

# minnesota MEDICINE

## Slowing the *revolving* *door*

Hospitals address readmission rates

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Hospital Chaplain

Critical Access Hospitals—  
Hubs for Rural Health Care

How Hyperbaric Oxygen  
Therapy Aids Healing





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COVER STORY

# Slowing the Revolving Door

| By Kate Ledger

Minnesota's hospitals are leading the way in reducing preventable readmissions.

Photo courtesy, Minnesota Hospital Association

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**Subscriptions**

Annual subscription - \$45 (U.S.), \$80 (all international)

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Photo by Scott Walker

# Reinventing the “Sick House”

Although the future is hazy, it's clear that tomorrow's hospital will not be like today's.

In the past century and a half, hospitals in the United States have done a 360. In the late 19th and early 20th centuries, the vast majority of medical care was delivered by the family doctor, a Norman Rockwell archetype with black bag and draped stethoscope visiting sick folks on the farm or in their homes. Only when those folks got deathly ill did they go to the “sick house” for prolonged stays involving questionable treatments. In an era when medicine had little that was scientifically sound to offer the sick, hospitals were a last resort for remedies that included rest and purges.

As 20th century technologically and scientifically driven medicine flourished, the hospital became a haven for “miracle cures.” The sick still came to the hospital, but now it was for effective medical care that couldn't be delivered elsewhere. Established hospitals bulged at the seams, and new hospital construction skyrocketed in the 1960s. By the 1980s, we discovered that all that high tech was expensive and the longer patients stayed in hospitals, the higher the bill and the more rapid the bloating of the American health care dollar. So during the past 20 years, hospitals in this country have come full circle—still a refuge for the sick, but delivering care to an ever smaller number of the ill.

The transitions have been rocky. As procedures moved from inpatient to outpatient, length of stays plummeted, and hospital censuses shrank. As government and private payers looked for ways to slash budgets, hospitals were targeted as big-ticket items. As primary care physicians abandoned the hospital part of their practices, the collegial core of the hospital medical staff withered. And the sick at the “sick house” just got sicker. Although the future is hazy, it's clear that tomorrow's hospital will not be like today's.

Perhaps a glimpse of the future is the program at TRIA Orthopaedic Center, where after routine total joint replacement, otherwise healthy patients receive postoperative care at a nearby Hilton hotel. In an uncomfortable commentary on our health care system, the program has been cheered by third-party payers because days at a local hotel with 24-hour nursing care are still cheaper than the same number of days spent at a regular hospital. Maybe hospitals are pricing themselves out of their usefulness.

As recent federal and state budget cutting and health care legislation have demonstrated, hospitals have not lost their reputation as high-priced cost centers ripe for the targeting. Hospital care is a big slice in all payers' pie charts, and that's where they look for savings.

It all does seem a bit unfair, for it's not as if hospitals haven't been trying. I remember average lengths of stay (ALOS) of seven days when I started practice in 1977. Hernia patients and those with cataracts stayed five days. When hospitals trimmed ALOS to four days after the advent of DRGs, we worried we were endangering patients' lives. I can remember chairing a medicine department meeting in the early '80s where we discussed whether sending a patient home four days after an uncomplicated myocardial infarction was practicing poor-quality medicine.

Without a doubt, in the future more medical care will be delivered outside hospital walls. The medical profession will ensure patient survival using the best that high-tech medicine has to offer. But it will be up to hospitals to redefine themselves so that they, too, will survive and become the thriving “sick house” of tomorrow.

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■ Postoperative Care

# Hotel Management

*An orthopedic group is experimenting with having surgery patients recover in a hotel.*

| BY SUZY FRISCH

Orthopedic surgeon Marc Swiontkowski, M.D., kept hearing the same complaint from his patients at TRIA Orthopaedic Center: that it was difficult to recover from surgery in the hospital with all of the hallway noise, overhead pages, beeping machines, and interruptions from care providers. So when a high-end hotel started going up near TRIA's outpatient surgery center in Bloomington, he got an idea: Why not let some

patients have their procedures done at the outpatient surgery center, rather than the hospital, and recover at the new Hilton? "It was a little out of the box, and some people thought it was crazy," recalls Swiontkowski, CEO of TRIA. "But when you ask most people if they would rather recover in a hospital or recover in a very nice hotel, it's a no-brainer for them. Couple that with the fact that it's costing the health care system less, and it's doubly a no-brainer."

## Safety First

Although the benefits were obvious to Swiontkowski, he knew others would have to be convinced. TRIA's surgeons and its parent organization, Park Nicollet Health Services, were certainly wouldn't consider paying for them to recover in an environment that was not safe.

A team from TRIA and Park Nicollet began research-

ing the feasibility of the idea. They found that the Sioux Falls Surgical Center in South Dakota had a similar program that allowed patients to recover at home, at the center, or at a connected hotel, depending on their condition after surgery. However, nothing like this had been tried in Minnesota.

They thought the concept had promise. "People in a hospital are very sick, and a lot of our patients are not," says Mary Haugen, R.N., TRIA's nursing director, who became involved after the team visited the Sioux Falls facility. "They are active and healthy, and maybe they don't need to be in



Marc Swiontkowski, M.D., got the idea for allowing some surgery patients to recover outside the hospital when Hilton started constructing a hotel near TRIA Orthopaedic Center in Bloomington, where he is CEO.

an acute hospital setting.”

Next, TRIA's leaders asked its surgeons to develop a list of procedures that would be appropriate for a hotel recovery. The initial list included partial knee replacements, multiple ligament reconstructions, and hamstring and quadriceps repairs. At the same time, TRIA's anesthesiologists created a screening tool to identify patients who would be candidates for a hotel stay.

To be considered for a hotel recovery, patients could not have comorbidities such as diabetes or significant cardiac disease, a body mass index over 42, obstructive sleep apnea, or a history of difficult pain management.

TRIA officials then contacted Hilton management to gauge their interest and started a review process to ensure that the hotel could meet the standards for room cleaning and infection control. (Haugen found that the hotel's cleaning requirements are as stringent as those at a hospital.) The rooms also had to be ADA compliant, meet TRIA's requirements for grab bars in the bathrooms, and have recliners and other equipment in the rooms to help postsurgical patients rest and recover. The hotel passed with flying colors.

### The Hilton Experience

After developing care plans that spelled out what needed to be done for a patient before, during, and after surgery, TRIA was prepared to test its Hilton recovery program. On

November 18, 2008, surgeons performed a partial knee replacement at the outpatient surgery center. After an initial postsurgical recovery period, the patient was taken across the street to the Hilton for the night. The pilot cases went smoothly (the bills for those first Hilton stays were paid by TRIA).

Since then, the process has worked something like this: In most cases, patients are driven by a family member or caregiver from TRIA to the hotel. The patient checks into a room with one adjoining it for a nurse, who provides care and monitoring. (TRIA typically uses the same sets of rooms, but the Hilton does rent them to other guests when TRIA patients aren't staying there. The Hilton also brings in recliners when rooms are being used by surgery guests.) Throughout the night, the nurse helps with pain management, dressing changes, or trips to the bathroom. The nurse also might show caregivers how to continue caring for the patient at home. Each nurse is assigned to no more than three patients at a time, Haugen says.

If there are any questions or concerns, the nurse can contact the patient's surgeon by cell phone or pager. The nurse also is equipped with an automated external defibrillator to handle emergencies. So far, there have been no such problems.

Representatives from TRIA meet with patients before they are discharged to ask about their experience, answer questions, address concerns, and make sure they understand their care plan. Two weeks later, TRIA follows up with a

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Thus far, the responses have been overwhelmingly positive. One hundred percent of patients who have taken the survey say they would use the program again.

Haugen says they comment that they like sleeping in a comfortable hotel bed with high-quality pillows instead of a hospital bed and having access to a flat-screen television, a microwave, and a mini-refrigerator. And they prefer ordering complementary room service from the Hilton's custom TRIA menu with its healthful and fresh choices over hospital food.

Since 2008, TRIA has made other procedures eligible for the Hilton program, including the total replacement of knees, shoulders, elbows, and ankles, as well as complex hardware exchange procedures. Most involve a one-night stay. Total knee replacements typically require a two-night stay, along with physical and occupational therapy two times a day. Instead of having those patients travel back to TRIA for therapy, therapists come to the Hilton to work with them. Any needed labs and or blood draws can be completed at the Hilton and couriered to TRIA. Surgeons also visit the hotel to check on patients.

After about 100 procedures involving hotel recoveries, TRIA successfully negotiated with four insurance companies to cover Hilton stays as they would a hospital stay. The payers focused on the program's protocols for safety, infection control, and pain management, as well as outcomes and patient satisfaction data, and found much to their liking, Swiontkowski says. They were especially pleased with the cost, which is 20 to 45 percent less than a hospital stay, depending on the procedure and the length of stay. That's a benefit for the payers, not TRIA, he adds.

Since the program began, the number of surgeons referring patients to it has increased from two to 18; altogether, 220 patients have participated. "Not one person has been admitted to the hospital," Swiontkowski says. "That convinces people."

## A Trend in Health Care?

TRIA's Hilton program, which is unique in Minnesota, reflects a shift in the market toward treating patients in stand-alone emergency rooms, surgery centers, and retail-based health centers instead of hospitals and clinics. Even so, outpatient surgery centers haven't had much impact on patient volumes at Minnesota hospitals, notes Jan Hennings, communications director for the Minnesota Hospital Association.

She believes programs such as TRIA's are something we will see more of in the future. "As long as they are properly accredited and they are following all the pertinent regulations and safety protocols, they should be able to compete in the marketplace," Hennings says. "Health care providers are seeing that they can provide these services in a more cost-effective manner in free-standing surgery centers, and health plans like them as well."

Steven Connelly, M.D., chief medical officer at Park Nicollet, says he isn't concerned about Park Nicollet's Methodist Hospital, where TRIA patients often had their procedures done, losing patients to such programs. "It's an innovative program that looks at stratifying patients according to how healthy they are and attempting to be more cost-effective with the care that is rendered," he says. "If this is successful, it allows us to offer the same procedure in a different setting, which then begins to bend the cost curve of medicine."

Based on patient outcomes and satisfaction, Swiontkowski believes it won't be long before others adopt the idea. But for now, he's happy that TRIA has found a new way to help patients recover successfully from surgery in a safe, less expensive, and more restful environment. "The patient satisfaction data is overwhelming," he says. "You don't see numbers like that from hospital stays." ■

### ■ Minnesota's Hospitals

## Just the Facts

- 85 hospitals in Minnesota are a part of larger health systems.
- The system with the most hospitals is Mayo Clinic, with 11 hospitals and 2,659 licensed beds.
- Minnesota's oldest hospital is St. Joseph's Hospital in St. Paul; its newest hospitals are Maple Grove Hospital and PrairieCare, both in Maple Grove.

Source: Minnesota Hospital Association

## ■ Hospital Closures

## Minnesota's Ghost Hospitals

The Minnesota Hospital Association began tracking hospital closures in the state in 1987. Since then, more than 30 have shut their doors. Here's a list of the ones that are no longer operating by the year they closed.

### 1987

- Community Memorial Hospital, Clarkfield, *13 beds*
- Mounds Park Hospital, St. Paul, *220 beds*
- Samaritan Hospital, St. Paul, *150 beds*
- St. John's Eastside, St. Paul, *354 beds*
- St. John's Hospital, Browerville, *32 beds*

### 1989

- Caledonia Health Care Center, Caledonia, *18 beds*
- Gaylord Community Hospital, Gaylord, *32 beds*
- St. Mary's Hospital, Winsted, *25 beds*

### 1991

- Fairview Milaca Hospital, Milaca, *41 beds*
- Greenbush Community Hospital, Greenbush, *27 beds*
- Heron Lake Municipal Hospital, Heron Lake, *16 beds*
- Metropolitan-Mt. Sinai Medical Center, Minneapolis, *736 beds*
- Mountain Lake Community Hospital, Mountain Lake, *24 beds*
- Parkers Prairie District Hospital, Parkers Prairie, *21 beds*
- Trimont Community Hospital, Trimont, *24 beds*

### 1992

- Wells Hospital, Wells, *28 beds*

### 1993

- Pelican Valley Health Center, Pelican Rapids, *13 beds*
- Comfrey Hospital, Comfrey, *8 beds*
- Eveleth Health Services Park Hospital, Eveleth, *26 beds*

### 1994

- HealthEast Divine Redeemer Hospital, South St. Paul, *130 beds*
- Lakefield Municipal Hospital, Lakefield, *10 beds*

### 1995

- Karlstad Health Facilities, Karlstad, *19 beds*

### 1996

- Community Memorial Hospital, Spring Valley, *24 beds*

### 1997

- HealthEast Midway Hospital, St. Paul, *246 beds*

### 1998

- Chisago Health Services, Chisago City, *49 beds*
- District Memorial Hospital, Forest Lake, *49 beds*
- Rush City Hospital, Rush City, *29 beds*

### 1999

- Harmony Community Hospital, Harmony, *8 beds*

### 2001

- Trinity Hospital, Farmington, *47 beds*
- Tweeten Health Services, Spring Grove, *10 beds*

### 2002

- Arnold Memorial Health Care Center, Adrian, *9 beds*

### 2003

- Zumbrota Health Care, Zumbrota, *24 beds*

### 2005

- Minnewaska Regional Health System, Starbuck, *19 beds*

### 2007

- Divine Providence Health Center, Ivanhoe, *18 beds*

Source: Minnesota Hospital Association

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Photo courtesy of Mayo Clinic



At Mayo Clinic's Rochester Methodist Hospital, one of the services volunteers offer is relaxing hand massage.

■ Hospital Volunteers

## Not Your Grandmother's Auxiliary

*The role of the hospital volunteer has expanded since the candy striper's day.*

BY LISA HARDEN

A former Iraqi physician wipes down cots at Mercy Hospital in Coon Rapids while a retired baker greets people at the information desk and a recent college graduate keeps a family informed while their loved one undergoes a cardiovascular procedure.

Today's hospital volunteers are more diverse than ever. They range in age from teenagers to centenarians, come from a variety of backgrounds, and bring a multitude of professional and life experiences. And while they still run coffee and gift shops, hospital volunteers also provide needed services to patients and their families, hold fundraisers, and serve as policy advocates, among other things.

Clearly, the hospital auxiliary is not what it used to be. "When you use the term 'auxiliary,' people get the idea of older women sitting around knitting," says Wendy Hazard, who recently published a book about hospital volunteers in Minnesota. "But that's just not true anymore."

At Mayo Clinic's Rochester Methodist Hospital, for example, volunteers give hand massages to patients. Volunteer coordinator Barbara Kermisch had heard about nontherapeutic massage at a conference and with permission from Brent Bauer, M.D., director of the Complementary and Integrative Medicine Program at Mayo, started the Caring Hands program five years ago, in which volunteers are trained to give nontherapeutic, relaxing hand massages. "Caring Hands massage is often an oasis of calm during an otherwise busy and sometimes anxiety-provoking hospital stay," Bauer says. "Many patients talk about it as a highlight of their stay—and as a resource that helped them get through challenging times."

At Queen of Peace Hospital in New Prague, members of the auxiliary not only work in the hospital but also distribute food, clothing, and personal goods to those in need through the hospital's Peace Center, which is located in a

house across the street.

And at some hospitals, auxiliaries are increasingly involved in raising large amounts of money for equipment or projects that aren't in the capital budget. When Louise Cottrell assumed the presidency of Mercy Hospital's auxiliary in 1998, the group had \$200,000 in its bank account. She worked with her board to donate \$100,000 to help launch the hospital's new heart center. She also stepped up fund-raising efforts, organizing twice-monthly activities in the lobby where volunteers sell everything from jewelry to Christmas stockings, Valentine's Day balloons, and Easter baskets. Last year, the auxiliary donated \$120,000 to remodel the ICU at Mercy.

### Today's Volunteer

People volunteer for a number of reasons. For one thing, a growing number of retiring baby boomers are looking for meaningful ways to use their skills and give back, says Kermisch. "It's not just coming in and sitting at a desk. The volunteer of today wants to feel competent."

Rick Carlson, a recently retired economist for the St. Paul District of the U.S. Army Corps of Engineers, is an example. Carlson started volunteering at Mercy in April, after he underwent a triple bypass there. "I received such wonderful treatment that I wanted to give something back," he says.

Carlson brought years of experience working with databases, so Volunteer Director Julie Hogue set out to find a job where he could put those abilities to work. So far, he has developed a spreadsheet for tracking activities in the hospital's service recovery program. "That's not something

“When you use the term ‘auxiliary,’ people get the idea of older women sitting around knitting.

But that’s just not true anymore.”

—Wendy Hazzard

that any person off the street could do,” Hogie says.

College students and recent graduates looking for opportunities to explore potential careers are also seeking volunteer work. Rachele Schmitt, who recently graduated from Anoka Hennepin Technical College’s medical secretary program with a degree in computer technology, is considering becoming a health unit coordinator (HUC). As a volunteer in Mercy’s cardiovascular waiting area, she communicates with hospital staff, including HUCs and OR staff, and patients’ families during procedures. “Volunteering allows me to see what an HUC does on a daily basis,” she says.

Although the recession hasn’t prompted large numbers of unemployed people to seek volunteer jobs at hospitals, some are doing it to build their resumes and make potential connections. For example, a recent housekeeping hire at Mercy had volunteered 500 hours at the hospital before landing the paid position.

### Adjusting to the New Reality

Given the changing profile of volunteers and the changing needs of hospitals, auxiliaries themselves are having to evolve.

“Like any successful organization, auxiliaries must learn to think strategically,” says Prudy Knaak, a retired English teacher who volunteers at Rochester Methodist Hospital and serves as president of the Health Care Auxiliary of Minnesota (HCAM), which represents auxiliaries at 100 hospitals and long-term care facilities across the state. She says auxiliaries today need to focus on leadership, best practices, education, advocacy, networking,

and social experiences to succeed. To foster success, HCAM has developed educational modules on such issues as meeting management, conflict resolution, fundraising, advocacy, and recruitment.

Knaak notes that recruiting and retaining volunteers is a constant challenge. However, something as small as changing the color of the volunteer uniform can have a big impact on an auxiliary’s image and ability to recruit volunteers. Rochester Methodist’s primarily female volunteers

for years were known as the “Pink Ladies” because they wore pink smocks. In deference to the growing number of male volunteers—and in hopes of increasing their numbers even more—the hospital recently switched to blue smocks for their volunteers.

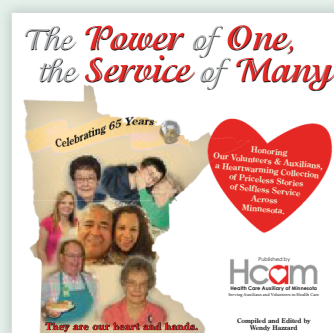
Although the number of volunteers at Mercy Hospital has remained relatively flat, averaging between 500 and 550 during any given month, Hogie admits it’s sometimes hard to place the people who do call her. “We may get someone who calls us after watching an episode of ‘Oprah’ and is motivated to come in right away and rock babies, but we can’t simply place them right away.” Mercy volunteers must pass a background and health screening and participate in a two-hour orientation session and a four-hour training shift before they can officially start. They also must commit to volunteering 50 hours before they “retire.”

### Inspiring Stories

As a member of the Health Care Auxiliary of Minnesota (HCAM) board, Wendy Hazzard heard a lot of stories from volunteers. She was so compelled by some of them that last year she turned those stories and others into a book, *The Power of One, the Service of Many*, which will be available this month in hospital gift shops and online at [www.mnhcam.org](http://www.mnhcam.org).

Hazzard logged 2,000 miles traveling across the state to attend auxiliary meetings to share her idea and solicit stories. As a result, she received hundreds of email submissions. Among the ones she recorded is that of Michelle Marx, now volunteer coordinator at Essentia Health-Fosston, who reflects on the power of presence as she describes reading the Bible to a hospice patient as she took her final breaths. Another is that of Beth Wheatley, M.D., of Fairview Milaca Clinic and Northland Medical Center in Princeton, who describes how her experience as a teen hospital volunteer inspired her to become a physician.

“The book honors the contributions of auxiliaries and volunteers,” Hazzard says. “We hope it will provide a platform for auxiliaries to learn from each other and inspire others to volunteer.” —L.H.



### Value Added

In 2009, more than 24,500 volunteers provided 1.5 million hours of service at Minnesota hospitals and long-term care facilities for an estimated value of \$32.4 million, according to HCAM. In addition, they contributed more than \$2.4 million in dollars or equipment to their facilities.

That value is not lost on hospitals. “The auxiliaries and all the volunteers who work in our organizations provide tremendous value to our patients and communities,” says Lawrence Massa, president of the Minnesota Hospital Association. “They do things hospitals would not otherwise be able to do. They add hands, eyes, and ears.”

They also bring new ideas and services. For example, two years ago, a retired radio DJ came to Mercy looking for a way to volunteer his time. He now arrives at 5 a.m. to greet patients arriving for surgery. “We didn’t have anything like that, but we realized that there were lots of retired people who used to work early shifts who could help out, so we started a new volunteer assignment that has been such a tremendous gift to our patients,” Hogie says.

Rochester Methodist’s Kermisch emphasizes that what volunteers give to a hospital is “priceless.” “I don’t let a volunteer leave the hospital without saying thank you,” she says. “No matter where they volunteer, it’s clear that the hospital wouldn’t run as well without them.” ■



#### ■ Hospital Chaplains

## Body and Soul

*As members of the health care team, hospital chaplains tend to the spirit.* | BY TROUT LOWEN

When he first began doing chaplaincy work at St. Marys Hospital in Rochester in 1984, Floyd O’Byran was often called to a patient’s bedside to say a prayer or offer communion. The patient was usually someone from the local Assemblies of God church, where he was the pastor.

Now, as director of Chaplain Services at Mayo Clinic, O’Byran oversees a staff of 30 that includes members of various Christian denominations as well as two rabbis, a Muslim religious counselor, and a Greek Orthodox priest. All are employed by Mayo to provide a range of spiritual care services to patients and staff of all denominations and religions and

even to those with no religious affiliation.

At Mayo, and at hospitals across the country, the role of the chaplain has undergone significant change during the past two decades, even though the core mission has remained essentially the same: to provide spiritual and emotional support to patients, their families, and hospital staff in a time of need.

How much change? Scott McRae, director of Spiritual Care Services at Park Nicollet Methodist Hospital, recently spoke to a group of pastoral care students about the neuroscience of leadership and how understanding the brain can inform the way chaplains educate students, talk with

“What’s important for a chaplain is listening... being willing to just be present.”  
—Brian Brooks

patients, and provide leadership in a hospital setting. “The whole post-modern era has us looking at spirituality through a different lens than we used to when it was primarily a religious lens ... because chaplains are going to be encountering that in the patients that they meet,” he says.



## A More Diverse Spiritual Environment

Although religion is prominent in politics these days, Americans are actually becoming less Christian and less religious, according to a recent Trinity College study of American religious identification. And fewer and fewer hospital patients have ties to a local congregation, chaplains say. With the influx of recent immigrants, cultural and spiritual diversity are increasing as well. During the past two decades, Minnesota has seen a significant increase in East Asian, African, and Latino residents.

That diversity is nowhere more apparent than at Children's Hospitals and Clinics in Minneapolis and St. Paul, says Brian Brooks, manager of chaplaincy services and bereavement coordinator. The patient population is both younger and more ethnically diverse than at other hospitals, and the changing family structure is also more apparent. "What we see today is what society is going to look like in another 20 years," he says.

Because of that, chaplains have to be able to "meet people wherever they are," Brooks adds. "I'm ordained Assemblies of God, but I'm not saying you need to do it the Assemblies way. ... The religion part isn't as important as the spiritual journey. What's important for a chaplain is listening to someone, being willing to just be present rather than having to do any religious rites or rituals."

Chaplains also serve as a bridge between the patient or family and a hospital staff who may not be familiar with a family's spiritual tradi-

"The whole post-modern era has us looking at spirituality through a different lens."

—Scott McRae



Photo courtesy Park Nicollet Health Services

tions, Brooks says, citing the example of a young Laotian boy who was dying in the intensive care unit (ICU). The family's spiritual tradition was to have an altar and a bowl of water with fresh flowers in the room, but hospital policy said no fresh flowers were allowed in the ICU unless they were wrapped in plastic. Brooks was able to intervene on the family's behalf and explain to the staff why the flowers were important, comparing them with a Christian Bible.

"It's really a matter of approaching them humbly, listening, finding out what their religious or spiritual needs are, and then kind of creating the space for that to happen," he says of working with patients and families with varied beliefs.

### New Kid on the Team

In addition to the changing role of religion and spirituality in modern life, the role of the chaplain is evolving within the hospital environment. Chaplains have become much more a part of the health care team, regularly recording their observations about patients' spiritual and emotional health and providing support for staff and physicians.

They also may serve on hospital ethics committees and help families navigate deci-

sions about treatments and end-of-life care, says Brooks, a past chair of the ethics committee at Children's. Urban and larger regional hospitals employ chaplains who are often assigned to work with patients on wards, in outpatient clinics for cancer or other diseases, and in home hospice.

When he first began working at St. Marys, O'Bryan says chaplains often kept their own notes on patients, which weren't part of the medical record. Now, chaplains are expected to chart their observations in the patient's electronic medical record. He says doctors and nurses want to read chaplains' impressions, their "spiritual assessment" of the patient. "We would see ourselves back in the '80s fighting to be at the table for patient care," O'Bryan recalls. "We don't have to do that now."

McRae agrees that there is much less resistance among

medical professionals to talking about spirituality. "We're in a time where there is great openness to integrating currents of medicine, religion, and spirituality," he says. "I have noticed that physicians and nurses are much more open to the spiritual journey of a patient than they were 10 years ago."

Even so, patients and hospital staff don't always understand what chaplains do. And chaplains sometimes find themselves at odds with hospitals' business models. "Our work is not about healing a patient, so to speak, but is about journeying with that patient," McRae explains. "That's hard to quantify or create measures around ... yet we work in a culture that is always looking for bottom-line results."

At Mayo, and around the country, as chaplains have be-

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“We would see ourselves back in the '80s fighting to be at the table for patient care. We don't have to do that now.”

—Floyd O'Bryan

come more integrated into the health care team, demand for their services has grown. “That can stretch the chaplaincy pretty thin at times,” O'Bryan says. However, there remains some lingering discomfort about practices in the past, when some chaplains may have engaged in proselytizing in the name of spiritual care. That's not part of the modern chaplaincy, chaplains interviewed for this story say.

To dispel patient concerns, McRae says Park Nicollet chaplains often introduce themselves to new patients by saying: “Hello, I'm from spiritual care, and I'm part of your health care team.”

“We want to frame it as a feature of their health care in the same way that a dietitian or physical therapist would,” he explains. “From there, we invite them to talk about how the experience is. Are you getting what you need? Do you have any concerns? Then we try to get them to really reflect on any emotional dynamics, or if it moves into the religious, we're very capable and able to go there. But we don't start there because that brings to the fore all of people's stereotypes about ministers and chaplains, and we don't want to set that off.”

### Certified Professionals

In general, chaplains are better educated and better trained than in the past. Although many are ordained ministers, laypersons also can be commissioned by a denomination or religious organization for the chaplaincy (Catholic nuns and laity can become hospital chaplains, for example). And more students with real-world ministry and counseling experience are pursuing clinical pastoral education (CPE) than in the past.

Regardless of their background, all hospital chaplains must complete a year-long residency in a CPE program accredited by the Association for Clinical Pastoral Education. They must then be board-certified by an organizations such as the Association of Professional Chaplains. To retain certification, they must complete 50 hours of continuing education annually.

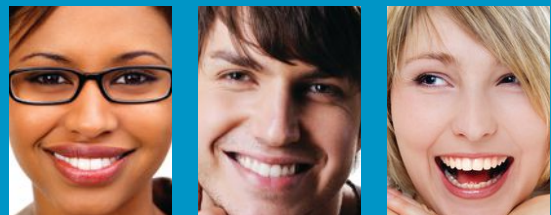
Clinical pastoral education is a mix of theology, psychology, and ministry, and it includes classroom education and hands-on ministry in a hospital setting, says McRae, a CPE supervisor and educator. The training is based on an action-reflection model that asks questions such as, How did I meet

the needs of the patient? How am I becoming aware of who I am? How does that inform me as to how I do my work? That model has been central to CPE for a long time, he says, but there have been changes such as encouraging students to embrace a broader theological perspective.

Although the classroom training may seem like a long

way from deciding what prayer to say with a patient, McRae suggests the distance isn't as great as it seems. He says the theological discussions build the chaplain's capacity to encounter patients where they are. “So when we do come to say that prayer, we know that patient and we can say it in a way that is deeply meaningful and possibly transformative. If we can't make that link, then our teaching is in vain.”

McRae mentions that although chaplains also receive training on clinical issues such as HIPAA regulations, infection control, and ethics, their primary focus remains spiritual, not physical, care. “There's a line there,” he says. “We need to be informed, and yet we don't ever want to start thinking like doctors and nurses.” ■



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**Patricia J. Lindholm, M.D.**  
MMA President

Photo by Steve Weverka

It is fitting that the MMA promote efforts to address professional well-being.

## A Fond Farewell

It is bittersweet knowing that this is my last Viewpoint column. At the annual meeting this month, I will pass the baton to my successor, President-Elect Lyle Swenson, M.D.

During my term as MMA president, I have tried to call attention to the issue of physician well-being. Over the months, I discovered that this topic was already on the minds of many physicians, medical directors, and leaders of health care organizations. I found that our colleagues have been waiting for venues to express their need for better work-life balance and greater professional satisfaction. I also heard from many dedicated and passionate physicians who have been studying and attempting to address those issues in Minnesota and around the world.

It is fitting that the MMA promote efforts to address professional well-being, and I am excited that we will be hosting a summit next month for physician leaders. It will be an opportunity to share resources and ideas and learn from those who have created successful programs for improving work-life balance and alleviating burnout. The summit is scheduled for October 27, 2011, and you can learn more about it at [www.mnmed.org/wellbeingevent](http://www.mnmed.org/wellbeingevent).

As your immediate past-president, I will continue writing about these issues from time to time. I also plan to keep adding resources on physician wellness to the MMA website. I welcome your ideas about

and suggestions for how the medical association might continue to call attention to the issue of well-being in our profession.

In addition, as leaders of the health care team, we need to be mindful of the effect stress can have on those who work beside us. The literature documents rates of burnout, mental illness, and personal stress among nurses, social workers, clergy, and others involved in health care that are similar to those of physicians.

Finally, I wish to again thank the members of the MMA Physician Well-being Task Force for their inspiration and support of our common mission. I also want to thank the staff of the MMA and *Minnesota Medicine*, who have shown enthusiasm for the issue of well-being and who have personally encouraged me. My special thanks to Karolyn Stirewalt, J.D., Scott Smith, Carmen Peota, Kim Kiser, and Janet Silversmith for their support and superb work. I also wish to thank my predecessors—our past MMA presidents—who have encouraged me to continue the work that we have begun.

As physicians, we touch the lives of countless Minnesotans, whom we are privileged to serve. In order to best care for them, we must first care for ourselves and our colleagues. We also must rediscover the joy of practicing medicine and renew our commitment to those we teach.

Blessings on all of you!



## MMA in Action

*Some of the recent ways MMA staff and members have worked for physicians in Minnesota.*



Photo by Scott D. Smith

From left to right, Twin Cities Medical Society CEO Sue Schettle, CMS Administrator Don Berwick, M.D., and MMA President Patricia Lindholm, M.D.

■ Last month, MMA President Patricia Lindholm, M.D., and about a dozen health care leaders met with Centers for Medicare and Medicaid Services Administrator Don Berwick, M.D., to showcase health care innovations in Minnesota.

The meeting included U.S. Rep. Betty McCollum, Sen. Al Franken, and representatives from the YMCA, Minnesota Hospital Association, Park Nicollet Health Services, Twin Cities Medical Society, HealthEast Care System, HealthPartners, Bethesda Hospital, Fairview Health Services, Mayo Clinic, and Sanford Health.

Berwick listened to the health care leaders talk about ways they had improved care or lowered costs by reducing hospital readmissions, decreasing the use of ventilators, implementing health care homes, and improving care coordination. He told the group that he considers Minnesota a font of innovative ideas and has been impressed with the state's collaborative health care environment and progress in areas such as diabetes care.

Lindholm says she was impressed by the ability of providers such as Essentia

Health and Hennepin County Medical Center, which serve large populations of Medicare and Medicaid enrollees, to both improve care and achieve savings through better care coordination.

“It was a real opportunity to get some face time with these important leaders and give them the 20,000-foot view of some of the health care innovations that are occurring in Minnesota,” she says.

See more photos at [facebook.com/mnmed](https://facebook.com/mnmed).



■ MMA Director of State and Federal Legislation Dave Renner met with state Sen. John Harrington (DFL-St. Paul) August 16, as part of the MMA's District Dialogue program.

■ Karolyn Stirewalt, J.D., MMA policy counsel, represented the MMA at the Board of Medical Practice meeting August 6.

## MMA Supports Mayo in U.S. Supreme Court Case

In August, the MMA agreed to join an amicus brief in support of Mayo Clinic in the case Prometheus Laboratories v. Mayo Collaborative Services, which will be argued before the U.S. Supreme Court next year. The case stems from a seven-year dispute over an issue relating to patent infringement. Prometheus Laboratories owns a patent that, if enforced, would restrict physicians from offering a diagnostic metabolites test for the drug azathioprine, which was created by Prometheus. A ruling in favor of Prometheus also could further restrict physicians from conducting research on how patients metabolize the drug.

Prometheus' test measures metabolite levels in patients taking thiopurine drugs, then correlates those levels with the drug's efficacy. Mayo developed its own test, which measured the same metabolites. Mayo says its method uses different levels to determine toxicity. Mayo has argued that the patent is illegal because natural phenomena (such as digestion) are not patentable. Mayo won at the district court level. But Prometheus appealed, and the case was overturned by the Federal Circuit Court of Appeals.

The MMA and the AMA Litigation Center will be joining the American College of Medical Genetics, the American Society of Human Genetics, the Association of Professors of Human and Medical Genetics, and potentially others in filing the amicus brief this month.



# MMA ANNUAL MEETING

## Physicians to Debate Nearly 30 Resolutions

The MMA's 158th House of Delegates will consider nearly 30 resolutions at this year's annual meeting September 15-16 in Duluth. Taking action on resolutions, which help shape MMA policy and the overall direction of the organization, is the main work of the House of Delegates.

Resolutions are debated in reference committees, which then recommend action by the House of Delegates. The House can vote to adopt or not adopt a resolution, refer a resolution to the Board, or amend or adopt a substitute resolution.

During the meeting, the House will consider resolutions on issues that represent the diverse opinions of MMA members. This year, the House will consider resolutions that call for the MMA to do the following:

- Develop and introduce legislation that makes it illegal in the state of Minnesota for physicians to be employed by health care corporations that are not physician-owned or physician-directed (R105);
- Support the reform of the malpractice system to a collaborative law approach in which there is a voluntary, contractually based dispute-resolution process for parties who seek to negotiate a resolution of perceived medical error rather than having a ruling imposed by a court or arbitrator (R107);
- Evaluate alternatives to standardized statewide quality measurement and reporting and include methods for individual clinics/medical groups to measure and report on clinical topics that address their practice's needs based on their patient populations and gaps in care (R200);

## Nominees for MMA Offices Announced

The MMA Board of Trustees accepted the Nomination and Leadership Development Committee's slate of nominees during its July meeting. Nominations will remain open until the MMA House of Delegates convenes on Thursday, September 15. The House of Delegates will elect its officers, AMA delegates, and trustees on Friday, September 16, during the MMA's Annual Meeting in Duluth.

The nominees are:

**President-Elect:** Dan Maddox, M.D.

**Treasurer:** David Westgard, M.D.\*

**Speaker of the House of Delegates:** Mark Liebow, M.D.\*

**Vice Speaker of the House:** Robert Moravec, M.D.\*

**At-large Trustee:** Macaran Baird, M.D.

**AMA Delegates:** Ray Christiansen, M.D.\*  
Sally Trippel, M.D.\*  
Paul Matson, M.D.\*

**AMA Alternate Delegates:** John Abenstein, M.D.\*  
David Estrin, M.D.\*  
Steve Darrow, M.D.  
Will Nicholson, M.D. (completion of the term of Blanton Bessinger, M.D., through 12/31/12)

### MMA Board of Trustees:

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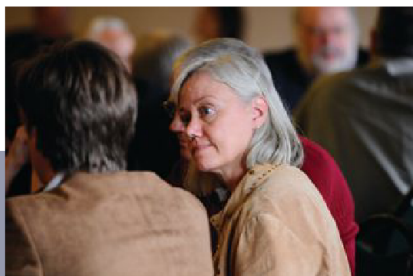
Doug Wood, M.D.,  
Southeast District\*

Roy Yawn, M.D.,  
Southeast District

The MMA would like to thank Blanton Bessinger, M.D., and Anthony Jaspers, M.D., who will be leaving the AMA Delegation, for their many years of service.

\*Candidate for re-election

See Annual Meeting updates and photos at [facebook.com/mnmed](http://facebook.com/mnmed)



- Support annual screening for *Chlamydia* among all males and females 15 to 25 years of age with repeat screening at the discretion of the physician (R201);
- Recommend that all worksites in Minnesota provide a 10-minute physical activity video for optional participation by their employees (R202);
- Develop a depression-care guideline (R204);
- Pass legislation requiring anyone who provides vaccines to patients to enter that data into the Minnesota Immunization Information Connection registry (R206);
- Support a requirement prohibiting prior authorization requirements for generic medication (R207);
- Support legislation prohibiting those younger than 18 years of age from using tanning beds (R209);
- Study the ramifications of including a public option plan as part of a state insurance exchange (R300);
- Adopt as policy that reimbursement for consultation codes should be restored by all payers, including the Centers for Medicare and Medicaid Services (R303);
- Support legislation to provide wellness incentives for all Medical Assistance recipients (R305);
- Work to require that all pharmacy benefit plans provide coverage for at least one inhaled steroid and one short-acting beta adrenergic inhaler in their formularies and pay for one rate-controlled spacer (R306);
- Bring a resolution to the AMA that one of the ultimate goals of health care reform should be that all Americans have a medical home relationship with a primary care provider (R308);
- Support the Minnesota Health Plan, which provides universal, publicly funded health care for all Minnesotans (R309).

Go to [facebook.com/mnmed](https://facebook.com/mnmed) for Annual Meeting updates.



## continuing medical education

<b>29th Annual Strategies in Primary Care Medicine</b>	<b>September 22 - 23, 2011</b>
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<b>Pediatric Trauma Summit</b>	<b>September 22 - 23, 2011</b>
<b>Fundamental Critical Care Support</b>	<b>October 13 - 14, 2011</b>
<b>Pediatric Conferences</b>	
<ul style="list-style-type: none"> <li>▪ Best Practices: Managing the Pediatric Patient in the Urgent Care Setting</li> <li>▪ Pediatric Update: Beyond the Basics</li> </ul>	<b>October 28, 2011</b> <b>October 29, 2011</b>
<b>12th Annual Women’s Health Conference</b>	<b>November 4, 2011</b>
<b>Emergency Medicine and Trauma Update: Beyond the Golden Hour</b>	<b>November 17, 2011</b>
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<b>33rd Annual Cardiovascular Conference</b>	<b>December 1 - 2, 2011</b>

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# Making Hospital Readmissions RARE

With the launch of the statewide RARE (Reduce Avoidable Readmissions Effectively) campaign this summer, Minnesota physicians joined with hospitals and long-term care providers to reduce avoidable readmissions. The goal is to reduce such readmissions by 20 percent (about 4,000 total) by the end of 2012, thus lowering the state's preventable readmissions rate from 5.8 percent in 2009 to 4.6 percent by the end of 2012. In addition to improving outcomes for patients, reducing readmissions by 4,000 would save commercial insurers an estimated \$30 million annually and Medicare even more.

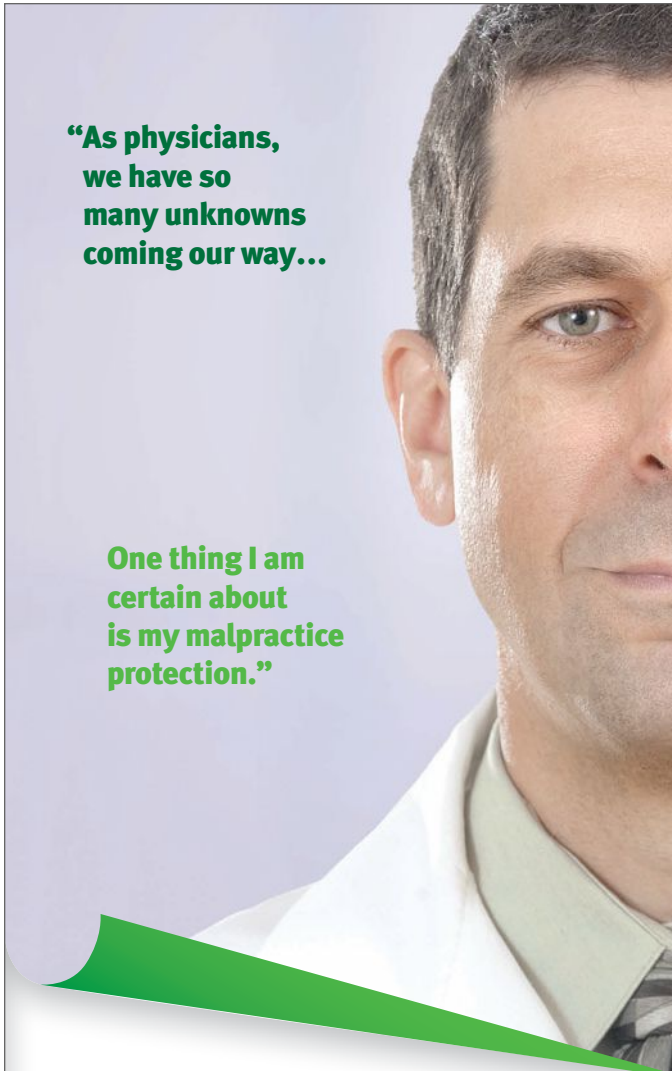
Nearly one in five Medicare patients discharged from Minnesota hospitals is readmitted within 30 days. Although the readmission rate for commercially insured patients is lower than for Medicare patients, the number of preventable readmissions is still significant. Eighteen states have lower readmission rates than Minnesota, according to Medicare data.

The RARE campaign will focus on developing comprehensive discharge plans and easing the transition from hospital to home or a nursing facility. Some of the issues that will be addressed include transition care planning, medication management, patient and family involvement in discharge preparation, and communication among hospital and long-term care providers.

## MMA Led the Way

The MMA was one of the first groups in the state to examine the issue of hospital readmissions. In 2009, the MMA and the Minnesota Council of Health Plans (MCHP) brought together leaders from hospitals, clinics, long-term care facilities, academic institutions, state agencies, and quality organizations, as well as payers and purchasers of health care, to identify the causes of readmissions and consider ways to prevent them. Throughout 2010, they reviewed the literature as well as Minnesota-specific and national Medicare data. The group decided to focus on improving readmissions rates by improving the health care community's understanding of the causes of readmissions and sharing strategies for reducing preventable ones.

Efforts to reduce readmissions gained momentum following passage of the Patient Protection and Affordable Care Act. A provision in the law calls for the federal government to reduce Medicare payments by up to 3 percent by 2015 to hospitals with higher-than-expected 30-day readmission rates for patients who have been hospitalized for certain conditions. In 2011, the Institute for Clinical Systems Improvement decided to focus on hospital readmissions, and the MMA-MCHP effort evolved into the RARE campaign. As of mid-August, 51 Minnesota hospitals along with more than a dozen health plans, state agencies, home health agencies, nursing homes, and patient advocacy groups had signed onto RARE.



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# The *Futurist*

A conversation with Minnesota's chief hospital executive.

Interview conducted by Carmen Peota

A decade ago, when he was CEO of Rice Memorial Hospital in Willmar, Lawrence Massa helped the leaders of that city-owned facility envision what health care might look like in the future so that they could build a new campus in a way that would meet the coming needs. Today, with that project long behind him, Massa is still focused on the future. And as president of the Minnesota Hospital Association, he's trying to help all hospitals in the state look ahead so that they not only can meet the needs of the communities they serve but also survive in a changing health care environment.

With a tough economy, cuts in publicly funded health care programs, competition in the marketplace, and nearly everyone—from insurers to legislators—pointing to hospitals when they talk about cutting costs, the times are challenging for hospitals. So we thought it would be interesting to hear how our state's leading hospital executive envisions the future for his organization's members. We asked him to share some of his perspectives. Here's part of that conversation.

**Q:** It seems to me that hospitals are in a state of flux? Do you agree?

I absolutely do. I think we're in a transitional state right now. There's growing recognition throughout health care that we've got to change the care that we deliver to get better results and bend the cost curve and make it more affordable. And hospitals have to be part of it.

**Q:** What are some of the forces driving these changes?

The national debt crisis and federal health care reform legislation have coalesced a lot of ideas about how care delivery and reimbursement ought to change in the future. And, quite frankly, a workforce problem is looming. We've got a workforce made up of baby boomers who will be retiring in the next decade or so, and the cohort that will replace them is not as large. We've

done a lot of work to encourage people to choose health care careers, but there aren't going to be enough who do. All of those things are coming together and forcing a lot of us to change our thinking.

**Q:** What worries hospital executives the most?

Right now they are very focused on reimbursement. As part of our planning process, we interview our board members every year. For the last couple of years, they have been focused on federal health care reform. But this year, they were much more state-focused because of all of the angst that was created by the polarization at the Capitol. There were some significant cuts to health care providers and health plans. That's keeping members on edge because many are operating on thin margins.

But there are other concerns: the federal deficit reduction discussions, imple-



Lawrence Massa, Minnesota Hospital Association president

Photo courtesy of the Minnesota Hospital Association

menting the federal health care reform act, and meeting the criteria for meaningful use of health information technology in order to access federal dollars. And we continue to see the impact of the declining economy on our members. Fewer patients are seeking care because they have high-deductible health plans, and we are seeing more uncompensated care because more people are losing their health care coverage altogether.

**Q:** What state legislative changes this year were particularly harmful for hospitals?

They delayed and repealed rebasing—a process under current law that's supposed to take place every two years; it updates what the state pays hospitals to keep up with inflation. They haven't done it for a number of years. They just keep delaying it. That costs members over a \$100 mil-

lion per biennium. Then they enacted a 10-percent across-the-board rate cut for the state's fee-for-service program. They also cut what they pay the health plans for prepaid Medical Assistance. I'm sure that will cause the plans to want to negotiate lower payments with our members.

**Q:** Do those cuts have more of an impact on rural or urban hospitals?

It depends. There are urban hospitals that treat a higher number of state program participants. But that same thing can be said of hospitals in rural areas. Bemidji, for example, has a large number of public program participants. The poorer counties will feel the impact of this. The offset to all of that, however, is that early Medicaid enrollment stays in place. That will salvage coverage for about 105,000 Minnesotans who otherwise would have lost it.

**Q:** How do hospitals feel about the constant talk of lowering health care costs? Don't many cost-cutting efforts actually hurt their bottom lines?

Yes. You know the old adage, when asked why he robbed banks, Willie Sutton said, "That's where the money is." Hospitals are in that same position in the health care delivery system. They're very large, they account for over a third of overall health care costs, and there are not that many of them. So it's easy to focus on hospitals. Our message has been that we need to change the payment system to reward value. Across-the-board cuts to fee-for-service—just paying providers less—may not be the best approach.

**Q:** The membership of your organization includes more than just hospitals, as many hospitals are now part of health systems that also include clinics and other types of providers. Might there be a name change in its future?

We talk about that all the time. We believe we have brand recognition now. But the fact of matter is, most of our members

are not just hospitals; many are integrated delivery systems. At this point, we feel comfortable with our name because all of those systems have a hospital. That's the one common denominator. But you're right, our name is a bit one-dimensional in a world that's multidimensional.

**Q:** How have hospitals' relationships with physicians changed during your career?

More hospital boards today have physician representation. Twenty-five years ago, that was more of a rarity. I think there's much more collaboration between physicians and hospitals. There's more of an understanding that we all have the same goals. And there's been tremendous growth in physician leadership. A lot of our hospitals have paid medical staff and physicians in administrative roles. That was very unusual 25 years ago.

**Q:** Do you have ideas about how the hospital association can work with organized medicine?

We have actually had joint meetings between our executive committee and the MMA's executive committee during the last year and a half. We're trying to identify issues where we're aligned and communicate about areas where we might differ. I think that dialogue has been helpful. The MMA has been our partner on the Minnesota Alliance for Patient Safety. We've also created a physician leadership counsel within our organization, not to compete with the MMA but to get physicians to share their thoughts with our board so that we can have more of a physician perspective when making decisions. They expressed that we needed to work on readmissions and that we should not go it alone. They've also encouraged us to work on the mental health safety net, so that when people show up in ERs, there are appropriate places where they can go.

**Q:** What do you envision for hospitals in Minnesota in 10 years?

I think health care will be more integrated than it is today. We may have about the same number of hospital beds or fewer. A lot will be determined by how successful we are at keeping people healthy so that they don't need to use the hospital as much and our success in improving the quality of the care we provide so that people won't need to be readmitted. People who are going to the hospital 10 to 20 years from now will be very sick—extremely sick.

I think the role of all health care workers will continue to change—that we'll continue to move toward more team-based care. I see more reliance on advanced practice nurses as primary care providers, complementing physicians.

Much more care will be delivered in the home, and that may be done by hospital-based organizations. I think our members are beginning to believe that in the future they'll be relying less on inpatient beds and more on outpatient services.

**Q:** This must be a difficult time for hospital leaders. Is it hard for them to know where to invest dollars and energy?

It is very difficult because, as I said, we're in this transitional phase. We're still paid on a fee-for-service basis. So reducing utilization hurts a hospital's financial performance. We're moving to a system in which we're going to be paid for bundles of care or receive global payments with ACO-type organizations, so there will be an incentive to provide only the care that is necessary for the patient. But when you're kind of in-between, it's very, very difficult to make long-term decisions or even short-term ones. But our members are doing it. **MM**

Carmen Peota is managing editor of *Minnesota Medicine*.



# Slowing the *revolving* *door*

By Kate Ledger

Minnesota's hospitals are leading the way in reducing preventable readmissions.

**A**s a pediatrician, William Nersesian, M.D., spent his clinical career focused on young patients at his practice in Minneapolis, but he also was the kind of thinker who liked to tackle big problems in health care. His curiosity was piqued three years ago, while speaking with UCare's then-chief medical officer Barry Baines, M.D., about one of the costliest issues on the table: the unfortunate return trips to the hospital for some of the sickest and oldest patients in the system. "Those patients, who have conditions like heart failure, diabetes, and COPD, comprise a great majority of all hospital readmissions," says Nersesian, who now serves as chief medical officer for Fairview Physician Associates.

He began reading up on the topic, consulting the articles that had begun to appear on the problem of hospital readmissions and what was being done to reduce them. The issue was already becoming one of national significance. In July 2008, the National Quality Forum had made readmission rates a measure of hospital performance, and the Centers for Medicare and Medicaid Services (CMS) had posed future penalties for hospitals with excessive avoidable readmission rates.

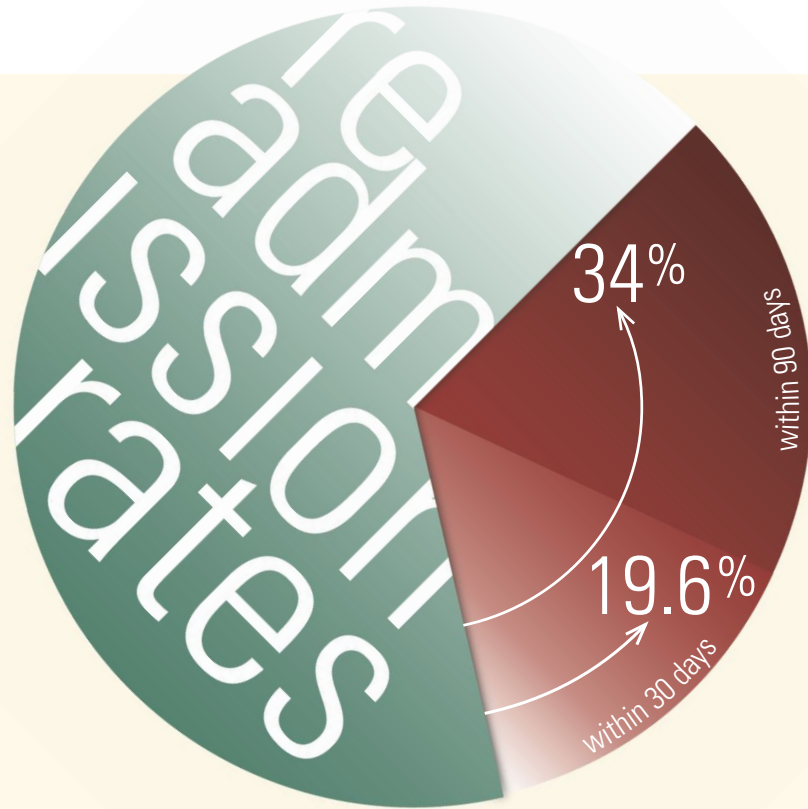
Nersesian sketched out a pilot program aimed at cutting preventable readmissions at Fairview Southdale Hospital, which he chose for several reasons. "It's a large-sized hospital, and I needed enough patients to measure statistically whether we were making a difference or not," he says. In addition, it happens to be a site that serves a significant number of UCare patients, among them seniors on its Medicare Advantage plan.

With the support of Baines, who agreed that UCare would sponsor the pilot, and the hospital's CEO Brad Beard, the program addressed specific gaps in care, including medication reconciliation and post-discharge follow-ups with primary care doctors, that tend to keep the frailest patients from a steady course of improvement after being discharged. The program launched in February 2009. Even Nersesian was surprised by the results a year later: The readmission rate for the targeted Medicare patients fell from

16.5 to 10.6 percent—a reduction of 36 percent.

Although the experiment at Fairview Southdale was among the earliest efforts of its kind that showed results, an array of similar projects were not far behind, both in Minnesota and nationwide. Amid soaring health care costs, avoiding preventable hospital readmissions has surfaced as the most fruitful way to reduce expenses while simultaneously improving care. President Barack Obama recently called for hospitals to reduce their readmission rates by at least 20 percent, a challenge that's also become a financial imperative. Beginning in 2013, hospitals with high readmission rates for patients with certain medical conditions will receive decreased reimbursement from Medicare, and the list of conditions is slated to expand in 2015. Recently, the state also put penalties on the line: Earlier this year, Gov. Mark Dayton signed a bill to withhold a portion of payments to health plans that fail to reduce hos-





Source: Jencks SF, Williams MV, Coleman, EA. N Engl J Med 2009; 360:1418-28.

During the first 30 days following discharge, there are often complications from medications or from poor adherence to discharge advice.

Readmissions among patients enrolled state-funded health programs by 5 percent a year until they reach an overall 25 percent reduction. “This is a topic that everyone’s talking about,” says Tania Daniels, vice president of patient safety for the Minnesota Hospital Association (MHA).

### Thirty Critical Days

The problem of patients bouncing back to the hospital is all too familiar, both to families and to doctors. Take an aging population with increasingly complex medical conditions, add an ever-widening array of available medical treatments and extremely varied home circumstances, mix in cultural differences, and the result is that it’s trickier than ever to ensure patients follow the steps they need to after a hospital stay. “They’re your parents or grandparents,” Nersesian explains. “They may come in to the hospital with all their medications—they have 17 in a bag—and nobody has sat down with them to review what they’re taking or whether those drugs might interfere with each other. They get treated by numerous specialists, whose

names they might not even know when they get discharged. And they may have trouble getting an appointment with their primary, or even getting a ride to that appointment.” At discharge, some patients return home, where they’re responsible for their own care, or they return to nursing facilities, where their hospital discharge information may or may not be integrated into their daily regimen. During the first 30 days following discharge, there are often complications from medications or from poor adherence to discharge advice. Patients can slide back into another episode of the problem they were treated for or even find themselves facing a new one such as pneumonia or the consequences of a bad fall.

A landmark study published in 2009 in the *New England Journal of Medicine* found 19.6 percent of the 11,855,702 Medicare beneficiaries who had been discharged from a hospital in 2004 returned within 30 days, and 34 percent were rehospitalized within 90 days. The study’s authors estimated that inadvertent rehospitalizations cost Medicare \$17.4 billion.

“Rehospitalization is a frequent, costly, and sometimes life-threatening event that is associated with gaps in follow-up care,” they noted. A state-by-state comparison showed Minnesota had a 30-day readmission rate of 18.2 percent, slightly lower than the national average.

### A RARE Opportunity

The problem of readmissions was hardly news, as several organizations in Minnesota had already begun taking note of it. In 2009, representatives of the Minnesota Medical Association and the Minnesota Council of Health Plans brought together a group that included leaders of hospitals, clinics, long-term care facilities, state agencies, academic institutions, payer organizations, and quality improvement organizations to discuss the causes of readmissions and ways to address the problem. The topic was also on the table at the MHA, which has been collecting claims data for more than 20 years. Stratis Health, Minnesota’s Medicare quality improvement organization, embarked on its own project to reduce readmission rates at



small Critical Access Hospitals beginning in 2010. The Institute for Clinical Systems Improvement (ICSI) was interested in tackling the issue on as large a scale as possible and had been discussing how best to recruit hospitals to work on it. “This is such a big issue, none of the agencies could tackle it alone,” says ICSI president Sanne Magnan, M.D. “None of us had the personnel or the resources on our own to invite the more than 130 hospitals in the state to participate. We knew we needed to bring all the various efforts together in some way.”

Those efforts have now coalesced in the form of a high-energy, forward-thinking program that’s focused on improving the steps involved in educating and discharging patients. Together, ICSI, the MHA and Stratis Health rolled out a statewide campaign in July called Reducing Avoidable Readmissions Effectively, or RARE. The goals of RARE are to rally institutions that haven’t yet started addressing the readmission issue, to further efforts that are already underway, and, ultimately, to cut unnecessary readmissions in the state by 20 percent (about 4,000) over the next year. As of mid-August, 51 hospitals across the state had joined RARE, which offers participants opportunities to learn about improving discharge practices and smoothing the transition from hospital to home or nursing facility.

Each hospital that enrolls in RARE will receive assistance from ICSI, MHA, or Stratis Health. A staff person from one of those organizations will work with the hospital to review its discharge practices, identify areas that could be improved, and design initiatives to solve problems. That may mean instructing hospitals in ways to help patients practice setting up and/or taking their medications before they leave the hospital, or helping them forge new lines of communication with nursing homes to make a patient’s transition smoother. Participating hospitals also will be able to share lessons about what did and did not work with each other.

Using a new software program, the MHA will help identify Potentially Preventable Readmissions (PPRs) and esti-

mate hospitals’ predicted readmission rates. It will then compare the estimate with actual numbers of readmitted patients to determine how well the programs around the state are working and identify those that may need to intensify their efforts. “We’ve provided baseline PPR data to all Minnesota hospitals, regardless of their participation in RARE, but we’re providing quarterly updates for RARE participants,” says Mark Sonneborn, vice president for information services at MHA, who has presented in webinars for hospitals leaders on how to interpret the numbers. The hospitals have to distinguish, for instance, between patients who are readmitted for a condition related to the initial hospital stay and those who return with another, unrelated ailment. “The hospitals seem to understand the data is really just contextual and tells them if they’re making progress or not,” he says.

### Multiple Means to an End

What’s evident is that no single fix will work for all hospitals, so hospitals around the state are trying various approaches.

Fifteen Critical Access Hospitals hospitals from New Prague to Virginia, Minnesota, are participating in a national project facilitated by Stratis Health and are employing a strategy known as Project RED (Re-Engineering Discharge) that got its start a handful of years ago at Boston University Medical Center. That program’s approach is to standardize discharge with an 11-point checklist that is reviewed with a patient. The checklist delineates explicit roles and responsibilities of physicians and other caregivers, makes sure that patients receive proper education about their condition and their medications, and spells out how information will get from the hospital to the patient’s primary care physician.

Although small, rural hospitals with Critical Access Hospital designation are not threatened with the same Medicare penalties as larger facilities, Jane Pederson, M.D., director of medical affairs at Stratis Health, says those hospitals still wanted to work on improving their readmission rates. “They didn’t have the same finan-

cial incentives as the larger PPS [Prospective Payment System] hospitals, but they certainly realized it was a quality-of-care issue and wanted to do the best for their patients,” she says. According to Pederson, most started making changes this spring and do not yet have data on the impact of that work on readmissions.

The program Nersesian helped formulate for Fairview Southdale Hospital began with the reassigning of a nurse case manager to help patients at discharge. The hospital also provided for a dedicated pharmacist to review each patient’s medications and make sure there were no drug interactions or duplications. Another key element of the program, Nersesian notes, was expediting discharge paperwork. The medical records department agreed to get all discharge summaries transcribed within two business days. That way, primary care physicians would have all the paperwork in hand when a patient came in for a follow-up appointment. “Hospital administration helped back me up on all that stuff,” Nersesian says.

But as he’s quick to point out, the program extended beyond the hospital. Hospital staff worked with physicians in the community and asked them to agree to fit discharge patients into their schedules for follow-up appointments. UCare’s Baines came up with the idea of offering physicians what Nersesian calls a “bounty”: \$50 for each patient seen within five business days of discharge. “Many physicians when they heard about the money kind of chuckled because it isn’t very much,” Nersesian acknowledges. “But typically Medicare pays \$60 or \$70 to get a patient in for a post-hospital check-up. Most physicians’ offices are losing money on Medicare patients and aren’t in any hurry to bend over backwards to get these patients in. Fifty dollars is not a lot extra. But the idea was to incentivize the follow-up and offer a significant increase over what they’re getting now.” UCare is continuing to pay physicians the additional dollars.

Money from UCare was also used to create an incentive for the hospital, which stood to lose funds from decreased readmissions. UCare invested approximately

\$100,000 to implement the program but realized gross savings from it on the order of \$300,000. About a quarter of that went back to the hospital as a reward for reducing readmissions. (The hospital has since entered into similar shared-savings contracts with other major payers including Blue Cross and Blue Shield of Minnesota and Medica.) Nersesian says UCare was pleased enough with the savings that they continued the program and extended it to Fairview Ridges Hospital in Burnsville and are considering offering it at the University of Minnesota Medical Center, Fairview.

Other hospitals and health systems also have taken significant steps to improve communication both within the hospital and with patients' primary care physicians. One is HealthPartners, which owns Regions Hospital in St. Paul. Regions is striving to achieve an avoidable readmission rate of 10.7 percent by the end of 2011 and to reduce that figure even more by the end of 2014.

One area of focus has been patients with heart failure. Their strategy for reducing preventable readmissions among those patients has centered around the design of a comprehensive care plan prior to discharge. The care plan takes shape during a pre-discharge conference that involves physicians, care managers, social workers, mental health professionals, pharmacists, dietitians, diabetes specialists, and other providers. It also involves taking steps to bridge the information gap between the hospital and a patient's primary care physician. When a patient with heart failure is admitted to Regions, the patient's primary physician receives an electronic alert. Then, when the patient is discharged, a care manager, patient care coordinator, or nurse follows up with the patient by phone, making sure he or she is scheduled for an appointment. The patient's primary care physician and a cardiac specialist from HealthPartners' heart failure clinic then co-manage the patient, using the electronic health record system to facilitate communication. Since beginning this work in late 2009, Regions has started to see a reduction in readmissions among patients with heart failure.

“You can't just have hospitals change their practices and affect the problem, and you can't just have the clinic doctors out there on their own hoping to cut down on readmissions. It's got to be a collaborative effort.”

—William Nersesian, M.D.

Other programs have focused on communicating with the patient at home. Essentia Health's St. Mary's Medical Center in Duluth has slashed its readmission rate for cardiac patients to less than 7 percent (the rate for heart patients is nearly 40 percent nationally). Heart patients in their program receive a scale in their homes that helps them take note of sudden weight changes that indicate heart failure. The scale is also telemonitored by a cardiac nurse, who can help adjust medications. In a study conducted in partnership with Blue Cross and Blue Shield of Minnesota, Essentia found that for the 29 patients who'd been participating for six months, the home scale system saved \$1.25 million by avoiding unnecessary hospital readmissions.

At Mayo Clinic in Rochester, the effort to reduce readmissions is evolving. It started with a highly successful pilot program two years ago in the Division of Hospital Internal Medicine. The small-scale pilot, initiated by division chief David Klocke, M.D., began by teaching physicians which patients were at high

risk for readmission and helping identify the causes of readmission, such as a patient not understanding exactly how to take a medication. Physicians went on to audit their own patients' readmissions, noting causes such as inadequate medication review and poor identification of a patient's psycho-social circumstances. After educating physicians about which patients were most at risk and why, rates improved: In a 14-month period, the division reduced readmissions by 50 percent.

That success led to a program involving hospital nursing units in Rochester and at other Mayo hospitals in Florida and Arizona as well as those in the Mayo Clinic Health System. That program, which focused on patients with heart failure, myocardial infarction, and pneumonia, has led to a reduction in readmissions by as much as 88 percent in some facilities. “Overall, we had approximately a 20 percent decrease, which was our goal,” Klocke says.

The next step is to use Mayo's electronic medical record to identify high-risk patients and flag those who may need more guidance and follow-up at discharge.

Those patients may be taking numerous medications or may have already indicated that they're opposed to the recommended treatment regimen. "We try to identify them as early as possible, not only based on how high the risk is but what risk factors they have," Klocke explains. "We then engage the patient and family in discussions about their own self-care, and we do that in the patient's room." Among strategies Mayo clinicians use at the bedside is a teach-back system, in which physicians and caregivers educate a patient and then have the patient explain specific details of their care, including what the diagnosis is, what the doctor's name is, and how they're going to get to their follow-up appointment. The highest-risk patients get a phone call within the week to make sure they see a primary care doctor.

One of the most surprising changes Klocke has seen has been in the attitudes of physicians in his division, with whom he conducted before-and-after surveys. Before focusing on readmissions, Klocke says, "The surveys indicated that most physicians believed there wasn't much we could do to help the situation. The general feeling was these patients are so sick, they're noncompliant, and there's not much we can change." But Klocke continually posted data—graphs showing the number of readmissions steadily declining. In a second survey, as physicians noted they were doing more discharge instruction and medicine reconciliation, they also showed an overall change in their perspective. "What they said in the survey was they now believed they could make a difference," he says.

### Enlisting the Village

Making a significant dent in preventable readmissions will require many to think differently about interactions within the health care system. Some also point out that it will take a village. Nersesian, who's on the RARE steering committee, puts it this way: "You can't just have hospitals change their practices and affect the problem, and you can't just have the clinic doctors out there on their own hoping to cut down on readmissions. It's got to

be a collaborative effort with everybody involved." Hospitals are finding that the effort can sometimes be bumpy. Some institutions are still learning to use their electronic medical record systems, and often those systems aren't compatible with the ones at nearby primary care clinics. Others are working out how best to collaborate with nursing homes that receive high-risk patients after discharge.

But many are clear about the importance of aiming for a 20-percent reduction in readmission rates over the next year. "We believe the stretch goal is appropriate, and we believe it's achievable," says ICSI's Magnan. "What we're beginning to build is an infrastructure. We know we've got a fragmented medical system right now in how care is coordinated, delivered, and followed up. If we work on things like medication management for people who are readmitted to the hospital, we're going to learn from this subset of patients. Eventually, the procedures will be usable for other patients, and throughout the health care system."

Meanwhile, the clock is ticking. Medicare will begin taking stock of readmission rates in October 2011. Yet Magnan thinks that's not what's motivating most hospitals to tackle this issue. "Most places aren't involved because of the penalties and the savings, they're doing it because it's the right thing to do." **MM**

Kate Ledger is a St. Paul freelance writer.

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# A Turning Point

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An experience in the ICU leads a medical student to shift her focus.

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By Rachel Sang, M.D.

About a week into my Medicine II rotation, I was struggling not to become too overwhelmed by my first ICU experience. I had just picked up a new patient. Middle-aged with blond curly hair and a mustache, Jim had been extubated a couple of days earlier. The previous week he had undergone gastric banding of esophageal varices that had hemorrhaged, the result of a liver plagued by chronic disease.

I launched into my well-rehearsed introduction. “Good morning, Mr. Smith. My name is Rachel, and I’m a third-year medical student.” I asked him how he was feeling and how he had slept.

Still groggy, he rubbed his eyes and responded, “Good. I’ll live. So you’re gonna be a doctor?”

“That’s the idea.”

“You guys are all angels. I don’t know how you deal with crusty old guys like me.”

I felt an immediate connection with this man. Mr. Smith reminded me of the rugged farm types I had grown up with: burly, feisty, and seemingly immune to the charm of physicians. He could have easily been my father, my uncle, or the crop-

spraying pilot in my hometown of 700—a man who works hard, plays hard, and who won’t come to the hospital until it’s almost too late.

“The crusty old guys are my favorite ones, Mr. Smith.”

“Please, call me Jim.”

I finished my questions and politely excused myself to gather my thoughts so I would be ready to present his case to my resident and attending.

Jim’s wife stood outside the door. A robust, cheery woman, she took my hand and thanked me for all the work we had done. “I just can’t wait to take him home,” she said. “We have so much to do.”

I knew Jim was not out of the woods. With such advanced disease, a liver transplant was necessary for any hope of long-term survival.

I fielded his wife’s questions and informed her that our team would be back that afternoon.

She thanked me yet again, “You guys are angels.”

*Angels.* It seemed a bit excessive, I thought, as I hurried off to check Jim’s vitals and labs before examining my next patient.



Later that afternoon, I was sitting in our team workroom when a group of nurses raced down the hallway. I peered at them through the doorway and saw that they were entering Jim’s room. Curious, I followed them. “Page the resident ... Dr. Nelson. Where’s his nurse? Blood pressure is dropping again ... beep ... Is the resident coming? Another bag of saline ... We’re gonna need gloves in here ... beep ... beep ... beep ... The patient has hepatitis. Is the resident coming?”

I gasped as I pulled back the curtain and saw the ghost of the man I had met earlier in the day. His hair was askew. I walked to his bedside as he heaved. Dark, clotted blood poured from his mouth, soaking his pillow and the white patterned hospital gown. Its metallic scent filled the air. His eyes were wide with fear.

My stomach was in knots. Soon after



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I arrived, my resident and attending appeared and immediately gave orders for blood transfusion, volume resuscitation, and pressors. A nurse inserted a second IV, and the race was on. I couldn't believe how quickly my patient had deteriorated. Only hours earlier, I had chatted with him about his favorite rock band, and now he was fighting for his life.

I found a computer kiosk and signed into Jim's medical record to check his last set of vitals and give myself time to catch my breath. Just as I suspected, his blood pressure and heart rate had been stable an hour ago.

I rejoined my resident and attending. Two 16-gauge IVs were in place and an interosseous IV was on the way.

"One of the bands probably came off," the attending said.

The gastroenterologist arrived and

decided endoscopy was the next step.

Twenty minutes later, 15 people packed the room, and the procedure began. Several nurses kept a constant stream of blood and saline flowing. The GI manned his scope and camera with hurried precision. Our ICU team hugged the wall as the intensivist discussed pressors with the resident. Jim was no longer awake and was bathed in his own blood. There was blood on the bed, the wall, and the gowns of half the people in the room. The rectal bag overflowed, creating a large puddle of stool and blood on the floor. The stuffy room smelled of rust.

The GI team tried to position Jim so they could proceed.

"Rachel, come here and hold his shoulders, just like this," the gastroenterology fellow said.

I had been called from the safety of

my corner to the front lines. A nurse threw a yellow gown, glasses, and gloves my direction.

As the scope entered Jim's mouth, he choked, coughed, and spewed blood. It soaked the front of my gown, saturated my scrub pants, and seeped into my socks.

I braced myself and focused on stabilizing Jim's head while the GI struggled to find the source of the bleeding. Jim's skin felt cool and clammy. His hair was sticky with blood. I could feel my pulse throbbing. The beep of the monitor filled my ears. I looked at Jim's pale face and thought "This man is dying in my hands."

Jim Smith did die later that day after receiving 20 units of blood, a dozen bags of saline, and several emergent procedures.

I don't remember much of what else went on in the hospital that day. I don't remember the bus ride home. I do remember seeing Jim's wife after she was told her husband had died. Her world had turned upside down. Her husband was dead. Her kids no longer had a father. She had a funeral to plan and a pile of medical bills to contend with. She hugged me, a stranger she had met that morning.

"He's in a better place," she said as tears rolled down her cheeks.

That night, I cried myself to sleep. I cried for Jim and his family. I cried as I recalled the macabre scene that had played out before me. I cried as a way to cope.

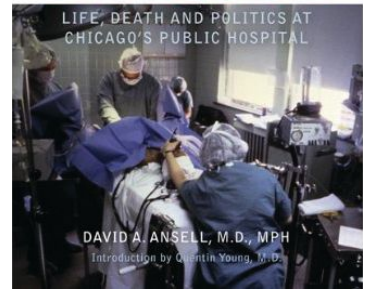
The decision to go to medical school, as with most of the decisions I had made up to that point, had been about me. That day, I realized it wasn't about me. It was about my patients. I needed to be knowledgeable and decisive. I needed to be there for them and their families. Who else are we here for if not for them? **MM**

Rachel Sang is now a first-year internal medicine resident at Abbott Northwestern Hospital in Minneapolis.

*A version of this article was published in Becoming a Doctor: Reflections by Minnesota Medical Students, University of Minnesota Press, 2011. It is reprinted with permission.*



# COUNTY



*County: Life, Death and Politics at Chicago's Public Hospital*, David Ansell, M.D., Academy Chicago, 2011

## Public Service

*Author David Ansell shares lessons from Chicago's Cook County Hospital about working with the underserved and the deficiencies of the U.S. health care system.*

| BY CHARLES R. MEYER, M.D.

Looming over Harrison Street and Pasteur Park on Chicago's west side is a gray monster of a building, shuttered in 2002, almost demolished in 2008, and now awaiting rejuvenation as a medical office building. For 78 years it delivered health care to Chicago's destitute and downtrodden and trained hundreds of physicians using the medical equivalent of trench warfare. Stories of the chaos that was medical care at Cook County Hospital (CCH) abound, and any memoir of medical care at "The County" will inevitably contain lurid anecdotes that add to its lore. But David Ansell's tale of his residency and attending years at CCH, *County: Life, Death and Politics at Chicago's Public Hospital*, isn't only war stories. It's also an indictment on how America delivered health care to the disenfranchised when Ansell started his residency in 1978—and on how we haven't improved all that much since.

Learning medicine seemed almost secondary when Ansell decided to do his internship and residency at CCH after finishing medical school in Syracuse, New York. Most medical school graduates approach residency as a challenge to the mind and body, a time to stuff the most medical knowledge into their brains in the shortest period of time. They choose their training program based on its reputation and what they hope it will do for their education. Ansell describes his 1978 choice of CCH, then in the midst of a battle between the state Legislature and the Cook County board over who would run the hospital, differently: "We came to County Hospital eyes wide open because of its troubles, not in spite of them. We did not come to County Hospital just to learn to be doctors. We came to County because we believed that health care was a right, not a privilege. That as doctors we had to lead the fight for fairness, equity and universal health care in the U.S."

Those noble sentiments were hard to keep in mind as Ansell experienced the usual wrenching insecurity of new medical trainees made even more emotionally traumatic by homeless people sleeping in bathroom stalls, the cacophonous waiting rooms, trauma befitting a battlefield, and patients with socioeconomic problems that dwarfed their medical ones. His descriptions of

his medical experiences are sometimes humorous, sometimes poignant. The general medicine clinic was a "gentle immersion into the intricacies of outpatient medicine," while the emergency room was the "intern equivalent of being thrown to the sharks," an instant learning experience with no formal teaching, "the medical equivalent of paint by the numbers" or "see one, do one, and pray." He developed a feisty assertiveness necessary to care for his patients: "At County I learned to be relentless in trying to help my patients."

And his assertiveness extended beyond patient care. In response to the rise in transfers of uninsured patients to public hospitals, Ansell co-wrote a paper, "Transfers to a Public Hospital," that was published in the *New England Journal of Medicine* in 1986. That article led to the passage of the Emergency Medical Treatment and Active Labor Act, the anti-patient-dumping legislation, later that year. In 1984, when a fellow attending physician who had founded the CCH AIDS clinic and developed AIDS himself was suspended, Ansell campaigned for unionization of the attending staff. Every chapter of *County* contains at least one paragraph bemoaning the plight of Ansell's patients, the political system that was contributing to their misery, and his efforts to change it.

Conditions did improve at CCH while Ansell was there. In the early 1990s, a competent, nonpatronage administrator, Ruth Rothstein, began to make the place work better. A replacement hospital, the John Stroger Hospital, was planned, built, and is now operating just behind the "Old lady of Harrison Street."

But the social morass of CCH patients hasn't cleared. Ansell summarizes his book: "The story of this singular public hospital is the story of health care in America, and its travails speak to our nation's failure to declare health care is a right and that Americans should not face early death or disability because they are uninsured." **MM**

Charles Meyer is a practicing internist and editor in chief of *Minnesota Medicine*.



# Critical Access Hospitals

## Hubs for Rural Health Care

By Mark Schoenbaum, M.S.W.

■ A 1997 federal law created a new type of rural hospital called the Critical Access Hospital (CAH). Having CAH designation allows a facility to receive cost-based reimbursement from Medicare in exchange for providing services such as emergency care and limiting the number of beds and the average length of stay. Minnesota has 79 CAHs. This article describes how having the designation has allowed these facilities to better meet the needs of the populations they serve. It also describes the challenges all CAHs face in light of federal budget constraints and health care reform.

Following Medicare's adoption of a prospective payment system in the 1980s, a system by which Medicare reimburses hospitals for inpatient services based on a predetermined rate for treatment of a specific illness, 23 rural Minnesota hospitals closed, causing thousands of area residents to have to travel farther for emergency and basic care.<sup>1</sup> It was not possible for these low-volume hospitals to cover their fixed costs under the prospective payment system. Responding to similar trends nationally, Congress created a new type of rural hospital designation, the Critical Access Hospital (CAH), as part of the 1997 Medicare law.

The provision allows small rural hospitals to receive cost-based reimbursement on their Medicare business in return for limiting their bed count to 25, maintaining an average annual inpatient length of stay of four days, and offering 24-hour emergency care services. Becoming a CAH brings a facility an average of \$850,000 in additional Medicare revenue a year.<sup>2</sup> Despite this incentive, it took 10 years for eligible Minnesota hospitals to apply for CAH status.

Today, with 79 CAHs, Minnesota

has the third-highest number in the country (Figure). The CAH program has helped those facilities become financially stable and keep their doors open, thus preserving access to care for an estimated 950,000 people in the state. This article looks at how CAHs in Minnesota are serving their communities as well as some of the challenges they face.

### A New Breed of Hospital

The financial viability brought by their CAH status has enabled many small rural hospitals to better meet the changing needs of the populations they serve and keep pace with the broader evolution taking place in health care. As a result, many now offer a mix of services that makes these institutions very different from what they once were. Where they mainly provided inpatient care, many now serve as hubs for primary care, specialty care, rehabilitation, hospice care, senior services, and other outpatient services. Half of Minnesota's CAHs own an attached nursing home, and about 35 offer assisted living units.<sup>3</sup> Some provide home health care, Meals On Wheels programs, and mental health care. In many cases, no other organization in the com-

munity offers these services.

The following are examples of some of the services Minnesota hospitals provide as a result of having a CAH designation and some of the benefits patients in those communities receive.

### ■ Round-the-Clock Radiology

Although telemedicine is still an emerging technology, use of digital imaging and teleradiology is now almost universal in CAHs in Minnesota. With digital radiology equipment on their campuses, they can send images to consulting radiologists at distant sites for immediate reading 24 hours a day. This is not only more efficient for the CAH staff, it allows patients to receive more timely care close to home.

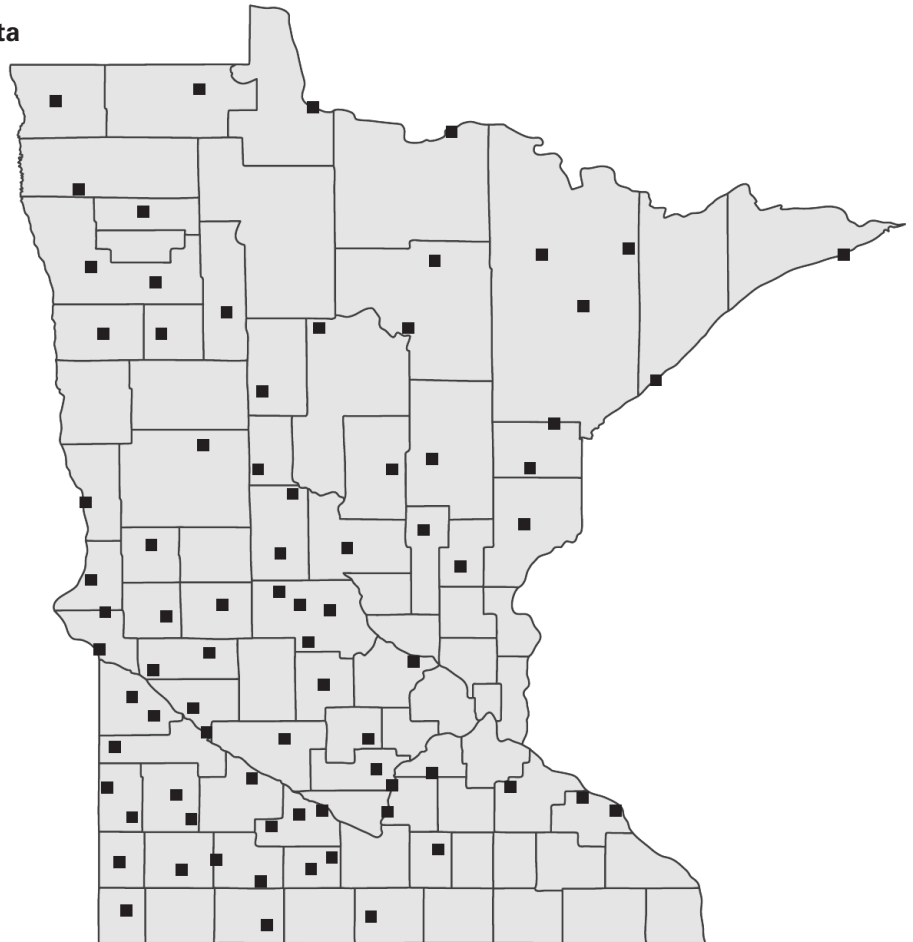
### ■ High-Quality Emergency and Trauma Care

For the majority of heart attack, stroke, and traumatic injury patients, a CAH is the place where they are stabilized and given initial treatment before being transferred to a tertiary care center. Critical Access Hospitals have adopted protocols for treating patients with ST-segment elevation myocardial infarction (STEMI) or acute stroke, trained their staff on the most current care guidelines, and developed and adopted policies supportive of systems-based care. Many CAHs have also developed relationships with larger hospitals to which they transfer patients. As a result, the quality of care for STEMI and stroke patients in rural areas has im-

Figure

**Critical Access Hospitals in Minnesota**

- |                     |                   |
|---------------------|-------------------|
| Ada                 | Madison           |
| Aitkin              | Mahnomen          |
| Albany              | Marshall          |
| Appleton            | Melrose           |
| Arlington           | Montevideo        |
| Aurora              | Monticello        |
| Bagley              | Moose Lake        |
| Baudette            | Mora              |
| Benson              | Morris            |
| Bigfork             | New Prague        |
| Blue Earth          | New Ulm           |
| Breckenridge        | Olivia            |
| Cannon Falls        | Onamia            |
| Canby               | Ortonville        |
| Cass Lake           | Park Rapids       |
| Cloquet             | Paynesville       |
| Cook                | Perham            |
| Crookston           | Pipestone         |
| Crosby              | Redwood Falls     |
| Dawson              | Roseau            |
| Deer River          | St. Peter         |
| Elbow Lake          | Sandstone         |
| Ely                 | Sauk Centre       |
| Fosston             | Slayton           |
| Glencoe             | Sleepy Eye        |
| Glenwood            | Springfield       |
| Graceville          | St. James         |
| Grand Marais        | Staples           |
| Granite Falls       | Thief River Falls |
| Hallock             | Tracy             |
| Hendricks           | Two Harbors       |
| International Falls | Tyler             |
| Jackson             | Wabasha           |
| Lake City           | Wadena            |
| Le Sueur            | Warren            |
| Litchfield          | Waseca            |
| Little Falls        | Westbrook         |
| Long Prairie        | Wheaton           |
| Luverne             | Windom            |
| Madelia             |                   |



Source: Minnesota Department of Health

proved. Many CAHs also house the ambulance service for their area and participate in the state’s EMS and emergency response system.

Since Minnesota passed legislation in 2005 creating a Statewide Trauma System, 120 hospitals have become designated trauma hospitals, with nearly all CAHs having either a Level 3 or 4 designation (Table). With training for their primary care providers and staff available through programs such as Advanced Trauma Life Support and Comprehensive Advanced Life Support (a program developed in Minnesota), staff at Level 3 and 4 trauma hospitals are able to quickly stabilize and transfer seriously injured patients. In addition, Level 3 trauma hospitals are able to provide definitive care for some patients.

■ Access to Physicians

The financial stability provided by a CAH designation has lent support to primary care providers in many communities. In

some, the physician practice has become part of the hospital, which can offer more substantial infrastructure and support systems. This has helped communities retain physicians who might otherwise struggle with feelings of professional isolation and to keep up with the rapid pace of change in health care delivery. In addition to offering primary care services on their campuses, CAHs often operate clinics in neighboring communities that might otherwise be too small to support an independent clinic. Cuyuna Regional Medical Center in Crosby and Riverwood Health Center in Aitkin, for example, have collaborated to establish a specialty program that offers access to minimally invasive surgery, ophthalmic surgery, and cardiac and other services in satellite clinics throughout the area they serve.

■ Improved Quality

The 1997 legislation creating CAHs included requirements for quality improve-

ment and coordination with other providers. It also provided states with funding to work with CAHs on these issues. In Minnesota, this has happened through a partnership among CAHs, Stratis Health (the state’s Medicare quality improvement organization), the Minnesota Hospital Association, and the Minnesota Department of Health’s Office of Rural Health and Primary Care.<sup>4</sup> During the last 12 years, CAHs have worked with these organizations to achieve measurable improvements in outcomes for patients with heart failure, atrial fibrillation, and pneumonia, as well as in care coordination and other areas.<sup>5</sup> A recent article published in the *Journal of the American Medical Association* reported relatively lower marks on certain quality indicators by CAHs. Although the article raises some timely issues, the research suffers from a number of conceptual and technical flaws.<sup>6</sup>

All CAHs capture and report quality data required by state law, and all are

involved in quality-improvement efforts. Critical Access Hospitals, like larger facilities, have found improving quality is an ongoing process. For example, CAH scores on pneumonia measures increased between 9 and 22 percentage points between 2005 and 2009.<sup>7</sup>

**■ Care Coordination**

The fact that CAHs often share staff with primary care clinics, nursing homes, home care agencies, and other services gives them experience with care coordination. Thus, CAHs tend to do well with such critical aspects of care as discharge planning and collaboration across the continuum of care. And this leads to improved quality, outcomes, and patient satisfaction. Improvements in these areas and reductions in hospital readmission rates are explicitly required in a number of the models created by federal and state health care reform legislation.

Rural providers have significant experience in coordinating care on behalf of their patients. Lakewood Health System, a CAH in Staples, which has clinics in five neighboring communities, became one of the state’s first certified health care homes, for example. At each Lakewood clinic, patients with multiple chronic conditions receive coordinated care and have ready access to providers, who are supported by an electronic health record (EHR) system and patient registry, and a dedicated health care home staff. The support of the CAH administration was central to Lakewood’s adoption of the model, according to John Halfen, M.D., the physician champion for the health care home initiative.

**■ Health Promotion and Chronic Disease Management**

Some CAHs have clinical pharmacists on staff who can be a resource to primary care physicians regarding medication management issues. In some communities, CAHs have opened their rehab departments as fitness centers. Saint Elizabeth’s Medical Center in Wabasha, for example, has developed a risk-reduction program for patients at risk for metabolic syndrome in which patients see a multidisciplinary

Table

**Trauma Hospital Designations**

**Level I:** Definitive care for all trauma patients

**Level II:** Definitive care for most patients

**Level III:** Definitive care for some patients; most major trauma patients stabilized and transferred

**Level IV:** Major trauma patients stabilized and transferred

**All trauma hospitals must have:**

- Board support with dedicated trained staff and physician oversight
- 24/7 trauma team activation: stabilization and rapid transfer
- Protocols and transfer agreements
- Quality, peer review, required benchmarks
- Site verification

Source: Minnesota Department of Health ([www.health.state.mn.us/traumasystem](http://www.health.state.mn.us/traumasystem))

team of clinicians and take part in a regular exercise program at the hospital.<sup>1</sup>

**Challenges**

Even though the 1997 law that created CAHs has helped a number of institutions survive and even grow and thrive, these hospitals face an array of challenges including maintaining financial stability, keeping up with changing technology, serving the needs of aging patients, and recruiting and retaining physicians and other providers. Changes required by reform legislation and payers and turbulent economic conditions will further test the agility of small hospitals with limited resources.

Demographic changes, especially the aging of the population, will continue to be felt more so in rural areas than in urban ones. The proportion of elderly patients CAHs serve is much greater than the state average. In addition, more CAH patients have chronic diseases and poorer health status than those treated in larger facilities.<sup>8</sup> Poor health and the lack of public transportation also limit mobility for many patients served by Minnesota’s CAHs.

Another challenge CAHs will have to address is attracting surgeons, as there is currently a shortage of general surgeons, especially those trained for practice in rural areas. According to a recent Minnesota Rural Health Advisory Committee report, 21 percent of Minnesota’s general surgeons practice in rural areas, with only 7 percent working in the areas most likely to

be served by CAHs.<sup>9</sup> Surgeons are essential to rural health care, as they provide their communities with timely treatment for trauma, as well as procedures such as appendectomy, cholecystectomy, small and large bowel procedures, bariatric surgery, and hernia repair. General surgery is often a key to the financial viability of a CAH, as it is a major source of revenue. If a CAH is unable to offer surgical services, it may struggle to provide other services. The Rural Health Advisory Committee report includes recommendations to strengthen general surgery in Minnesota through additional rural-focused training, infrastructure investments, and changes in pre- and postsurgical care. (The Rural Health Advisory Committee also has begun to study obstetrical care in rural Minnesota.)

Health information technology presents another challenge for CAHs. Critical Access Hospitals’ adoption of EHR systems lags behind that of larger facilities. Sixty-three (80%) of Minnesota’s CAHs have some components of an EHR, but they have a lower rate of adoption than that of non-CAH hospitals, which is 96%. In addition, the EHRs used by CAHs tend to have less functionality and be less likely to achieve meaningful use core objectives.<sup>10</sup> Health information technology will play a key supporting role in payment reform models such as accountable care organizations (ACOs), and the CAHs that are farthest along in adopting EHRs will be better equipped to participate in these



ventures. Health care reform is presenting CAHs with other challenges as well.<sup>11</sup>

Critical Access Hospitals have never operated in isolation. Under federal law, they are required to have a network agreement with at least one other hospital for patient referral and transfer, electronic sharing of patient data, credentialing, and quality assurance. Many also participate in networks for shared information technology services, group contracting and training, and joint clinical ventures. Historically, a number of CAHs have also been managed, leased, or owned by larger health systems, and there has been a noticeable uptick in the pace of system affiliation in recent years. Mayo, Sanford Health, and Essentia have all recently acquired additional CAHs in Minnesota. In light of health care reform efforts, independent CAHs will not need to be acquired or disappear as long as they have mutually beneficial partnerships and connections to networks and care systems.

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**Conclusion**

Whether they are independent or part of a larger system, CAHs will need to continue to reinvent themselves if they are to remain essential community institutions dedicated to improving health outcomes all along the care continuum—from primary care and prevention to trauma care. Although CAHs face the same uncertainties as other hospitals, they can serve as a model for other facilities and health care organizations as reforms and financial challenges force them to become more nimble and adapt to the changing needs of the populations they serve. **MM**

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# The Role of the Long-Term Acute Care Hospital

By Rahul Koranne, M.D., M.B.A., F.A.C.P.

■ Long-term acute care hospitals (LTACHs) have a niche role in the health care system. They specialize in caring for patients who are ventilator-dependent, are on inpatient dialysis, or have multi-organ or multi-system failure, postsurgical or organ transplant complications, complex wounds that need care, or traumatic or acquired brain injury. Many physicians are unfamiliar with the work done by the interdisciplinary teams that serve these facilities. This article describes LTACHs and their approach to care.

You are a physician at a short-term acute care hospital who has been treating a 50-year-old man who was crushed by a 1,600 lb. tree. The man was airlifted to your facility and initially cared for by the trauma and surgery teams.

The patient was brought in with 17 bones broken in 60 places, a collapsed lung, a bruised heart, and a stretched aorta. He is now on a ventilator, has a trach tube, is just coming out of a coma, and has many plates, pins, and screws holding him together.

You feel he is ready to be moved from the acute care hospital. But he still needs to be weaned from his ventilator, relearn how to breathe and talk on his own, regain control of his body, and build strength. He also will need to relearn daily activities such as how to feed

himself. In addition, he will need to focus on recapturing both his gross and fine motor skills so he can return to his job or another career and support his family. After that, he will likely need ongoing, specialized outpatient therapies to further his recovery.

As you prepare to discharge the patient, you consider his options: a skilled nursing facility, home care, or your hospital's transitional care unit. There is another option to consider, however: a long-term acute care hospital (LTACH).

## What is a Long-Term Acute Care Hospital?

Long-term acute care hospitals provide medical care to critically ill patients with complex conditions over an extended period of time. There are 432 of them in the United States, two of which are in Min-

nesota.<sup>1</sup> Bethesda Hospital is the largest with 140 beds. The other is Regency Hospital, which has 68 beds. Long-term acute care hospitals are accredited by the Joint Commission and reimbursed by Medicare and other public and private insurers.

Medicare data indicate that LTACH patients are more severely ill than those treated at other types of post-acute care facilities. Patients typically are admitted needing long-term services for complex medical problems such as multi-organ or multi-system failure, postsurgical or organ transplant complications, treatment of complex wounds, multiple injuries, and traumatic or acquired brain injury. Some need inpatient dialysis or help being weaned from a ventilator. Thus, the case mix index for LTACHs is extremely high.<sup>2</sup>

Patients often are referred to LTACHs directly from intensive care units (ICUs). To be considered for long-term acute care, they must undergo a clinical assessment and meet InterQual or National Association for Long-Term Hospitals (NALTH) admission criteria—that is, they must require ongoing

acute care, need daily physician visits, have had a short-term acute care hospital stay that lasted longer than five days, or have failed a lower level of care and had a readmission. The average length of stay for LTACH patients on Medicare is 25 days; however, some patients may stay for longer periods (by comparison, the average Medicare length of stay in a short-term acute care hospital is five days).<sup>3</sup> In 2009, 116,000 Medicare beneficiaries were cared for at LTACHs at a cost of \$4.9 billion.<sup>3</sup>

Long-term acute care hospitals offer comprehensive, personalized medical treatment and therapies designed to improve outcomes for the medically complex patients they serve. Patients benefit from daily physician visits and the presence of a physician onsite 24 hours a day, which they would not have in a nursing home or other long-term care facility. Long-term acute care hospitals also provide medical and rehabilitation services that are not routinely offered at other types of facilities such as care of complex wounds and injuries and inpatient dialysis. In addition, they provide comprehensive laboratory and radiology services on site. Long-term acute care hospitals employ medical specialists and subspecialists. The staff at Bethesda Hospital, for example, includes pulmonologists, neurologists, psychiatrists, psychologists, nephrologists, pathologists, geriatricians, infectious disease physicians, and general surgeons; the hospital also has in-house respiratory, pharmacy, laboratory, radiology, case management, and social service expertise.

Unlike a nursing home, patients don't live permanently at an LTACH. Rather, the purpose of an LTACH stay is to optimize a patient's ability to 1) live independently and return to his or her home community or 2) achieve the highest level of wellness possible and then move on to the next level of care, be it a skilled nursing facility, transitional care unit, or home with specialized home care services.

### **A Team Approach**

Staff at LTACHs use a team approach as they work to identify all of a patient's med-

ical conditions, devise treatment plans, and set goals that will result in positive, long-term outcomes for that individual. Physicians are integral members of those teams. Many of the physicians who work at LTACHs are hospitalists who have been trained in internal medicine, family medicine, or critical care. These physicians, along with the facility's medical director, provide daily oversight of a patient's care and partner with providers from pulmonary care, complex wound care, rehabilitation, dialysis, IV antibiotic therapy, and pain management in developing treatment plans.

The physicians are also supported by nurses, many of whom have advanced training in areas such as wound, ostomy, and continence care; pharmacists; nutritionists; diabetes educators; and occupational, speech, and physical therapists. Spiritual care, creative arts therapies, and recreational therapy also may be part of a patient's care plan. In addition, physicians and other caregivers work closely with patients' families to ensure that any other needs are being met. Certain LTACHs also provide specialty outpatient care clinics to assist patients after discharge. These clinics address concerns such as concussion, memory loss, Parkinson's disease and movement disorders, and neuropsychology.

Each day, physicians round with nurses and a mix of other providers, sharing information and viewing the patient's status from a variety of perspectives. Between seven and 10 days into a patient's stay, team members hold an update meeting to discuss the patient's progress, ensure that everyone is on the same page in terms of care progression, and address the non-medical aspects of the patient's care. The team continues to meet weekly to discuss clinical and social issues affecting a patient, review the person's progress, and define goals for the coming week.

Good communication among LTACH staff, between staff and patients, and between LTACH providers and community providers is essential. Because most patients are referred to an LTACH by an intensivist or hospitalist at a short-

term acute care hospital, communication between the receiving LTACH hospitalist and the referring doctor on the day of transfer is critical. LTACH physicians also communicate with the patient's primary care physician if there is a significant change in the patient's condition and prior to discharging the patient. After discharge, the LTACH physicians are available to help the patient's primary care physician get up to speed on the individual's recent care and prognosis and to answer questions. The goal is to help patients make a smooth transition from one location to another.

### **Improving Quality, Controlling Costs**

Like short-term acute care hospitals, LTACHs are concerned with improving clinical outcomes for patients and are engaged in quality-improvement initiatives. The National Association for Long-Term Hospitals maintains a database that LTACHs nationwide can use to assess their clinical performance. Areas of particular concern include ventilator weaning rates, ventilator-associated pneumonia rates, central line blood stream infection rates, urinary tract infection rates, fall rates, and hypoglycemia management. As part of the Patient Protection and Affordable Care Act of 2010, the Centers for Medicare and Medicaid Services must implement a pay-for-reporting program for LTACHs by 2014. A panel is in the process of developing 10 to 12 measures based on those LTACHs are already using for quality monitoring.<sup>3</sup>

A key measure for LTACHs is the ventilator weaning rate, as it is an indicator of whether a patient will do well long-term. Bethesda's ventilator weaning success rate for the first quarter of 2011 was 68%. The national average rate during that same period was 61%, according to benchmark data from NALTH.

Successful weaning means many things: Not only are patients less likely to be readmitted to the hospital after discharge from the LTACH, but they also are able to retain their mobility; travel to physical therapy; free themselves from restrictive medical equipment such as feed-



ing tubes; regain their vocal abilities so they can clearly indicate their needs; and heal more quickly. This translates to a better quality of life for the patient and lower health care costs.

Long-term acute care hospitals help reduce costs in a number of ways. First, the cost of care provided at an LTACH is less than that at a short-term acute care hospital for certain patients. For those with tracheostomies, for example, Medicare spending for care was lower for those who stayed in an LTACH than for those who did not.<sup>3</sup> In addition, nursing costs per day at an LTACH may be half the cost of nursing care in a short-term acute care hospital ICU, according to industry comparisons. Further, because some patients may do better at an LTACH than at a short-term acute care hospital, they may recover more quickly and be discharged earlier. A Connecticut study comparing short-term acute care hospital patients with those admitted to an LTACH with similar conditions found that the LTACH patients spent fewer days in the hospital than those in the short-term acute care facility (37.5 days vs. 19.5 days, respectively). The LTACH patients also were more likely to be discharged home than the patients in the short-term acute care facility (31.1% vs. 10.7%).<sup>4</sup>

Short-term acute care hospitals can address their own length-of-stay challenges and ultimately control costs by referring patients to an LTACH if and when those individuals meet admission criteria. In addition, patients treated at LTACHs tend to be readmitted to short-term acute care hospitals less often than patients treated in other post-acute care settings. According to MEDPac's 2004 Report to Congress, patients treated in LTACHs were readmitted to acute-care hospitals 26% less often than patients with similar conditions who were being cared for at skilled nursing or long-term care facilities.<sup>5</sup>

Physicians also report that working at an LTACH provides the luxury of time, not only to formulate a customized care plan but also to get to know patients and their families. Often, they develop lasting relationships with them. This builds a

strong sense of community at the LTACH and contributes to the physicians' satisfaction with their work. In 2011, for example, Bethesda Hospital had the highest physician satisfaction rates in the HealthEast system, which also has three short-term acute care hospitals and 14 clinics.

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**Conclusion**

Long-term acute care hospitals have emerged as an important component in the continuum of care. Data have shown that care in an LTACH can result in lower costs, fewer hospital readmissions, and more successful ventilator weaning. Thus, it is clear that LTACHs will continue to have a place in a reforming health care system. Because they serve patients with conditions that are beyond the scope of a short-term acute care hospital, transitional care facility, or skilled nursing facility, LTACHs have a unique niche. And because they are experienced at taking a team approach to patient care, they are a model for providers in all settings, as they demonstrate the benefits of interdisciplinary teamwork in caring for patients with complex medical needs. **MM**

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# Hyperbaric Oxygen for Treatment of Problem Wounds

By Cheryl Adkinson, M.D.

■ Hyperbaric oxygen treatment has seen a resurgence of interest in recent years, with more academic medical centers building facilities and more physicians becoming board-certified in undersea and hyperbaric medicine. The reason for the growing interest is better understanding of the role of hypoxia in wound healing and an appreciation for the role of HBOT in reversing tissue hypoxia and enhancing the healing process. This has resulted in a number of new evidence-based indications for HBOT. This article describes the role of HBOT in wound healing and how it specifically applies to treatment of delayed radiation injury, one of the conditions for which it is commonly used.

Although Dutch physician Ita Boerema first described adjunctive use of hyperbaric oxygen for clostridial myonecrosis (gas gangrene) in 1940,<sup>1</sup> it wasn't until the 1960s that hyperbaric oxygen therapy (HBOT), in which 100% oxygen is inhaled while the entire body is at increased atmospheric pressure, came into use in civilian medicine in the United States.

Inspired by reports of successful treatment of gas gangrene and its potential in facilitating open-heart surgery and organ transplantation, several academic institutions constructed large hyperbaric research facilities in the mid-'60s. Those chambers were used extensively for about a decade. However, as other means of accomplishing heart surgery and organ transplantation were developed, academic interest in hyperbaric medicine waned, although some commercial entities offered HBOT for off-label maladies including wrinkles, hair loss, and impotence. Thus, during the 1970s and 1980s, legitimate use of HBOT was limited to treatment of gas gangrene, decompression sickness, cerebral air embolism, and carbon monoxide poisoning.

Over the last two decades, however, there has been a resurgence of interest in hyperbaric oxygen treatment. The number of hyperbaric facilities in the United States grew from 215 in 1991 to 514 in 2000 to 950 in 2010. The number of patient treatments in established facilities increased as well, from 1,362 in 1990 to 3,131 in 2010 at Hennepin County Medical Center, for example, and from 2,000 in 1990 to 10,000 in 2008 at Virginia Mason Medical Center in Seattle.<sup>2</sup> During this same period, hyperbaric medicine became a subspecialty recognized by the American Board of Medical Specialties. There are now 446 U.S. physicians board-certified in undersea and hyperbaric medicine.

The greatest impetus for growth in hyperbaric medicine practice has been better understanding of the role of hypoxia in nonhealing wounds<sup>3</sup> and an appreciation for the role of HBOT in reversing tissue hypoxia and enhancing wound healing. This has resulted in a number of new evidence-based indications for HBOT, all of which share the therapeutic basis of correcting tissue hypoxia (Table 1). The two medical con-

ditions that are currently contributing most to the growing interest in hyperbaric medicine are chronic diabetic foot ulcers, which are associated with life-

Table 1

## Indications for Hyperbaric Oxygen Therapy

### Emergency

- Air or gas embolism
- Carbon monoxide poisoning
- Clostridial myositis and myonecrosis (gas gangrene)
- Necrotizing soft-tissue infections
- Crush injury, compartment syndrome, and other acute traumatic ischemias
- Decompression sickness
- Arterial insufficiencies
- Central retinal artery occlusion
- Severe anemia

### Routine

- Enhancement of healing in selected problem wounds
- Intracranial abscess
- Osteomyelitis (refractory)
- Delayed radiation injury (soft-tissue and bony necrosis)
- Compromised grafts and flaps
- Acute thermal burn injury

Source: Gesell LB (ed). *Hyperbaric Oxygen Therapy Indications*, 12th edition. Undersea and Hyperbaric Medical Society, Durham, North Carolina. 2008.

and limb-threatening infections, tissue necrosis, osteomyelitis, amputations, and nonhealing amputation sites; and delayed radiation injury, which is associated with bone and soft-tissue necrosis and failure of skin flaps and grafts. This article discusses how HBOT promotes healing, with a particular focus on delayed radiation injury.

**Factors Contributing to Poor Wound Healing**

A problem wound is one that fails to progress normally through the typical stages of healing. It demonstrates poor granulation, persistent exudates, retarded contraction, and/or failure of neo-epithelialization. Skin flaps and grafts fail to integrate with the underlying tissue, leading to retraction and death of the flap or graft and to re-exposure of the original wound in its initial or a worsened state. In some cases, the overt cause of a problem wound is a surgical procedure in tissue that is intact but compromised.

Multiple factors can contribute to the failure of a wound to heal. Low tissue oxygenation, caused either by decreased systemic oxygenation or by poor tissue perfusion, is foremost among these factors. Others include inflammation; infection; nutritional deficiencies; repetitive trauma; poor glucose and lipid control; hematologic, rheumatologic, and autoimmune disorders; use of certain medications; and social and economic concerns such as alcohol and tobacco use, poverty, and homelessness (Table 2).<sup>4</sup> Therefore, treating any wound that is not healing properly must involve identification of all contributing factors and a focused attempt to eliminate or ameliorate each one.

Tobacco use bears special mention because it is common and avoidable. Tobacco contributes to the development of wounds, delays in healing, wound dehiscence, and infection. Nicotine causes vasoconstriction, resulting in local tissue hypoxia.<sup>4</sup> Vasoconstriction in the microcirculation has been demonstrated within five to 10 minutes of smoking one cigarette, and microvascular flow is reduced by 30% to 38% after two cigarettes.<sup>5,6</sup> Nicotine substitutes have the same effect. Smoking also

appears to be correlated with long-term endothelial vasomotor alterations, endothelial dysfunction, accelerated atherosclerosis, platelet activation, and decrements in collagen synthesis,<sup>7-10</sup> all of which contribute to poor wound healing in current and former smokers.

**The Role of Oxygen in Wound Healing**

Hypoxia plays an important role in initiating the healing process. Local tissue hypoxia generates specific proteins that maintain oxygen homeostasis and regulate hypoxia-inducible genes. These proteins are called hypoxia-inducing factors (HIF), and the genes they regulate include human erythropoietin (EPO), vascular endothelial growth factor (VEGF), heme oxygenase I (OH I), lactate dehydrogenase A (LDHA), inducible nitric oxide synthase (iNOS), and glucose transporter I. These hypoxia-inducible genes help to resolve hypoxia by increasing the number of erythrocytes in the blood, enhancing development and relaxation of blood vessels, and adapting cellular metabolism to low oxygen conditions, thereby improving the oxygen-carrying capacity of the blood, tissue perfusion, and local cellular adaptation to low-oxygen tensions.<sup>4</sup> Although hypoxia is required to initiate the healing process, adequate oxygen is necessary to support the cell proliferation stage of wound healing.<sup>11,12</sup> Neutrophils remove necrotic tissue, bacteria, and debris from the wound through oxidative killing, which is oxygen-dependent.<sup>13</sup> Neutrophils also secrete growth factors and chemotactic factors for macrophages. The macrophages are instrumental in regulating the wound-healing process and are the primary source for vascular endothelial growth factor, which plays a major role in the development of a vascular network within the wound.<sup>14,15</sup> The proliferation of leukocytes, fibroblasts, and keratinocytes requires adequate tissue oxygen content. And the rate of fibroblast production of collagen is dependent on the level of oxygen.<sup>16</sup> Therefore, after the initial injury, wounds that do not have adequate oxygen do not heal.

Table 2

**Factors Contributing to Poor Wound Healing**

- Decreased systemic oxygenation (cardiopulmonary disease, anemia, high altitude)
- Decreased tissue perfusion (hypotension; vasoconstriction from medications, nicotine use, cold exposure; edema; hypovolemia; large and small vessel disease [atherosclerosis, thrombosis, diabetic vasculopathy, therapeutic radiation, accidental or surgical trauma])
- Poor nutrition
- Infection/inflammation
- Repetitive trauma (weight-bearing, self-mutilation, persistent pressure)
- Poor glucose and lipid control
- Hematologic disorders (anemia, hypercoagulability)
- Rheumatologic and autoimmune disorders (rheumatoid arthritis, Crohn's disease, systemic lupus erythematosus, Sjogren's syndrome, diabetes mellitus, psoriasis, scleroderma)
- Medications (immune suppressants, steroids, anticoagulants, antineoplastic agents, vasoconstrictors)
- Economic and social concerns including poverty, homelessness, and alcohol and tobacco use

**How Hyperbaric Oxygen Therapy Works**

The primary therapeutic mechanism of hyperbaric oxygen is improving oxygen delivery to tissue by dissolving oxygen in plasma. Under normal conditions at sea level, a healthy person has a hemoglobin saturation of 97% to 100% and a negligible amount of oxygen dissolved in plasma (0.3 vol %, which equals 0.3 cc of oxygen for every 100 cc of blood). Because hemoglobin is already nearly saturated, the only way to increase the oxygen-carrying capacity of blood is to dissolve more oxygen in the plasma. The same healthy person breathing 100% oxygen at sea level will have a hemoglobin saturation of 100% and dissolved oxygen in plasma of 2 vol %. Because the solubility of a gas in a liquid increases with pressure, another 2 vol % oxygen is added to plasma for every additional atmosphere of pressure. Breathing pure oxygen at two times atmospheric pressure will result in an arterial pO<sub>2</sub> of about 1,400 mmHg and 4 vol % oxygen dissolved in plasma.<sup>17</sup> At three times normal atmospheric pressure, arterial pO<sub>2</sub> is



2,100 mmHg and 6 vol % oxygen is dissolved in the plasma, which is sufficient to meet the requirements of the heart and brain in the absence of circulating hemoglobin, thus accounting for survival of patients with severe acute blood loss anemia treated with HBOT.<sup>1</sup>

The dramatic increase in the arterial oxygen content of the blood going to tissues during HBOT creates a steep diffusion gradient favoring oxygen movement to tissue and increasing the diffusion distance of oxygen. At three times normal atmospheric pressure, for example, the diffusion distance from the precapillary arteriole into the extravascular compartment is increased from 64 microns to 240 microns.<sup>18</sup> This is thought to enable a smaller number of capillaries to deliver oxygen to a larger volume of tissue.

### HBOT and Wound Healing

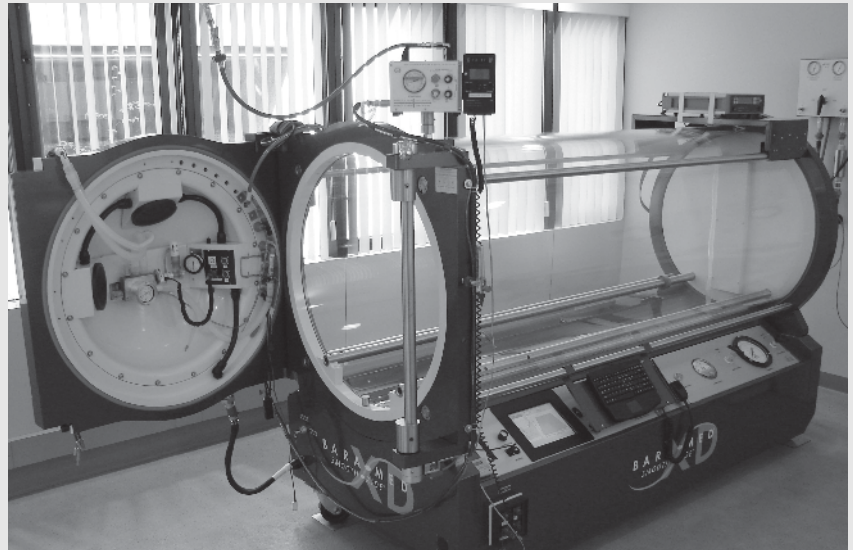
Hyperbaric oxygen therapy promotes wound healing in a number of ways (Table 3) including intermittent correction of tissue hypoxia and direct enhancement of fibroblast proliferation, collagen synthesis, neovascularization, and epithelialization.<sup>14,19,20</sup> It also reduces local tissue edema by causing vasoconstriction of both arterial and venous vessels. Although blood “in-flow” is reduced, with very high arterial oxygen content, the net ef-

Table 3

### Ways HBOT Promotes Wound Healing

- Corrects tissue hypoxia
- Enhances fibroblast proliferation
- Enhances collagen synthesis
- Promotes neovascularization
- Promotes epithelialization
- Reduces edema
- Kills anaerobes
- Promotes leukocyte killing of Gram-positive and Gram-negative aerobes
- Enhances antibiotic effectiveness (transport of aminoglycosides into cells)
- Stimulates osteoblast and osteoclast function
- Increases platelet-derived growth factor (PDGF)
- Promotes angiogenesis
- Mitigates leukocyte-mediated post-ischemic reperfusion injury

## How Hyperbaric Oxygen Therapy is Delivered



Photos courtesy of Hennepin County Medical Center

Hyperbaric oxygen therapy is delivered in a chamber. A monoplace chamber (top) houses one patient at a time. A multiplace chamber (bottom) accommodates two or more patients at a time (along with a medical attendant) and delivers oxygen to the patient through a mask, hood, or endotracheal tube. In the chamber, the air pressure is typically two to three times that of normal atmospheric pressure. For most indications, treatment duration is 90 to 120 minutes. The number of treatments is preset for some indications; for others it is based on clinical response. On average, patients undergoing treatment for nonemergency indications receive 35 treatments.

fect of HBOT is an increase in tissue oxygen.<sup>13,16,21</sup> Hyperbaric oxygen therapy also improves the host immune response. It is toxic to anaerobes and promotes leukocyte bactericidal action against both Gram-positive and Gram-negative aerobes.<sup>22-24</sup> In addition, HBOT enhances the transport

of aminoglycoside antibiotics across the bacterial cell wall, enhancing the efficacy of these drugs, which is inhibited *in vivo* by local tissue hypoxia.<sup>25</sup>

Hyperbaric oxygen therapy raises the low-tissue oxygen tensions in infected bone to normal or above-normal levels<sup>26</sup>

and stimulates osteoblast and osteoclast function, which is impaired under hypoxic conditions. It also up-regulates the gene expression for the platelet-derived growth factor (PDGF) beta receptor, which may be one of the mechanisms by which HBOT enhances angiogenesis.<sup>27</sup> Of interest with respect to acute ischemia in crush injury and compartment syndrome, closed head trauma, and replantation surgery, HBOT mitigates leukocyte-mediated post-ischemic reperfusion injury in muscle and brain tissue by preventing leukocyte adhesion to the venule wall, thereby limiting the production of oxygen free radicals.<sup>28-30</sup>

### HBOT for Delayed Radiation Injury

Hyperbaric oxygen therapy has been used successfully to treat the complications of delayed radiation injury for 30 years. Delayed radiation injury is usually seen six months or more after radiation and is characterized by endarteritis, hypocellularity, and severe secondary fibrosis. The current thinking is that the obliterative endarteritis, the prolonged depletion of cell lines (fibroblasts, squamous cells) and stem cells, and the release of fibrogenic cytokines by the radiation all play a role in the permanent and progressive damage to these tissues. Wound healing in irradiated tissue is inhibited both by the hypoxia resulting from endarteritis and by the absence of cells essential for wound repair.<sup>31</sup>

Hyperbaric oxygen therapy stimulates angiogenesis in irradiated tissue, resulting in increased vascularity.<sup>32</sup> Increased oxygen tensions in the irradiated tissue accompany this increased vascularity as patients progress through a series of hyperbaric treatments. This improvement in resting tissue oxygen levels is robust over time.<sup>33</sup> In the animal model, even the vascular density of irradiated bone has been shown to increase with HBOT.<sup>34</sup> Increased cellular density also has been demonstrated in heavily irradiated tissue in humans.<sup>32</sup> Two studies have shown that HBOT can mobilize stem cells by increasing nitric oxide,<sup>35,36</sup> although this has not yet been shown to have a direct impact on irradiated tissue. The beneficial effect

## Case Study

### Patient with Delayed Radiation Injury

R.F. is a 64-year-old male who underwent definitive radiation of 7000 cGy to the larynx and mediastinum for T2N0M0 SCCA of the larynx. Thirteen weeks after finishing radiation, he was discovered to have recurrent/residual cancer and required total laryngectomy, left hemithyroidectomy, and bilateral selective neck dissection. Ten days after surgery, he developed a pharyngocutaneous fistula. Despite attempts at local repair, the fistula failed to heal for six months. R.F. then underwent right-sided deltopectoral island flap elevation, which failed and had to be removed two weeks later. A right pectoralis major myocutaneous flap elevation and rotation was performed to close the pharyngocutaneous fistula, and a split-thickness skin graft was placed on the residual defect. Six days later, the flap was dehiscent at the fistula site and reapproximated. Six days subsequent to that (now 12 days postop) dehiscence was again noted, and R.F. was sent for hyperbaric medicine consultation. He started HBOT the day of consultation. R.F.'s medical history was ASCAD, HTN, hypothyroid, hyperlipidemia, depression, nonsmoker since cancer diagnosis but with a 75-pack-a-year history. | Photos courtesy of Hennepin County Medical Center



Granulation tissue, followed by epithelium, grew over the distal flap and the donor defect. The patient continued to heal while awaiting surgery to close the fistula.

of HBOT on irradiated tissue is likely to involve all three mechanisms: stimulating angiogenesis, reducing fibrosis and increasing cellular density, and mobilizing stem cells.

Although spontaneous necrosis of soft tissue or bone in the irradiated field may occur, more often, complications of delayed radiation injury happen because of surgical procedures in the irradiated field.<sup>31</sup> These surgical procedures fall into one of several categories: 1) surgical salvage for cancer recurrence in the irradiated field (eg, laryngectomy for recurrent laryngeal cancer), 2) surgery in the irradiated tissue for a

condition unrelated to the initial malignancy (eg, CABG after radiation for breast cancer), or 3) surgery to address radiation-induced injury (dental extractions for severe radiation caries; flap coverage after debridement of radiation tissue necrosis).

Based on the results of current research, a case may be made for preoperative HBOT to improve the outcome of any major surgical procedure that is to occur in a field that was heavily irradiated more than four months previously. Preoperative HBOT is a well-established practice in the case of extraction of non-restorable teeth from within a heavily irradiated field. Pre- and postoperative HBOT





This photo was taken at the beginning of HBOT, with the dehiscence at the fistula site covered by gauze next to his stoma, the large pectoralis major flap with dehiscence of its attachment to the superior medial chest wall, and the STSG site visible by the right shoulder.



During HBOT, dehiscence did not progress, flap edema decreased, and the flap attached to the chest wall.



The patient returned for HBOT six days after a radial forearm free flap was placed to close the fistula.



The free flap healed uneventfully.

have been shown to reduce the incidence of subsequent mandibular osteoradionecrosis from 29.9% to 5.4%.<sup>37</sup> Significant improvement in osseous integration and reduction of subsequent osteoradionecrosis has been demonstrated when dental implants within an irradiated field are supported by pre- and postimplant HBOT.<sup>38</sup> The successful eradication of mandibular osteoradionecrosis has been demonstrated with presurgical HBOT, then debridement of all necrotic bone, followed by postsurgical HBOT, whereas, historically, either surgery alone or HBOT alone have failed to halt this progressively destructive process.<sup>33</sup> This combined approach

has been shown to be less expensive than surgery or HBOT alone.<sup>39</sup> Improved outcomes have been reported for bladder surgery following HBOT.<sup>40</sup>

Serious wound complications are common after head and neck surgeries within a previously irradiated field.<sup>31</sup> In a series of patients for whom surgery was planned to repair radiation necrosis wounds or to resect recurrent cancer, a marked reduction was reported in the incidence of wound infection, wound dehiscence, and delayed healing when HBOT was used before and after surgery, compared with controls. However, patients requiring urgent salvage surgery

for recurrent cancer in an irradiated field may not have the option of pretreatment. Hyperbaric oxygen therapy still has a role in reducing wound complications in these patients. When surgical resection is performed for laryngeal or pharyngeal cancers in previously irradiated fields, starting HBOT when it is evident that the wounds are not healing results in much-improved outcomes compared with historical controls.<sup>41</sup> An even greater reduction in complications, as compared with patients who do not undergo HBOT, is associated with starting HBOT immediately after surgery, without waiting for evidence of wound complications.<sup>42</sup> More research is needed



to identify the patients at greatest risk for and the procedures most associated with serious postoperative wound complications. Cost analyses are not available for head and neck salvage procedures. Given the cost of a major flap procedure that fails (initial surgical costs, prolonged hospitalization, repeat debridements, and a second reconstructive procedure), for example, it is likely to be less expensive to undertake a coordinated plan of surgery and HBOT.

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**Conclusion**

The field of hyperbaric medicine has grown over the past two decades primarily because of its efficacy for treating problem wounds. It has proved to be especially helpful for diabetic patients with chronic lower extremity wounds and for cancer patients with healing problems caused by delayed radiation injury. Additional research will improve our understanding of these and other problem wounds and the role of HBOT in improving outcomes.

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# Philanthropy and Scientific Medicine

## The History of the University of Minnesota's Cancer Institute

By Aimee Slaughter and John H. Kersey, M.D.

■ The University of Minnesota's Cancer Institute was established in 1925 with a gift from the Citizens Aid Society. The Institute was the first cancer hospital in Minnesota, and its focus on patient care, research, and education laid the foundation for the eventual formation of the Masonic Cancer Center. This article describes the origins of interdisciplinary cancer care at the University of Minnesota.

In 1925, the University of Minnesota opened a new Cancer Institute, complete with 50 hospital beds, half a gram of radium, and a state-of-the-art X-ray machine. The Institute was established with a gift from the Citizens Aid Society, under the leadership of Carolyn McKnight Christian, and supported by the Society through the 1930s. The Cancer Institute laid the foundation for the eventual formation of the Masonic Cancer Center in 1991, which is now a National Cancer Institute (NCI)-designated Comprehensive Cancer Center. This article describes the origins of organized cancer care at the University of Minnesota, a history that began more than 80 years ago and involves patients, physicians, scientists, and philanthropists.

### Science Meets Philanthropy

The 1920s and 1930s were a time of hope in American medicine and cancer care.<sup>1-3</sup> Medicine was beginning to be presented as an explicitly scientific endeavor, in part because of developments such as aseptic surgery and medical X-rays. At the same time, Americans were becoming more concerned about cancer, which was seen as a modern malady. This led to a growing interest in specialized cancer care. By the early 1930s, there were about a hundred cancer hospitals

or centers in the United States, according to the count of historian Patrice Pinell.<sup>4</sup> Although some of these were small in size and limited in scope, they were part of a growing movement to organize care around cancer.<sup>4</sup>

In the first part of the 20th century, radical surgery was generally the preferred treatment for cancer. William Stewart Halsted at Johns Hopkins University, for example, championed the radical mastectomy. But some cancers, including some advanced cases that were considered inoperable, responded well to radiation therapy. X-rays and radioactivity were used therapeutically, especially for superficial conditions. However, radiation therapy was still relatively new and not universally accepted by the medical profession, partly because of its novelty and pressure from socially powerful surgeons who were concerned about losing some of their patients to radiation therapists.

Leaders at the University of Minnesota, however, supported the idea of using radiation therapy, sometimes in combination with surgery, and brought on staff with expertise in the area. Dr. Karl Wilhelm Stenstrom, a Swedish physicist with experience in radium therapy, was hired in 1926, and Dr. Leo Rigler was sent to Sweden for a year's

training with world-class radiologists and appointed director of the Division of Radiology in 1927. Stenstrom and Rigler worked together closely, demonstrating how physicists and physicians could share their knowledge of and experience with radiation therapy.

The cancer center might not have gotten off the ground, however, if it were not for the efforts and vision of Carolyn McKnight Christian (Figure 1), president of the Citizens Aid Society. The Citizens Aid Society was founded in 1916 by her father-in-law, grain miller George H. Christian. After the death of her husband, George Chase Christian, from cancer in 1919, she resolved to combat the disease through philanthropic support of research, education, and treatment.

The Society initially provided \$250,000 (more than \$3 million in today's dollars) to form the Institute, with \$50,000 of this dedicated to the purchase of an X-ray machine and a half-gram of radium, which cost \$30,000 (its purchase required additional support from the Howard Baker fund). By the early 1930s, the Society was supporting the Institute with annual gifts of about \$8,000.<sup>5</sup> This support was essential because the university insisted that the Institute be self-sufficient. (This goal was not always met, however, and the university occasionally approved small, stop-gap gifts and provided several thousand dollars a year as well from 1932 to 1934.) In addition to their financial support, the Citizens Aid Society and Christian helped chart the course of the Institute. "The gift places a

new emphasis upon thoroughly scientific investigation and methods of treatment of one of the dread ailments of humanity,” wrote University of Minnesota President Lotus Coffman in a letter to Carolyn McKnight Christian on April 17, 1923.<sup>6</sup>

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**A First of its Kind**

The Cancer Institute was unique in that it had a combined commitment to patient care, research, and education. It was state-of-the-art in its approach to caring for patients. The Institute employed “scientific medicine,” which referred not just to its use of the new radiation therapies but also to its methods for managing patient care. There was systematic record keeping, and physicians made informed treatment decisions based on pathology reports and other standardized, easily trackable and comparable information in those records. It also used state-of-the-art equipment. With funding from the Citizens Aid Society, the Institute installed new X-ray machines in 1930 and in 1938, ensuring that patients would receive modern care and that students would train with the most current equipment. Most of the patients treated with the deep (200 kV) X-ray were cancer patients; superficial (100 kV) X-ray was used to treat those with skin cancer. (Patients with nonmalignant conditions such as acne and plantar warts were also treated with superficial X-ray.)<sup>7</sup>



Figure 1. Carolyn McKnight Christian in 1949.

The Institute’s supply of radium was kept in a radium emanation plant (Figure 2), a common practice at the time. The plant was set up by one of the leading radium therapists of the day, Dr. Giocchino Failla of what is now Memorial Sloan-Kettering Cancer Center in New York.<sup>8,9</sup> Radium continually decays into radon gas, then called radium emanation. Radium emanation plants processed the radon and collected it in tiny glass needles or seeds, which were then implanted into tumors. Because of radon’s short half-life, using radium emanation seeds allowed for safer and more manageable treatments compared with using radium salts, which were originally used for radium therapy.

The vast majority of patients treated with radium emanation at the Institute had uterine or breast cancers. These cancers were comparatively easy to access with the radium emanation needles, and radiation therapy did not entail disfigurement or the removal of surrounding organs or glands, as surgery often did. There are no long-term records for these patients, so we cannot know how they ultimately fared. However, based on the records of other radium therapists, it is clear that if carefully applied, radium emanation was effective in reducing or eliminating some tumors, in some cases for many years. Physicians at the time had every reason to be optimistic about the possibilities of radium therapy

and were hopeful that by providing an alternative to surgery for some cancers, patients would be less fearful and more willing to consult their doctors if they were concerned about any changes in their physiology. In many ways, radium therapy laid the groundwork for the therapeutic use of radioactive isotopes, a practice that spread after World War II and continues today.<sup>10</sup>

Another important component of the modern scientific medicine the Institute offered was systemized record keeping; its record system was developed by Lillian Dahl, who acted as secretary, receptionist, X-ray technician, film processor, and radiographer. Social work was another valued facet of patient care at the Institute; Lucille Amiotte was hired in 1936 to assist cancer patients and their families with concerns that went beyond their immediate medical needs such as arranging accommodations for those who came from out of town and setting up home care for patients leaving the hospital. The Cancer Institute had strong ties with the pathology lab, which was under the direction of Dr. Rudolph Koucky, whose salary was paid by the Society. The number of pathology samples studied each year grew from 645 in 1925 to 3,785 in 1935, and the majority of the work done in the pathology lab was related to cancer.<sup>9</sup>

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**Beyond Patient Care**

In 1935, the Cancer Institute reported that during the previous five years it had treated 485 patients with uterine cancer, 415 with breast cancer, 217 with skin cancer, 200 with lip cancer, 147 with prostate cancer, and 967 with other cancers.<sup>11</sup> (Those numbers do not represent all cancer patients treated by the hospital, only those admitted through the Cancer Institute.) By the end of the 1930s, the Institute was treating more than 1,000 new patients a year.

Although patient care, whether in the form of treatment or palliative care, was the Institute’s primary focus, some physicians and staff found time for research and outreach as well. Several physicians collaborated, for example, on animal studies

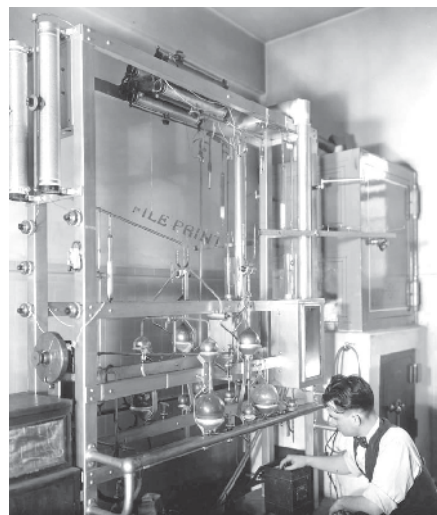


Figure 2. The radium emanation plant in 1930.

Photos: University Archives, University of Minnesota



on possible causes of cancer. And although comparatively little breakthrough research took place, the Institute's educational efforts—aimed both at professional and lay audiences—were widespread and influential. The physicians and scientists associated with the Cancer Institute taught courses to University of Minnesota medical students that covered topics including pathology, roentgenology, biophysics, and radiation therapies. They also helped train residents; for example, Stenstrom and Rigler had a three-year program to cooperatively train residents in roentgenology and radium therapy.<sup>9</sup> In addition, physicians associated with the Institute spoke at professional conferences, and the Institute hosted leaders in the field who gave addresses on various topics.

The Institute's physicians also were heavily involved in educational outreach, working with the Citizens Aid Society to distribute pamphlets and give lectures about cancer prevention and treatment. Some gave addresses on WCCO radio. Between 1928 and 1936, pathologist William O'Brien gave 400 radio talks, and cancer was the subject he most frequently discussed. He also gave more than 400 live lectures to civic, professional, religious, and other groups, reaching a total audience of more than 90,000 people.<sup>9</sup> Those outreach efforts were particularly important because at the time, cancer carried a large social stigma and was seldom discussed publicly, a reticence that was just starting to change thanks to the efforts of national organizations such as the American Society for the Control of Cancer and local campaigns such as those of the Cancer Institute.

### Organizational Challenges

One challenge for the Cancer Institute was the fact that it had no formal department or division status within the medical school. Most of the providers at the Institute held appointments within other departments or divisions, and this distributed organization was often a source of confusion. For example, in 1929, four years after the Institute was founded, the medical school dean, Dr. Elias Lyon, wrote

to university President Lotus Coffman asking if he, as dean, or Arthur Strachauer, as director of the Institute, had ultimate say over Cancer Institute decisions.<sup>12</sup> The status of the Institute became more uncertain after Strachauer's retirement in 1930. The Institute was without a director for two years; its affairs were managed by a group of affiliated faculty, sometimes under the informal guidance of chief of surgery Dr. Owen Wangensteen.

In 1932, after consulting with Cancer Institute providers, Dr. Richard Scammon, then dean of the medical school, appointed a five-member committee to direct the Institute, in a way codifying the practice of the previous two years. This committee sent its last three-year report to the Citizens Aid Society in 1939 (the Society had agreed to a three-year funding cycle in 1935); the next report was written in 1942 by medical school dean Dr. Harold Diehl. This appears to have been the last report filed. That report mentioned a 1938 "plan of the Department of Surgery to somewhat decentralize the cancer service"—a plan that appears to have been implemented.<sup>13</sup> Cancer care continued to be provided, but it was under the purview of the department of surgery. The Cancer Institute, as an organizational structure, had been dissolved and absorbed. The Citizens Aid Society continued to support the efforts of the University of Minnesota in combating cancer, endowing the George Chase Christian Professorship of Cancer Research, held first by Dr. John Joseph Bittner in 1943.

### Conclusion

The University of Minnesota's Cancer Institute reached thousands of Minnesotans in the 1920s and 1930s with its commitment to scientific cancer care, research, and outreach, which at the time was unique in the state. Its work was recognized in 1937, when the newly created NCI, as part of a larger program designed to train physicians in surgery and radiation therapy, granted support to five fellows at the University of Minnesota, beginning a research tradition that continues to this day.

In many respects, the Cancer Insti-

tute was on the leading edge of medical and social efforts to fight cancer. It had a matrix structure, a director with authority, philanthropic partners, institutional support, and a multidisciplinary approach to care and research—all qualities that are found in current NCI-designated cancer centers including the University of Minnesota's Masonic Cancer Center. **MM**

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# Operation

By Mina Le, M.D.

He cut her like you cut a fruit, a plum  
Through layers gashed, its twilight peel and sphere,  
But for blood's dusky accents chasing curves  
Drawn by the knife. Her nose an angel-thumb,  
Her scarlet-pitted cheek in its fifth year,  
She slept, and halothane bewitched her nerves.

All in a pool of light of lambent blue  
Her face, in linen diamond framed, exposed  
Its softness like Ophelia's in the boat;  
He touched the offering, then dipped into  
Red liquid petals the cautery's wasp. Smoke rose,  
With scent of seared flesh, from the stemmed moat.

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