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Official publication of the Wisconsin Medical Society

Breaking the addiction:

Wisconsin cessation programs help patients end tobacco dependence

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COVER THEME
Breaking the addiction: Wisconsin cessation programs help patients end tobacco dependence

Since the launch of the Wisconsin Cessation Outreach Program 10 years ago, smoking rates in Wisconsin have declined nearly 20%. This issue of the *Wisconsin Medical Journal* includes 2 papers that look both at the program's success and the effectiveness of one of its initiatives, the Wisconsin Tobacco Quit Line.

Cover design by Mary Kay Adams-Edgette.

The mission of the *Wisconsin Medical Journal* is to provide a vehicle for professional communication and continuing education of Wisconsin physicians.

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IT'S NOT TOO LATE TO REGISTER!

Kim Peek 1951-2009

Darold Treffert, MD

April 10, 2008 was a very happy event for both the Wisconsin Medical Society (Society) and the Wisconsin Medical Society Foundation (Foundation). Father and son, Fran and Kim Peek, who "share the same shadow" according to Kim, shared that remarkable, bonded image with those attending the annual Foundation dinner. Kim never forgets anything. And I am certain those in attendance will never forget Kim.

December 19, 2009, on the other hand, was a very unhappy day. I received a phone call around dinnertime from Fran who told me Kim had died suddenly of a heart attack earlier that afternoon. We lost a friend that day. I say "we" because Kim and Fran so enjoyed their time with Society members and their significant others that April evening and had hoped to return someday to a place at which they felt so warmly welcomed.

Kim Peek was, and remains, the Mount Everest of memory. Other accounts have told of some other "memory giants" in the past. I am familiar with all of them, but none can match Kim's factual memory—so deep and seemingly without limit—and I doubt any in the future will rival that astounding capacity either. Kim's data bank of 15 areas of expertise—history, geography, space exploration, the Bible, sports, area codes, ZIP codes, maps, to name only a few—will remain, I am convinced, unsurpassed. Moreover, unlike so many memory giants of the past whose memories were "without reckoning," in recent years Kim had become a living Google™, linking all those facts with astonishing rapidity and in ways that sometimes took me a day or 2 to find out what the connection was. But there always was a connection. Kim was simply ahead of me with those associations, puns, and witticisms.

Photo copyright of, and supplied by, Salinas Valley Memorial Healthcare System, California/Photographer: Richard Green.

Kim Peek pictured in the classic Buick from the movie *Rain Man.* Peek was the inspiration for screenwriter Barry Morrow's 1988 Oscar-winning movie.

I got to know Kim when our paths crossed around the movie *Rain Man.* Kim was the inspiration for that excellent film; I had the opportunity to be a technical consultant to the movie. My first contact with Kim was a phone call. Kim asked my birth date and told me it was a Sunday, the evening of President Roosevelt's first fireside chat. I didn't know that. Then he proceeded to tell me the date and day of the week I would turn 65 and could retire. Next came my ZIP code, area code, television stations from Green Bay and Milwaukee broadcasting to our area, which phone company served this area; recent Packer game scores, and the day, temperature, and final score of the ice bowl game (at which I nearly did freeze to death). Then I learned more than I ever knew before about the Stockbridge and other American Indian tribes in the area, the Niagara Escarpment on which our house rests, and some political history of the progressive movement in Wisconsin, including exactly who my senators and representatives were.

My initial interest in Kim had to do with savant syndrome, of which

Doctor Treffert, past-president of the Wisconsin Medical Society and psychiatrist at St. Agnes Hospital in Fond du Lac, Wisconsin, has studied savant syndrome for years. He is the author of the book, *Extraordinary People: Understanding the Savant Syndrome,* which chronicles case studies of savant syndrome patients.

he was such a spectacular example. In spite of extensive central nervous system (CNS) damage from the time of birth, including an encephalocele and absent corpus callosum, Kim had one of the most extraordinary brain capacities I have ever encountered. Kim had memorized—yes, memorized—literally thousands of books. He did so with amazing rapidity, scanning paperback size books with 1 eye reading 1 page and the other eye reading the adjacent page—simultaneously. Then that material would go to his hard drive for storage. I kept waiting for the "disk full" message to come up, but it never did.

Fortunately, we have retained some detailed imaging studies of Kim—computed tomography, magnetic resonance imaging (MRI), functional MRI, diffusion tensor imaging—that we can use to compare and contrast his brain imaging to others in the future. And we have neuropsychological profiles and other studies preserved as well. From those we can learn more about savant syndrome through the unique window into the brain that savant syndrome—and particularly Kim Peek as a prodigious savant—provides.

But as startling as Kim's skills and abilities were, and as revealing as our glimpses into his brain will be for future research, neither of those are what I will remember most about Kim.

What I have learned about circuits in the brain from Kim is dwarfed by what I learned from Kim and Fran about matters of the heart. Fran was told to put Kim in an institution. Another doctor suggested a lobotomy. But the family would have none of that. They loved him, nurtured him, celebrated his abilities, worked around his disabilities, and nourished those "islands of intactness" that eventually allowed his "islands of genius" to surface and prosper. Yes, they cared *for* him. But they unconditionally cared *about* him as well. What a wonderful role model they have provided for so many other families who have been visited by disabilities. And it is a role model for us as physicians as well—caring about our patients as we care for them.

After Kim's death, I put a note on the savant syndrome website (which the Society has kindly sponsored all these years) that anyone who wished to send a note of condolence to Fran could do so, and I would send it on to Fran. Fran doesn't do e-mail. Hundreds of notes, from all over the world came flowing forth—from parents of disabled children, from disabled persons themselves, from students who were touched by the presentation in their schools (some of whom are going into neuroscience now), from teachers, from therapists, and from just plain folks who were so touched by Kim and Fran during their nearly 3-million-mile journey to share their story, and their shadow. Running through that cascade of appreciative notes, variously written, was really a single word—*inspiration*.

That's the same word I would use for how Fran and Kim left us that April evening—inspired.

And that's how Kim has left me. Touched and inspired. Kim was more than an interesting case of savant syndrome to me—Kim and Fran became my friends. That happens with our "patients" sometimes.

Kim went home for Christmas. As I told Fran when I spoke to him the next day, as I looked up in the sky that December night he called me, there was a new star shining brightly, differently shaped than all the rest. But as I looked up I remembered the words Kim said so often: "We are all different. You don't have to be handicapped to be different. Treat other people like you would like to be treated and the world will be a better place."

One of the condolence messages came from China. I can't read Chinese so I had my computer translate it, somewhat awkwardly, for me. It said "Kim Peek, will live in our heart forever. Thank Fran."

Indeed Kim will live in our hearts forever. And indeed, thank you Fran.

Tobacco, hypertension, and the environment…and a request for reviewers

John J. Frey, III, MD
Medical Editor, Wisconsin Medical Journal

This issue of the *Wisconsin Medical Journal* highlights 2 reports from one of the State's – and the country's – leading programs on community- and practice-based smoking cessation. These reports show how hard progress comes in the campaign to change behavior but also show a record of accomplishment of which the State and clinicians should be proud.

Most of us in primary care know that simply raising questions to our patients about their willingness to stop smoking, if it is done with understanding and a non-judgmental quality, will move many to consider or in fact stop. What the research on the use of a fax referral to the Wisconsin Quit Line demonstrates is that our personal interest will increase the likelihood of referred patients to stop smoking rather than leaving it up to patients themselves (The Wisconsin Tobacco Quit Line's Fax to Quit Program: Participant Satisfaction and Effectiveness. *WMJ.* 2010;109[2]:79-84). Having someone who will help us, in the course of a busy and complex practice setting, work with our patients on smoking cessation is a great relief. It moves primary care clinicians from being initiators to supporters of behavioral change.

One fact in the discussion of the UW's Center for Tobacco Research and Intervention's (CTRI) decade of experience (A Decade of Experience Promoting the Clinical Treatment of Tobacco Dependence in Wisconsin. *WMJ.* 2010;109[2]:71-78) that stands out is that their Wisconsin Quitline programs received over 50% of their contacts from patients on Medicaid. Research has shown repeatedly that lower income adults smoke at a higher rate than those from higher incomes. Quitline is a source for help for those who need it most. No one group should take credit for the decrease in smoking in the state over the past 20 years, but a personal resource for those most at risk has to have played an important part in the process.

Hypertension control is where the real risk management "money" is in chronic disease care, yet the US doesn't do well.[1] The Veterans Administration has been a leader in innovative primary care approaches, and the article by Hayes and colleagues (Preliminary Description of the Feasibility of Using Peer Leaders to Encourage Hypertension Self-Management. *WMJ.* 2010;109[2]:85-90) discusses a program using volunteer Veterans with hypertension as advocates within the population of patients with hypertension. As the authors note, many community practices and health systems could learn, again from the VA, about a method of outreach from patients themselves as an adjunct to office-based practice.

With winter almost over, could ticks be far behind? Aside from the usual suspects, Johnson and colleagues (Tickborne Powassan Virus Infections Among Wisconsin Residents. *WMJ.* 2010;109[2]91-97) describe a rare but serious encephalitis caused by Powassan Virus that should caution us to be mindful of yet more dangers that lurk in the woods and fields (Infectious Disease and Cancer. *WMJ.* 2010;109[2]: 66-69) describes the growing awareness of the relationship between viruses and cancer. While virus exposure can't be avoided, the issue of possible vaccines against cancers becomes possible with the research into the virus-cancer link.

Finally, a journal is only as good as what it publishes, and what it publishes is only as good as its reviewers and the timeliness and quality of the reviews. As one of the few indexed online state medical journals, the *Wisconsin Medical Journal* holds a special position in the world of general and regional journals. But we need those of you who are willing to help the process to let us know that you would like to be a reviewer. It is easy. For more information, visit www.wisconsinmedicalsociety.org/wmj or e-mail wmj@wismed.org and let us know your general areas of interest and how frequently you would be willing to review. Thanks ahead of time.

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Wisconsin Medical Journal

CALL FOR PAPERS, REVIEWERS

The *Wisconsin Medical Journal* is a peer-reviewed, indexed scientific journal published 6 times a year by the Wisconsin Medical Society (Society). The *Journal's* mission is to provide a vehicle for professional communication and continuing education to its readers—the Society's 12,000 members, as well as physicians and other health care professionals from around the country and even the world who access the *Journal* electronically. It is available in full text online through the Society's website and is linked to PubMed through the National Library of Medicine.

The *Journal* invites original research, case reports, review articles and essays about medical issues relevant to readers. Accepted manuscripts are published on a space-available basis. Submission guidelines are posted on the Society's website at www.wisconsinmedicalsociety.org/wmj in the "For Authors" section.

The *Journal* also seeks physicians to add to our list of highly qualified reviewers who can be objective, insightful, and respond in a timely manner. Reviewers receive manuscripts electronically and are asked to complete their review within 3 weeks. Interested physicians should e-mail their name, contact information including preferred e-mail address, specialty including at least 3 areas of expertise or interest, and the frequency they are willing to serve as reviewers to wmj@wismed.org. Manuscript review is an important collegial act and is essential to the integrity of the *Journal*.

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Susan L Turney, MD, MS, FACP, FACMPE

Guest Editorial

WHITEC to provide technical resources for Wisconsin practices implementing EHRs

Susan L. Turney, MD, MS, FACP, FACMPE

Just the thought of implementing an electronic health record (EHR) system can be overwhelming. After all, we became physicians because we wanted to take care of people, right? For many of us, sitting in front of a computer wasn't part of the picture.

But EHRs are here, and a 2007 survey by the Medical Group Management Association revealed that most of those who had implemented EHRs wouldn't go back. In fact one respondent said, "After 3 years on EHR, I would never go back to paper charts. It's a daunting project, but well worth the time and effort."[1]

Why? The benefits of going paperless can be significant, ultimately resulting in increased quality and efficiency and lower costs. At the same time, the process can be complex, costly, and time-consuming. It may take from 6 months to 2 years to move from the planning stage to becoming fully operational, and many practices don't have the necessary resources to work through that process. So over the past year, the Wisconsin Medical Society has offered programs and resources to assist practices with the EHR selection and implementation process, as well as the use of data for quality improvement and patient outcomes.

Then in February, the Society was 1 of 5 members of a consortium awarded a 4-year, $9.125 million federal grant, funded under the American Recovery and Reinvestment Act of 2009, for the operation of the Wisconsin Health Information Technology Extension Center (WHITEC). Other consortium members are the Wisconsin Primary Health Care Association, the Wisconsin Hospital Association, the Rural Wisconsin Health Cooperative and MetaStar, Inc.

WHITEC will provide an array of services designed to provide education, outreach and technical assistance to Wisconsin physicians, physician assistants and nurse practitioners to select, implement or improve the use of their EHR with the goal of becoming a "meaningful user" of their system. The general requirements of meaningful use include the following:

- using a "certified" system that allows for information exchange.
- the ability to report clinical quality data and other reporting measures.
- e-prescribing as appropriate.

Achieving these goals through EHRs will allow eligible providers to receive incentive payments from Medicare and Medicaid beginning in 2011. Although the definition of meaningful use won't be finalized until later this spring, it's already clear that if the criteria are met, incentives can add up, perhaps even offsetting the cost of the EHR as well as providing additional savings through increased efficiency. The maximum incentive available per provider is $44,000 for Medicare and $63,750 for Medicaid.

The time to begin a thoughtful selection process and implementation is now. Rushing can lead to poor decisions that won't work over the long-term; and starting in 2015, providers not actively using a certified EHR in compliance with the meaningful use definition will be subject to financial penalty.

WHITEC services will be available for a fee to all providers practicing in Wisconsin, and financial subsidies will be available the first 2 years to "priority primary care providers" who are defined as:

- physicians and other health care professionals with prescribing privileges in practices of 10 or less providers.

continued on page 113

For more about WHITEC

WHITEC website:
www.whitec.org

Health IT website:
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Susan L Turney, MD, MS, FACP, FACMPE, is the Chief Executive Officer and Executive Vice President of the Wisconsin Medical Society. WHITEC is funded through a cooperative agreement award from the Office of the National Coordinator, Department of Health and Human Services. Award No.90RC0011/01

Infectious Disease and Cancer

Joseph J. Mazza, MD, MACP

Abstract

With the recent advances in molecular biology and genetics over the past several decades, we have gradually uncovered the elusive cause of some of the malignant diseases that have been, and continue to be, a major factor in human mortality. Infectious disease agents, so ubiquitous in our environment, have now become the most credible link in our search for the cause of cancer. The number of malignancies associated with specific infectious disease agents continues to grow and now represents approximately 20% of all cancers. This perspective represents a brief summary of those cancers that have been associated with or caused by infectious disease agents. Hopefully, knowledge of this relationship can be translated into more effective means of treatment.

• • •

Infection from a variety of microorganisms must be considered as an important risk factor for cancer in humans; it is postulated that approximately 20% of cancers worldwide are linked to viruses, bacteria, and parasites.[1] Infectious disease agents are now recognized as a factor contributing to the cause of many chronic illnesses and may play an important role in malignant diseases. As we have continued to explore this possibility with recent molecular and genetic technology, ample data have become available that support the concept of viral agents being incorporated into the human genome, altering its composition and affecting its functioning genes and their products.

Viral nucleotide sequences discovered in the human genome have been inherited or passed on from lower species and preserved through the eons of the evolutionary process and may play an important beneficial (protective) role in host survival, constituting a necessary symbiotic relationship.[2-4] However, these incorporations may result in alterations of genes that encode for factors related to cell proliferation, differentiation, and transition from normal to abnormal, with the potential of becoming a malignant clone and destroying the host. Examples of these end results can be seen in the integration of human T-cell lymphotropic virus (HTLV) I & II into the human genome that lead to malignant proliferation and demise of the host (Table 1). Although the pathogenesis of malignant transformation is not completely understood and is likely a multistep process, infectious disease agents must be considered as possible initiating events in this process or a later promoting factor causing mutational alternations of a protoncogene.

Additionally, viruses and bacteria may also play an important role in the occurrence of malignancy by

Table 1. Examples of Infectious Disease Agents Linked to or Associated with Various Cancers

Infectious Agent	Disease
The Epstein-Barr virus (EBV) [5-17]	Non-Hodgkin's lymphoma
	Hodgkin's disease
	Burkitt's lymphoma (African)
	Nasopharyngeal carcinoma
Helicobacter pylori[18-21]	Lymphoma of the stomach (marginal-zone of mucosa associated lymphoid tissue type [MALT])
Campylobacter jejuni[22-23]	Lymphoma of the small intestine
Borrelia Burgdorferi[24-25]	Lymphoma (marginal-zone B-cell)
Simian virus 40[26-27]	Non-Hodgkin's lymphoma
Papilloma virus[28-31]	Cancer of the cervix
	Cancer of the anogenital region
Herpes virus-VIII[32-35]	Kaposi's sarcoma
	Multiple myeloma
HTLV-I & II[36-37]	Adult T-Cell Lymphocytic Leukemia/Lymphoma
Hepatitis B virus[38-39]	Hepatocellular carcinoma
Hepatitis C virus (HCV)[40-41]	Hepatocellular carcinoma
	Splenic lymphoma with villous lymphocytes
Cytomegalovirus (CMV)[42]	Glioblastoma of the central nervous system
Xenotropic murine leukemia virus-related virus (XMRV)[43-44]	Familial prostate cancer

HTLV, human T-cell lymphotropic virus

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altering the microenvironment of the infected tissue, allowing normal host cells/tissue to transition into a malignant clone with unchecked proliferation and invasive capability. These environmental changes are often associated with a chronic illness and may persist for years before a malignant clone arises from the milieu of infected cells.

Recently, we have come to appreciate the rapidly expanding spectrum of genetic abnormalities, eg, the array of translocations and deletions seen in patients with myelodysplasia, leukemia, lymphomas, and other malignant tumors. Conceivably, these cytogenetic abnormalities that result in abnormal gene products may be the result of viral genome sequences that have been incorporated into and/or damaged the deoxyribonucleic acid (DNA) of the host's genome, leading to or initiating the evolution of an abnormal or malignant clone. The gene products from these altered genes are believed to be important cytokines and growth factors that are over-expressed and provide the microenvironment necessary for abnormal clonal transformation, ie, metaplasia and proliferation. Some examples of these products that influence clonal proliferation include tyrosine kinases that act as growth factors of hematopoietic cells, interleukin 6 that appears to be a growth factor for myeloma cell, etc (Table 1).

Unrepaired alterations to the DNA are essential first steps in the process of malignant transformation and can result from over expression of certain genes causing inactivation of important suppressor genes that guard against the development of this transformation, cell proliferation, and clonal expansion.

Over the past several decades, molecular and genetic technology (ie, microarray, gene mining of the human genome, epigenetics, comparative genomics, etc) have provided tools and methods of detecting nucleotide sequences that are genetic representatives of a viral genome.

Exploitation of polymerase chain reaction (PCR) has provided a sensitive and accurate means to detect viral sequences that perhaps are contributing factors in the development of various cancers. In addition, extensive catalogs of gene sequences or genetic probes of infectious agents have been commercialized and made available to investigators throughout the world. Microarray plates containing numerous nucleotide sequences for genetic probes have been developed and are being used to detect the presence of microorganisms in various tissues from individuals suffering from a variety of chronic illnesses. The microarray technique allows the investigator to make available thousands of these genetic probes on a small microcompartmentalized plate on which the genetic information from an infected cell can bind to a complimentary genetic probe on the plate.

Summary

Viruses that can incorporate themselves into our genome, bacteria that cause chronic infection, and microorganisms that alter the microenvironment of tissues appear to play an important role in the evolution of malignant clones of cells and have been implicated in a number of cancers—the list continues to grow. The frequency of papilloma virus found in cervical cancer, one of the most frequently occurring cancers in women, the Epstein Barr Virus occurring in Burkitt's Lymphoma (African), and the association of Hepatitis C virus with hepatocellular cancer are a testament to a cause and effect relationship of these agents. Although a direct cause-and-effect relationship cannot be made for most of these agents, circumstantial evidence has enhanced our quest to better understand this transformation via DNA alteration and gene function resulting from host infections. The role of cytokines, growth factors, tumor suppressor genes, genetic mutations, deletions, and hyper- and hypodiploidy all are part of the complex network that has been implicated in this biological process leading to cancer. Additionally, external environmental factors, as inducers of genetic alterations leading to a microenvironment conducive to metaplasia and the proliferation of a malignant clone, also remain prime suspects. Hopefully, with a deeper understanding of these factors, opportunities will continue to emerge that will lead to therapeutic interventions that target important components of this process.

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WISCONSIN MEDICAL JOURNAL

A Decade of Experience Promoting the Clinical Treatment of Tobacco Dependence in Wisconsin

Lezli A. Redmond, MPH; Robert Adsit, MEd; Kathleen H. Kobinsky, MPH, CHES; Wendy Theobald, PhD; Michael C. Fiore, MD, MPH, MBA

ABSTRACT

Background: The University of Wisconsin Center for Tobacco Research and Intervention (UW-CTRI) is the designated lead agency at the University of Wisconsin-Madison charged with the responsibility of reducing the harms from tobacco use in Wisconsin and beyond. In 2000, the UW-CTRI, with funding from the state of Wisconsin, launched a population-wide effort—the Wisconsin Cessation Outreach Program (Program)—to increase the availability and use of evidence-based clinical treatments for tobacco dependence. This paper describes the Program's strategies, outcomes, and impact on the clinical treatment of tobacco dependence in Wisconsin.

Program Strategies: The Program was designed to change the standard of health care in Wisconsin, so that primary care professionals, and the health systems in which they work, universally identified and intervened with tobacco users. Five primary strategies were used to accomplish its goal: (1) deliver clinic-based and Web-based training and technical assistance for clinicians, including free continuing medical education (CME); (2) provide technical assistance to accomplish health systems' change to support the routine provision of tobacco-dependence treatment; (3) include evidence-based cessation treatment as a covered insurance benefit and reduce other barriers to cessation treatment such as co-pays; (4) provide telephonic tobacco cessation quit line services to all state residents and integrate it with routine medical services; and (5) reduce tobacco-related disparities by increasing access to and use of evidence-based treatment by priority populations.

Outcomes: In the 10 years since the Program was initiated, progress has been achieved in a number of tobacco use parameters in Wisconsin, including higher rates of Wisconsin smokers making a quit attempt; increased insurance coverage for cessation counseling and medications; higher rates of discussion of cessation treatment options by clinicians; and integration of the Wisconsin Tobacco Quit Line (WTQL) into routine primary care, with almost 100,000 Wisconsin smokers using the WTQL. Nearly half of all WTQL callers were uninsured or Medicaid enrollees. Additionally, smoking rates in Wisconsin have fallen by almost 20% during this period, from about 24% of all adults in 2000 to <20% today.

BACKGROUND

In 2000, nearly 1 million Wisconsin adult residents (24.1%) were smokers—slightly higher than the national average (23.2%) at that time.[1] Among pregnant women in the state, 16.5% smoked during pregnancy, compared to the 2000 national rate of 12.2%.[2] In contrast to others states, such as California, that had invested in substantial tobacco control efforts and had observed substantial declines in their rates of tobacco use,[3] Wisconsin invested minimally in tobacco control prior to 2000, and Wisconsin's adult tobacco use rate had remained stagnant—around 24%—for a number of years. In 2000, Wisconsin initiated a comprehensive tobacco control program funded by the Master Settlement Agreement between the tobacco industry and the participating states.[4] The Wisconsin Department of Health Services (DHS) contracted with UW-CTRI to provide statewide comprehensive cessation services to ensure that any tobacco user who wanted help quitting would be able to readily access such treatment.

Figure 1 describes the activities of the Wisconsin

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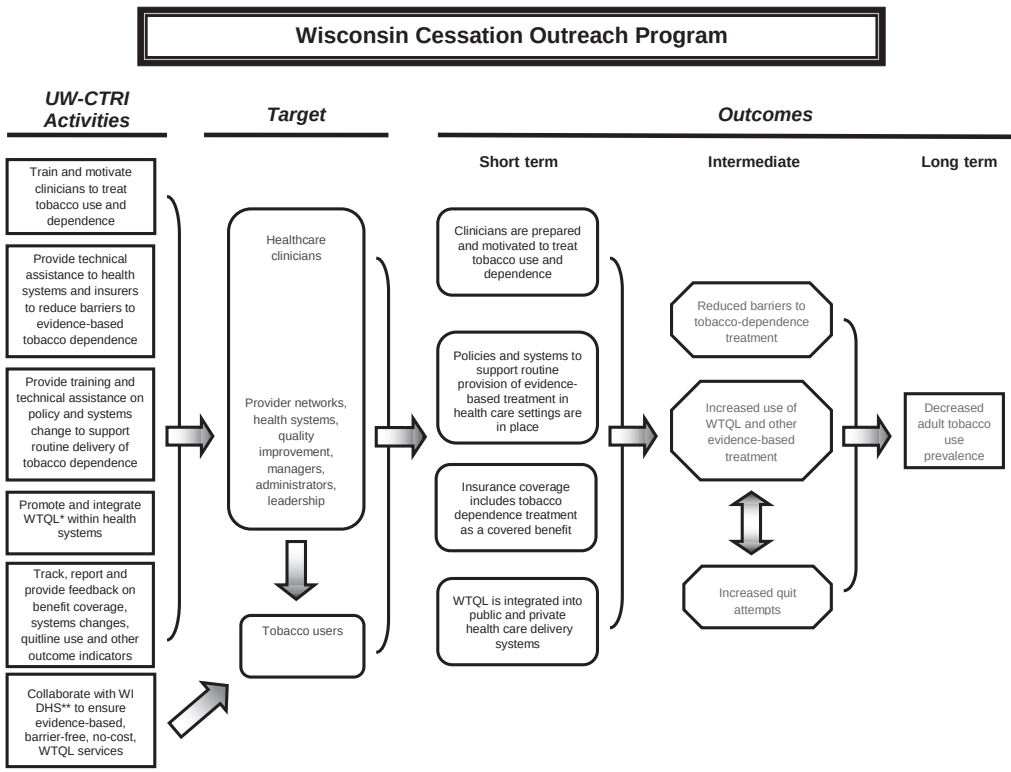

Figure 1. The activities, targets, and outcomes of the Wisconsin Cessation Outreach Program (2000-2010). Abbreviations: DHS, Department of Health Services; WTQL, Wisconsin Tobacco Quit Line.

Cessation Outreach Program (Program), its targeted audiences, and its intended outcomes. Central to all aspects of the Program was an emphasis on employing evidence-based strategies such as academic detailing, promoting free and convenient continuing medical education (CME), and tailoring technical assistance to integrate systems change so that tobacco users are universally identified and provided evidence-based treatment options.[5-7] To facilitate delivery of face-to-face academic detailing and development of long-term partnerships, the Program's team of 6 outreach specialists were housed across Wisconsin in Green Bay, Milwaukee, Rhinelander, Eau Claire, and Madison. They were assigned to the primary care clinics, hospitals, health systems, insurers, and purchasers in their regions.

All Program activities are based on a powerful scientific evidence base including best-practice recommendations as described in *The Guide to Community Preventive Services*,[8] *CDC Best Practices for Comprehensive Tobacco Control Programs (2000 and 2007)*,[9] and the Public Health Services (PHS) Clinical Practice Guideline *Treating Tobacco Use and Dependence*[10] and its 2008 update.[11]

Building on this evidence base, the Program assisted primary care health care systems across the state in implementing an algorithm for the treatment of tobacco dependence. This treatment algorithm, described in the 2008 United States PHS Clinical Practice Guideline *Treating Tobacco Use and Dependence*,[11] is referred to as the "5As." Because tobacco dependence is a *chronic condition* that often requires repeated intervention, the PHS Guideline recommends that the 5As *(Ask, Advise, Assess, Assist, and Arrange)* be implemented for every patient who uses tobacco at every clinic visit. (See Figure 2.) The overarching goal of the PHS Guideline recommendations is that clinicians consistently recommend the use of effective tobacco dependence counseling and medication treatments to their patients who use tobacco, and that health systems, insurers, and purchasers assist clinicians in making such effective treatments readily available. Through the evidence-based strategies described below, the UW-CTRI's Program worked to achieve this overarching goal.

PROGRAM STRATEGIES

To achieve its goal of ensuring that smokers across Wisconsin, including those visiting primary health care settings, are identified and offered evidence-based treatments to help them quit, the Program implemented 5 core strategies over the last decade.

The Program's first core strategy is to deliver clinic-based and Web-based training and technical assistance

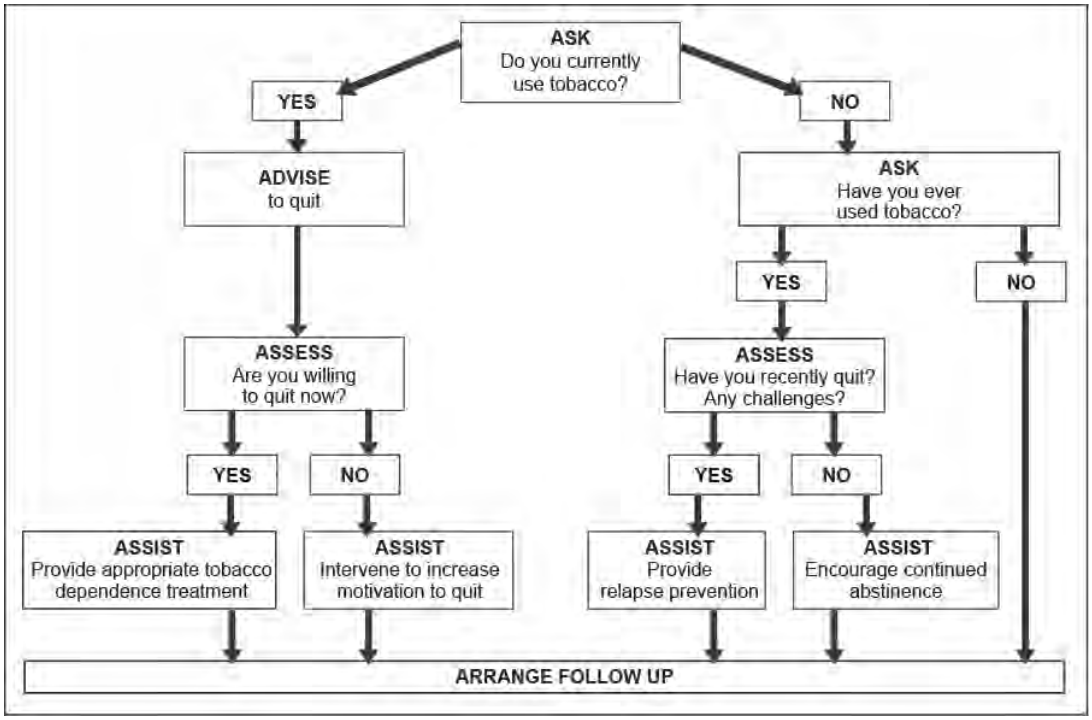

Figure 2. The 5As Tobacco Dependence Treatment Algorithm of the United States Public Health Service[11] as disseminated by the Wisconsin Cessation Outreach Program.

for clinicians, including free CME. On-site visits by Program outreach specialists include in-depth education on US Food and Drug Administration (FDA)-approved tobacco cessation medications (including how to prescribe them safely and effectively); training and practice on brief intervention and counseling strategies including motivational interviewing techniques; education about tobacco dependence as a chronic disease; and specific guidance about delivering treatments to populations of particular concern, including pregnant women, teens, racial and ethnic minorities, and those with mental health and alcohol and other drug abuse (AODA) diagnoses. Free CME has been available and can be delivered either in-person by outreach specialists or accessed electronically. The Program has developed a number of training and other supportive materials for clinicians and health systems including videos, fact sheets, targeted print materials, and case studies. One aspect of the outreach specialist's technical assistance is to provide clinicians with instructions on how to access the materials and use them effectively. All of these materials are public and available free of charge on the UW-CTRI website: www.ctri.wisc.edu.

The second Program strategy is to provide technical assistance to accomplish health systems' change to support the routine provision of tobacco dependence treatment. A large body of research has documented that training individual health care clinicians is necessary, but not sufficient, to achieve integration of tobacco dependence treatments into health care delivery.[11] This research has documented that enduring change requires the collaboration and effort of all stakeholders, including health care systems.[12-13] A 2007 Institute of Medicine (IOM) report[14] emphasizes the importance of systems integration to maximize the effectiveness of tobacco treatment interventions. Systems integration was listed as the "single most critical missing ingredient needed to maximize the yet unrealized potential to significantly increase population cessation rates."[14] Since 2000, the Program has worked with clinics and systems to institute feasible and enduring system changes designed to institutionalize evidence-based tobacco dependence treatment interventions for every patient at every primary care health care visit.

The third Program strategy is to include evidence-based cessation treatment as a covered insurance benefit and reduce other insurance barriers to cessation treatment, such as co-pays. One essential component for increasing access to tobacco dependence treatment is that health insurers must provide coverage for evidence-based tobacco dependence treatments. Toward this goal, the Program has conducted direct outreach to insurers over the last decade. Specifically, the Program provides detailed information for insurers regarding return on

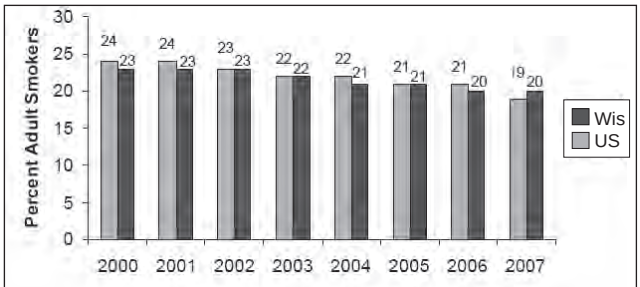

Figure 3. The rate of smoking among adults in Wisconsin and the United States, 2000-2007.

investment for tobacco dependence treatment services, model benefit language, and updating their formularies to reflect FDA-recommended treatments for tobacco dependence. The Program has tracked insurance coverage for tobacco dependence treatments in Wisconsin since 2002. This tracking has assessed benefit coverage for evidence-based cessation pharmacotherapy, counseling by each insurer, and additional factors impacting use of these benefits such as co-pays, the existence of company benefit plans based on the PHS Guideline, incentives offered to members to use the services, and barriers faced by the health plans themselves. Periodically, survey results are shared with all insurers in the state to provide relative rates of insurance coverage for tobacco dependence treatments.

The fourth Program strategy is to provide telephonic tobacco cessation quitline services to all state residents. To do this, the Program initiated and has managed the Wisconsin Tobacco Quit Line (WTQL), which provides free, proactive telephone counseling services for all Wisconsin residents. A large body of evidence has identified proactive telephone quitlines as an effective treatment for tobacco dependence.[11] WTQL coaches work one-on-one with tobacco users, health care professionals, and proxy callers (calling on behalf of a tobacco user) to provide confidential, tailored assistance with quitting tobacco or helping others to quit. Since 2007, callers also have been provided with a starter kit that includes free medications and self-help materials; a website that allows callers to build their quit plan and interact with quit coaches and peers in discussion forums (Web Coach); referrals to local quit-tobacco programs (where available); and information for family, friends, and others concerned about a tobacco user.

Outreach specialists include information about the WTQL in their education and technical assistance, framing it as a treatment extender for busy clinicians. The WTQL also serves as a central repository for the state because UW-CTRI collects information about local cessation resources and programs that the WTQL uses as a referral resource. Clinicians need remember only 1 resource that delivers evidence-based tobacco-dependence treatment, but also refers patients to local programs and resources for additional support in quitting. Another attractive feature of the WTQL is the "Fax to Quit" program. Fax to Quit was designed to link health systems, clinicians and tobacco users seamlessly with the WTQL. When a patient presents for a regular health care visit, is identified as a smoker, and is willing to make a quit attempt, the clinician simply faxes patient contact information and consent directly to the WTQL. Within 72 hours, a WTQL counselor proactively calls the patient to enroll him or her in treatment services. Clinicians still are responsible for urging the patient to quit, helping him or her set a quit date, and recommending 1 of the 7 FDA-approved medications. But these clinicians can now count on the WTQL to provide additional counseling and follow-up. Fax to Quit links smokers visiting clinics to the WTQL and facilitates convenient access to evidence-based counseling, then provides follow-up information to the referring clinician.

The Program's fifth strategy is to reduce tobacco-related disparities and increase access to and use of evidence-based treatment by priority populations. A key Program priority has been to partner with and serve health care settings that treat high numbers of smokers, such as federally qualified health care centers, free clinics, and tribal clinics. In addition, a number of special programs have focused on priority populations, including senior citizens (Senior Patch Program), pregnant women (a component of the Wisconsin Women's Health Foundation First Breath Program), military personnel and veterans (Operation Quit Tobacco), low-income parents (Healthy Air for Kids), and Medicaid enrollees (Medicaid Covers It).

PROGRAM OUTCOMES

Delivering Training and Technical Assistance

UW-CTRI outreach specialists have provided on-site training and technical assistance to more than half of the 900 primary care clinics in Wisconsin over the last decade, plus hundreds of other outpatient, public health, and hospital settings. Since 2000, UW-CTRI outreach specialists have delivered more than 5000 hours of free training and technical assistance to approximately 10,000 clinicians and others.

The UW-CTRI website, managed by the Center's Communication Office, is extremely popular with both clinician and lay audiences and is frequently cited as one of the world's leading sites for information on

treating tobacco dependence. In 2009, this website (www.ctri.wisc.edu) had more than 2 million hits. Many regular users of the website are staff from Wisconsin health systems.

Through collaboration with the UW Office of Continuing Professional Development (OCPD) and the Wisconsin Nurses Association (WNA), the Program has awarded CME/CE credits to nearly 4000 Wisconsin clinicians through in-person tobacco dependence treatment training provided by the regional outreach specialists in every Wisconsin county. In addition to this in-person training, UW-CTRI's Web-based CME/CE, which is hosted by Medscape (http://cme.medscape.com/viewarticle/583425), offers free CME/CE credits to physicians, pharmacists, and nurses on effectively treating tobacco dependence. Since its implementation in 2002 as part of the Program, it has awarded credits or certificates to more than 25,000 participants.

A primary goal of the outreach specialist is to encourage clinicians to discuss evidence-based tobacco dependence treatment options with their patients. By 2004, Wisconsin had surpassed the national median by 28% in the rate that clinicians discuss treatment options with their patients who smoke, including recommending counseling and/or medication use for tobacco cessation.[15] Another key activity of the outreach specialists is to prompt clinicians to link their patients to the WTQL. Since 2001, 23,000 tobacco users (approximately 20% of the total) contacted the WTQL as a result of a clinician referral, testament to its integration into primary health care across Wisconsin.

Promoting Treatment of Tobacco Dependence

Over the last decade, the Program has worked with 26 Wisconsin health systems to implement recommendations of the 2008 PHS Clinical Practice Guideline *Treating Tobacco Use and Dependence* and to integrate the WTQL into their health systems' workflow. Over the years, the demand for on-site technical assistance on systems change rather than basic tobacco dependence treatment education has grown. Health care professionals are eager to improve consistency, rate, and documentation of tobacco dependence interventions. Outreach specialists help clinics, provider networks, and health systems to establish prompts, effective workflows, and other methods to ensure that these treatments are delivered routinely. Outreach specialists have worked closely with hospitals and health systems in the state including Gundersen Lutheran, Aspirus Wausau Hospital, and Dean Health System to integrate tobacco dependence treatment into their electronic medical records. They continue to provide technical assistance on various system projects to improve clinician performance on tobacco dependence treatment delivery, such as development of quality improvement initiatives and clinician feedback projects.

One indicator of systems integration is the success of WTQL's Fax to Quit program. Since Fax to Quit's inception in 2003, more than 800 clinics and other sites have enrolled, linking their patients directly to the WTQL, and have received training by UW-CTRI Outreach Specialists on how to use the program most effectively. More than 10,000 patients have been referred to WTQL services through Fax to Quit. Several large health systems in Wisconsin, including Dean, Aspirus, Aurora Health Care, and Marshfield Clinic, have integrated Fax to Quit systemwide, making it a priority among clinical services and/or quality initiatives.

Reducing Insurance Barriers to Cessation Treatment

Removing barriers to tobacco dependence treatment is a primary goal of the Program, and increasing insurance coverage for tobacco dependence treatment while eliminating co-pays has been a successful effort. The percent of insured Wisconsin residents with a health plan that covered tobacco cessation medications increased from 68% in 2002 to 88% in 2006.[16] UW-CTRI outreach efforts also contributed to increases in rates of cessation counseling provided. Ninety-four percent of beneficiaries had counseling coverage in 2006, compared to only 42% in 2002.[16]

Providing Telephonic Tobacco Cessation Quit Line Services

Since its inception in 2001, the WTQL (1-800-QUIT-NOW), has fielded a total of over 150,000 calls and provided services to over 110,000 registered callers—95,000 of whom were tobacco users. Almost 30,000 participants who called the Quit Line and received services have also been referred back to local quit-tobacco resources in their communities. Since the free 2-week starter kits of nicotine replacement therapy were made available to WTQL callers in December 2007, nearly 30,000 callers have received free medication. The interactive Web feature, Web Coach, the interactive Web feature launched in October 2007, has enrolled almost 20,000 WTQL participants.

Reducing Tobacco-related Disparities and Increasing Access to Treatment

UW-CTRI's Program has developed fruitful, long-term partnerships in settings that treat large numbers of tobacco users. For example, early on, UW-CTRI was able to furnish most of Wisconsin's federally qualified health centers with free nicotine patches as an incen-

tive for clinicians to intervene more routinely with their patients who smoke. More recently, the Program worked with the Wisconsin Primary Health Care Association on quality improvement projects with several of the qualified health centers to integrate prompts for tobacco dependence treatment into their electronic medical records. Special programs targeted to priority groups resulted in more evidence-based treatment provided to those populations, particularly through the WTQL. Advertising campaigns targeted to reach African Americans, Hispanics, and low-income residents have resulted in increased calls to the Quit Line from these priority groups. African Americans are consistently over-represented among quitline callers compared to their representation among Wisconsin residents overall. The outreach campaign to increase the use of evidence-based tobacco cessation treatment by Medicaid enrollees was highly successful, resulting in greater numbers of enrollees engaging in Quit Line services and receiving stop-smoking medications (P Keller, unpublished data, 2010). Approximately 50% of callers to the WTQL each month are either uninsured or Medicaid enrollees, providing support that the WTQL is unusually effective in reaching underserved and disparate populations.

Long-term Outcomes

Since the Program was launched, the percent of Wisconsin smokers who made a serious quit attempt jumped from 46% in 2003 to 59% in 2008. In contrast, the national rate of quit attempts was 45% in 2008. In 2007, for the first time in Wisconsin's recent history, the state's adult smoking rate fell below 20%. Between 2001 and 2007, the period when the Program was in place, adult tobacco rates decreased from 24% to 19.7% (Figure 3).[17-19]

DISCUSSION

In Wisconsin, nearly 8000 lives are lost each year due to a disease directly caused by tobacco use. Tobacco use continues as the single greatest preventable cause of disease and premature death in our state. More than $1.6 billion in our state is spent on tobacco-related health care annually. These compelling statistics led Wisconsin health officials, in concert with the UW-CTRI, to establish the Program.

Recent policy changes have enhanced the need for cessation services in Wisconsin. In 2008, the Wisconsin cigarette excise tax increased to $1 per pack. In April 2009, a 61-cent federal cigarette tax increase went into effect, followed by an additional 75-cent per pack Wisconsin increase in September 2009. Wisconsin currently has the fifth highest cigarette excise tax rate in the nation at $2.52/pack. In addition, Wisconsin recently passed comprehensive smoke-free worksite legislation that will be implemented in July 2010. As a result of these policy changes, hundreds of thousands of Wisconsin tobacco users are considering quitting, and many will turn to the Program for assistance.

According to the 2008 Behavioral Risk Factor Surveillance System, more than 59% of Wisconsin smokers made a serious quit attempt (lasting ≥24 hours) in the previous year. If this trend continues, >480,000 of the 800,000 current adult smokers in our state will make a quit attempt this year. Given new policies (higher state and federal tobacco taxes and statewide clean indoor air legislation), the number of smokers making quit attempts may be even higher. This provides an unparalleled opportunity to help Wisconsin smokers quit by providing them with access to evidence-based treatments that can boost their quitting success 4-fold.[11] The Program was established in 2000 by the UW-CTRI and Wisconsin to seize this opportunity. Since established, it has succeeded in implementing strategies that have been associated with important tobacco cessation outcomes.

The Program is a nationally recognized model program that demonstrates how states can promote clinical tobacco cessation at the population level. Its components have been replicated broadly in numerous states. A number of factors have contributed to its success. Although access to clinics by outreach staff was somewhat challenging initially, the credibility of the University of Wisconsin School of Medicine and Public Health helped remove that barrier. Presentations at grand rounds by outreach staff across the state introduced many to the Program's services. In addition, the outreach staff presented at professional association meetings and other clinical events and meetings. Gradually, through repeated efforts, and by cultivating on-site "champions," partnerships were established with clinics, hospitals, and health systems across Wisconsin. Providing access to the latest in scientific research, delivering all services free of charge including CME, offering Web-based, on-site and regional training, and ensuring simple access to free resources including the WTQL all were helpful strategies. Training all members of the health care team has been effective. Nurses and physician assistants have been particularly receptive.

Sustainability of Program components at the clinic level has been a consistent goal, yet clinic staff turnover, particularly among medical assistants who play a key role in identifying smoking, has been problematic. And, when a "champion" leaves the clinic, it often results in setbacks. A growing body of evidence demonstrates the

importance of a systems approach designed to institutionalize tobacco dependence treatment as part of routine medical care.[12] The focus of the outreach work has shifted from an emphasis on training individual clinicians in the basics of tobacco dependence treatment to the provision of technical assistance on systems integration of tobacco dependence treatments across the clinic. The transition to electronic medical records (EMRs) has offered new opportunities, and UW-CTRI has worked with clinics, hospitals, and systems to integrate the 5As into their EMRs.

FUTURE DIRECTIONS

Unfortunately as a result of the recent financial crisis in Wisconsin, tobacco control funding was cut in 2009 by 55% overall (from about $15 million per year to about $7 million per year), including an almost 70% cut to the Program. These cuts took place just as the state increased its tobacco excise taxes, borne by smokers, to over $700 million per year. These cuts have had a serious impact on both WTQL services and the capacity of the Program. WTQL counseling services have been reduced from up to 5 coaching calls to just 1. Outreach staffing was reduced from 6 full-time staff to 4 part-time outreach workers. The statewide academic detailing model that has been so effective will be modified to reflect a decrease in staff time and travel dollars. There will be a heightened focus on systems change versus working with individual clinics. Distance learning and the use of new technologies must replace and augment on-site training and technical assistance. These funding cuts are particularly challenging to Wisconsin smokers given the dramatic increases in cigarette excise taxes in Wisconsin over the last 18 months and the upcoming implementation of Smokefree Wisconsin in July 2010.

The Program has been referred to as a shining example of the "Wisconsin Idea," bringing the resources and expertise of the UW-CTRI to clinical partners across the state. It is a powerful example of how to translate "research into practice," disseminating and implementing best practices into routine medical care. The Program has also influenced the UW-CTRI research program, making it more translational and "real world" with the potential for greater and more immediate clinical impact.

CONCLUSION

Established in 2000, The Wisconsin Cessation Outreach Program has delivered tobacco dependence treatment services and training successfully for more than a decade. During that time, more than 10,000 clinicians have been trained in evidence-based tobacco dependence clinical interventions, insurance coverage for evidence-based tobacco dependence treatments has increased substantially, and nearly 100,000 Wisconsin smokers have been provided treatment through the WTQL. These cessation initiatives, part of a statewide comprehensive tobacco control program, have witnessed a decline in adult smoking prevalence in Wisconsin from 24% to 20% over the 10 years they have been in effect. This suggests that comprehensive tobacco control programs—that include population-based, tobacco cessation components—can have substantial impact in reducing the harms from tobacco use.

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The Wisconsin Tobacco Quit Line's Fax to Quit Program: Participant Satisfaction and Effectiveness

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ABSTRACT

Objective: The purpose of this study was to assess the Wisconsin Tobacco Quit Line's (WTQL) clinic-based Fax to Quit (FTQ) provider referral program in terms of participant satisfaction and short-term quit outcomes, and to compare those findings to a non-FTQ provider referral group.

Methods: A sample of 432 WTQL callers completed a telephone survey approximately 3 months after they received WTQL services. Of these, 265 contacted the WTQL based on a clinic referral and served as the basis for analyses. Of these 265, 158 FTQ respondents were compared to 107 non-FTQ respondents in terms of satisfaction with the WTQL as well as quit attempts and tobacco abstinence.

Results: Overall, survey respondents reported high levels of satisfaction with the WTQL (FTQ=96.8%, non-FTQ=92.7%). Other measures of satisfaction (cultural sensitivity, respondent needs and concerns understood) showed similarly high levels of respondent satisfaction for both groups. FTQ respondents reported a statistically significantly higher 30-day abstinence rate (46.8%) compared to non-FTQ respondents (32.7%).

Conclusions: Participants expressed high levels of satisfaction with WTQL services and demonstrated high short-term quit rates. FTQ-referred WTQL users reported higher rates of tobacco cessation than non-FTQ-referred WTQL users. These findings suggest that fax referral has potential to successfully link smokers visiting primary care clinics to the WTQL, an evidence-based cessation option.

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INTRODUCTION

Numerous studies and meta-analyses have shown that telephone quitlines are an effective population-wide strategy to deliver evidence-based tobacco dependence treatments to smokers.[1-4] In addition, the US Public Health Service Clinical Practice Guideline *Treating Tobacco Use and Dependence: 2008 Update* identified quitline counseling as an effective treatment that increased the odds of tobacco abstinence by approximately 60% when compared to minimal counseling, no counseling, or self-help.[5] This body of evidence has influenced all 50 states to provide tobacco cessation quitline services to their residents. Because quitlines require only the availability of a telephone, they have the potential to reach a large proportion of tobacco users, including those of low socioeconomic status and underserved individuals.

Yet the population reach of state-based telephone quitlines has been very low to date.[1,6] A recent national assessment determined that approximately 1% of smokers in the United States call quitlines each year.[7] In response, states have implemented various strategies to increase the reach of evidence-based quitlines including media and marketing efforts, promotions that include the provision of smoking cessation medications with quitline services, and efforts to link the quitline to health care delivery systems.[8] There is a clear need to identify and evaluate strategies that can increase the reach and use of quitlines in a cost-effective way so that this evidence-based treatment can help a greater number of tobacco users quit.

One strategy aimed at providing a sustainable, high-volume referral stream to quitlines is provider-initiated fax referrals from health care settings. Using this strategy, when a provider identifies a tobacco user during a routine health care visit, a mechanism is in place at

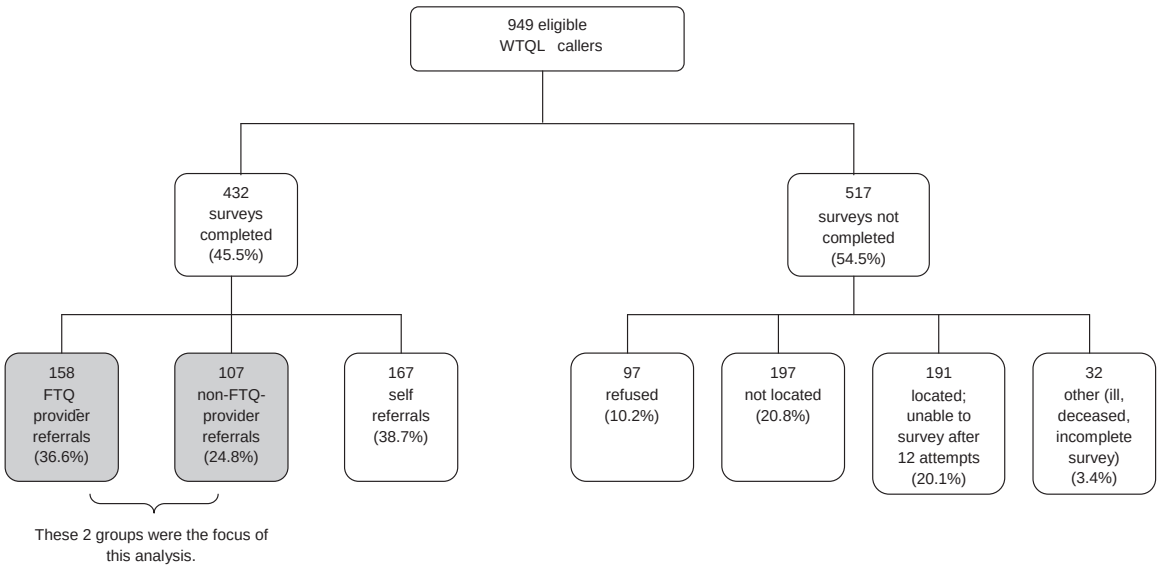

Figure 1. Division of survey sample, respondents, and call disposition. Abbreviations: WTQL, Wisconsin Tobacco Quit Line; FTQ, Fax to Quit.

the clinic to inform these patients of the availability of free quitline tobacco cessation services. The clinic then faxes a request for those services to the state quitline if the patient agrees. Fax referral has rapidly become part of many cessation interventions across the United States—49 of 53 state and territory quitlines now offer fax referrals for healthcare professionals (J. Saul, PhD; North American Quitline Consortium; oral communication; June 2009).

Wisconsin's fax referral program, Fax to Quit (FTQ), has been established at more than 500 clinic sites across the state and has generated over 17,000 fax referrals since 2003. However, this quitline referral strategy has not been formally evaluated. While there is gathering evidence that fax referral programs can serve as an effective tool for increasing quitline referral and enrollments rates,[9-11] research has not yet evaluated participant satisfaction with these programs or the extent to which fax referral influences quit outcomes compared with other quitline methods of entry. The purpose of this study was to assess participant satisfaction and quit rates with Wisconsin Tobacco Quit Line (WTQL) services as a function of 2 methods of entry: FTQ provider referral versus non-FTQ provider referral.

METHODS

Prior users of the WTQL were included in the survey sample if they were tobacco users, received an intervention from a WTQL Quit Coach®, were English speaking, 18 years of age or older, and had a valid phone number in the WTQL database. Of the 949 WTQL callers identified as eligible, 432 completed the telephone survey, resulting in an overall 45.5% completion rate. Among the 517 WTQL users who did not complete the survey, 97 (10.2%) refused, 197 (20.8%) were not locatable, 191 (20.1%) were located but did not complete the survey after 12 attempted calls, and 32 (3.4%) did not complete the survey due to death, illness, or failure to complete the entire survey (Figure 1).

Since its inception on May 1, 2001, the WTQL, 1-800-QUIT-NOW, has fielded more than 150,000 calls and provided free, telephone-based tobacco treatment services to nearly 100,000 tobacco users. Tobacco users who call the WTQL have an array of service options: one-on-one counseling calls with a Quit Coach; Web Coach™—a secure, interactive, Web-based program with discussion forums; a free 2-week starter kit of over-the-counter nicotine replacement therapy (NRT); printed self-help materials; and referrals to local quit-tobacco resources (where available). Most callers take advantage of multiple options to help them quit (unpublished WTQL data, 2009).

Residents can access the WTQL through 3 referral methods: non-FTQ provider referral, FTQ provider referral, or self referral. The WTQL, as part of standard baseline data collection for all new callers, asks callers how they accessed the WTQL and provides that information to the state as part of a monthly WTQL utilization report. Self-referred tobacco users call the WTQL number on their own, often as a result of advertising, other promotions, or free publicity about the WTQL (unpublished WTQL data, 2009). Provider-based refer-

rals (both non-FTQ and FTQ) are generated by a range of health professionals including physicians, physician assistants, nurses, health educators, dental providers, and pharmacists in a variety of settings such as clinics, hospitals, health maintenance organizations, health departments, and dental clinics. For non-FTQ provider referrals, tobacco users are encouraged by a health care professional to call the WTQL when they are ready to quit. For FTQ provider referrals, tobacco users who are identified by a health care professional as interested in quitting in the next 30 days and willing to accept calls from the WTQL are asked to sign a consent form to be proactively contacted by the WTQL. The health care professional then faxes the signed consent form to the WTQL, and the tobacco user is contacted within 3 days by a WTQL Quit Coach.

At the time of the survey, WTQL promotional materials including brochures, bookmarks, and business cards free of charge were available to health care professionals through the WTQL website (www.WIQuitLine.org). The WTQL FTQ program has been described in greater detail elsewhere.[12]

An independent research survey company (The Gilmore Research Group) was contracted to conduct a telephone survey that was administered between March 1, 2007, and August 30, 2007, to a sample of 949 eligible callers who received WTQL services between December 1, 2006, and April 30, 2007. A mix of census and random sampling methods were used by the Free and Clear, Inc Evaluation Division to ensure an adequate number of individuals who (1) accessed the WTQL via the 3 referral methods and (2) represented disparate populations in Wisconsin. The survey was timed to take place approximately 3 months after the callers received WTQL services. At the time of the survey, neither Web Coach nor NRT was available for all WTQL tobacco users.

The current study focuses only on provider-based referrals in that individuals in the non-FTQ provider referral and FTQ provider referral groups did not differ on key sociodemographic and health care access variables, whereas self-referred callers were quite different from both provider-referred WTQL users on these variables. For example, only 25.2% of self-referred users were white compared to 80.4% of non-FTQ provider-referred WTQL users and 89.9% of FTQ provider-referred users. Self-referred users also were less likely than provider-based quitline users to have health insurance or a health care professional. Preliminary analyses showed that these differences between provider-based versus self-referred WTQL users were highly associated with study outcomes, thus making unambiguous interpretation of results difficult. As a result, the current study compares only the non-FTQ provider referral and FTQ provider referral groups (Figure 1). Results for the self-referred group are available on request.

Definitions

Respondents who agreed to participate in the survey were asked about their satisfaction with WTQL services and whether they had successfully quit tobacco use. Overall satisfaction with the WTQL and with the Quit Coach was reported as positive if respondents reported that they were "somewhat" to "very" satisfied with these services. Respondents answered "yes" or "no" to whether or not the WTQL met their expectations. Regarding whether WTQL staff understood the caller's needs and concerns, the response was coded as yes if the respondent answered "somewhat" to "strongly" agreeing with that question. Survey respondents were also asked if the WTQL coach respected their values, beliefs and culture as a measure of cultural sensitivity. If respondents answered "somewhat" to "strongly" agreeing with that statement, the answer was coded as yes to culturally sensitive. Respondents who answered "refused" or "don't know" to any of the satisfaction questions were excluded from the computation of agreement rates for the questions. Helpfulness of the referring health care professional was also evaluated; ratings of "very helpful" and "somewhat helpful" were considered to be indicative of helpfulness (versus ratings of "not too helpful" and "not at all helpful").

A serious quit attempt was defined as an attempt to quit tobacco that lasted at least 24 hours sometime during the 3 months after participants enrolled in the WTQL. Consistent with the Society for Research on Nicotine and Tobacco criteria for abstinence outcomes, tobacco abstinence was defined as participants self-reporting that they had been tobacco free for the last 7 days or more at the time of the 3-month follow-up survey.[13] Additionally, a 30-day abstinence rate was defined as respondents being tobacco free for 30 days or more at the time of the 3-month follow-up survey.

Statistical Analysis

All analyses were conducted using SAS Version 9. All tests were 2-tailed tests, and findings were classified as significant if $P<.05$. Frequencies were generated for all participants' sociodemographic variables and for questions asked during the 3-month follow-up survey. Significance tests for group comparisons were computed using χ^2 tests, analysis of variance, and logistic regression analysis. For each outcome measure, 2 logistic regression analyses were computed: a model unadjusted

Table 1. Sociodemographic Characteristics and Tobacco Use Variables by Referral Method

	Referral Groups (N=265)		Logistic or Multiple Regression Results for FTQ- vs Non-FTQ-Provider Referral Comparison, *P*-values
	Fax-to-Quit (FTQ)-Provider Referral (n=158)	Non-FTQ-Provider Referral (n=107)	
Female (%)	60.8	52.3	.17
White (%)	89.9	80.4	.03
Age, Mean (SD)	46.0 (13.9)	50.0 (12.8)	.11
Has health insurance (%)	89.7	79.1	.03
Cigarettes per day, mean (standard deviation)[a]	18.1 (10.5)	21.1 (15.1)	.11
Smoke first cigarette within 5 minutes of waking (%)	40.7	47.5	.29

[a] Total subjects for this comparison was 183 rather than 265 due to missing data.

for covariates and a model including covariates (gender, race, whether or not the respondent has health insurance, and whether or not the respondent smoked his or her first cigarette of the day within 5 minutes of waking).

RESULTS

Table 1 displays sociodemographic and tobacco use variables by referral group. The FTQ provider-referred and non-FTQ provider-referred groups differed by percentage of white participants (89.9% and 80.4%, respectively) and percentage with health insurance (89.7% and 79.1%, respectively). These 2 variables are used as covariates in adjusted logistic regression analyses along with gender and whether or not the first cigarette of the day was smoked within 5 minutes of waking.

Results by Referral Method

Table 2 presents results of analyses comparing the FTQ provider-referred and non-FTQ provider-referred groups on satisfaction with the WTQL. Levels of overall satisfaction did not differ for the 2 groups and both rates of satisfaction were above 92%. FTQ provider-referred respondents reported somewhat higher and statistically significant levels of satisfaction with their WTQL Quit Coach compared to non-FTQ provider-referred respondents (98.6% versus 93.7%, respectively). No group differences were found for the remaining 3 satisfaction questions concerning the WTQL meeting expectations; the Quit Coach respecting values, beliefs, and culture of respondents; and the WTQL staff understanding caller needs and concerns. Satisfaction rates for these questions were also quite high. In terms of helpfulness of referring health care professionals, respondents in the FTQ provider-referred group reported a significantly higher rate of helpfulness (91.0%) compared to the non-FTQ provider-referred group (77.5%).

Quit Rates

Table 3 presents quit attempts and quit rates for the 2 groups. FTQ provider-referred group respondents reported a higher rate of quit attempts (91.6%) compared to non-FTQ provider-referred group respondents (83.2%); this comparison was statistically significant (P=.04) in the unadjusted analysis but only marginally significant (P=.06) in the covariate-adjusted analysis. Groups did not differ on the 7-day point prevalence abstinence rate although the FTQ provider-referred group was somewhat higher (52.5%) than the non-FTQ provider-referred group (42.1%). However, there was a group difference on the 30-day point prevalence abstinence rate with 46.8% of the FTQ provider-referred group reporting abstinence versus 32.7% in the non-FTQ provider-referred group. This difference was found in both the unadjusted and covariate-adjusted analyses.

DISCUSSION

For almost a decade, the WTQL has endeavored to achieve 2 core goals: first, to provide evidence-based tobacco dependence treatment to Wisconsin smokers who want to quit, and, second, to provide telephone tobacco cessation treatments via a client-centered approach tailored to the personal beliefs, values, and needs of each caller. This study suggests that the WTQL is succeeding in achieving both outcomes. A substantial proportion of smokers who contacted the quitline achieved short-term cessation success, and those respondents expressed high levels of satisfaction with the services they received, as well as reporting that they felt comfortable and respected by WTQL staff. Moreover, there were no differences in ratings of satisfaction or cultural sensitivity across the 2 provider-based referral

Table 2. Respondent Satisfaction with Wisconsin Tobacco Quit Line (WTQL) and Health Care Professional by Referral Method

	Referral Groups		Logistic Regression Results for FTQ- vs Non-FTQ-Provider Referral Comparison, *P*-values	
	Fax-to-Quit (FTQ)-Provider Referral	Non-FTQ-Provider Referral	Unadjusted for Covariates	Adjusted for Covariates[a]
Percent satisfied with the WTQL	96.8	92.2	.11	.07
Percent satisfied with their quit coach	98.6	93.7	.06	.04
Percent reporting that the WTQL met expectations	90.9	87.6	.26	.42
Percent reporting that the quit coach respected values, beliefs, and culture	99.3	96.9	.20	.40
Percent reporting that the WTQL staff understood caller needs and concerns	98.6	94.9	.11	.19
Percent reporting that referring health care professional was helpful in the decision to try quitting tobacco	91.0	77.5	.005	.01

[a] Adjusted for the following covariates: gender, race (white versus non-white), whether or not first cigarette is smoked within 5 minutes of waking, and whether or not the caller has health insurance.

methods of accessing the WTQL. Finally, the WTQL is achieving its goal of providing population-wide tobacco cessation services. By January 1, 2010, nearly 100,000 Wisconsin smokers received services from the WTQL, representing one-eighth of smokers in our state.

In terms of quit outcomes, results indicate that callers to the WTQL achieved high short-term quit rates. Three months after receiving counseling services from the WTQL, 46.8% of FTQ provider-referred respondents and 32.7% of non-FTQ provider-referred respondents had not used even a puff of tobacco for 30 days or more. These quit rates compare favorably to those in randomized controlled trials evaluating the effectiveness of telephone support to help smokers quit.[3]

FTQ provider-referred respondents were different from non-FTQ provider-referred respondents on health care professional access and helpfulness, which may have contributed to their higher rates of tobacco abstinence. More specifically, FTQ provider-referred respondents were more likely to have health insurance and to report that their health care professional was helpful in assisting them in the quit process.

Evidence has documented that physician advice can be a powerful motivator to quit and minimal clinical interventions lasting as brief as 3 minutes increase tobacco abstinence rates.[5] Through WTQL's FTQ program, health care professionals take an active role in promoting cessation by screening for tobacco use, advising tobacco users to quit, and—for individuals willing to make a quit attempt in the next 30 days—seamlessly arranging follow-up through the WTQL. The WTQL delivers the counseling component of tobacco dependence treatment, while health care professionals are expected to encourage the use of the WTQL and recommend or prescribe FDA approved medications. These 2 components—evidence-based counseling and prescribing or recommending 1 or more of the 7 FDA-approved cessation medications—were key recommendations of the recently published 2008 US Public Health Service Clinic Practice Guideline *Treating Tobacco Use and Dependence*.[5] Additionally, the health care visit is an opportune moment for a cessation intervention since the tobacco user is already addressing health issues and may be more motivated to make a quit attempt.[12] Overall, FTQ provider-referred survey participants appeared to benefit from their health care professional's linkage to the WTQL.

This study has several limitations. Due to funding constraints, this evaluation was carried out only at 3 months after participants completed the program. Quit rates will decline over time, and 6-months is a commonly recommended follow-up time period for measuring long-term quit outcomes. The study also relied on self-reported quit rates without biochemical verification, although others have found a strong correlation between self-report tobacco use status and cotinine levels, and this approach has been used in many quitline studies.[5,14] Further, we did not select a random sample of all callers, relying on a mixed method of random and census sampling procedures in order to contact a sample that represented the diversity of Wisconsin smokers and included large enough numbers of smokers who accessed the quitline via the 3 possible referral mechanisms. And, with a response rate of about 45%, it

Table 2. Quit Attempts and Tobacco Abstinence Rates by Referral Method

	Referral Groups		Logistic Regression Results for FTQ- vs Non-FTQ-Provider Referral Comparison, *P*-values	
	Fax-to-Quit (FTQ)-Provider Referral	Non-FTQ-Provider Referral	Unadjusted for Covariates	Adjusted for Covariates[a]
Percent who made a serious quit attempt (>24 hours)	91.6	83.2	.04	.06
7-day point-prevalence abstinence rate	52.5	42.1	.10	.08
30-day point-prevalence abstinence rate	46.8	32.7	.02	.02

[a]Adjusted for the following covariates: gender, race (white versus non-white), whether or not first cigarette is smoked within 5 minutes of waking, and whether or not the caller has health insurance.

is unknown whether or not individuals who responded to the survey differed in any meaningful ways from individuals who did not respond to the survey. Finally, while findings from this evaluation indicate differential quit rates among referral groups, we did not collect sufficient data to make assumptions regarding the reasons for these differences. Further study is required to fully clarify the differences in quit outcomes.

CONCLUSIONS

For almost a decade, Wisconsin has provided evidence-based tobacco cessation treatments via the WTQL, serving nearly 100,000 smokers in our state during that time. WTQL services are highly rated by callers in terms of both satisfaction and cultural sensitivity. The WTQL has been successful in assisting callers in successfully quitting tobacco use. In particular, callers accessing the WTQL via fax referrals demonstrated higher tobacco abstinence rates, although these callers differed somewhat from other callers (non-FTQ provider-referred). These findings suggest that FTQ is an effective way to link smokers visiting their primary care professional with evidence-based treatments.

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Preliminary Description of the Feasibility of Using Peer Leaders to Encourage Hypertension Self-Management

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ABSTRACT

Background: Despite consensus that effective treatment of hypertension reduces morbidity and mortality, control rates remain relatively low. This report describes key features of a peer support program designed to motivate individuals to improve self-management of hypertension.

Methods: We recruited Veterans of Foreign Wars posts in southeastern Wisconsin and trained members of these posts to be peer health leaders over a period of 18 months. The curriculum covered information important to blood pressure control, as well as peer educator skills. During this time, the peer leaders presented educational materials and encouraged self-monitoring of blood pressure at post meetings. Surveys and focus groups were conducted to evaluate the adoption of the program at the posts.

Results: After a series of informational mailings and visits to veteran posts, 15 posts and 27 peer leaders volunteered to participate. Fourteen posts (93%) continued active participation throughout the study period, as did 24 peer leaders. Peer leaders reported that they gained health knowledge, skills, and confidence to perform as informational resources at their posts, resulting in greater levels of health support among post members.

Conclusion: The partnership of health care professional, medical school, and veteran service organization successfully organized and maintained a community-based, peer-led program to promote healthy behaviors among Wisconsin's armed services veterans. Community physicians should be familiar with programs of this type as chronic disease self-management grows in appeal in our communities and increasing numbers of veterans return from armed service duty.

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BACKGROUND

Approximately 65 million Americans have hypertension. National Health and Nutrition Examination Survey (NHANES) data indicate that the age-standardized prevalence of hypertension increased from 24.4% to 28.9% ($P<0.001$) between surveys conducted in 1989-1991 and 1999-2004.[1] An aging population, growing rates of obesity, high-sodium diets, and a sedentary lifestyle all are thought to contribute to this increase.[2] Nationally, hypertension is the largest treatable contributor to stroke and the second largest contributor to coronary heart disease. It is also the second leading cause of end-stage renal disease and contributes significantly to congestive heart failure.[3]

Despite consensus that effective treatment for hypertension significantly reduces the risk of these clinical outcomes, treatment and control rates remain relatively low. Only 35.1% of people with hypertension are adequately controlled, including just 57.2% of those being treated.[2] Inadequate control is more common among older individuals with hypertension, particularly older men.[1] The ineffectiveness of traditional care has led to many interventions aimed at improving hypertension control.[4] Most efforts to date have focused on encouraging health care professionals to optimize medical management. However, even under the best circumstances these interventions have been inadequate for many patients. In the Antihypertensive Lipid Lowering Heart Attack Trial (ALLHAT), 35% of patients were still uncontrolled despite good access to health care and medication, aggressive monitoring, and feedback to health care professionals.[5]

Another approach to controlling hypertension is to enhance the patient's ability to participate in his or her own blood pressure management. Randomized clinical trials have shown that "activated patients"—those who are actively involved in their own care—have better clinical outcomes with asthma, diabetes, arthritis, and chronic diseases in general.[6-7] A key element of activation is patient education. While long-term effects of education are not well known, patient education is known to be beneficial when paired with other self-management skills.[8]

An innovative method for patient education is the use of trained community members, alternatively referred to as lay health advisors, peer health educators, or simply peer leaders.[9] Peer leadership on health matters often adds the benefit of sustained engagement in a socially supportive environment, which may result in longer-term effects on chronic disease self-management. Several studies have demonstrated that peer-led education supports healthy behavior changes, including exercise, nutrition, and communication skills.[10-13] Moreover, there is significant evidence that social isolation is one of the most powerful negative influences on all causes of mortality among men.[14] The need for improved hypertension control and the increasing evidence that community interventions are effective led us to implement a peer support program to improve hypertension management in a high-risk population in Wisconsin.

PROGRAM DESCRIPTION AND METHODS

Wisconsin is home to almost half a million veterans, most of whom are older men: 75% are >50 years old, and 41% are >65 years old. Many older veterans belong to 1 or more of 53 congressionally chartered veterans service organizations (VSOs). These organizations originally formed as veteran advocacy groups, but have important social roles as well. The Veterans of Foreign Wars (VFW) was formed in 1899. It is the second largest of the VSOs in Wisconsin, after the American Legion. The VFW has a strong orientation toward community service, especially for youth programs, military families, and the survivors of veterans. The VFW has a national and state structure, but the local post is the primary organizational unit. There are more than 300 VFW posts in Wisconsin. Posts are usually affiliated with a town or suburb, but sometimes with a career (eg, police post) or an employer (eg, Harley Davidson post). Most posts meet monthly to conduct post business and socialize; attendance commonly ranges from 10 to 25 members. Decisions about post activities are driven almost entirely by the post members themselves, rather than by the state or national organization.

Because the post provides an existing social structure where many high-risk individuals with hypertension regularly come together, our study team approached Wisconsin VFW leaders about forming a partnership to implement a pilot program. The program—Posts Working for Veterans' Health (POWER)—trained members of the VFW to serve as peer leaders to improve hypertension control among their fellow post members. In this report, we describe this program, how it was implemented, and preliminary measures of adoption and success.

The principal investigator of this study initially visited 8 VFW posts in the greater Milwaukee area to discuss the importance of hypertension control and self-management of chronic disease and to elicit suggestions from post members for an effective program to improve hypertension control. The study team then worked with state VFW leaders to develop the study intervention and apply for funding. The Healthier Wisconsin Partnership Program, a local health-focused foundation, provided funding for 3 years to a partnership among the VFW, the Medical College of Wisconsin, and the Clement J. Zablocki VA Medical Center in Milwaukee. The institutional review board at the Zablocki VA Medical Center approved the study. Participation was offered to all 51 VFW posts located within approximately 30 miles of the Zablocki VA Medical Center through an initial mailing to the post commander. Follow-up calls were made offering to visit the post and describe the POWER program. Three American Legion posts approached us because members had heard our presentation at VFW meetings.

Based on literature concerning adoption of innovations,[15-16] our informational visits emphasized the need for support from post leadership and 2 post members who would be willing to be trained as peer leaders. Prior health experience was not required for these volunteer leaders, but they had to be members in good standing and have time to complete POWER-related tasks. If posts expressed interest, we provided further information about annual peer leader stipends of $200 and post payments of $300 annually to cover the costs of participation. In addition, each participating post received 2 automated oscillometric blood pressure monitors (Omron model HEM-780), 12 pedometers, and 1 weight scale.

Once recruited, peer leaders attended an initial 8-hour training session to review the basics of hypertension self-management, including home blood pressure

checks, weight monitoring, and pedometer use. Small-group leadership and communication skills, lifestyle modification, and behavior change were also discussed during this session. Following this initial session, regular 2-hour evening meetings were held with the peer leaders—monthly to start, then every other month. At these meetings, we reviewed project-related activities, introduced new health materials that peer leaders were expected to bring to their posts (see "script" information in the next paragraph), and discussed health topics raised by the peer leaders. Each meeting also included a debriefing and problem-solving session for issues related to the peer leader role. For example, we discussed strategies that peer leaders could use with post members who were unclear or skeptical about the value of health behavior change. To make it easier to attend these meetings, duplicate meetings were held each month at locations convenient to the peer leaders.

We expected the peer leaders to be visible and audible health resources at their monthly post meetings. They routinely set up blood pressure cuffs and weight scales, offered to help their peers check and record these values, and distributed health self-management tools and information. For each training session, the study team developed "health scripts" that peer leaders could use to promote self-management among post members. Scripts were designed to be delivered in 10 minutes or less and included both health content and guidance about how they were to be delivered. The study team selected the initial script topics; later topics reflected input from the peer leaders and study team assessment of what seemed to "work" (see Table 1). The training session *Preparing for Doctor Visits* stressed the value of a being an active participant in health care decisions, knowledge of treatment regimens and goals, and the primacy of communicating with the physician. The importance of engaging social support was the emphasis of another training session that provided participants with means of involving family and friends in health-related issues.

To examine the extent to which the program engaged the peer leaders and their posts, data were collected in 2 ways. First, post-training surveys were administered to peer leaders to determine their learning and behavior changes. Second, after-program focus groups were held using standard methods[17] to inquire about the factors that peer leaders associated with program success and barriers. Analysis consisted of descriptive statistics of numerical data and content analysis of narrative text.

All evaluation data were collected and stored using standard research techniques, including informed consent and data storage in secure locations. In contrast, the extent to which personal health matters were discussed at post meetings was left to the discretion of the post members. For example, some post members asked that the peer leader maintain a log of blood pressure readings and weights, while others kept these health measurements private. As is generally the case in support group settings, many members related personal anecdotes during discussions of the health issues.

Table 1. Peer Leader Training Session Topics

Topics	Date Covered
General	
Establishing Post Priorities	June/July 2007
Getting POWER[a] on the Agenda	September 2007
Contest Introduction	January 2008
Medical Knowledge	
Hypertension Basics	October 2007
Self-Measurement of Blood Pressure	September 2007
Stress Management	July 2008
Hypertension Review	January 2009
Patient Activation	
Preparing for Doctor Visits	January 2008
Establishing Health Goals	November 2007/ March 2008
Taking Medications	September 2008
Motivation and Communication	
Stages of Change	March 2008
Family Support for Chronic Disease	September 2008
Nutrition and Eating Habits	
Counting Calories/Reading Labels	November 2007
Tips on Dining Out	May 2008
Physical Activity	
Losing Weight/Barriers to Exercise	January 2008
How to Use a Pedometer	June/July 2007
Metabolic Equivalents/Exercise Tips	May 2008
Steps to Fitness	July 2008
Exercise Bands	November 2008

[a]Posts Working for Veterans' Health

RESULTS

The 35 posts (65% of 54 invited) that requested an informational visit were located in communities across urban and rural parts of southeastern Wisconsin. All 35 posts were contacted by phone after the visit, and a total of 15 posts (43%) agreed to participate in the program. These 15 posts represented 6 southeastern Wisconsin counties (Figure 1).

From the 15 posts, a total of 27 peer leaders were recruited. Their ages ranged from 45 to 81 (mean of 63), and 21 (78%) were male. Several had medical experience

Figure 1. Map of the posts participating in the Posts Working for Veterans' Health Program. Each dot represents the post's location within southeastern Wisconsin. Two posts meet in the same location. The diamond designates the Clement J. Zablocki VA Medical Center in Milwaukee.

during their military service (eg, 3 had served as combat medics), and 3 had non-military experience as medical professionals. All but 1 had completed high school, and 22% were college graduates. On average, peer leaders attended 7 of the 11 follow-up training sessions. Six peer leaders (22%) withdrew during the 2 years of the study. The reasons they gave were out-of-state relocation, health issues, or changes in job status. Three were replaced with other post members, leaving 24 peer leaders to participate in the end of program evaluation.

All but 1 of these peer leaders (96%) completed surveys assessing their reaction to the program and acquisition of new skills. Most peer leaders (18/23, or 78%) believed the program was worth their effort; the remainder said they were unsure; none thought it was not worth the effort. Peer leaders reported that each of the training sessions contributed significantly to their knowledge or understanding of the topics. On a scale from 1 (no contribution to knowledge or understanding) to 5 (a very strong contribution), they rated the contribution strongest for sessions focused on *Preparing for Doctor Visits* (4.5), *Using Blood Pressure Monitors* (4.3), and *Steps to Fitness* (4.3). Peer leaders also judged their ability to present these content areas to their peers. They rated their ability the highest (1=low ability; 5=high ability) for *Using Blood Pressure Monitors* (4.5), *Use of Exercise Bands* (4.3), and *The Importance of Physical Fitness* (4.2).

During focus groups we asked peer leaders whether support for post member health increased due to the POWER program. The consensus response was that participation in the program promoted support among members, most notably through discussions and interactions about health, where there were no such discussions or interactions before the program. When asked to look back and comment on factors associated with program success at their post, peer leaders highlighted 3 factors as most influential:

1. Credible information—"Members appreciated that the information presented came from a doctor, which makes it more credible."
2. Accessible information—"Members listened more to health information when it came from their peers as opposed to the newspaper or somewhere else."
3. Sustained presence—"It takes 7 times to create a new habit, so if you get them focused 7 times, they're committed."

Peer leaders also commented on barriers to participation. Commonly reported barriers were low levels of enthusiasm and participation in post activities generally. One peer leader said, "The majority of attendees are 70 plus years old and unwilling to make lifestyle changes." Some reported difficulty in having the health topic added as a regular post meeting agenda item. Finally, some post members felt that health maintenance and blood pressure control were issues that their doctor would address for them.

DISCUSSION

This study describes the implementation and early success of an innovative peer-led program encouraging healthy behaviors among community-based, older veterans in southeastern Wisconsin. The study team feels results will be of interest to physicians and policy makers seeking to design supportive programs for chronic disease self-management.

From an open solicitation for program participants, 15 of 34 VSOs visited by program staff agreed to participate. All but 1 post participated throughout the 2 years of the project. We were satisfied with this level of participation due to the novelty of the program's design, which required a certain amount of change and accommodation in an organization with a highly regimented structure. The requirement that a post identify 2 committed peer leaders prior to joining the program, also limited post participation; in many cases posts

expressed interest but did not have individuals willing to serve as peer leaders.

Several factors account for early success in establishing a peer-led educational program in this particular group. First, statewide leaders were supportive, facilitating efforts to recruit individual posts. Second, peer leaders reported significant confidence in the skills and responsiveness of training staff, leading to their perceptions of a shared commitment to veterans' health. Delivering credible information through a visible physician-led program was perceived as an important factor in POWER's success. Third, peer leaders were very satisfied with the staff's presentations and interactions that often included discussions of personal health issues. We repeatedly emphasized the bi-directional nature of this program and consistently drew the analogy to a well-functioning partnership between doctor and patient. For example, we selected and refined health information scripts on the basis of peer leader views. This alignment between peer leader interests and staff-supplied instructional resources contributed to the peer leaders' high ratings of their confidence and skill.

Finally, financial support by the Healthier Wisconsin Partnership Program was essential to fund the cost of equipment (such as blood pressure cuffs and pedometers) and to offset personnel costs. Tangible equipment and dedicated staff time were concrete reminders that this program was worthy of participants' attention. Moreover, repeated post contacts were key to establishing credibility and forming relationships. These would have been very difficult to sustain solely through volunteer efforts.

Some challenges were encountered as the program evolved. First, posts that had just 1 peer leader did not receive information on some topics because the sole peer leader was unable to attend the corresponding training session. Our experience supports others who emphasize the value of co-teaching, using active *pairs* of peer leaders to encourage sharing of peer leadership tasks.[18] Second, support for the intervention among post leadership varied. Although all commanders had agreed to participate, peer leaders reported varying success at including the health topic as a regular item on the monthly agenda. Although peer leaders at these posts still provided the information to members before or after the meeting, they found that they missed many of the members this way and reported less positive perceptions of their impact.

Peer leaders also reported a wide range of beliefs and attitudes, from highly supportive to highly skeptical, concerning the role of the post in supporting health self-management. Peer leaders reported explicit statements by some members that their health was a matter for them and their physicians, but certainly not the post. Other post members expressed concern that health-related activities added to already busy agendas led to longer meetings. The use of prepared scripts—timed to last 10 minutes or less—was a response to this concern. When we encountered skepticism, we found that our best approach was that of concerned listener, to focus discussions on evidence that supported our initiative and to tie our efforts to the ultimate goal of improved veteran health. Currently we are collecting and analyzing data regarding the impact of post interventions on self -management attitudes, skills and behaviors. We believe evidence of its impact on these, and eventually on blood pressure, will bolster support among peer leaders and post members. Explicit support of these activities from physicians in a post's community would also enhance the credibility of such a program. However, our limited financial support did not allow us to offer incentives for local physicians. As this program is refined and extended, we encourage peer leaders to identify community physicians who support the activity.

Several factors limit the generalizability of this study. This pilot study was without a control group and involved small numbers of peer leaders and service organizations. Therefore, the results reported here may be due to the chance enrollment of certain types of participants, which may have influenced findings in unpredictable ways. Second, this study is a preliminary report on program design and training outcomes that doesn't examine POWER's influence on veterans' blood pressure, lifestyle, or self-management skills. Analyses of project outcomes are ongoing and will be reported in the future. Third, this evaluation relied on self-reported data. However, the trustworthiness of findings was strengthened by using both numerical and narrative data. Finally, we have limited data regarding the sustainability of the intervention. However, 1 year after the last training session, 14 of the 15 posts still provide health information to post members in varied ways, ranging from articles in the post newsletter to oral presentations during each meeting.

CONCLUSION

We believe that the design and results of this intervention add to a growing body of literature on the use of existing community social structures to promote healthy lifestyle changes. By strengthening ties between post members, this intervention also works to reverse social

isolation, which is associated with mortality, especially in older men. The unique emphasis on VSOs extends prior studies and recognizes the special importance that Wisconsin has long attached to supporting veterans of military service.

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Tickborne Powassan Virus Infections Among Wisconsin Residents

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ABSTRACT

Introduction: Powassan virus (POWV) is a tickborne *Flavivirus* that causes a rare but potentially life-threatening illness. The first reported case of POWV infection in a Wisconsin resident occurred in 2003. Enhanced surveillance and testing detected 2 additional cases.

Methods: Patient specimens with a positive or equivocal immunoglobulin M (IgM) antibody to an arbovirus were sent from commercial laboratories to the Wisconsin State Laboratory of Hygiene and forwarded to the Centers for Disease Control and Prevention (CDC) for confirmatory testing. Patients with laboratory confirmed POWV infections were interviewed to obtain demographic, clinical, and epidemiologic information.

Results: POWV infections were confirmed in 3 adult Wisconsin residents in 2003, 2006, and 2007; illness onsets occurred during May and June. Two patients were hospitalized and all survived. One patient had a dual infection with POWV and *Anaplasma phagocytophilum.* Specimens from all 3 patients were initially reported as positive for IgM antibody to either St Louis encephalitis or California serogroup viruses; POWV-specific antibody was detected during confirmatory testing at the CDC. Each patient had exposures to known or likely tick habitats in different counties within 30 days before illness onset.

Conclusions: These are the first diagnosed human POWV infections in Wisconsin. Because all 3 patients were initially identified as having other arboviral infections using commercial screening kits, routine confirmatory testing is essential for proper diagnosis of most arboviral infections. Wisconsin residents should be educated regarding risks of acquiring and ways to prevent POWV infection and other tickborne diseases when spending time outdoors.

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INTRODUCTION

Powassan virus (POWV) is an arthropod-borne virus (arbovirus) in the family of Flaviviridae, genus *Flavivirus*. Human POWV infections are rare and associated with acute onset of fever, profound muscle weakness, confusion, headache, nausea, vomiting, and stiff neck. Severe signs and symptoms include respiratory distress, tremors, seizures, paralysis, and coma.[1-3] Most individuals with POWV infections develop meningoencephalitis and many have long-term neurologic sequelae; 10%-15% of cases are fatal.[3-5] POWV is transmitted to humans through the bite of an infected tick. Symptoms usually begin at least 1 week (range 8-34 days) following infection.[2] Apart from supportive and symptomatic management, there are no specific treatments for or vaccines available to prevent POWV infection.

Initially isolated in 1958 from the brain of a boy aged 5 years who developed encephalitis and died, POWV was named after the northern Ontario town where the child resided.[5] The first POWV infection reported in the United States occurred in New Jersey in 1970. Since then, POWV infections have been reported rarely and have occurred in Maine, Michigan, Minnesota, New York, Vermont, and Wisconsin.[6-7]

POWV has been isolated from several North American tick species, including *Ixodes spp. (I. cookei, I. marxi,* and *I. spinipalpus*) and *Dermacentor andersoni.*[5] In Wisconsin, a POWV variant, deer tick virus (DTV), has been isolated from *I. scapularis*.[8-10] Presence

Table 1. Council of State and Territorial Epidemiologists and Centers for Disease Control and Prevention Case Definition of Powassan Virus (POWV) Infection[13]

Confirmed case
A clinically compatible illness in an individual with specific laboratory criteria supporting the diagnosis. Clinically compatible illness includes a febrile illness with headache, myalgia, arthralgia, and may be accompanied by skin rash or lymphadenopathy or central nervous system disease (meningitis or encephalitis).
Laboratory criteria (1 of the following)
• Four-fold or greater change in virus-specific serum POWV antibody titer • POWV-specific IgM antibodies demonstrated in CSF • POWV-specific IgM antibody demonstrated in serum and POWV-specific neutralizing antibody in the same serum or a later specimen (if other arbovirus is also detected, POWV titer must be at least 4-fold higher than the titer corresponding with the other arbovirus agent) • Detection of POWV in culture or viral RNA by nucleic acid testing

of POW-lineage viruses has been well documented in at least 38 mammal species including small- and medium-sized wild animals (rodents, woodchucks, skunks) and domestic animals (dogs, cats).[5]

Following the introduction of West Nile virus (WNV) to the United States in 1999, federal funding to establish WNV surveillance through cooperative agreements with the Centers for Disease Control and Prevention (CDC) enabled states to detect and report arboviral infections. In 2001, the Wisconsin Division of Public Health (WDPH) expanded arbovirus-related human case surveillance statewide and collaborated with the Wisconsin State Laboratory of Hygiene (WSLH) to implement arbovirus panel testing for West Nile, La Crosse (LAC), St Louis encephalitis (SLE), Eastern equine encephalitis (EEE), and Western equine encephalitis (WEE) viruses. In 2003, the list of notifiable arbovirus diseases in the United States was expanded to include WNV, POW, SLEV, EEE, WEE, and California (CAL)-serogroup (LAC and other CAL) viruses.[11] In Wisconsin, all arbovirus infections are reportable.[12]

Herein we describe enhanced arbovirus surveillance methods that resulted in detection of POWV infections in 3 Wisconsin residents from 2003 through 2007, and we provide clinical and laboratory information, and findings of the epidemiologic investigations of each case.

METHODS

Cases of POWV infection were defined using the Council of State and Territorial Epidemiologists and the CDC arboviral infection case definition adapted for POWV infection (Table 1).[13]

Laboratory Testing

Commercially available laboratory tests for arboviruses may produce false-positive and cross-reactive results. Given this, WDPH requests all samples that are immunoglobin M (IgM) positive at a commercial lab be sent to WSLH for confirmatory testing. Arboviral testing (WN, SLE, LAC, EEE, and WEE) at WSLH is performed by applying an algorithm on serum and cerebrospinal fluid (CSF) specimens using a sensitive IgM capture enzyme-linked immunoabsorbent assay (MAC-ELISA) and then using a more specific plaque-reduction neutralization test (PRNT) for confirmation.[14] All specimens with positive or indeterminate WSLH test results were forwarded to the Arboviral Diagnostic Laboratory (ADL) at the CDC for additional confirmatory testing, including PRNTs. With PRNT, the patient's serum (ie, antibodies) is combined with a live virus. If the antibodies are specific to the virus, a complex is formed and this prevents the infection of Vero cells and a reduction in the number of plaques formed when the Vero cells are combined with the virus. To determine the likely etiology of the infection, ADL staff employed a regional algorithm method using IgM MAC-ELISA, immunoglobin G (IgG) ELISA, IgM microsphere immunoassay (MIA), and PRNT testing for the following arboviruses: CAL, LAC, EEE, SLE, WEE, WN, Jamestown Canyon (JC), and POW.

Epidemiologic Investigation

Patients with illnesses meeting the case definition for POWV disease were interviewed by local health department investigators using a standard arbovirus follow-up form that included questions on demographic features, clinical information, travel history, mosquito, or other vector exposures, the use of insect repellent during the 2 weeks before illness onset, and received or donated blood or organs within 30 days before illness onset. Completed forms were sent to the WDPH; information was entered into an electronic database and reported to the CDC via ArboNET, a national electronic surveillance reporting system for arboviruses.

RESULTS

Patient 1: 2003

This patient's illness was previously described in brief.[6] A 69-year-old man who resided in Rusk County saw his physician on June 26, 2003, with an 11-day history of nausea and epigastric and right upper quadrant pain; a proton pump inhibitor was prescribed. The abdomi-

Table 2. Results of Arbovirus Testing at the Wisconsin State Laboratory of Hygiene (WSLH) and the Centers for Disease Control and Prevention (CDC) of Specimens Obtained from Patients with Powassan Virus (POWV) Infection, Wisconsin, 2003-2007

Patient	Collection Date	Specimen Type	WSLH Results	CDC Results	Interpretation of Results
Patient 1	07/09/2003	Serum	SLEV IgM+	POWV IgM+ POWV IgG+ POWV PRNT+ (1:320)	Serologic evidence of recent POWV infection; cross-reactive SLEV antibodies
	07/10/2003	CSF	IgM equivocal to SLEV	POWV IgM+	
Patient 2	07/10/2006	Serum	SLEV IgM[a]	POWV IgM+ POWV IgG+ POWV PRNT+ (1:20) LACV PRNT+ (1:10) JCV[b] PRNT+ (1:80)	Serologic evidence of a recent POWV infection and previous CAL serogroup bunyavirus
	07/16/2006	Serum	SLEV IgM[a]	POWV IgM+ POWV IgG+ POWV PRNT+ (1:80) LACV PRNT+ (1:20) JCV[b] PRNT+ (1:80)	
	08/03/2006	CSF	SLEV IgM[a]	not tested	
Patient 3	06/20/2007	Serum	arbovirus negative	POWV IgM+ POWV IgG+ POWV PRNT+ (1:80)	Serologic evidence of a recent POWV infection; non-specific CALV reactivity
	08/10/2007	Serum	LACV IgM equivocal	POWV IgM+ POWV IgG+ POWV PRNT (1:80)	

Abbreviations: SLEV, St Louis encephalitis virus; POWV, Powassan virus; CALV, California serogroup virus; LACV, La Crosse virus; JCV, Jamestown Canyon virus; PRNT, serum dilution-plaque reduction neutralization test; CSF, cerebrospinal fluid

[a] Indeterminate result: non-specific reactivity to West Nile virus.

[b] There are no IgM and IgG tests for JCV in the United States; antibody testing is done using only PRNT at the CDC.

nal pain improved. On June 27, he developed recurring chills and fever and was hospitalized on July 8. Significant findings included temperature 101.7ºF and a heart murmur; echocardiogram (echo) was normal. Hematologic laboratory abnormalities included hemoglobin 11.5 g/dL and platelets 82,000/mm³. Cerebrospinal fluid (CSF) obtained on July 9 was clear, colorless with white blood cell count (WBC) 60/mm³, red blood cell count (RBC) 73,080/mm³, glucose 75mg/dL, and protein 60mg/dL. Multiple blood cultures were negative. Given the correlation between anemia, thrombocytopenia, and some tickborne infections, blood specimens obtained on July 9 and July 10 were tested for IgM and IgG antibodies to *Anaplasma, Borrelia burgdorferi,* and arboviruses. *Anaplasma* morulae were detected in a blood smear, serologic tests demonstrated a positive (512) *Anaplasma* titer and an equivocal SLEV titer. The patient began treatment on July 9 with doxycycline (100 mg bid for 21 days). Discharge diagnoses on July 11 indicated a febrile illness with *Anaplasma* and an arbovirus as suspected pathogens. Tests of a serum specimen obtained on July 24 demonstrating an *Anaplasma* titer ≥512 confirmed the *Anaplasma* infection.

Given the equivocal SLEV IgM results from the hospital testing, the patient's serum and CSF were forwarded to the WSLH and arbovirus IgM panel testing yielded positive and equivocal results to SLEV, respectively (Table 2). Arboviral testing of both specimens at the CDC demonstrated positive POWV-specific IgM, IgG, and neutralizing antibodies. There was no evidence of neutralizing antibodies to SLEV, which suggested the antibody to SLEV detected at the hospital laboratory and the WSLH was a result of *Flavivirus* cross-reactivity. Diagnostic testing of this patient confirmed a dual infection with *Anaplasma phagocytophilum* and POWV.

During an interview on July 21, 2003, the patient reported persistent lethargy but no other signs or symptoms of neurologic illness before or after hospital discharge. He reported exposure to areas with ticks and small mammals within 20 days prior to illness onset; exposure was mostly in his yard and in woods near his home (Figure 1). He also traveled to northwest Ontario, Canada to fish in a wooded area during June 23-25. He reported no known tick bites before illness onset. Because the incubation periods for both anaplasmosis

Figure 1. Three confirmed cases of Powassan virus infection in Wisconsin depicted by location of patient residence (patients 1, 2, 3) and location of additional potential exposure for patient 2 (2e) and patient 3 (3e), 2003-2007.

and POWV infection exceed 1 week, infection with POWV and *Anaplasma* likely occurred near his home between June 12 and June 19.

Patient 2: 2006

On July 3, 2006, a 49-year-old man who resided in Marathon County presented at a clinic with fever, chills, headaches, myalgia, and fatigue that began June 29. He reported congestion, mild non-productive cough, and a history of smoking (33 pack years). Physical examination was unremarkable. Laboratory findings included mildly elevated WBC (12,600 cells/mm^3) and creatinine (1.1 mg/dL). Computed tomography (CT) scans of the chest and head were negative. The patient was diagnosed with a fever of unknown etiology and was prescribed clarithromycin.

On July 4, the patient was seen at an emergency department (ED) with throbbing frontal headache with bitemporal radiation, fever (103.8ºF), chills, malaise, fatigue, photophobia, nausea, stiff neck, muscle aches, and loss of appetite and was admitted to a hospital. Admission temperature was 102.9ºF, blood pressure 157/70 mm. No additional abnormalities were detected during physical examination. Chest x-ray was normal; lumbar puncture was not performed. Laboratory testing results included WBC 8500/mm^3 with 76% granulocytes. The differential diagnosis included a zoonotic infection and aseptic meningitis. Results of tests conducted at the hospital laboratory for *Borrelia burgdorferi, Anaplasma,* and Rocky Mountain spotted fever were negative; WNV ELISA testing was inconclusive. The patient was treated with doxycycline (100 mg bid for 14 days), albuterol, and hydrochlorothiazide. Within 3 days, his appetite improved, chills and headaches resolved, myalgia decreased, and he walked without unsteadiness or weakness. Laboratory results returned to normal. He was discharged July 10 with diagnoses of viral syndrome with meningoencephalitis and clinical depression.

Several days later, the patient developed general malaise, decreased appetite, photophobia, and chills. He was hospitalized July 16 for evaluation of viral encephalitis, decreased appetite, dehydration, and acute renal failure. Laboratory test results included creatinine 3.6 mg/dL and blood urea nitrogen (BUN) 77 mg/dL. While hospitalized, he received supportive treatment for dehydration and physical therapy; his laboratory and clinical status soon improved. Repeated laboratory tests of specimens obtained July 10 and July 16 for *Anaplasma, Borrelia burgdorferi,* and WNV were negative; tests of both specimens at the WSLH demonstrated positive IgM antibodies to SLEV. Discharge diagnoses on July 20 included acute renal failure secondary to dehydration, and viral encephalitis, presumptively SLE.

A CSF sample was obtained August 3 to confirm the SLE antibody positive results. Arbovirus testing at WSLH of 2 sera and a CSF sample demonstrated positive results for IgM antibody to SLEV; WNV results were indeterminate (Table 2). Testing of serum specimens at the CDC revealed positive IgM and IgG antibody to POWV with a 4-fold change (PRNT 20-80) in antibody titers indicative of recent POWV infection. Additional specific antibody tests indicated cross-reacting antibodies to SLEV and negative tests for other arboviruses. Prior infection with a California serogroup virus was also detected. The CSF sample was not available for CDC testing.

During an August 21 interview, the patient reported persistent thigh and back weakness, shoulder pain, memory deficit, gait and balance difficulty, and depression. He recalled noting a rash on his back 1 week before illness onset. He resided in a heavily wooded area in Marathon County (Figure 1). Activities included camping trips to a lake in Marathon County (north-central Wisconsin) on June 4 when he observed deer ticks on his dog and recalled being bitten by a tick, to St Cloud (central Minnesota) from June 16 to June 18, and to a park in Price County (northern Wisconsin) from June 23 to June 24 where he received many mosquito bites.

The exposure to POWV likely occurred in Marathon County near his home or in Minnesota from June 15 to June 22.

Patient 3: 2007

A 47-year-old woman who resided in Kenosha County was evaluated June 15, 2007, 2 days after onset of generalized aches, nausea, and lightheadedness and 25 days after noticing a rash on her neck and onset of severe headaches. Because of prior history of migraine headaches, she delayed seeing a physician. Her headaches were treated with analgesics but did not improve. On June 20, she experienced persistent headaches and blurred vision. She had recent cataract surgery. Results of laboratory tests on June 20 included WBC 6000/mm^3 and platelets 160,000/mm^3 and were otherwise unremarkable. A serum specimen sent to a commercial laboratory was tested for antibodies against arboviruses, *Anaplasma, Borrelia burgdorferi,* CMV, EBV, lymphocytic choriomeningitis virus, rubella, rubeola, VZV, and HSV types 1 and 2. Results received on June 26 were positive for IgM antibody to CALV and negative for IgG. WNV IgM result was inconclusive due to high background reactivity, and WNV IgG was negative. The patient was referred to her ophthalmologist for evaluation of abnormal vision.

The patient was seen again in an ED June 29 following complaints of upper respiratory tract symptoms and shortness of breath; the patient denied chest pain, orthopnea, fever, cough, or gastrointestinal complaints. Physical examination, electrocardiogram, and chest x-ray were normal. She was treated with albuterol and discharged. During a follow-up interview July 10, the patient complained of memory deficit, and neck and back pain.

Arboviral testing at the WSLH of the June 20 serum specimen was negative, but because of the positive IgM result for CALV at the commercial laboratory, the sample was sent to the CDC. CDC testing identified IgM and IgG antibodies against POWV and a PRNT of 80 (Table 2). A serum specimen obtained August 10 and tested at the WSLH demonstrated equivocal IgM antibody to LACV and confirmatory testing at the CDC identified IgM and IgG antibodies against POWV with PRNT of 80 (Table 2). This result suggested a recent infection with POWV and a false-positive IgM antibody to CALV as subsequent testing did not detect IgM nor IgG antibodies to CALV.

The patient resided in southeastern Wisconsin but went turkey hunting in Vernon County (southwestern Wisconsin) during weekends in May (Figure 1). She reported sitting on the ground in grassy and brushy areas where many small mammals were seen including skunks and squirrels. She had no known tick bites and did not use repellent with *N,N*-Diethyl-*meta*-toluamide (DEET) while turkey hunting. She denied travel outside of Wisconsin. Exposure to POWV most likely occurred in Vernon County from May 6 to May 13, assuming her illness onset was May 20 when she developed severe headaches.

DISCUSSION

As with other arboviruses, asymptomatic infections with POWV can occur.[5] Symptomatic infections typically present as encephalitis or meningitis and often result in significant morbidity and mortality. Symptoms of POWV infection can be difficult to differentiate from those caused by other arboviruses. In the United States and Canada, POWV infections are less frequently reported than infections with other arboviruses that cause encephalitis, namely WNV, LACV, SLEV and EEEV.[1,15] It is uncertain whether the small number of cases reported is related to limited disease activity, awareness, testing, or surveillance. Our surveillance suggests POWV infection is likely to be misdiagnosed and thus under-reported in Wisconsin.

From 1958 to 2007, 44 POWV illnesses have been identified in North America—28 in the United States, and 16 in Canada.[2,6,16] Before 1999, most cases occurred in Northeastern United States and Eastern Canada. During 1999-2007, 17 POWV infections reported in the United States occurred in Maine (4 cases), New York (8), Michigan (1), Vermont (1), and Wisconsin (3).6,16 The most recent cases occurred in New York state in 2008 and in Minnesota in 2008 and 2009.[16-17]

Most commercial assays for arboviruses are labeled for use on serum to aid in a presumptive diagnosis, and further testing is recommended to confirm the results.[18] The 3 Wisconsin cases were detected using an enhanced statewide surveillance that ensures confirmatory tests are conducted at the WSLH and as needed at the CDC on all specimens testing positive for arboviruses at commercial laboratories. In our 3 cases, initial tests incorrectly identified a non-Powassan arbovirus as the infectious agent. Confirmatory tests demonstrated specimens from 2 patients were serologically cross-reactive to SLEV and 1 patient had a false-positive result to CALV. In all cases, more specific testing for the presence of neutralizing antibody using PRNT was needed to properly diagnose POWV infection. Physicians should consider requesting additional confirmatory testing on their patient samples that test positive for an arboviral agent on a commercial assay.

The 3 Wisconsin patients were adults (age range 47-69 years), 2 were males, and all 3 had illness onsets in late May and June. Two patients were hospitalized, with 1 requiring rehospitalization. All 3 resided in wooded areas or traveled to forested areas 7-14 days before illness onset and had other possible tick exposures within 30 days before onset.

One patient was co-infected with *Anaplasma phagocytophilum,* which is endemic in Wisconsin. The highest incidence of anaplasmosis in Wisconsin occurs in the northwestern counties. About 810 cases of anaplasmosis were reported in Wisconsin during 2003-2007. *Anaplasma* are transmitted by *I. scapularis* (deer ticks or blacklegged ticks). Human co-infection with multiple tick pathogens occurs when a deer tick harboring these agents feeds on the host. Illness onset with anaplasmosis usually occurs 5-14 days (median 9 days) after being bitten by an infected tick. Common symptoms of anaplasmosis include chills, fever, headache, and myalgia, which are similar to symptoms of arbovirus infections. However, clinical laboratory findings include thrombocytopenia, elevated hepatic transaminase, leukopenia, and anemia. Intracytoplasmic bacterial aggregates (morulae) present in leukocytes can be useful in the diagnosis of *Anaplasma* infection.[19] In addition, laboratory tests such as culture and isolation of the organism, immunostaining of antigen in a skin biopsy, serologic testing for antibodies, and polymerase chain reaction (PCR) assay are also important for differential diagnosis. While anaplasmosis was diagnosed initially in patient 1, the systematic testing for multiple agents was essential to detect the co-infection with 2 tickborne pathogens.

Infection with POWV has been described as most closely related to the tickborne encephalitis (TBE) virus, which causes significant neurologic disease and is endemic in Eastern Europe and part of Asia.[20] However, 2 of the Wisconsin POWV infections were relatively mild illnesses compared to other POWV infections. One possible explanation for the mild illness may involve infection with the deer tick virus (DTV). Identified in 1997, DTV was found to be a genotype of POWV.[21-22] Further studies suggest DTV and POWV strains in North America are divided into 2 distinct lineages.[8,23] Lineage 1 strains, such as POWV, are suspected to be more pathogenic and associated with the tick species *I. cookei* and in turn with groundhogs; these strains have typically been isolated in New York and Canada.[8] Lineage 2 strains, such as DTV, are associated with *I. scapularis* and have been isolated from adult ticks collected near Spooner, Wis.[10] However, current antibody testing cannot differentiate DTV from POWV infections. To date, the only 2 known human DTV infections were documented based on post-mortem retrieval of DTV from neurologic tissues.[24]

Experimental transmission studies suggest mice can acquire POWV from infected nymph-phase deer ticks within 15 minutes;[25] it is not known how brief tick attachment must be to transmit POWV to humans or the minimum viral load required for symptomatic POWV infection.

It is important for clinicians and the public to be aware that in Wisconsin, *I. scapularis* is the most likely vector to transmit tickborne pathogens that cause anaplasmosis, babesiosis, Lyme disease, and POWV/DTV infections. The key to preventing tickborne infections is to avoid the habitats of rodents where ticks are most likely to reside. Tick bite prevention includes avoiding tick infested areas (wooded areas with tall grass, weeds, leaf litter) and taking precautions when entering wooded areas. Precautions include wearing proper clothing, tucking shirts into pants and pants into socks to create a barrier against ticks, checking for ticks on oneself and pets after being outdoors, and using tick repellents. Environmental control measures to minimize tick encroachment include use of landscaping and actions that discourage wild animals from nesting near homes. Finally, in Wisconsin it is important for clinicians and laboratories to consider vectorborne arboviral diseases in the differential diagnosis of springtime and summertime illnesses and obtain appropriate samples (serum and CSF) for diagnostic testing.

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WISCONSIN MEDICAL JOURNAL

Late Effects in Adult Survivors of Childhood Cancer: Considerations for the General Practitioner

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ABSTRACT

Childhood cancer survivorship is a national public health priority, with an increasing number of survivors who face late effects from both disease and treatment. As childhood cancer survivors are living into adulthood, care of the late effects associated with their diagnosis and treatment can become complex. Often these patients no longer have follow-up with the treating pediatric hospital and seek medical care from an adult primary care professional. Combining the results of current survivorship research with clinical experience, we describe common late effects that general internists and primary care professionals may encounter during routine visits with adult survivors of childhood cancer. Recommendations and resources are provided for identifying and managing late effects.

INTRODUCTION

During the past 60 years, significant advances have been made in childhood cancer therapy. Today children diagnosed with a cancer are expected to be cured—almost 80% will survive into adulthood. In 1997, there were an estimated 270,000 childhood cancer survivors in the United States, of whom approximately 1 in 640 were between the ages of 20 and 39 years.[1] These numbers have continued to grow; by 2010, there are projected to be 1 in 250 young adult survivors between 20 and 29 years of age.[2]

Survivors of childhood cancer and bone marrow transplant (BMT) comprise a large and heterogeneous group, with a variety of diagnoses and a plethora of treatments, each with their own set of potential late effects. As survivors age, nearly two-thirds will develop a chronic health condition. In a quarter of survivors, these conditions will be moderate, severe, or life threatening.[2] Late effects from cancer treatment can occur soon after treatment is completed or may not appear until many years later. The potential incidence of late effects is influenced by the underlying disease process, types, and dose of treatment received, and age at time of treatment. Host factors such as gender, ethnicity, genetics, and health behaviors (including tobacco, alcohol, diet, exercise, etc)—as well as underlying medical conditions—can also influence the occurrence and/or severity of any late effects. Differences in treatment regimens over time may also affect the types and risks of side effects. Any organ system can potentially be affected.

For many years, pediatric oncologists have provided oncology care as well as primary care to childhood cancer survivors. However, as the numbers of adult survivors of childhood cancer grow, like adult survivors of congenital cardiac disease and cystic fibrosis, adult care professionals will become health care professionals for survivors of childhood cancer, and they need to be aware of the unique issues and problems these survivors may face.

As a primary care professional caring for these patients, it is important to recognize that their prior cancer treatment may have lifelong effects. These may present as typical medical issues but may also require additional screening and intervention based on the patient's past medical history and treatment. Table 1 provides a summary of potential late effects a childhood cancer survivor may experience. The late effects listed are arranged by organ system. The organ systems affected and the potential late effects are influenced by the survivor's treatment. Not all survivors are at risk for all late effects. A brief overview of potential late effects related to commonly used chemotherapy agents and radiation (Table 2) and commonly encountered childhood cancers (Table 3) is provided for general refer-

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Table 1. Organ System and Potential Late Effects Related to Cancer Therapy

Organ System	Potential Late Effect
Brain	Seizures; learning disabilities; memory problems and/or speed of processing; neurological problems; brain tumors
Endocrine	Hypo/Hyperthyroidism; growth hormone deficiency; cortisol deficiency; SIADH; prolactin deficiency; precocious puberty
Eyes	Cataracts; dry eyes
Ears	Hearing loss; Eustachian tube dysfunction; balance problems
Dental	Cavities; malformed or missing teeth; short roots; gum disease
Sinus	Recurrent sinusitis
Heart and Vascular System	Cardiomyopathy; conduction abnormalities; valve damage; pericarditis; peripheral vascular disease
Lungs	Restrictive lung disease; pneumonitis; bronchiolitis obliterans
Breast	Asymmetry; underdeveloped; breast cancer
Liver	Fibrosis; hepatitis; gall bladder dysfunction
Gastrointestinal	Fibrosis; polyps; bowel obstruction; chronic GVHD; asplenia (actual or functional); GERD
Kidney	Renal dysfunction and/or failure; hypertension
Bladder	Fibrosis; dysfunction; malignancy
Gynecology	Abnormal menstruation; premature menopause; pregnancy complications; vaginal dryness; infertility
Testes	Gonadal failure; impotence; infertility
Skeletal	Amputation; chronic pain; arthritis; avascular necrosis; fracture; osteochrondroma; osteopenia; functional deficits
Skin	Scars; striae; dyspigmentation; secondary cancers; dystrophic nails; alopecia
Psychosocial	Altered peer and family relationships; school, work, and insurance issues; anxiety; depression; survivor's guilt
Peripheral Nervous System	Neuropathies; weakness; phantom pain
Global	Fatigue

Abbreviations: SIADH, syndrome of inappropriate antidiuretic hormone hypersecretion; GVHD, graft-versus-host disease; GERD, gastroesophageal reflux disease

ence. The focus of this article is to provide an overview of late effects by organ systems as well as risk factors and screening guidelines for the potential late effects, recommendations for patient follow-up, and referral.

Cardiovascular Effects

Symptom Presentation and Risk Factors: Cardiovascular disease is a significant medical problem for many Americans. Childhood cancer survivors may be at additional or increased risk for cardiovascular disease secondary to their treatment with chemotherapy and/or radiation. For some survivors of pediatric cancer, treatment-related late effects may not arise until growth and pubertal development have completed. Cardiotoxicity may not appear until many years after the end of treatment. In particular, cardiotoxicity related to the use of anthracycline (eg, daunomycin, doxorubicin, and mitoxantrone) has been the subject of many studies. As a consequence, treatment regimens have changed over the years.[3] Specific late effects include cardiomyopathy, arrhythmias, and left ventricular dysfunction. Pericardial and atherosclerotic disease have also been reported. The increase in blood volume that occurs as a result of pregnancy may adversely affect cardiac function.[4] Clinical symptoms including shortness of breath, chest pain, palpitations, and abdominal symptoms (eg, nausea or vomiting) may predominate in younger patients (<25).

Factors associated with highest risk for cardiotoxicity include those who were <5 years at time of treatment , female, and African American ethnicity. Radiation therapy to the chest or upper left abdomen (involves the left ventricle) also increases risk; higher total dosage is associated with higher risk. The risk for developing late cardiac complications increases with time from anthracycline exposure. Medical conditions such as obesity, congenital heart disease, and pregnancy can contribute to the risk.

Recommendations and Resources: Patients who have received cardiotoxic cancer treatment should have medical follow-up that includes regular cardiac monitoring to detect heart problems early. This is particularly important since these patients are often asymptomatic. An echocardiogram is recommended at entry to long-term follow-up and then subsequently at intervals based on age at the time of treatment, radiation dose, and cumulative anthracycline dose received. A fasting lipid panel profile is recommended every 2 years for survivors who received radiation to the chest. Discussions

Table 2. Frequently Used Chemotherapy Agents and Potential Late Effects

Chemotherapy Class and Drug(s)	Often Used In	Potential Late Effect
Anthracyclines Daunomycin Doxorubicin Mitoxantrone	Leukemias (AML, higher risk ALL) Lymphoma Neuroblastoma Wilms tumor (if higher risk/stage) Osteosarcoma Some soft tissue sarcomas Some liver tumors	Cardiac dysfunction Can be acute More often chronic, may be progressive Related to total dose (mg/m^2 – not mg) Second cancers Usually, but not always, leukemia Enhances radiation effects
Alkylating agents Mechlorethane Cyclophosphamide Ifosfamide Melphalan Cisplatin Carboplatin Nitrosoureas (BCNU[a], CCNU[b]) Dacarbazine and Procarbazine Busulfan	Leukemias (if higher risk ALL) Lymphomas Brain tumors Neuroblastoma Wilms Tumor (if higher risk) Osteosarcoma Soft tissue sarcomas Some liver tumors Retinoblastoma	Marrow suppression Scarring, bleeding of bladder (especially cyclophosphamide and ifosfamide) Infertility, gonadal dysfunction, early menopause Secondary cancer Usually, but not always, leukemia Damage, scarring of lung tissue Hearing loss (especially cisplatin, carboplatin) Kidney dysfunction
Topoisomerase II inhibitors Etoposide Teniposide	Leukemias (AML, higher risk ALL) Some lymphomas Neuroblastoma Wilms Tumor (if higher risk/stage) Some Osteosarcoma Soft tissue sarcomas Some liver tumors Germ Cell tumors	Secondary leukemia or other cancer Infertility or gonadal dysfunction
Bleomycin	Lymphoma	Scarring of lungs, pulmonary fibrosis
Anti-metabolites Methotrexate 5-fluoruracil Cytarabine 6-mercaptopurine 6-thioguanine	Leukemias Lymphoma Brain tumors Osteosarcoma Some liver tumors	Hepatic fibrosis Especially mercaptopurine and thioguanine Neurocognitive changes Mainly with methotrexate when given intrathecally or in high doses
Vinca alkyloids Vincristine Vinblastine	Leukemia (ALL) Lymphomas Neuroblastoma Wilms Tumor Soft tissue sarcomas Liver tumors	Rare weakness, sensation loss Worse if underlying Charcot-Marie-Tooth disease
Steroids Prednisone Dexamethasone	Leukemia (ALL) Lymphomas	Avascular necrosis Weight gain May increase risk for metabolic syndrome
Radiation	Leukemia (high risk CNS) Lymphomas (stage dependent) Brain tumors (type dependent) Neuroblastoma (stage dependent) Wilms tumor (stage dependent) Soft tissue tumors (type, stage & surgery dependent)	Tissue changes Secondary cancers, more often solid tumors Thyroid Breast Sarcoma Neuro-cognitive changes Infertility, or other endocrine dysfunction Pre-term delivery

[a]Carmustine
[b]lomustine
Abbreviations: AML, acute myelogenous leukemia; ALL, acute lymphocytic leukemia; CNS, central nervous system

with patients regarding the safety of aerobic exercise and discouraging heavy weightlifting and wrestling are imperative. Smoking should be strongly discouraged, while healthy eating and exercise should be encouraged.[5] Although childhood cancer survivors may have additional risk factors for cardiovascular disease compared to the general population, it may be possible to modify the risk for cardiovascular disease through lifestyle modification and close medical follow-up.

More frequent cardiac monitoring during pregnancy may be indicated. The Children's Oncology Group (COG) Long-Term Follow-Up Guidelines (2008) recommend additional cardiology evaluation for those women who are pregnant or plan to become pregnant and have received >300mg/m^2 of anthracycline therapy or <300mg/m^2 plus chest radiation.[5] Recommendations include echocardiograms before and periodically during pregnancy (especially in the third trimester) and cardiac function monitoring during labor and delivery.

Pulmonary Effects

Symptom Presentation and Risk Factors: Chemotherapy and radiation therapy can put patients at potential risk for pulmonary late effects. Although changes may be subtle, they may greatly impact a survivor's quality of life. Lung volumes can be reduced, thus limiting the ability to participate in more strenuous activities. Clinical symptoms may include shortness of breath, wheezing, chest pain, and frequent lung infections, such as bronchitis or pneumonia.

Recommendations and Resources: For patients at risk for pulmonary toxicity due to their cancer treatment, a yearly medical check-up is recommended. A chest x-ray and pulmonary function tests may identify lung problems that are not evident on physical exam. The recommendations for frequency of testing are based on the previous treatment the patient received. The COG guidelines include consideration for the administration of pneumococcal (pneumonia) and yearly influenza (flu) vaccinations. Smoking is discouraged, and it is recommended that the survivor avoid second-hand smoke. The importance of regular physical activity and exercise should be encouraged. A complete check-up by a pulmonologist is advised prior to participating in scuba diving.

Musculoskeletal and Bone Health

Symptom Presentation and Risk Factors: Surgery, chemotherapy, and radiation therapy have been instrumental in decreasing mortality rates for patients with muscle and bone tumors. However, chemotherapy can limit soft tissue growth, and treatment regimens with steroid administration can impair bone mineralization, bone growth, or cause avascular necrosis. Radiation and therapy can also hinder growth of bone and tissue. Depending on the area irradiated, this can result in asymmetrical growth with potential risk for scoliosis and increased risk for fractures.

Recommendations and Resources: For patients at risk for musculoskeletal complications, early intervention is imperative to maximize bone health and to decrease the risk for osteoporosis. It is important to encourage patients to have adequate calcium intake or supplementation, to incorporate regular exercise, and to avoid smoking. Follow-up with orthopedics may be needed for survivors of bone or soft tissue tumors who have had limb-sparing procedures or those who have prosthetic devices.

Endocrine and Fertility Issues

Symptom Presentation and Risk Factors: Childhood cancer survivors who received chemotherapy, radiation, and/or surgical treatment during a time of growth and development may be at risk for endocrine and fertility complications. Patients who are treated at a young age or who received radiation treatment to their head, neck, and/or spine are at highest risk for developing endocrine abnormalities. Obesity may be a major problem—particularly for acute lymphocytic leukemia (ALL) survivors who are female, are treated at a young age, and have received cranial radiation. Childhood cancer and BMT survivors also may be at risk for infertility or premature menopause. Patients at highest risk are those who have received radiation therapy to their abdomen, high doses of alkylating agents, and/or bone marrow transplant conditioning regimens. Sexual dysfunction, such as erectile dysfunction and vaginal dryness, can also occur.

Recommendations and Resources: Survivors, particularly those treated at a young age, should have close monitoring of their growth and pubertal development. Patients at the highest risk for endocrinopathies are those who have received radiation to the head, neck, or spine and/or BMT. Close monitoring of growth charts, Tanner staging, thyroid function, gonadotropins (follicle-stimulating hormone [FSH], luteinizing hormone [LH]), and other hormones (estradiol, testosterone) should be monitored for patients who are at risk. Prompt evaluation by a pediatric endocrinologist is recommended if any abnormalities are identified.

Patients with obesity, particularly abdominal obesity, should be counseled regarding weight control. Counseling regarding regular exercise and healthy eating

habits is important for survivors to decrease other health concerns that may arise secondary to their obesity.

For patients at risk for early menopause, counseling regarding family planning issues is important as these women may have a shortened timeframe for fertility. For men and women at risk for infertility, referral to a reproductive medicine specialist for further evaluation of fertility (ie, semen analysis, hormone levels) may be necessary. Referral to a center familiar with cancer and BMT survivors may also be beneficial.

Fertile Hope and the Lance Armstrong Foundation (Appendix A) are excellent resources for childhood cancer and BMT survivors dealing with fertility issues. They can be an excellent resource both prior to therapy, as well as after therapy has been completed. Information available to patients includes referral centers and fertility options.

Other Organ Systems

Symptom Presentation and Risk Factors: Chemotherapy, surgery, and radiation can affect many other body organs as well. Radiation therapy can contribute to vision loss or cataract development. Extensive steroid use can predispose survivors to cataract development. Chemotherapy agents, radiation therapy, and some antibiotics can result in hearing loss. Routine dental follow-up every 6 months is highly recommended to assess for dry mouth, dental caries, malformed dentition, enamel breakdown, and tooth decay.

A history of multiple blood product transfusions while undergoing treatment increases the risk for hepatitis and liver disease. Patients transfused prior to 1992 have the highest risk.

Gastrointestinal late effects can include liver and bowel symptoms. Patients with a history of surgery, radiation, or BMT are at risk for the development of fibrosis, bowel obstruction, polyps, or other concerns. Liver fibrosis can occur as a result of chemotherapy, radiation, and multiple transfusions. Some patients experience altered immune function. Patients who have had a splenectomy or who have a nonfunctional spleen are at risk for severe encapsulated bacterial infection.

Cancer treatment and exposure to certain antimicrobials can contribute to long-term kidney and bladder dysfunction. Patients with a single kidney require special attention to their kidney function and may need special precautions, including the use of a flank guard, when playing contact sports.

Recommendations and Resources: Regardless of the late effect, it is imperative that a detailed history be documented and a comprehensive exam performed. Survivors who are at risk for other organ late effects should be identified and screening measures initiated. Specific follow-up recommendations are outlined in the COG guidelines based on the survivors' risk factors.[5]

Secondary Cancers

Symptom Presentation and Risk Factors: Secondary cancers are a known complication after childhood cancer treatment and BMT. The risk for occurrence of secondary cancers is estimated to be at least 2-8 times higher than risk for the general population to develop a primary cancer.[6-8] The incidence of secondary cancers is 3%-12% in the first 20 years after diagnosis and increases over time. Potential risk factors for developing a secondary malignancy after childhood cancer include exposure to radiation, exposure to specific chemotherapeutic agents (alkylating agents and topoisomerase II inhibitors), genetic predisposition, and BMT patients with a history of chronic graft-versus-host disease.

Recommendations and Resources: Patients with a history of cancer or BMT may need additional screening for secondary cancers depending on the type of cancer and the treatment they received. It is important for the primary care professional to be aware of any previous treatment and its implications for the development of a secondary cancer.

Patients who have a history of radiation as part of their cancer treatment or BMT preparative regimen should have inspection and palpation of the skin and soft tissues in the radiated fields.[5] Female patients should have mammography and breast magnetic resonance imaging (MRI) at an earlier age if they have received radiation to their chest.[5]

Patients exposed to certain chemotherapeutic agents, specifically alkylating agents and topoisomerase II inhibitors, have been shown to have an increased risk for myelodysplasia and acute myelogenous leukemia (AML). The incidence of developing a secondary AML peaks 4-6 years after exposure and typically does not occur later than 15 years from exposure. Patients who have been exposed to these agents should have a complete blood count checked annually for at least 10 years after the completion of chemotherapy.[5]

Neurocognitive and Psychosocial Late Effects

Symptom Presentation and Risk Factors: Adult survivors of pediatric cancer are at risk for development of cognitive late effects. At increased risk are those who have had central nervous system (CNS) disease and/or treatment, such as brain tumor and ALL survivors. Research has consistently shown that contributing factors to the development of cognitive late effects include

systemic and in particular, intrathecal chemotherapy and/or cranial irradiation,[9] which have a primary effect on the white matter of the brain. The effect is age and dose dependent, such that younger children and those who receive higher doses of intrathecal chemotherapy and/or radiation are at greater risk.[9]

Cognitive late effects differ from acute cognitive problems commonly reported by patients during chemotherapy and/or radiation ("chemo brain") that resolve once treatment is completed. Cognitive late effects may be subtle to severe and may include problems with or decreases in intellectual functioning, attention, memory, executive functioning, and processing speed.

Although the majority of studies have found that, overall, cancer survivors adjust adequately to life after treatment,[10-12] some survivors experience psychosocial difficulties, such as symptoms of depression and anxiety, and social problems. Risk factors associated with poor psychosocial outcome include diagnosis, type and length of treatment, severity of disease, age at diagnosis, medical late effects of disease and treatment, length of remission, and time since diagnosis.[11]

Recommendations and Resources: When survivors present with neurocognitive difficulties, it is important to consider leukoencephalopathy, which may occur after CNS treatment for ALL or other disorders. A referral for imaging studies may be warranted. In general, if neurocognitive problems exist, the primary physician should provide a referral to a psychologist or neuropsychologist for neurocognitive testing (referrals may be obtained from local cancer centers); preferably testing will be completed by those who have experience in assessment of this population. Stimulant medications, such as methylphenidate, have been prescribed by clinicians to treat attention/concentration, processing speed, and or executive functioning problems in cancer survivors, given its efficacy in patients with attention-deficit/hyperactivity disorder (ADHD). Preliminary results of ongoing randomized clinical trials of stimulant medication use in childhood cancer survivors are promising.[13]

With psychosocial problems such as adjustment or health-related quality-of-life difficulties, cognitive behavioral therapy, provided by a mental health professional with experience working with individuals with medical conditions, is an empirically supported treatment for these issues (eg, anxiety, depression). Sometimes a combination of therapy and psychotropic medication may be warranted. Long-term survivorship clinics have mental health professionals who specialize in the psychosocial treatment of cancer survivors.

If cognitive problems are detected, the psychologist will make specific recommendations for assistance in school. For an adult, a referral to Wisconsin's Department of Vocational Rehabilitation and other vocational resources is recommended. Colleges and universities have disability programs that may assist cancer survivors with disability accommodations if needed. Cancer survivors who will be attending college may be eligible to apply for scholarships based upon their cancer history, such as scholarships offered through the American Cancer Society. Organizations such as The Sam Fund and Care. Commit. Change. (CCC) provide financial assistance, college scholarships, and scholarship information and resources for young adult survivors of cancer. There are a number of psychosocial support programs and resources available in the community that may be helpful to survivors. See Appendix A for a comprehensive list of websites.

DISCUSSION

Childhood cancer follow-up care has taken place in a variety of settings: primary care clinics (pediatrics, internal medicine, family practice, ob/gyn), oncology clinics (pediatric and adult), and specialized long-term follow-up clinics. The health care professional may be less familiar with the magnitude of cancer-related health risks and screening these survivors face, and—in the setting of a busy practice—may lack the time to gain expertise in survivor care. Although follow-up may occur at the tertiary care center, the majority of after-cancer care occurs in the primary care arena. For this reason, ready and easy access to resources to facilitate care is of paramount importance. Fortunately, there are many resources available (see Appendix A).

In Wisconsin there are 2 centers that provide care and recommendations for childhood cancer survivors. The Next Steps Clinic of the Midwest Athletes Against Childhood Cancer (MACC) Fund Center for Cancer and Blood Disorders provides care to oncology and BMT survivors. Survivors are provided with a treatment summary of their cancer care as well as recommendations for follow-up of current late effects, screening for potential late effects, referrals to other specialists, and assistance with nutritional, school, and psychosocial aspects of care. Educating survivors regarding their disease, treatment, and potential late effects is critical. Survivors are given a variety of written resources regarding survivorship issues. Depending on the specific needs of the survivor, these patients may continue to be seen annually in the survivorship clinic or may be transferred to their primary care professional for continued care. The Caring for Life Clinic at the American

Table 3. Common Childhood Cancers and Some Potential Late Effects

Frequently Used Chemotherapy Drugs	Important to Know	Potential Late Effect
	Acute Lymphocytic Leukemia	
Steroids Anti-metabolites (methotrexate, mercaptopurine, cytarabine) Vincristine Asparaginase Daunomycin or Doxorubicin Less often: Cyclophosphamide etoposide	Type of disease • Low, intermediate, high or very high risk Era of treatment Type(s) of treatment • Anthracyclines • Topoisomerase inhibitors • Alkylating agents • Radiation • Bone marrow transplant Age at time of treatment	Overall, few effects Most common • Avascular necrosis (older age, use of) dexamethasone • Neuro-cognitive problems (younger age) Metabolic syndrome
	Acute Myelogenous Leukemia	
Daunomycin, Mitoxantrone Etoposide Cytarabine Asparaginase (May include high dose therapy and stem cell rescue [BMT])	Age at diagnosis Was stem cell rescue (BMT) part of therapy Was radiation therapy used	Cardiac problems Infertility and/or other endocrine dysfunction Secondary malignancies Chronic GVHD (if allogeneic BMT) Immune dysfunction (if allogeneic BMT)
	Lymphomas	
Cyclophosphamide, ifosfamide Doxorubicin Vincristine Prednisone, Dexamethasone Etoposide Bleomycin	Kind of lymphoma • Hodgkin • Non-Hodgkin eg, Burkitt, other B-cell or T-cell Radiation? Which chemotherapy drugs	Cardiac problems Infertility Avascular necrosis Neuro-cognitive changes Secondary cancer (mostly leukemia unless also received radiation) Immune dysfunction
	Brain Tumors	
Nitrosoureas Cyclophosphamide Cisplatin, carboplatin Temozolomide Vincristine Thiotepa Methotrexate	Type Location Treatment • Chemotherapy • Radiation Surgery	Focal neurologic deficits related to tumor location or surgery Endocrine problems Neuro-cognitive problems Infertility Secondary cancers Pulmonary fibrosis
	Neuroblastoma	
Cisplatin, carboplatin Vincristine Doxorubicin Cyclophosphamide Etoposide; Topotecan, Irinotecan Temozolomide	Age and stage of disease at diagnosis What therapies • Chemotherapy • Radiation (How much? Where?) Stem cell rescue (BMT)	Cardiac dysfunction Hearing loss Infertility of other endocrine problem Secondary cancers

Abbreviations: GVHD, graft-versus-host disease; BMT, bone marrow transplant; CNS, central nervous system

Table 3. Common Childhood Cancers and Some Potential Late Effects (CONTINUED)

Frequently Used Chemotherapy Drugs	Important to Know	Potential Late Effect
	Wilms Tumor (Fortunately, Few)	
Vincristine Dactinomycin If higher risk/stage: Doxorubicin Cyclophosphamide Etoposide	Location (side), stage of tumor at diagnosis Therapy • Chemotherapy agents used anthracycline alkylator topoisomerase inhibitor Radiation (where and how much)	Cardiac dysfunction Pulmonary fibrosis Liver dysfunction Pre-term births Secondary cancers Renal dysfunction rare (unless predisposed to Wilms Tumor)
	Osteosarcoma	
Doxorubicin Cisplatin Methotrexate Less often: Etoposide Ifosfamide	Therapy	Musculoskeletal problems relating to tumor and/or surgery Cardiac dysfunction Hearing loss Renal dysfunction Second cancers
	Rhabdomyosarcoma, Ewing sarcoma, other soft tissue sarcomas	
Vincristine Dactinomycin Cyclophosphamide, Ifosfamide Doxorubicin Recent additions: Etoposide Irinotecan Topotecan	Age at diagnosis Location of primary tumor and any metastatic site Type(s) of therapy • Chemotherapy • Radiation • Surgery • Both radiation and surgery	Musculoskeletal problems relating to tumor location Cardiac dysfunction Secondary cancers Infertility or other endocrine problems Bladder scarring Pulmonary fibrosis
	Liver tumors	
Cisplatin 5-fluorouracil Vincristine Doxorubicin	Which tumor • Hepatoblastoma • Hepatocellular carcinoma • Other Chemotherapy agents used	Cardiac dysfunction Hearing loss Renal dysfunction
	Germ Cell tumors	
Bleomycin Cisplatin Etoposide	Age at diagnosis Type, stage of tumor Location of tumor • Extragonadal • Gonadal • CNS Chemotherapy agents used	Hearing loss Renal dysfunction Secondary cancers Endocrine problems mainly if CNS tumor
	Retinoblastoma	
Cyclophosphamide Carboplatin, cisplatin Vincristine Etoposide	Family history Unilateral or bilateral Therapy • Surgery • Chemotherapy • Cryotherapy Radiation	Vision loss Hearing loss Renal dysfunction Secondary cancers Pituitary dysfunction if tumor located there also

Abbreviations: GVHD, graft-versus-host disease; BMT, bone marrow transplant; CNS, central nervous system

Family Children's Hospital—University of Wisconsin Hospital and Clinics also provides survivorship care for the survivors of childhood cancer and BMT. Further information regarding the above 2 programs is available in Appendix A.

The patient's treating cancer/BMT institution can be a resource to the primary care professional in providing a complete treatment summary and recommendations for the individual survivor. If the survivor does not have access to the original treating facility, there are multiple survivorship clinics around the country that may be able to identify for a specific patient, his or her risks and screening recommendations. The COG website, www.childrensoncologygroup.org, provides information about and locations of survivorship clinics around the country.

The COG has developed, and continues to revise, a set of evidence-based guidelines for the follow-up and screening for chronic health conditions or late effects associated with therapy (www.survivorshipguidelines.org). Health links are also available for patients and their families, of which 5 have been translated into Spanish. These guidelines are intended to standardize the follow-up care of survivors throughout their lifetime, with an emphasis on evidenced-based screening for late effects of therapy rather than for recurrence of malignant disease, in order to facilitate early identification of late effects, promote a healthy lifestyle, and provide ongoing monitoring of health and timely intervention for late effects.

Adult caregivers will be seeing an ever-growing population of adult survivors of childhood cancer in their practices. It is vitally important that these health care professionals are aware that late effects of treatment can occur years after treatment. Because of this, adult survivors of childhood cancer and BMT need specialized screening for potential late effects based on their prior treatment. Resources are available to provide guidance to the general internist seeing these patients, and cancer survivorship clinics in Wisconsin are available as resources for adult childhood cancer survivors as well as the practitioners caring for them. There are multiple models for the care of the childhood cancer survivor (eg, life-long care at the pediatric treating institution, primary care model) each with their own unique advantages and disadvantages. However, a model of collaboration and communication between the specialized survivorship clinic and the primary care professional may be the most advantageous for the survivor in meeting his or her medical and psychosocial needs. A full discussion of this topic is needed,but is beyond the scope of this article. Continued efforts for ongoing surveillance need to be made between the primary care professional and survivorship clinic in order to provide comprehensive and holistic care to these survivors of childhood cancer.

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Appendix A. Childhood Cancer Survivor Resources for the Primary Care Provider

American Cancer Society: Health organization and largest non-governmental funder of cancer research and discovery.	*www.cancer.org*
Cancer Care: Provides free support services to anyone affected by cancer.	*www.cancercare.org*
Candlelighters Childhood Cancer Foundation: Provides information, awareness, advocacy, and research for childhood cancer patients and families.	*www.candlelighters.org*
A local chapter can be found in Madison, Wis (Capital Candlelighters).	*www.capcan.org*
The Caring for Life Clinic at the American Family Children's Hospital (University of Wisconsin): Comprehensive survivorship clinic in Madison, Wis	*www.uwhealth.org/pediatriccancer/caringforlifeclinic/11136*
CCC: An annual college scholarship program that recognizes survivors who demonstrate leadership, commitment to education, and betterment of their community.	*www.cccscholarships.org*
Children's Hospital of Wisconsin's Young Adult Oncology Group in Milwaukee: Young adult cancer survivors who meet monthly to provide one another with support, education, and resources in a fun and relaxed atmosphere.	*www.chw.org/yaog*
Children's Oncology Group: Long-term follow-up guidelines for survivors of childhood, adolescent, and young adult cancers.	*www.survivorshipguidelines.org*
Cure Search: Unites the Children's Oncology Group and the National Childhood Cancer Foundation to fund research.	*www.curesearch.org*
Fertile Hope: Nonprofit organization dedicated to providing reproductive information, support, and hope to cancer patients and survivors whose medical treatments present the risk for infertility.	*www.fertilehope.org*
Gilda's Club: Emotional and social support community.	*www.gildasclub.org/*
There are local chapters located in Milwaukee and Madison, Wis.	*www.gildasclubsewi.org* *www.gildasclubmadison.org*
Lance Armstrong Foundation: Unites people to fight cancer and pursue an agenda focused on prevention, access to screening and care, and improvement of the quality of life for cancer survivors.	*www.livestrong.org*
Leukemia & Lymphoma Society: Health organization dedicated to funding blood cancer research, education, and patient services.	*www.lls.org*
There are local chapters located in Brookfield, Madison, and Menasha.	*www.leukemia-lymphoma.org/all_page?item_id=5101*
National Cancer Institute: Conducts and supports research, training, health information dissemination, and other programs related to cancer diagnosis and treatment.	*www.cancer.gov*
National Children's Cancer Society: Provides support, information, and education to those impacted by childhood cancer.	*www.nationalchildrenscancersociety.com*
National Osteoporosis Foundation: Provides information regarding the importance of bone health.	*www.NOF.org*
Next Steps Clinic (Children's Hospital of Wisconsin): Comprehensive survivorship clinic in the Milwaukee, Wis area.	*www.chw.org/NextSteps*
Planet Cancer: An online community of young adults with cancer.	*www.planetcancer.org*
Sam Fund: Assists young adult survivors of cancer by providing financial support through the distribution of grants and scholarships.	*www.thesamfund.org*
U.S. Preventive Services Task Force: Provides recommendations for cancer screening.	*www.ahrq.gov/clinic/uspstfix.htm*

Community-based HPV vaccination for rural Wisconsin

Michelle Clark-Forsting, University of Wisconsin School of Medicine and Public Health

The mission of my Wisconsin Medical Society Foundation (Foundation) Summer Fellowship in Government and Community Service was to disseminate information about human papillomavirus (HPV), cervical cancer, and the HPV vaccine so that female adolescents, together with their parents, could make informed decisions about whether or not to receive the HPV vaccine series.

The project was developed as a result of concerns raised by Michael Mahan, MD, of Black River Falls, Wis, that a low proportion of his adolescent patients were opting to receive the vaccine. Because the vaccination series should be completed before any sexual activity occurs, our goal was to speak with our target population (ie, female adolescents and their parents or guardians) during pre-teen checkups and/or visits to the clinic for acute illnesses, as well as reaching them through community health education efforts and print materials.

Throughout the summer, I spent a full week with at least 5 different family physicians and nearly 3 weeks working with my mentor, Dr Mahan, at the Krohn Clinic in Black River Falls. Each time we saw a patient who was eligible for the vaccine (ie, female aged 9 to 26), we discussed HPV, cervical cancer, and the HPV vaccine. To prepare, I studied the HPV vaccine prescribing information and completed an extensive literature review, not only so that I could provide the most up-to-date information to patients, but also to develop a survey regarding HPV, cervical cancer, and the HPV vaccine for distribution to parents of vaccine-eligible adolescents.

In addition to work in the clinic, I was able to participate in some community health education activities. I served on the planning committee for an event titled "Women's Wellness: A Free Community Event," which drew nearly 150 attendees. Another event, a women's health fair held at the Black River Memorial Hospital featured displays, information, and screening services from multiple departments of the Black River Memorial Hospital, Krohn Clinic, and Jackson County Public Health Department as well as Western Dairyland Women's Health Center and the Ho-Chunk Health Department. The health fair included a panel of health care professionals from Krohn Clinic who addressed many women's health topics ranging from adolescence through post-menopause. I participated in the panel focusing on adolescence, with an emphasis on educating the audience about HPV, cervical cancer, and the HPV vaccine. I also prepared a table-top display used at the health fair and later displayed at Krohn Clinic.

Through my Foundation fellowship, I gained practical clinical experience and learned a great deal about health care in a rural community. As a student in the Wisconsin Academy for Rural Medicine at University of Wisconsin School of Medicine and Public Health, I have a strong desire to eventually return to my hometown area of Black River Falls and practice family medicine. This fellowship has strengthened that desire. By serving on the planning committee for the women's health fair and working with the variety of organizations that affect health care, I gained invaluable networking experience and intervention planning skills that will help me in the future. I am grateful for the insight I gained into the many different factors that can affect a community's health through this fellowship opportunity.

The goal of the Wisconsin Medical Society Foundation's Summer Fellowship in Government and Community Service Program is to provide medical students a public health research opportunity within a Wisconsin community. The experience exists to educate students about ways in which the medical profession can work to improve health through connections to both community organizations and government. Each student receives a $3500 stipend. The fellowships require the support of donors to make the experience possible and physician mentors who help guide and foster students' projects.

In 2009, the Foundation provided 6 fellowships, which will be highlighted in the *Wisconsin Medical Journal* throughout the year. For more program information and sponsorship opportunities, please contact Foundation Executive Director, Rebecca Thompson, CPA, at rebecca.thompson@wismed.org.

Robert N. Golden, MD

Dean's Corner

A strategic approach to addressing physician workforce needs

Robert N. Golden, MD

There are many complexities related to our national dialog on health care reform, but clearly an important aspect of any successful effort to improve access to health care must take into account the growing scarcity of physicians working with underserved populations. The UW School of Medicine and Public Health has been strategically addressing this issue in several ways.

In an earlier issue of this *Journal,* we highlighted one of our school's pioneering efforts: the Wisconsin Academy for Rural Medicine (WARM). This program is a major component of our strategic response to the national cry for increasing the physician workforce. We are now in the 3rd of 5 years of ramping up WARM. In the end, we will have increased each class by 25 students, with the new WARM cohort selected based on their backgrounds, aptitude for and commitment to careers that focus on serving Wisconsin's underserved rural populations.

By all measures, this program—directed Byron Crouse, MD, our Associate Dean for rural and Community Health—has gotten off to a remarkably strong start. Our first group of WARM students is currently engaged in their third year of clinical training at Rice Lake, a vital training site of our Marshfield Academic Campus. We are looking forward soon to expanding the clinical training to include sites in Prairie du Chien, Whitehall, Tomah, and Decorah, all of which are affiliated with our Western Academic Campus in the Gundersen Lutheran Health System.

An equally pressing need is to increase the pipeline of physicians who will focus their professional work on underserved populations in our urban centers. Wisconsin urgently needs more clinicians in Milwaukee, the area of greatest disparity in our state. We are extremely excited about the successful launch this year of the Training in Urban Medicine and Public Health program, or TRIUMPH, under the leadership of Cynthia Haq, MD. Marge Stearns, MPH, has been our invaluable liaison in Milwaukee.

Following a successful pilot in 2009, this year we selected an impressive group of 8 medical students who will spend 5 months of their 3rd year and at least 5 months of their 4th year in Milwaukee. They will complete obstetrics/gynecology, primary care, and internal medicine clerkships, as well as many senior-year electives. These will take place in the Aurora Sinai Medical Center; in several federally qualified community health centers, such as 16th Street Community Health Center and Milwaukee Health Services; and in free clinics, neighborhood centers, and other community-based organizations such as the Bread of Healing Clinic, Walnut Way, the Milwaukee Health Department, Milwaukee Public Schools, and United Community Center. All of these partners are committed to serving Milwaukee's most disadvantaged residents.

What is especially exciting about TRIUMPH is the partnership each medical student forms with a community group and community mentor. During the pilot phase last year, our students worked with many of the organizations listed above to create innovative projects dealing with topics such as tobacco cessation, reduction in infant mortality, reduction in childhood obesity rates, sex education, substance abuse, nutrition, and prevention/control of hypertension and diabetes.

We believe that TRIUMPH is a great example of the Wisconsin Idea being channeled into a thoughtful strategic plan for tackling one of the most critical issues in our state: the limited supply of physicians who work primarily with disadvantaged and underserved urban populations.

We are amazed at how excited students have been about this program.

Continued on page 115

Doctor Golden is the Robert Turell Professor in Medical Leadership, Dean of the School of Medicine and Public Health, and Vice Chancellor for Medical Affairs at the University of Wisconsin-Madison.

What is wrong with your medical staff?

Elizabeth A. Snelson, Esq.

As a physician, you bring your patients to a hospital to provide them needed care and to access quality patient care delivery systems supporting your hospital practice. To do so, you belong to the hospital medical staff, which provides direct means for you to participate in peer review, set the standard for the care provided, and add your voice to those of other physicians and other professionals to determine how clinical decisions are made at the hospital.

So, how is that working for you?

With physicians employed by hospitals, independent physicians under pressure, and hospitals taking over review and quality functions, the medical staff can be so transparent as to be invisible, failing to fulfill the intent of an organization of clinicians that oversees care provided within the bricks and mortar, schedules, and wards under management and support staff hired by the hospital board of directors. Does your medical staff measure up as the quality standard setter and change engine in charge of all things clinical, or is the medical staff change engine stalled out, just doing what it is told? Look out for the following problem areas.

Elizabeth A. Snelson, Esq. of Legal Counsel for the Medical Staff, PLLC, represents medical staffs around the country from her office in St Paul, MN. She can be reached at easesq@snelsonlaw.com and through her website, where she blogs on medical staff issues at Bylawg@snelsonlaw.com.

Organization

The minimum requirement to meet Centers for Medicare & Medicaid Services (CMS) requirements, and Joint Commission or Det Norske Veritas (DNV) accreditation standards, is that there is "an organized medical staff." How organized is your medical staff?

Most medical staffs are organized into departments, comprised of single specialties or related subspecialties. The Joint Commission, which certifies most United States hospitals to meet the federal Conditions of Participation for Medicare, recognizes the role departments should play in standard-setting, requiring, for example, that the data to be collected in ongoing peer review "is determined by individual departments and approved by the organized medical staff."[1] Nonetheless, some hospitals employ non-physician quality assurance staff who determine and cull the data that the hospital is more interested in, placing it in front of physicians who are not aware that the medical staff organization is to set the data points for its use in improving patient care.

Medical staffs are also organized into committees, comprised of different specialties to handle tasks that span departments. Increasingly, "medical staff" committees are made up of hospital administrators, who are paid to attend or even run the "medical staff" committee meetings. Are committees of your medical staff limited to, or at least representative of, your medical staff?

How do medical staff decisions get made? Organizations of the size, complexity, and responsibility of your medical staff have basic elements to assure transparent and effective decision-making. These common structures can be found in organizations ranging from the Girl Scout Council to a church vestry, but are rare occurrences in medical staff organizations. For example, does your medical staff have a budget, and a finance committee to oversee it?

The medical staff has—or should have—dues, and ought to have a budget to determine how funds are allocated and simple procedures governing which officers sign checks. Your local school parent teacher association has this much structure, but medical staffs have either not faced this, or in some cases have been discouraged from handling money matters by hospital management.

Medical staffs also need, but almost never have, basic conflict of interest policies, governing who can serve in medical staff leadership and what conflicting interests should be sorted out in assigning peer review duties or deciding who is and is not qualified to perform procedures or recommend therapies, despite American Medical Association (AMA) policy recommending conflict of interest policies for all medi-

cal staffs.[2] The medical staff conflict of interest policy should call for identifying physicians who have financial relationships with the hospital (such as employment or exclusive contracts) to guard against manipulation, while protecting them from retribution from the hospital when the physicians support the quality decision even when it does not advance the hospital's bottom line. Medical staff decision-making should be transparent and geared toward decisions that will promote quality patient care.

Code of Conduct

What is in the code of conduct that applies to the medical staff? If you don't know now, you might later find out the hard way that it prohibits conduct that would not occur to you as being "inappropriate" or "disruptive"[3]—such as conduct that competes with the hospital system. As most corporations and other organizations do, the hospital corporation has a code of conduct, which will apply to physicians unless the medical staff adopts a medical staff specific code of conduct governing its members' behavior. Hospital codes of conduct are designed for employees but often do not translate well to physicians who are not employees, directing complaints to the Human Resources Department instead of to peer review, or punishing violators who, for example, are automatically "disruptive" when they admit patients because a poorly written Code condemns "conduct that adds to the workload of the staff." Physician behavior should be addressed and controlled as warranted by the organized medical staff in the medical staff's code of conduct.[4]

Meetings

Medical staffs that have meeting requirements that do not work for the medical staffs are medical staffs that do not work. Many medical staffs have outdated requirements for meetings that are either unenforced or unenforceable, so that the medical staff never takes an action because it never has a forum. If your medical staff does not meet, consider revising your structure to permit virtual meetings that can take place online, over an extended period during which physicians can log in and comment, vote, and otherwise participate.

Bylaws

The home for medical staff organization is its medical staff bylaws. Do your medical staff bylaws need some housecleaning? If the basic organizational problems described here are not resolved in your medical staff bylaws, the answer must be "yes." In Wisconsin, medical staffs have the benefit of a court ruling that medical staff bylaws are a contract.[5] Medical staff bylaws are strengthened by this holding, but it is crucial that the medical staff bylaws are current and helpful for the medical staff. It's your contract with the hospital—make it a good one. And if your medical staff's hospital is accredited by the Joint Commission, know that changes in the accreditation requirements are pending and may be put into operation in 2011. Stay tuned for changes for your organized medical staff.

References

1. Joint Commission standard MS 08.01.03, Element of Performance 2.
2. American Medical Association. AMA Policy Compendium H-225.957.
3. Joint Commission standard LD 03.01.01, Element of Performance 4.
4. American Medical Association. AMA Council on Ethics and Judicial Opinion E-9.045.
5. *Austin v Mercy Health System,* 1995 WL 525250 (Wis. App.).

WHITEC

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- ambulatory clinics connected to a public or critical access hospital.
- community health centers or rural health clinics.
- other ambulatory settings predominantly serving uninsured, underinsured and medically underserved populations.

Each participating practice will complete an initial readiness assessment. Then, an individualized plan will be developed to provide a methodical process and needed services for achieving effective EHR implementation. For those practices that have already adopted and are striving for meaningful use, tailored assistance will be available.

Other WHITEC services include the following:

- workflow analysis and redesign tools.
- technology selection.
- contracting and purchasing tools.
- assistance with implementation.
- best practice information in privacy and security.
- assistance in interoperability and health information exchange.
- EHR optimization.

Practices interested in working with WHITEC are encouraged to complete an Application to Participate form, which is available on WHITEC's website: www.whitec.org. For more information, visit the website or e-mail QandE@wismed.org.

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1. Margolis J. The great, the awful and the scary. What adopters have to say about implementing an EHR. *MGMA Connexion*. 2008; July: 24-27.

The Wisconsin Pressure Ulcer Coalition

Jay A. Gold, MD, JD, MPH; Jody Rothe, RN, WCC

In general, physicians, even those with a fair number of nursing home patients, tend to view the prevention of pressure ulcers as primarily a nursing issue. Such an attitude is not devoid of sense, as the systematic care of pressure ulcers needs to be accomplished primarily by those who work on the premises. But in the words of the American Medical Directors Association (AMDA), "Because medical conditions may contribute to and complicate the development of pressure ulcers, practitioners should not view ulcers as solely a nursing challenge but rather as a problem best addressed by a comprehensive, interdisciplinary approach to the patient."[1]

Pressure ulcers constitute a widespread problem in residents. The Centers for Medicare & Medicare Services (CMS) reports that from July to September 2009, the percentage of high-risk residents (those with impaired mobility, malnourishment, or coma) was 9.9% in Wisconsin (12.5% nationally); rates in patients without those conditions were 2.5% both statewide and nationally.[2] Pressure ulcers cause considerable harm to patients, hindering functional recovery, frequently causing pain, and often serving as vehicles for the development of serious infections. They also are associated with extended length of stay and increased mortality: an estimated 60,000 patients die each year from complications due to hospital-acquired pressure ulcers.[3] Furthermore, with appropriate measures, pressure ulcers can be prevented in many cases (Table 1).[4] For these reasons, and because treating pressure ulcers can be extremely costly, the Institute for Healthcare Improvement (IHI) chose pressure ulcer prevention as 1 of the 12 interventions in its 5 Million Lives Campaign.[5]

Over the last 7 years, MetaStar has worked with Wisconsin nursing homes on projects to improve the diagnosis and treatment of pressure ulcers. For a time, MetaStar worked on this topic with hospitals as well. Currently, in our Medicare contract, MetaStar is working with participating nursing homes to increase the rate at which high-stage pressure ulcers are treated appropriately, and to increase the use of preventive measures for pressure ulcers at all stages.

In addition to the work under contract with Medicare, in 2009, MetaStar established the Wisconsin Pressure Ulcer Coalition (WPUC), a large statewide cross-setting collaborative whose goal is to reduce the incidence of pressure ulcers, while increasing cross-setting communication. Currently there are 90 Wisconsin facilities participating in WPUC: 66 nursing homes, 13 hospitals, 8 home health or hospice agencies, and 3 assisted living facilities. An advisory group composed of representatives of various stakeholders and facilities provides guidance. Because this work is over and above MetaStar's work with Medicare, a modest fee is charged to participants.

Table 1. Strategies for Preventing Pressure Ulcers

For all patients
• Conduct a pressure ulcer admission assessment for all patients
• Reassess risk for all patients daily
For patients at risk
• Inspect skin daily
• Manage moisture
• Optimize nutrition and hydration
• Minimize pressure

In WPUC's first year, participants saw an overall decrease of 38% in the prevalence of pressure ulcers, and a 33% reduction in the rate of facility-acquired pressure ulcers. These results were achieved on the basis of a variety of activities:

- *Learning sessions*—MetaStar held 3 statewide learning sessions over the course of the year, with nationally known speakers and an opportunity for attendees to work on action plans.
- *Regional meetings*—Facilities in different regions of the state came together for cross-setting networking, using a toolkit MetaStar

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developed for that purpose.

- *Webinars*—MetaStar sponsored a series of webinars dealing with different areas of pressure ulcer prevention. These, like the learning sessions, carry continuing education credit.
- *Data*—Facilities collected data; MetaStar put the data into monthly reports and ran charts.
- *E-newsletter*—A regular newsletter provided additional information to participants.

WPUC is continuing with similar activities in its second year. Given the stakes, it behooves facilities to consider joining the coalition. If a facility you work with is interested in exploring the possibility of membership, they should contact Jody Rothe at 608.274.1940 or jrothe@metastar.com.

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We are equally in awe of—and so very grateful to—the community-based mentors and preceptors who have enthusiastically embraced additional teaching responsibilities, on top of their already filled plates of responsibilities.

With the creation of WARM and TRIUMPH, we have made important strides in recruiting more medical students into community service where they are needed the most. At the same time, it has focused our attention on the earlier components of the clinician workforce pipeline. Ideally, we would like to attract young people into medical careers that focus on underserved populations in rural and central city Wisconsin, especially those who are from disadvantaged underserved populations themselves.

Thus, we created a college pipeline program, Rural and Urban Scholars in Community Health (RUSCH). This past summer we began RUSCH in partnership with the University of Wisconsin-Platteville and the University of Wisconsin-Milwaukee, and quickly expanded the program to include Spelman College in Atlanta. We hope that over time, we will be able to expand this program to include other colleges in Wisconsin.

Many steps remain in the long journey to achieving the important goals of health care reform in our country. We believe that WARM, TRIUMPH, and RUSCH represent giant leaps forward in our trek toward full access to safe, high-quality health care for all.

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