms

Case Management/Utilization Management (CM/UM)–These terms have identical meaning in this article. Case management is a more recent term. The goal of case management is to assist health care professionals in the efficient use of hospital resources to care for the patient. The assignment of payment classification (inpatient vs outpatient) is an area of particular interest to the case manager. Case/utilization managers are professionals with clinical backgrounds trained in the use of criteria to identify the appropriate payment classification.

Case Management Protocol (CMP)–For the purposes of this article, a CMP is a protocol that enables the physician to enter an order in the medical record to "admit the patient under the case management protocol" when it is not obvious to the physician whether the patient should be admitted as an inpatient or placed in an outpatient status. A trained case management professional accesses the medical record documentation and makes a recommendation to the physician as to the appropriate financial status. The physician, in the form of a signed order, ratifies the decision.

Centers for Medicare and Medicaid Services (CMS)–Formerly known as the Health Care Financing Administration (HCFA), CMS is the federal agency within the Department of Health and Human Services that is responsible for administering the Medicare, Medicaid, SCHIP (State Children's Health Insurance), HIPAA (Health Insurance Portability and Accountability Act), CLIA (Clinical Laboratory Improvement Amendments), and several other health-related programs.

Quality Improvement Organization (QIO)–The QIO is an entity that contracts with CMS under Title XI of the Social Security Act to ensure the quality of care for Medicare beneficiaries. MetaStar is the Wisconsin QIO. One of the functions the QIO performs is to assist health care professionals in reducing payment error through the appropriate assignment of payment classifications.

get areas and in outlier groups. The QIO can also see how its state compares to other states.

According to the FATHOM reports, Wisconsin is a relatively high user of 1-day inpatient stays when compared to other states and territories. Most recently, in the third quarter of Fiscal Year 2007 (April-June), Wisconsin ranked 16th of 53 states and territories in the percentage of Medical DRGs that were 1-day stays. Wisconsin's percentage was 12.4, as compared with a national median of 10.8%.

In 2003-2004, CMS funded an unpublished study that employed the use of a CMP promoted by the Florida Medical Quality Assurance, Inc (FMQAI), Florida's QIO.[1] That study, using 20 pilot hospitals and 20 controls, demonstrated a 3-fold reduction in denials of payment for 1-day stays that should have been billed as Observation. Several Wisconsin hospitals familiar with the experience in Florida, along with MetaStar's Hospital Payment Monitoring Program Advisory Group, recommended to MetaStar that a study similar to the Florida study be undertaken here in Wisconsin. The concept of the CMP was discussed at statewide meetings attended by hospital financial management and case management professionals.

METASTAR ASSISTANCE PROVIDED HOSPITALS

MetaStar invited all Wisconsin hospitals that are reimbursed under the Medicare DRG reimbursement system to join in the CMP project. The purpose of the project was to encourage the hospitals to consider the use of the CMP. Nineteen of Wisconsin's 67 DRG-reimbursed hospitals elected to join the project.

MetaStar worked with this group of hospitals to:

- design a CMP appropriate to each facility, working individually with hospitals and with the hospitals as a group. Figure 1 represents the CMP process. Hospitals were encouraged to include the following hospital entities: medical staff leadership, hospital leadership, case management/utilization management, health information, compliance, patient care, business office, and information services.
- assist individual hospitals in establishing a need for the protocol through a criteria-level review of selected 1-day hospital admissions. Selected 1-day stays included chest pain, congestive heart failure, arrhythmias, dehydration, esophagitis, gastroenteritis, digestive disorder, and medical or non-surgical back pain. MetaStar staff reviewed a sample of 20 admissions from each of the 19 hospitals that elected to join the project, using national criteria (InterQual™). The percent of admissions found not to meet inpatient-level criteria ranged from 33% to 78%. Hospitals were encouraged to concentrate on these conditions to initiate the use of the CMP.
- discuss progress during onsite hospital visits. Such visits were typically attended by medical staff leadership. Without exception, medical staff leadership favored the use of the CMP to allow physicians to concentrate their efforts on evaluation and treatment of their patients.
- conduct monthly webcasts about CMP development and education of case management, patient care staff, physicians, and patients themselves about appropriate Medicare financial status. Hospitals had the opportunity during the webcasts to share lessons learned, discuss barriers, and share successes.

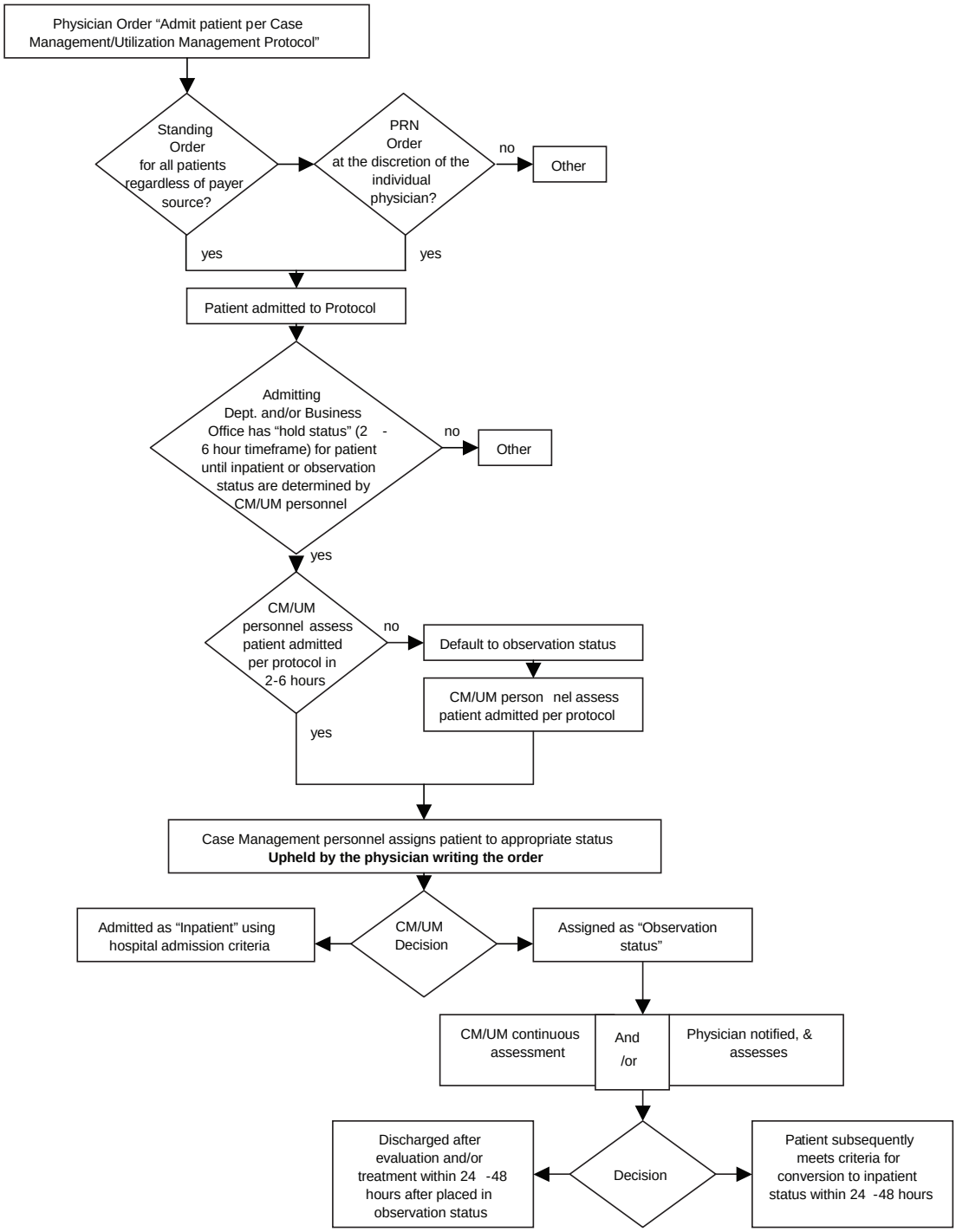

Figure 1. Admission per case management protocol.

- provide presentations by MetaStar's Medical Director to the medical staff, when invited, on a variety of utilization topics, including the CMP.

Ultimately, 9 of these hospitals actually used the CMP, either full-time or part-time, giving the physician the ability to request a review by case management. The Florida QIO found that the CMP was used about 30% of the time. We found that Wisconsin hospitals' experience was consistent with this finding.

RESULTS

We employed a series of pre-post comparisons. We compared (1) the rate of 1-day medical DRG stays as a percentage of all medical DRG stays between when we

Table 1. 1-Day Medical Diagnosis-Related Group (DRG) Stays as a Percent of All Medical DRG Stay

	Case Management Protocol Participants	Nonparticipants
Quarter 4 (FY 2006)	13.2% (1587 / 11,987)	13.0% (2379 / 18,364)
Quarter 3(FY 2007)	11.8% (2251 / 17,765)	12.7% (1356 / 11,471)
Relative Improvement	10.6%	2.3%

Table 2. Sum of Target Payments for 1-Day Medical Diagnosis-Related Group Stays

	Quarter 4 FY 2006	Quarter 3 FY 2007	Change in Reduction from Baseline
CMP Participants	$5,968,453	$5,383,920	9.8%
Nonparticipants	$9,369,495	$9,356,223	0.14%

started (4th quarter 2006) and ended (3rd quarter 2007) for the 19 hospitals that participated in the study and the 48 hospitals that did not, and (2) the sum of 1-day medical DRG stays as a percentage of all medical DRG stays between the same quarters for the same groups of hospitals. Hospitals that did not participate were essentially unchanged. The CMP participants showed significant decreases ($P<.01$) in both the percentage of 1-day stays (Table 1) and the sum of target payments for 1-day medical DRG stays (Table 2).

DISCUSSION

As mentioned, MetaStar staff determined that of the charts reviewed, 33%-78% of the admissions did not meet inpatient-level criteria, (ie, were inappropriate). Such a high rate of inappropriate admissions has substantial negative effects: decreased hospital/physician payment, potential allegations of fraud, and repayment of received DRG reimbursement. The inappropriate assignment of an inpatient status unnecessarily consumes patients' inpatient benefit. If all of a Medicare Beneficiaries' inpatient days are consumed, the patient may be liable for any further inpatient days. Hence it is important to find methods by which patients can be assigned efficiently and accurately to the appropriate payment classification.

Using a 2-tailed T-test, the decrease in 1-day stays as a percentage of medical DRG stays for hospitals participating in this study, as compared with nonparticipants, is significant at $P<.01$; the difference in target payments is also significant at the .01 level. Of course, these results do not show that any particular classification or group of classifications was appropriate, as medical records were not reviewed as part of the follow-up.

What we can conclude is that use (or at least consideration) of a tool like the CMP, or a similar tool, is apt to lead to a decrease in admissions. In view of the large number of inappropriate admissions discovered at baseline, we believe it is likely that the tool was effective in preventing unnecessary admissions. If so, the decrease in payments to participants as compared to nonparticipants indicates that the CMP could hold substantial benefits for the Medicare trust fund. Use of the CMP also would be expected to decrease the number of inpatient denials and of repayments to Medicare from retrospective review.

An appropriate follow-up study would be to review the charts of participating hospitals during the follow-up period to see whether the proportion of inappropriate admissions decreased after use or consideration of the CMP. MetaStar has no plans to conduct such a study at this time.

It should be noted that this is not a quality of care issue. Patients who are admitted unnecessarily do not benefit from the admission, and run the risk of increased expense and iatrogenic complications.

The use of the CMP should be of particular interest to admitting physicians. Medical staff leadership at participating hospitals uniformly praised the use of the CMP, as it enabled them to focus on the diagnosis and treatment of their patients, without being distracted by coding issues.

Those desiring more information on the CMP may contact Bill French, MetaStar's Vice President of eHealth Services.

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WISCONSIN MEDICAL JOURNAL

Spinal Intramedullary Cysticercosis of the Conus Medullaris

Yusuf Izci, MD; Roham Moftakhar, MD; M. Shahriar Salamat, MD, PhD; Mustafa K. Baskaya, MD

ABSTRACT

Neurocysticercosis is the most common central nervous system (CNS) parasitic disease worldwide, but spinal cysticercal infection is relatively rare, especially in the United States. Because of increased immigration to the United States from endemic areas, the incidence of neurocysticercosis has risen, especially in California, Texas, Arizona, and other southwestern states, but not in Wisconsin.

Spinal intramedullary cysticercosis involving the conus medullaris is an uncommon clinical condition that can lead to irreversible neurological deficits if untreated. Rarely, *Taenia solium*, a cestode that causes neurocysticercosis, may produce spinal intramedullary lesion, which may mimic an intramedullary tumor.

We report a case of thoracolumbar spinal intramedullary cysticercosis caused by *Taenia solium*. Spinal neurocysticercosis should be kept in mind in the differential diagnosis of intramedullary conus lesions even if the patient lives in Wisconsin.

INTRODUCTION

Neurocysticercosis (NCC) has become an increasingly important infection in the United States. There are more new cases of NCC in the United States than in all other developed countries combined. This is generally due to the influx of immigrants from endemic regions to the United States and the ease of international travel. The spread of NCC throughout the United States has largely followed the flow of immigration from Mexico and several South American countries.[1]

NCC is the most frequent parasitic disease of the central nervous system (CNS) and the most common cause of convulsions and hydrocephalus in adults in endemic regions, where the seroprevalence of disease is about 4% of population.[2] The parasitic involvement of the spinal cord and its nerve roots is relatively rare and occurs in only 0.7 to 5.85% of patients with NCC.[3-4] It is usually associated with cerebral cysticercosis, but may also present as an isolated lesion.[3] The thoracic spine is most commonly involved.[5]

We describe a 70-year-old man who presented to the University of Wisconsin Hospital and Clinics complaining of low back pain, bilateral leg weakness, urinary retention, and bowel incontinences. He was found to harbor an isolated thoracolumbar intramedullary spinal cysticercosis.

CASE REPORT

A 70-year-old man presented with urinary retention, bowel disturbance, and leg weakness 2 months prior to admission. He had recently immigrated from Mexico to Wisconsin. His medical history was positive for hypertension and complete blindness in his right eye due to trauma.

On neurological examination, there was motor weakness in plantar flexion of both lower limbs and sensory loss to pinprick bilaterally below T11-T12 dermatomes. He had hypoactive deep tendon reflexes and urinary and bowel incontinences.

The magnetic resonance imaging (MRI) of the spine revealed a large cystic contrast enhancing mass extending from T11 to L1. Conus medullaris appeared to be compressed and distorted by this mass (Figure 1).

He underwent microsurgical near total/subtotal removal of the conus medullaris lesion via T10, T11 total, and T12 partial laminectomies. Intraoperative monitoring of motor and somatosensorial evoked potentials were also performed. The intramedullary mass lesion had a central large cystic component with a peripheral capsule and a mural nodule that was dense and very adherent to the conus. The cyst and its wall were nearly completely removed. During the resection of conus medullaris, the amplitude of motor-evoked

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Figure 1. The magnetic resonance imaging (MRI) of the patient with contrast enhancement. T1-sagittal section shows the intramedullary contrast enhancing mass lesion compressing the conus medullaris.

Figure 2. Postoperative T1-sagittal magnetic resonance imaging (MRI) of the patient shows a small enhancement and no recurrence of cyst with well decompressed conus medullaris.

potentials decreased significantly. To avoid permenant injury to the spinal cord, a small part of the cyst capsule was left alone.

Neuropathological examination revealed cyst wall remnants of cysticercosis. The wall consisted of a cuticular layer with brushlike border and an inner reticular layer demonstrating degenerative changes. The *T. solium* scolex could not be identified. The remaining specimens revealed dense gliotic capsules with accompanying lymphocytes and macrophages. Examination of spinal cord samples demonstrated reactive gliosis.

In the early postoperative period, the radiological evaluation of the whole body showed no foci of cysticercosis. His neurological status remained stable and he was discharged home without an additional deficit. The patient underwent antihelminthic regimen in a postoperative period with albendazole for 3 months. At the third month follow-up, the patient's urinary retention and bowel incontinence were improved. He was able to urinate without a catheter. Follow-up postoperative MRI showed a small enhancement and no recurrence of the cyst with well decompressed conus medullaris (Figure 2).

DISCUSSION

Worldwide, cysticercosis is the most common parasitic infection affecting the CNS. NCC typically involves the brain parenchyma, intracranial subarachnoid space, or ventricular system and is often self-limited unless hydrocephalus requires surgical intervention.[2] Spinal NCC is rare even in endemic regions, and may require more aggressive management because of the natural confines of the spinal canal. The location and the size of the lesion, and the inflammatory response generated by cyst breakdown are the important factors in the management of spinal NCC.[2-3,6]

Spinal cysticercosis is classified as extraspinal or intraspinal, depending on the location. In the former group, the lesion is in the vertebral bodies, whereas the latter group includes extradural, subarachnoid, and intramedullary forms. Intradural spinal cysticercosis can be subdivided in leptomeningeal (subarachnoid) or intramedullary forms (parenchymal), the former being the most prevalent type of spinal parasitic infestation.[2-3,7-9] An intramedullary location is considered a result of hematogenous spread similar to the parenchymal intracranial NCC; more than 50% of patients have evidence of *T. solium* infection elsewhere. Spinal NCC occurs in patients with an established diagnosis of intracranial NCC in approximately 75% of cases. Isolated cases of spinal NCC are extremely rare.[2-3,9] In our case, no brain involvement was detected and the scanning of the whole body was negative for cysticercosis.

The locations of spinal lesions appear to be proportional to regional spinal cord blood flow. As such, De Souza Queiroz et al[7] estimated that spinal distribution of cysticerci occurs as follows: 34% in the cervical, 44.5% in the thoracic, 15.5% in the lumbar, and 6% in the sacral region. If blood flow was the sole factor

in distribution, the expected relative incidence of intramedullary spinal NCC would be 10%-15%. The discrepancy between the expected distribution due to blood flow and reported distribution of NCC lesions remains unexplained.[3]

The imaging features of intramedullary NCC on MRI are not specific, and the differential diagnosis includes neoplastic, inflammatory, demyelinating, vascular, and granulomatous lesions. Intramedullary NCC may also occur in conjunction with cysticercal meningitis, further confounding accurate diagnosis. MRI of intact spinal intramedullary lesions typically demonstrates cystic areas within the parenchyma and cyst fluid similar to that of cerebrospinal fluid on both T1- and T2-weighted images.[10-11] A subtle hypointensity may appear at the rim of the cyst on T2-weighted sequences. Infrequently, the scolex can be visualized on T1-weighted images as a mural nodule isointense to cord parenchyma and is located in the cyst itself. Irregular areas of peripheral enhancement after intravenously administered gadolinium have also been observed.[10-12] In our patient, spinal NCC was observed on T1-weighted MRI as a hypointense mass lesion with a ring enhancement. The lesion was presumed to be intramedullary conus medullaris tumor preoperatively.

Surgical treatment is indicated in spinal NCC in which patients had severe and progressive neurological dysfunction regardless of whether medical therapy has been attempted. The inflammatory process may be so severe that some cysts cannot be readily or completely resected. Excision of intramedullary NCC lesions has been described as being possible after myelotomy or requiring microsurgical dissection from the parenchyma prior to removal.[2-4,9] We performed a 2-level laminectomy plus midline myelotomy to reach the lesion and removed it subtotally in order to preserve the neural tissue.

Although the role of medical treatment is increasing in the management of NCC, medical management is often an adjunct to surgery. The effectiveness of cysticidal therapy does not prevent the need for resection of symptomatic intraparenchymal lesions. Postoperative anticysticercal treatment is generally recommended because cysticercosis is considered to be a generalized disease with focal symptoms. Albendazole (15 mg/kg/day) and praziquantel (50 mg/kg/day) regimens have been used for both 8- and 30-day periods. Steroids must be added to the anthelmintic regimen because the inflammatory response around the cyst after treatment may deteriorate the spinal cord functions.[3-4,6,13] Our patient completed a 3-month course of albendazole.

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Amyloidosis Presenting as Lower Gastrointestinal Hemorrhage

Bret J. Spier, MD; Michael Einstein, MD; Eric A. Johnson, MD; Andrew O. Zuricik, III, MD; Johnny L. Hu, MD; Patrick R. Pfau, MD

ABSTRACT

AL-Amyloid rarely presents in the gastrointestinal tract as acute gastrointestinal hemorrhage, especially in the absence of clinical disease elsewhere in the body. There are no reported cases of monoclonal gammopathy of undetermined significance progressing to AL-Amyloid presenting as lower gastrointestinal hemorrhage. We report a case of a patient initially diagnosed with monoclonal gammopathy of undetermined significance who progressed to AL-Amyloid over the course of 1 year. His progression resulted in primary colonic amyloidosis that manifested as lower gastrointestinal hemorrhage. The diagnosis was made by biopsy of a sigmoid plaque demonstrating necrotic material on histopathology. Amyloid deposition was seen on congo red and on birefringence. The bleeding stopped spontaneously without intervention and he was discharged his fourth day in the hospital. Further evaluation revealed no involvement in other organ systems. The plan is to treat with melphalan and dexamethasone.

We conclude that early endoscopic examination and biopsy of the surrounding intestinal tissue is indicated when patients with monoclonal gammopathy of undetermined significance present with gastrointestinal hemorrhage to evaluate for the progression to AL-Amyloidosis. Treatment to prevent recurrent hemorrhage and further progression of the disease should be considered.

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INTRODUCTION

Early recognition of AL-Amyloidosis (AL) is important in an attempt to limit significant long-term effects. AL is a disorder characterized by the extracellular deposition of homogeneous, fibrillar monoclonal immunoglobin light chains in various organs and tissues. The presentation of AL is protean with symptoms reflecting the sites of amyloid deposition. The organs most commonly involved are the heart and kidney.[1]

Monoclonal gammopathy of undetermined significance (MGUS) has a prevalence of 3%-6% in those 70 years old or older and can be a clinical precursor to AL.[2-3] MGUS is the presence of small amounts of monoclonal protein in the serum and urine without clinical manifestations. Patients with MGUS have the same life expectancy as the general population. However, MGUS is not static and can progress to multiple myeloma (MM), plasmacytoma, macroglobulinemia, AL, or chronic lymphocytic leukemia. This occurs at a rate of approximately 1% per year.[4]

AL rarely presents in the gastrointestinal (GI) tract as acute GI hemorrhage, especially in the absence of clinical disease elsewhere in the body. We present a case report of a patient initially presenting as MGUS who 1 year later progressed to AL with primary colonic involvement presenting as a lower GI hemorrhage. The incidence and pathophysiology for AL-associated gastrointestinal hemorrhage and the emphasis for early recognition of AL in an attempt to limit progression and prevent further organ involvement is discussed.

CASE REPORT

In January 2006, a 70-year-old white man was found to have a monoclonal gammopathy while being evaluated for anemia. Serum protein electrophoresis (SPEP) revealed a monoclonal IgG-lambda spike of 1.33 g/dL. Workup for MM was negative, and he was diagnosed with MGUS. His anemia was felt to be secondary to the chronic inflammation.

The remainder of his medical history included coronary artery disease, diabetes, hyperlipidemia, hypertension, and chronic obstructive pulmonary disease from longstanding tobacco use. His status is post radical prostatectomy with external radiation therapy for prostate cancer. Current mediations include glyburide, lisinopril, metoprolol, niacin, and simvastatin.

Approximately 4 months prior to this admission for GI hemorrhage, the patient had a screening colonoscopy that revealed 2 tubular adenomas and was without other remarkable findings. A histopathologic review of biopsies obtained at that colonoscopy revealed no amyloid involvement, suggesting the development of the amyloid plaque was rapid and localized in its colonic involvement.

He was doing well until January 2007 when he presented with multiple episodes of painless hematochezia, which represents the passage of bright red blood primarily from the lower GI tract. This is contrasted with melena, which is the passage of oxidized (black and tarry) blood primarily from the upper gastrointestinal tract. The patient was hemodynamically stable and did not require transfusion. Colonoscopy revealed a large plaque with adherent clot in the sigmoid colon that encompassed nearly a third of the circumference of the lumen (Figure 1). Multiple biopsies were obtained, which were described as necrotic material on histopathology. Amyloid deposition was seen on congo red and on birefringence (Figure 2). The bleeding stopped spontaneously without intervention and the remainder of his hospitalization was uneventful without further hemorrhage. He was discharged on day 4.

At a follow-up visit 2 months after discharge, the patient had experienced no further episodes of GI hemorrhage. Colonoscopy at that time revealed a healed scar where the amyloid plaque had been, suggesting this lesion had healed without intervention. However, there was another plaque that had developed distally. Further evaluation for AL included a transthoracic echocardiogram, which revealed an ejection fraction (50%) without presence of diastolic dysfunction or right heart failure. He had no complaints of diarrhea, intestinal bleeding, weight loss, swollen legs, shortness of breath, or rash. His renal function remained normal. Based on these findings, a therapeutic regimen of melphalan and dexamethasone in an attempt to prevent further progression of amyloidosis is planned.

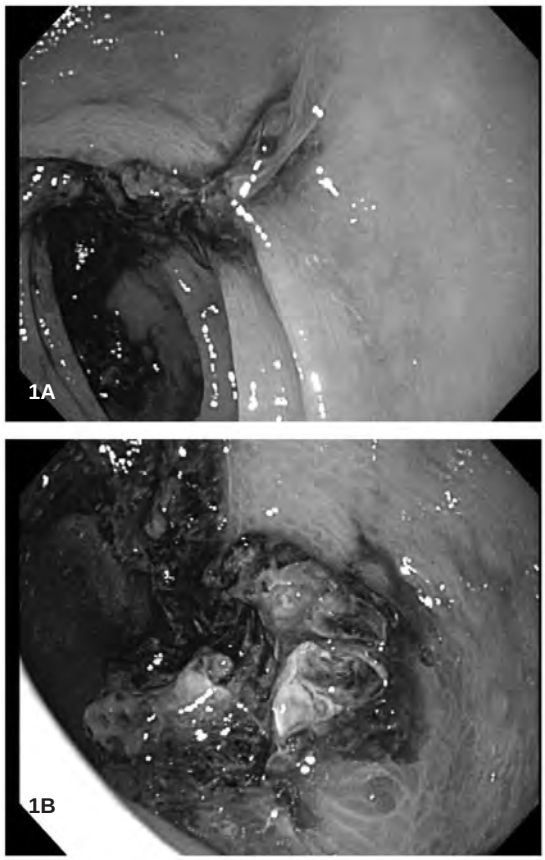

Figure 1. A and B represent endoscopic pictures of the colonic lesion, which appeared to be flat and plaque-like with adherent clot.

DISCUSSION

Our patient was initially diagnosed with MGUS and within 1 year progressed to AL with primary colonic involvement manifested as lower gastrointestinal hemorrhage. This specific progression of MGUS to AL presenting as a lower GI hemorrhage has not been reported. GI involvement in AL is common, and has been found in up to 98% in some autopsy series, depending on the detection technique used.[5] However, AL can present initially as GI hemorrhage and has only been reported 5 times in the literature.[6-10] Conversely, there is a well-established association of AL patients experiencing GI hemorrhage at some point in the course of the disease. In 1 retrospective study of 337 patients with AL over an 8-year period, Mumford et al found a 5% incidence of GI hemorrhage.[11]

Several mechanisms have been reported in the literature by which AL can induce GI hemorrhage. The best-established mechanism is the well-recognized association between AL and coagulation abnormalities, which can increase the risk of intestinal hemorrhage. In the study by Mumford et al, a prolongation of thrombin time, prothrombin time, or activated partial thromboplastin time was observed 51% of the time.[11] Acquired deficiency of fac-

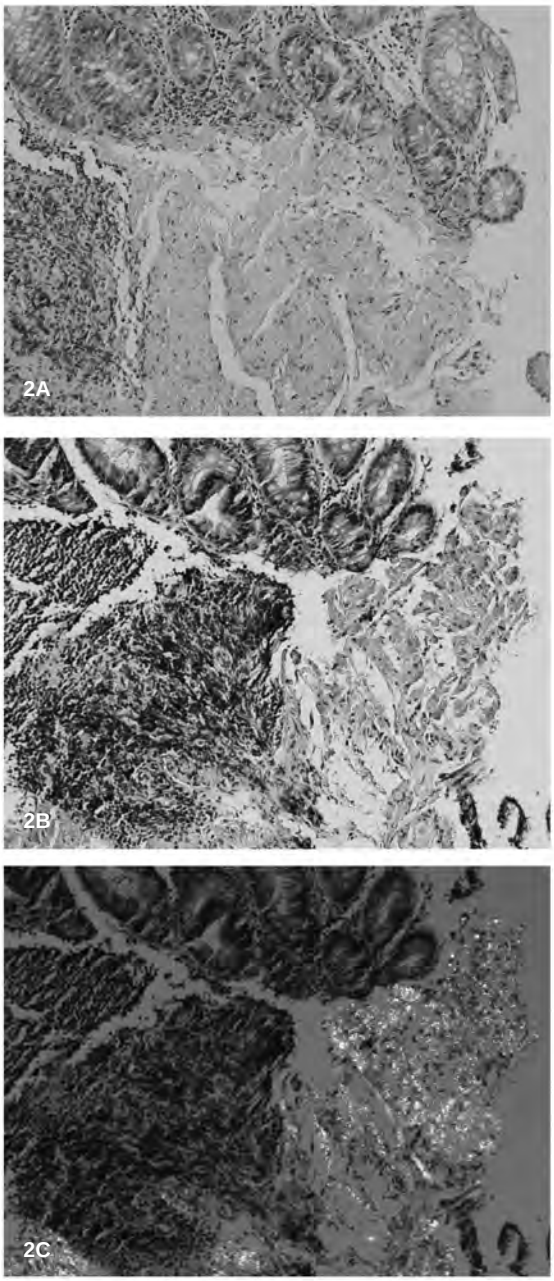

Figure 2. A. H&E stained sections of biopsied specimen revealing amorphous, eosinophilic material deposited within the submucosa. **B.** Congo red stained section revealing positive staining for amyloid protein. **C.** Apple-green birefringence as viewed through polarized lenses.

tor X is the most common coagulation factor deficiency in AL. Choufani et al performed a retrospective analysis of 368 patients with AL and found 32 (8.7%) patients with an acquired deficiency of factor X, correlating well with other studies that found 6.3%[13] and 14%.[11] The authors concluded that all patients with AL should be screened for reduced factor X levels due to the increased risk of hemorrhage, especially prior to surgical procedures.[12] Mechanistically, the acquired factor X deficiency appears to result when amyloid binds selectively to factor X, impairing the clotting cascade.[14]

Other less well-defined mechanisms for AL induced hemorrhage involve localized intestinal ischemia, which occurs when all layers of the intestine and blood vessel walls are infiltrated. This can lead to diffuse mucosal oozing as described by Mallory et al.[15] This is the most likely scenario in our case, as necrosis with amyloid deposition in the submucosa and surrounding vessel walls was seen on biopsy (Figure 2). Also described is heavy focal amyloid deposition causing ulcerations.[16] Lastly, amyloid deposition in the mesenteric and submucosal vessel walls can induce fragility and subsequent hemorrhage.[17-18]

Given the nonspecific nature of GI manifestations and the rarity of AL presenting as GI hemorrhage, it is important to have a high index of suspicion for progression of patients with MGUS if they present with hemorrhage or GI symptoms as this may be the initial sign of progression.[19-21] If patients with MGUS present with either upper or lower intestinal bleeding, endoscopic examination should be performed to determine the source of bleeding. Further, mucosal biopsies should be obtained at the time of endoscopy with special stains performed for the presence of amyloid.

Diagnosis of AL is important after the initial bleeding has been controlled, as there are treatment options available that can have a significant impact on their disease course. Therapy is generally directed at management of specific organ system complications and, when possible, reduction of the amount of circulating amyloid protein to prevent or slow the rate of additional amyloid deposition. Thus, the presence of AL with primary GI involvement only, as in our case, should prompt consideration for treatment because the cause of death in most patients is cardiac related, and usually reflects the extent of cardiac involvement.[22] Patients with AL have improved survival over placebo when treated with autologous or allogenic hematopoetic cell transplants, and various regimens including melphalan, dexamethasone, thalidomide, and interferon.[23] In addition, our patient has recurrence of amyloid plaques, thus increasing his likelihood to rebleed.

CONCLUSION

In conclusion, we report a case of MGUS progressing to AL and presenting as GI hemorrhage. Though primary presentation with GI hemorrhage is rare, a high degree of suspicion is required with early endoscopic examination, and biopsy of the surrounding intestinal

tissue is recommended. Survival in patients with AL is largely dependent on the degree of cardiac and renal involvement, and immediate referral to a hematologist for consideration of treatment should be undertaken when the involvement is limited to the GI tract.

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Jay Czarapata, CFP, CRPS

Could declining home values affect your retirement plans?

Jay Czarapata, CFP®, CRPS®

Homeowners who stay put and ride out the current slump in the housing market should not be overly concerned about the value of their homes or the long-term effect on their net worth. As the population continues to grow, the demand for housing and new homes continues to rise, just not as quickly as in past years, according to leading economic indicators.

If you have to sell in the near future, your house may bring less now than it would have a year ago. In addition, many borrowers may be paying additional fees on new mortgages. In December 2007, the Federal National Mortgage Association (Fannie Mae) added a 0.25% upfront charge on all new mortgages that it buys or guarantees. On a $400,000 mortgage, that would add $1000 in fees.

On the positive side, you will probably get a good value on the house you buy. Mortgage terms may be less favorable, however. With less credit being extended overall, even homebuyers with good credit ratings may find home mortgages harder to come by. There are tougher requirements for down payments and increases in mortgage insurance costs. In addition, the interest rate premium paid for "jumbo" loans, those above $417,000, has become much more expensive. Borrowers looking for a jumbo loan are paying more than a full 1% higher rate than the average smaller mortgage.

Some Background

During the recession of 2001, home prices rose appropriately. The Federal Reserve reduced interest rates and kept these rates low until 2004. The low-rate environment from 2001 to 2004 and the foreign savings flowing into the United States kept mortgage rates low, making homes more affordable.

In 2004, former Federal Reserve Board Chairman Alan Greenspan argued there could be no housing bubble because the high cost and inconvenience of moving slows down speculation and price bubbles. But the continual home price appreciation may have given buyers and lenders an unreasonable sense of security. When mortgage rates began rising, buyers no longer could afford as large of a house, and that began the downward spiral we are experiencing now.

Recession on the Horizon?

In 2008, lower housing prices could have a dampening effect on the overall economy. According to Federal Reserve Board Chairman Ben Bernanke, for every dollar decline in home values, consumer spending decreases 4-9 cents. Decreasing home values also may discourage homeowners from borrowing against the equity in their homes to buy large-ticket items.

Declining home values, coupled with rising energy costs and uncertainty about a new presidential administration, create volatility in the stock market and feed speculation about a recession in 2008. In spite of the poor economic forecasts, the United States may avoid a recession because the housing market is a much smaller share of the economy than the business market that fueled the 2001 economic recession.

Buyer's Market?

When housing prices are low and the stock market is uncertain, some investors may be tempted to put their money in real estate.

Jay Czarapata, CFP® is a Certified Financial Planner who practices in the Milwaukee office of SVA Wealth Management, Inc., Registered Investment Advisor, an affiliated company of Suby, Von Haden & Associates, S.C. For more information, call Wisconsin Medical Society Insurance and Financial Services, Inc. toll free at 866.442.3810.

Attempting to "time" the market—buying low, selling high—is nearly impossible to do, whether it's the housing market or the stock market.

Real estate investments are more complex now than in the past. If you do invest in real estate, consider a globally diversified real estate investment trust (REIT) fund that is actively managed by a professional fund manager. We generally recommend clients limit real estate investments to no more than 5% of their total portfolio.

Wise investors choose a strategy and stick with it. Periodically revisit your asset allocation and risk tolerance. In general, the farther you are from retirement, the more risk you can afford to take. As you get closer to retirement, you have less time to recover from a downturn in the economy, so you will want to move assets into more conservative investments.

Conclusion

Your home is a significant asset, but it's not a very *liquid* asset. When we advise clients about retirement income, we typically exclude home equity from their plans unless they are definitely downsizing their home in retirement. You will always need a roof over your head, so consider other investment options in planning for retirement.

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The mission of the Wisconsin Medical Society Foundation is to advance the health of the people of Wisconsin by supporting medical and health education. The individuals and organizations named below made contributions to the Wisconsin Medical Society Foundation from January 1, 2007 through December 31, 2007. We are deeply grateful for each donor's support of the Foundation.

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The White Coat Campaign provides a white coat and note of encouragement for each first-year medical student in Wisconsin.

Operation: Education offers a forum for medical students to speak with physicians representing a variety of practices—family practice, specialties, and research, rural or urban—in small groups, allowing an informal setting for students to ask questions early in their education.

The Tribute Program provides an easy and meaningful way to remember someone with a gift to the Foundation—whether in memory of a deceased colleague or loved one, or to honor someone or for a special occasion.

The Charles W. Landis, MD, Memorial Lecture supports an annual lecture on a mental health topic.

Fundraising Event

Our signature fundraising event for 2008 will feature the unique opportunity to meet Kim Peek, one of the world's few identified prodigious savants, along with Darold Treffert, MD, a recognized expert on Savant Syndrome. Peek has read over 7600 books and has 98% recall of each—not to mention a storehouse of facts on subjects ranging from music to history to sports. He's also developmentally disabled. Although it does not depict his actual life story, Peek inspired the 1988 Oscar winning film, *Rain Man*. With a large silent auction and a very intriguing program, we anticipate attendance of 500 or more. You won't want to miss it!

For table sponsorship details or to purchase individual tickets, contact Renee Reback at 608.442.3720 or e-mail reneer@wismed.org.

For more information on the Foundation, visit us at www.wisconsinmedicalsociety.org/foundation.

SOME KIDS ARE GROUNDED WHEN THEY'RE CAUGHT WITH A DRINK.

OTHERS ARE OFFERED ANOTHER.

Underage teens are finding it easier and easier to obtain alcohol— the number one drug of choice for American youth.

What's worse, they're getting it more often from adults, including their own parents, than from strangers. In an American Medical Association (AMA) survey, one in three teens responded that it is easy to obtain alcohol from their own consenting parents.

Some parents believe that underage drinking is a rite of passage. But fatal injuries, car accidents, sexual assaults and contracting sexual diseases are not rites of passage- they are life-altering events. And alcohol causes what may be irreversible damage to a young person's brain, which develops into their 20s.

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CRC Health Group is the largest for-profit provider of behavioral health treatment services and ancillary services in the country. CRC facilities have enjoyed an industry wide reputation from treatment excellence over the past 20 years and consistently receive the highest possible accreditation scores from national and state agencies. We set the standard of excellence in the fields of chemical dependence and behavioral healthcare.

At Valley Health Services, we are passionate about helping our patients through Outpatient Addiction Treatment. We are in need of PT Medical Director to join our team.

Primary Responsibilities include:
- Planning and organizing medical and clinical practices at the facility.
- Oversight of the prescribing, and administration of approved medications for the treatment of opiate addiction.
- Performing history and physical exams for patients.
- Reviewing treatment plans and discussing cases with treatment team.
- Assessing co-existing medical and psychiatric disorders.
- Providing comprehensive care to patients by formulating and prescribing treatment and medications appropriate to the condition of the patient.

Qualifications:
- Current M.D. or D.O. license in the state of WI and an active DEA registration without restrictions.
- Psychiatrist, Addictionologist, and/or ASAM Certification preferred.
- Ability to communicate effectively with staff, patients, patient-families, and the public.

Please e-mail your resume with salary history to: jwilliquette@crchealth.com; fax: 920.733.4796
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DOOR COUNTY WISCONSIN: Our group is seeking BC/BP emergency physician or FP/IM physician with two years ED or 1,500 hours experience, to join our practice. Outstanding compensation, benefits and retirement package with a distributed ownership structure. Opportunity to explore medical information systems, preventive and occupational health as well as traditional clinical leadership roles. Community is located on Lake Michigan provide outdoor activities, great neighborhoods and schools. Please direct inquiries to Mary Schwei, e-mail: mschwei@infinityhealthcare.com, Infinity HealthCare, Inc. 1035 W. Glen Oaks Ln, Ste 101 Mequon, WI 53092, 888.442.3883, fax 414.290.6781.

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INTERNAL MEDICINE—The Medical College of Wisconsin is seeking highly motivated BC/BE Internists to join our primary care practice. Our mission is to provide patient-centered, state-of-the-art, cost-effective patient services in our on-campus and nearby clinics. Responsibilities include clinical practice in primary care with an opportunity to teach medical students and residents. Base salary with incentive compensation and excellent benefits. Wisconsin medical license required prior to start. Mail cover letter and CV to: Mark Lodes, MD, Director or Deborah Fears, Administrator, Primary Care Initiative, Medical College of Wisconsin, 9200 W Wisconsin Ave, Milwaukee, WI 53226; phone 414.805.5589; fax 414.805.5544. An Equal Opportunity Affirmative Action Employer M/F/D/V.

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