

Brick By Brick: Building the Pyramid

A Flagship for Innovation

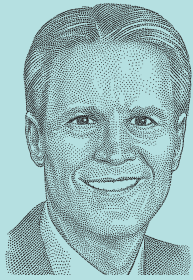
Something Special

Who Needs This Test?

"More Than Loud Noises in the Night"

Medicine is a public trust

THE JOHNS HOPKINS CENTER
FOR INNOVATIVE MEDICINE



David B. Hellmann, MD., M.A.C.P.
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BRICK BY BRICK

It's happening: The Pyramid, the new model for academic medicine that we have developed in the Center for Innovative Medicine (CIM), is being put into action. I hope you'll be as excited as I am to see what we're doing as you read this issue of *Breakthrough*. With each new initiative, we are practicing what we believe: That Medicine is a Public Trust, the patient, family and community come first, collaboration is the key to making this happen, and everyone involved, at every level, needs to be part of it.

Our Bridgeview Unit (see Page 4) has been open for a few weeks now. It is a short-stay unit that is unlike anything else at Johns Hopkins. Its staff of hospitalists and nurses are absolutely committed to making the hospital stay as good as it can be for the patients and their families. Before it was built, this unit was planned so thoughtfully, so painstakingly, that when it opened, there was not a single hitch (well, except for needing to move a few electrical outlets).

The Bridgeview staff feels part of something special, but it doesn't take a brand-new facility to do this. In the Division of Rheumatology, recently named the top in the country, director Antony Rosen spends a lot of time listening to his hundred or so faculty and staff (see Page 8). The changes that this improved communication has brought about are making the entire division a better, and more productive, place to be.

We have been talking about wise use of technology at the CIM for more than five years now. In a new initiative (see Page 10) led by our house staff, a group called Physicians for Responsible Ordering is working to help doctors – who have a bad habit of ordering more tests than patients may need – order tests more responsibly. Our Aliki team is looking at another important part of hospitalization – the discharge process – and is transforming this often chaotic transition by making the patient a key part of it (see Page 16).

In exciting research news, a new interdisciplinary sleep unit is making possible more sophisticated studies, and pioneering work in sleep apnea has revealed that instead of being a symptom of obesity or other conditions, this is a potentially deadly problem all by itself (see Page 12). And thoughtful preclinical work on the use of stem cells and Parkinson's Disease (see Page 14) may hold the keys to curing this devastating illness.

Finally, I am thrilled to tell you that our groundbreaking Miller-Coulson Academy of Clinical Excellence has inducted its second class of Master Clinicians (see Page 19), caring, brilliant doctors and teachers who set the bar for what a clinician should be, and whose work is inspiring the next generation of physicians to aim equally high.

I hope in reading this issue that you will feel, as I do, that we are laying the foundation for better health care everywhere, bringing the standard closer every day to what we believe it must be, because people who are sick deserve nothing less. Academic medical centers are incubators, places where change begins. What we do here is already spreading, as our colleagues elsewhere learn about our work, and as our young doctors graduate and take what they have learned here with them. I hope, too, that you will know that you are a critical part of these achievements. Without private support, our work would not be possible. Ideas put into action tend to get funded only after they show results; but they can't show results until someone believes in them enough to nurture them. Thank you for your faith in what we are doing.

David B. Hellmann, M.D.

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WE BELIEVE

Medicine belongs to the public. Our mission is to create a different kind of academic medicine, to tear down ivory towers, share knowledge and dedicate ourselves toward one goal – making life better for patients.

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A Flagship for Innovation: The Pyramid Comes to Life

Nobody knew it would be this good. They hoped, and they planned, and they believed in the Pyramid vision laid out by David Hellmann, explained and expanded upon in countless meetings and e-mails.

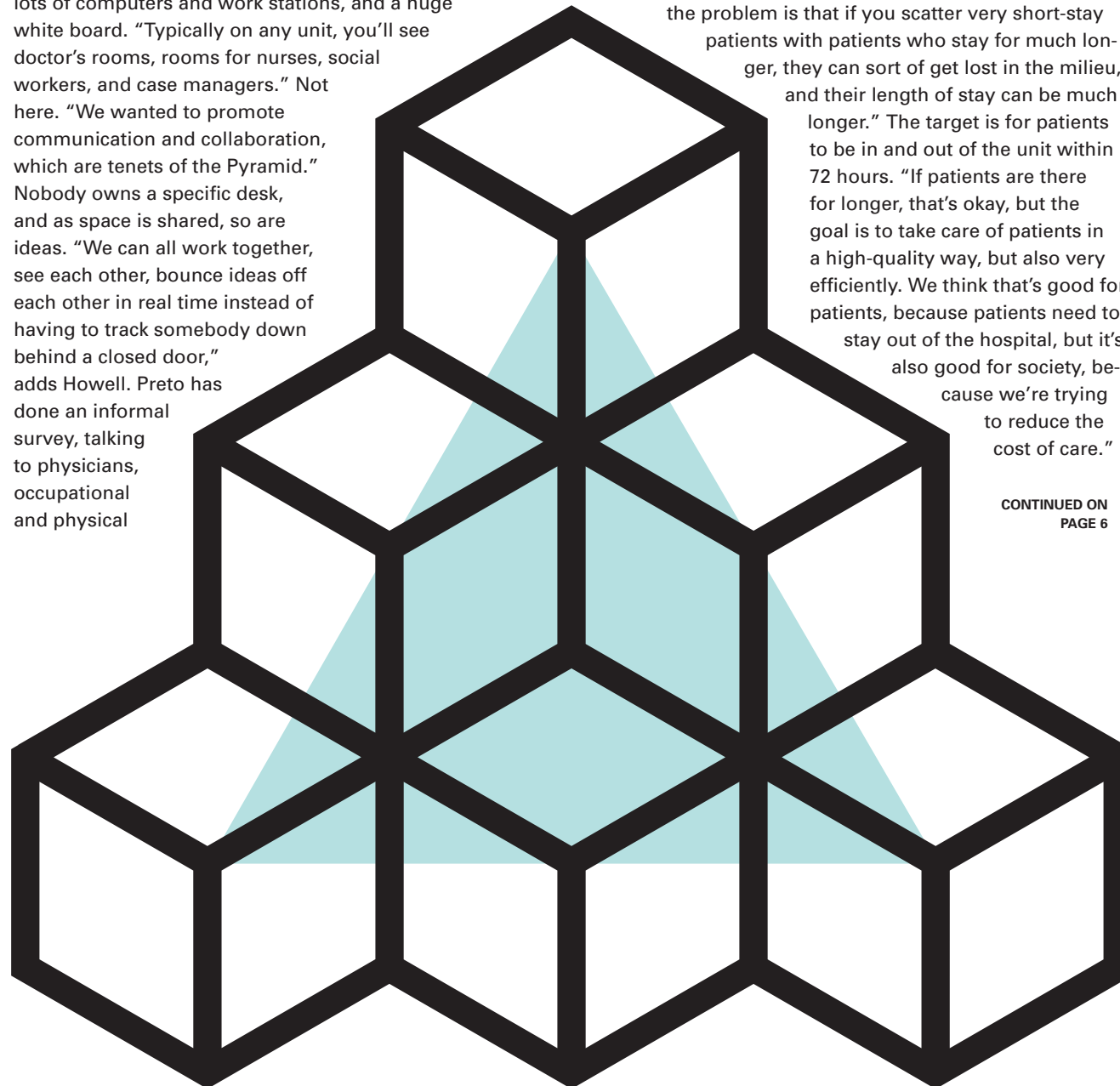
But even in their best-case scenarios, they didn't imagine just how much the patients – and all the doctors, nurses, social workers, physical therapists, case managers, occupational therapists, and housekeepers working together to serve them – would appreciate the new Bridgeview Unit. Designed and implemented with great thoughtfulness and painstaking care, it is the Pyramid in action, a flagship for innovation, and it's changing the face of Johns Hopkins Medicine at Bayview.

The condensed story is that a 63-bed unit for chronic care patients was transformed into a 38-bed unit for short-stay patients. But there's much more: From the beginning, everyone involved in this metamorphosis felt that here was a chance to do something different. "We had a wonderful opportunity here," says hospitalist Christine Soong, M.D., "to really think about putting the patient and family first, at the top of that pyramid." In a very short time – the unit opened in late August – "Bridgeview has become our vanguard unit for rolling out our new initiatives to improve patient-centered care," adds Cynthia Rand, Ph.D., Deputy Director for Patient-Centered Care.

"It's doing great," says Eric Howell, M.D., head of the Collaborative Inpatient Medicine Service, "much better than we ever anticipated. There have been almost no bumps in the road, no difficulties, it's really gone quite smoothly." Correction: They did need to move some electrical outlets, he notes. Otherwise, "from a patient care perspective, it's been almost flawless." This is because so much thought went into it from the get-go, Howell believes. What makes Bridgeview different? One distinction is that all of this unit's doctors, led by Howell and Soong, are hospitalists. (It is a noteworthy confluence of events that a similarly pioneering effort, the Alike Service, is transforming

the teaching of medicine to young doctors – see story on Page 16 – and that these parallel forces for change are both blossoming now at Bayview.) Most hospital units are hospital-centered, Howell says, and "the main issues for how the unit works are to meet the hospital's needs. Bridgeview was designed from the very beginning to be patient-centered and interdisciplinary."

Walk into the unit, and one of the first things you'll notice is what the Director of Nursing, John Preto, R.N., M.S., calls the "room without walls" – the multidisciplinary room, bright and cheerful, with lots of computers and work stations, and a huge white board. "Typically on any unit, you'll see doctor's rooms, rooms for nurses, social workers, and case managers." Not here. "We wanted to promote communication and collaboration, which are tenets of the Pyramid." Nobody owns a specific desk, and as space is shared, so are ideas. "We can all work together, see each other, bounce ideas off each other in real time instead of having to track somebody down behind a closed door," adds Howell. Preto has done an informal survey, talking to physicians, occupational and physical



Most hospital units are designed to meet the hospital's needs. Bridgeview was designed from the get-go to be patient-centered and interdisciplinary.

therapists, and case managers, and "they are so happy, number one, that the room exists, and two, that it's easy to have the professional team talk about the care of a patient," when everybody's together. "That's what the team just loves about the room," says Rona Corral, R.N., M.S.N., C.N.S., Bridgeview's patient care manager. "It's always open, and everyone is always invited."

Patients on the Bridgeview unit are primarily very short-stay, says Howell – people with chest pain, or mild heart failure, for example. "Before Bridgeview, they were scattered throughout the hospital, and the problem is that if you scatter very short-stay patients with patients who stay for much longer, they can sort of get lost in the milieu, and their length of stay can be much longer." The target is for patients to be in and out of the unit within 72 hours. "If patients are there for longer, that's okay, but the goal is to take care of patients in a high-quality way, but also very efficiently. We think that's good for patients, because patients need to stay out of the hospital, but it's also good for society, because we're trying to reduce the cost of care."

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What is the Pyramid?

The Pyramid concept, created by David Hellmann, M.D., the Alike Perrotti Professor of Medicine and co-founder of the CIM, is a creative rethinking of the traditional "triangle" model of academic medicine. This model, which stood the test of time for more than a century, was developed at Johns Hopkins, and its three sides stand for Teaching, Patient Care, and Research – the traditional missions of a teaching hospital.

The Pyramid model has more to it. Built around the belief that medicine is a public trust, it has a pinnacle: At the very top are patients, families, and the community. "All sides point toward the patient," explains Hellmann. In contrast, "only one side of the traditional triangle model explicitly focuses on the patient. The assumption is that the other two sides also focus on helping patients, but unfortunately, this is not always the case." Research, particularly in a competitive environment where funding is limited, often tends to become an end of its own, rather than a means to the greater goal of helping people who are sick. The three sides of the traditional triangle are still there, but in the Pyramid, they support each other in many ways. Hellmann's model makes collaboration a huge priority, between doctors and scientists, doctors and nurses, doctors and patients, clinical and basic researchers in different disciplines, and among clinicians, scientists and teachers. "Answers to complicated health problems can only be found if we all work together, and if everyone feels that we are part of something special and important." No wall stands alone in a pyramid. Nurses, physical therapists, pharmacists, administrators, volunteers, housekeeping and security staff – we all bolster each other, many parts strengthening the whole. "Our whole work force is the base," say Hellmann. "Our bedrock foundation is people working together for one greater good, the patient."

“Taking Care of Your Family ... Our Family”

The Bridgeview care team puts it right out there: “We’re all there to provide the best service to the patient,” says John Preto. “We have expectations.”

Rona Corral makes sure “anyone who steps on the unit knows our motto, ‘Taking care of your family ... our family.’ We must always greet and smile, make sure we are explaining everything to our patients, and acknowledging and including the family. That is just non-negotiable.”

The special Bridgeview welcome started when the very first patient came to the unit, Corral says. The Emergency Department called to say the patient was on the way. Minutes later, members of the multidisciplinary team had whipped up a personalized welcome sign and hung it outside his room, and gathered at the elevator and outside the patient’s room to welcome him. “He said he felt like a guest of honor. We want to make each patient feel the exact same way.”

“Our motto is, ‘Taking care of your family ... our family.’ We must always greet and smile, make sure we are explaining everything to our patients, and acknowledging and including the family. That is just non-negotiable.”

Preto believes the Bridgeview welcome helps set the tone, telling the patient that this is a different environment. It also reinforces to the staff an accountability, that “we are going to do special things here, and for you to be a part of that, you have to adopt that philosophy immediately.” And the staff has met the challenge, he adds, from people in housekeeping, who immediately clean the central shower rooms after they are used, so they’ll be ready in case anyone wants to use them, to people from pharmacy, who stock the three Pyxis medication machines (see side story), to nutrition services workers who replenish the snacks, to the people in clinical engineering, who labored for days to get the cardiac monitoring telemetry systems running smoothly.

“When we opened the unit, maybe Rona and I were standing in the picture, but there were at least 100 other people who helped make this environment what it is.”

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Among the new initiatives being launched in the unit is a plan to have the patient’s discharge summary, the communication from the hospital doctor to the patient’s primary physician, done within 48 hours. The legal standard for doing this is 30 days, which is way too long, say Howell and Soong – because if someone is likely to need to be readmitted to the hospital, this often happens within the first couple of weeks, “so obviously, 30 days is not going to help improve that,” says Soong. Adds Howell: “We’ll also make sure there is communication to the primary care physician for patients who are at a high risk of coming back to the hospital. If you look across the country, communicating with the primary care physician at the time of patient discharge happens the vast minority of the time.”

Another pilot program to be tested in Bridgeview involves pain management, says Rand. “We are revising the system of care so that appropriate medical orders are on file, and there won’t be long delays in getting approval when a patient needs help managing pain.”

Still another idea, a very simple one that falls into the “why hasn’t anyone ever thought of this before?” category, is designed to help patients remember the name of their doctor. Melissa Helicke, M.B.A., assistant dean, talks to a lot of patients in the hospital. Most of them know who their nurse is, she says, but “I ask if they know their doctor, and they very rarely do.” In a small pilot program, Bridgeview patients will get a 4 x 7 card with a picture of their doctor. “It seems like it’s the right thing to do,” she adds. “So a patient can say, ‘This is my doctor today, this is who is taking care of me.’”

These are early days for Bridgeview, but preliminary results from patient satisfaction surveys are coming in with extremely high scores. Rona Corral has gathered some less scientific, but more tangible data, as well: Cards, cookies, fruit, flowers, and candy, sent by patients and families to say thanks. ■

Thoughtful Little Touches Add Up

Think about any time you’ve ever spent hanging around a hospital, either as a patient or at the bedside. Remember walking down the hall, not wanting to bother the nurse, just trying to get a cup of ice? Or maybe you would have given your eye teeth for a fresh cup of coffee when the cafeteria was closed, or wished you could heat up the other half of that Italian sub you bought five hours ago. Maybe you wondered how it was going downstairs, where your sister was waiting with the kids, who were too young to go into the hospital room.

Rona Corral, John Preto, and many others involved in planning the Bridgeview unit spent months figuring out how to create the most considerate, patient-friendly environment possible. “It was very important to us to think of the little things,” says Preto. Their thoughtful touches can be seen throughout the unit. Here are just a few:

- **Kitchenettes for patients and families.** There’s one on each of Bridgeview’s three wings. “These rooms stay open,” Corral, which means round-the-clock access to snacks, water, juice, ice, coffee, a microwave, napkins, straws, etc. “We keep these rooms stocked at all times.”

- **Sleeper chairs.** Bridgeview is a 38-bed unit, but the current maximum number of patients is 24. There are 10 private rooms, and the nursing staff tries to space the patients apart, giving them as much privacy as possible. Budgeting for a lot of sleeper chairs was one of the team’s priorities, recognizing how important it is “for families to be with their loved one,” says Preto.

- **A kid-friendly waiting area.** Children under 12 can’t go into the patient rooms, but at least they can be just a few feet away. “We have toys, coloring books, and activities for that mother or father who has to bring the three-year-old,” says Corral.

- **Peaceful places to hang out.** There are two open areas with rockers and benches, and windows with a great view of the bay, where patients and visitors can sit together, “and get a break from the hospital room,” says Corral. The unit is on the third floor, adds Preto, “so we were very specific when we were talking with the facilities and design crew, that we wanted those rocker chairs.”

- **Extra bedside tables.** “So the family can sit in the room and actually eat a meal while the patient is eating, as well,” notes Preto. No more perching a hospital tray on your lap.

- **Color, lights, pictures.** Pretty fixtures, pleasing colors and patterns. Each wing has its own color – yellow, peach, or blue – and flavor, says Corral. In one wing, all the pictures relate to Maryland’s equestrian scene. Another has a nautical theme, and the third has artwork featuring city life – Little Italy, Annapolis, downtown Baltimore. It’s not just pretty; it also helps patients who are able to walk around remember where their room is located.

- **Three Pyxis machines instead of one.** You’ve seen them, the towers that dispense and record the medications each patient uses. There’s one on each wing, closer to the patients. It means extra work for Pharmacy, but it helps the nurses get the medication to patients sooner. There are also nursing substations and chart record stations on each wing. “We felt it was really important to decentralize the unit,” says Preto, “so the team can be closer to the patient.”



Something Special: Why It Matters That People Like Their Jobs, and How to Help Them Do It

Why does the Pyramid model (see page 5) call for all the employees to feel like they're part of something special? What difference does it make, anyway – isn't our mission to help others, not ourselves? If we do this, does it really matter whether or not people feel good about their jobs?

It matters a great deal, says Antony Rosen, M.D., the Deputy Director of Innovation at Bayview. In any organization, employee satisfaction has a lot to do with productivity and effectiveness – but in medicine, it's even more important. "How people do their jobs and how effective they are at contributing to the missions of the organization – all this depends very much on their morale," says Rosen, who is also the Mary Betty Stevens Professor of Medicine, the Hugh and Renna Cosner Scholar, and the Director of the Division of Rheumatology. "If you are overloaded and unappreciated, you are unlikely to be nice to patients. And if you are not nice to patients, their entire experience is affected."

It doesn't take much. A few cranky words by a grumpy employee may make a patient say no when asked to participate in a research study. An unpleasant experience could keep someone from coming back. "The ability to pursue what is really important to the entire enterprise depends on mutual ownership," says Rosen. "There are many downstream benefits. Going the extra mile in every area – patient care, research, teaching, quality, leadership – is what makes our environment unique and successful."

Rosen's Rheumatology division was just named the top in the country. Part of the reason may be that the people who work there really like it. The division, which has about 100 employees, recently held a retreat. A lot of planning went into it ahead

of time, by Rosen, his division manager, Duane Reynolds, M.H.A., and others, to make sure it was a good one. If you've ever been to a bad employee retreat, you may well appreciate their effort. At some well-meant retreats, grievances and resentments are given a generous airing, with results that can be truly awful. Hurt feelings for some; for others, a fervent wish for escape or invisibility or, worse, freshly dredged anger at simmering injustices from previous years – and then people go back to work the next day, with nothing resolved. "We said, if we are going to do this, what do we want to achieve?" Rosen says. "We put time and resources into making sure that the goals were achievable, and we then committed resources to achieving them. There's nothing more demoralizing than letting people air what they don't like and then not changing it."

The retreat, held at Hopkins' Mount Washington campus, a nice, neutral location, was run by Hopkins' Organizational Development Office (having "outsiders," even though they work for the same institution, running the show helps foster the feeling that it's safe for participants to speak their mind). Among the issues discussed was work life – the division's environment. This was important to Rosen, who believes that "people, if you want them to really participate, need to have some ownership." The academic medical environment is hierarchical, he says, and this can lead some people to feel that they're less valued in the overall endeavor than others. "And yet, if you want everybody to own success, you have to make everybody have a share. We really wanted to try to move to the 'small shareholder' mentality."

One way to do this, Rosen learned, is in the area of social events. "There are things that we do for all the right reasons, events that you have that supposedly are for morale, but the problem is that the decision-making around them generally comes just from one sector," and it means a lot to some people to be able to have a say in how a group occasion, like a holiday party, is celebrated.

Rosen admits that he was oblivious to this particular issue; it was just not on his radar. For example, "we don't have a summer picnic as a division," he explains. "It's one of those things that doesn't mean anything to me," and he assumed others felt the same. But it turns out, the retreat revealed, that some people really want to have a summer social event. So there is now a committee, made up of representatives from throughout Rheumatology, "who are responsible for planning how to use the resources that we currently spend, but that people feel they don't own."

The important thing, to Rosen, is not having more potluck suppers or trips to see the Orioles – it's ownership. "In fact, my assumption had always been that they felt that, and I was struck by the fact that not everybody did."

Other subjects, besides work life, covered at the retreat included finding new ways to maximize research collaboration, and exploring the idea of measurement. "Why are people so uncomfortable with measuring their performance, or measuring whether they're reaching their goals?" The retreat was "incredibly positive," Rosen says. "I think everybody got something out of it." Even the skeptics in the crowd, he adds, "felt that there is something to be said for that kind of personal interaction, for us to say what we think, and change what we do."

During the retreat one such skeptic – Rosen won't say who – "said, 'this is B.S., this is just touchy-feely, a waste of our time.'" And that was okay, Rosen thought, because he was glad the person felt comfortable enough to say that. "One of the things that came up that day was that people don't

At some retreats, grievances and resentments are given a generous airing, with results that can be truly awful. Hurt feelings for some; for others, a fervent wish for escape or invisibility or, worse, freshly dredged anger at simmering injustices from previous years – and then people go back to work the next day, with nothing resolved.

praise when praise is due," that an academic environment "is easy to criticize, but slow to praise. This person, who really hated the whole process, kind of kept quiet after that," and later in the day, found out that a grant had been funded, and called Rosen in his office to report the good news. Rosen gave his congratulations, and was surprised when the person then said, "'Where's my hug?' I said, 'Come on down.' And the person did."

Culture-changing efforts such as this, Rosen believes, work better when done group by group, an office or division at a time rather than, for example, multiple departments holding retreats together. "If every group did it, it would make the overall place much nicer to work in." Another important note is that this kind of event doesn't have to cost a lot of money. Talking is free, and it can be done over a brown-bag lunch as well as a catered meal. In return, listening, keeping an open mind, and being willing to change, are priceless. ■

Who Needs This Test?

Doctors can develop bad habits, too, and one of them is ordering more tests than patients may need.

Making things more complicated than they need to be: It's a problem for many of us in this age of information overload, but doctors tend to raise it to an art form – especially when it comes to unnecessary testing, says cardiologist Roy Ziegelstein, M.D., executive vice-chair of the Department of Medicine, and deputy director for education.

In 1989, when he was a medical chief resident at Hopkins, Ziegelstein used in his teaching an article from the *New England Journal of Medicine*. In a 1985 study, investigators found that most patients admitted to the hospital got a routine chest x-ray. “Now, you're probably saying to yourself, ‘I think most patients *still* get an admission chest x-ray,’ and they do,” says Ziegelstein. In this article, the scientists ruled out patients with problems that clearly called for a chest x-ray – things like breathing trouble, cough with fever, chest pain – “and said, ‘let's just take the average Joe, who comes in with abdominal pain, or infection of the leg, and let's see how often the chest x-ray reveals something that changes anything about the hospitalization.’” And the answer, in almost 500 patients was essentially zilch. It didn't

help if there wasn't a chest-related complaint to begin with. “So the main message in this, our number one scholarly publication, was that you don't need to do an admission chest x-ray on patients who don't have cardiopulmonary symptoms,” says Ziegelstein. “That was 25 years ago, and it hasn't changed.”

That's because, Ziegelstein believes, “this really needs to be looked at as a behavior problem, much as you would look at being overweight or smoking,” and it is so ingrained that education alone doesn't seem to help. “To change someone's practices like that is sometimes very difficult to do just by changing knowledge. Even though we think of ourselves as smart; you would think that if you just talked to doctors, and told them they didn't need to do something, that they would do it. But doctors are animals, creatures of habit.”

Millions of dollars are spent each year on tests that probably didn't need to be done, says Marc Laroche, M.D., a medical resident who is working to change this. He and resident Linda Mobula, M.D., under the supervision of cardiologist Jeff Trost, M.D., program director Colleen Christmas, M.D., and others, have formed a group called Physicians for Responsible Ordering (PRO), to help physicians order tests more responsibly. This initiative began about a year ago, at a morning report when Ziegelstein and Mobula presented a patient who had to go through three different studies to confirm that he needed to have his gallbladder taken out.

“This really needs to be looked at as a behavior problem, much as you would look at being overweight or smoking.”

“Probably one of those would have been sufficient,” says Laroche. “We had a discussion about that and our tendencies to order more tests than we need,” and the PRO group was born. “The internal medicine residency at Johns Hopkins Bayview is trying to do something about doctors' bad habits, by trying to curb them during their formative years of residency training,” says Christmas.

The group is focusing on two of the most commonly overused tests: the chest x-ray and the troponin test, a lab test that looks for an enzyme called troponin, which could suggest damage to the heart and help tell whether someone has had a heart attack.

So, who gets a chest x-ray at admission these days? Well, pretty much everybody, Laroche says, “which is often a very reasonable thing to do in people who have a complaint that might relate to their heart or lungs. But we're seeing it in people with a skin infection, things that really had nothing to do with what would be going on if you needed a chest x-ray.” Laroche is trying to discover why this still happens. “There could be lots of reasons. It may be out of habit, or maybe it's perceived in the emergency room that doctors will not accept a patient to the floor unless it's been done, so it's ordered up front. Or it may be a standard order set that gets done in the ER to reduce delays in further care.” Doctors from the PRO group, in several meetings with emergency physicians, have begun trying to reduce this pattern of use.

Who gets the troponin test? The vast majority of patients on the medicine service, Laroche found. “One day, I just looked at every one of the patients on the medicine service, and over 80 percent of them were getting this test ordered, and many were having it ordered many times,” he says. “Then I went to the literature, and tried to see what would be a rational approach to using it, and who should have it ordered.” Based on his research and discussions with Bayview cardiologists, Laroche estimates that the troponin test is being ordered about 30,000 times a year more than it needs to be, and the potential savings – even though the test itself is not that expensive, around \$25 – could be more than \$1 million.

If over-ordering were the only problem, that wouldn't be so bad, he adds, but there are downstream effects, “because we react to it.” If troponin comes back elevated, this could trigger a whole series of tests, including a cardiac catheterization, and treatments, including anti-clotting drugs like heparin, which are not only costly, but which carry risks of their own. Troponin, an enzyme only found inside heart muscle, should not be detectable in the blood, and its presence there may reflect damage to the heart. If you are having a heart attack, your troponin level would go up over a period

“Creating a forum in which residents feel empowered to lead change is a home run for the Pyramid team.”

of about 24 hours, and then go back down, and within a week it should be undetectable again. But “a lot of things can stress the heart,” he adds, including lung disease, infection, and kidney disease; some people make antibodies that can create a false positive on the test, as well.

“We're not saying that this is a bad test and we shouldn't use it, but that we should use it appropriately and rationally,” says Laroche. “We need to be more clinically savvy.”

This takes the Pyramid idea (see story on Page 4) another step forward, says David Hellmann, M.D., Vice Dean of Johns Hopkins Bayview, and the Aliko Perroti Professor of Medicine. “Too many attempts at change come from the top down, and surprise! These efforts are not effective,” he says. “One of the real obstacles in putting the patient first is getting doctors to step up to the plate and swing for improving quality and safety. So creating a forum in which residents feel empowered to lead change is a home run for the Pyramid team.” Yes, adds Richard Paisner, co-founder with Hellmann of the Center for Innovative Medicine, “it would be nice to be able to report that the unnecessary x-rays had been eliminated, and we had saved \$1 million. But pyramids are built block by block, and getting people to focus more on the patient is the first step in a process.” ■

“More Than Loud Noises in the Night” Groundbreaking research is changing how scientists think of sleep apnea

If only sleep apnea were just a drag. You’ve probably heard it, or maybe even experienced it, this annoying condition that guarantees a lousy night’s sleep – for the person who labors with it, and also for anyone else unfortunate enough to be in the vicinity, trying to get some shuteye. First comes the snoring, generally the “sawing logs” kind, rather than the gentler variety; and then, just when you become accustomed to the rhythm, if not the racket, there’s a pause that may last a few seconds. Dead silence, which can be scary; no breathing at all.

And then, perhaps a snort, a sputter, as the sleeper rouses slightly, and the whole cycle starts over. Someone with this problem never makes it to deep sleep or even REM sleep, where you dream, and have a better shot at waking up rested; instead, people who have sleep apnea live with the chronic, draining fatigue that just wears you down, night after night.

Most – but not all – of the millions of people who suffer from sleep apnea (see below) also have other health problems, too, including being overweight. And this has been kind of a red herring for sleep scientists, explains pulmonologist Naresh Punjabi, M.D. Ph.D., because people who have obesity, and people who have sleep apnea, often develop the same conditions. “That’s the big bugaboo. If you’re overweight, you’re probably going to get sleep apnea, and you also may develop cardiovascular disease or metabolic disease. So how do you know if sleep apnea is really the cause of these conditions?”

But Punjabi’s research has shown that obesity is not necessarily the horse, with sleep apnea as the cart. Instead, sleep apnea, all by itself, is a very serious, and sometimes deadly health problem. “It’s not simply loud noises at night,” he says. “There is increasing evidence that it causes hypertension, accelerated atherosclerosis, more strokes and heart attacks, and it may also cause diabetes.”

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The work of Punjabi and others has “significantly increased the importance of thinking about sleep apnea as a cause of disease, as opposed to a cause of disrupted sleep,” says Landon King, M.D., Director of Pulmonary and Critical Care Medicine and the David Marine Professor in medicine, who helped bring together people and resources to build a new, interdisciplinary sleep research center at Bayview (see side story). Although scientists had speculated that sleep apnea was more than it seemed, until this work they didn’t have proof, for instance, “that people with sleep apnea die more than people without it. That sleep apnea might contribute to a variety of metabolic disturbances, including changes in lipid, insulin and glucose metabolism, each of which can independently have other ill effects on health.”

So, how do you tease out the effects of sleep apnea from the consequences of obesity? One approach – Punjabi is working on several – is to do a very large study, involving thousands of people, and see if they eventually develop hypertension, heart disease, heart failure, and other problems, “and if the development of these conditions is independent of the effects of obesity.” For nearly 20 years, Punjabi has been the lead investigator at Johns Hopkins of the Sleep Heart Health Study, following more than 6,400 people throughout the U.S., and has learned that “people who have sleep apnea seem to be at a higher risk, independent after accounting for the effects of obesity,” for earlier death, and for developing stroke and heart disease.”

Another approach, now much easier to carry out with the opening of the Center for Interdisciplinary Sleep Research and Education, is to take young, healthy people who don’t snore, and disrupt their

New Center Allows Real-Time Sampling Without Waking Up The Patients

Sleep is something so simple, we can do it with our eyes closed. It’s also so complicated that scientists who dedicate their careers to studying it – pulmonologist Naresh Punjabi, M.D., is a fine example – would be the first to tell you that they’ve barely cracked the surface of what they hope to discover about this activity that takes up a third of our life.

Sleep medicine is not a new field at Hopkins, which has done pioneering research in sleep and sleep disorders for nearly three decades. But the newly opened Center for Interdisciplinary Sleep Research and Education will give researchers in many disciplines the opportunity to study it in new ways. A collaborative effort made it happen; it involved David B. Hellmann, M.D., Vice Dean of Medicine and Chairman of the Department of Medicine; Pam Ouyang, M.D., director of the Clinical Research Unit; Constantine Lyketsos, M.D., Chairman of Psychiatry, Richard O’Brien, M.D., Ph.D., Chairman of Neurology, and Landon S. King, M.D., Chief of Pulmonary and Critical Care Medicine. Funding came from many sources, including substantial support from the Dean’s Office of the School of Medicine, and the Institute for Clinical and Translational Research of the National Institutes of Health.

The Center’s highly sophisticated inpatient testing rooms allow for real-time sampling that wouldn’t work well otherwise. “Let’s imagine you have a study subject,” says King, “whom you either need to take samples from on a regular schedule, or in whom you need to be able to recognize a certain response – maybe they’re having an apneic episode and their brain is waking up. At that exact time, you would like to administer something to them, or take a blood sample. If you have to open the door, go into the room, and handle the patient’s IV, there’s an excellent chance that you’re going to disturb whatever state they’re in, so now you’ve changed the experiment.” But with the Center’s special set-up, a study participant

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Could This Be The Cure?

Stem Cells and Parkinson's Disease

If stem cells turn out to be as promising a treatment for neurological diseases as everyone hopes, Parkinson's disease will be the proving ground, says Richard O'Brien, M.D., Ph.D., Chairman of the Department of Neurology at Johns Hopkins Bayview.

"In Parkinson's disease, the damage is confined to a small area of the brain," unlike the more widespread devastation that happens in Alzheimer's disease and stroke. "Thus, there is a real possibility that transplantation of stem cells into this one area, called the striatum, will cure the disease – just as bone marrow stem cells are a cure for many hematologic disorders."

Although the effects are devastating, movement abnormalities in Parkinson's disease can be boiled down to a relatively simple manufacturing problem: the loss of dopamine-producing cells. This can be offset, sometimes for many years, by drugs that mimic dopamine. "It's really quite remarkable," says neurologist George Ricaurte, M.D., Ph.D., "that you only need to replenish a small amount of dopamine in the striatum to completely reverse the slow movement of Parkinson's Disease. The truth is that virtually every one of us can do very well with up to 90- to 95-percent depletion of our dopamine. It's only when you get into that small, red zone, when you're down to your last 5, 10 percent, that you begin to show the signs and symptoms of the movement disorder." And this is exactly why Ricaurte believes that transplanting stem cells, immature cells that have a chameleon's ability to take on the role of cells wherever they are placed, may be enough to restore normal function in people with Parkinsonism. "You don't need to repopulate the whole striatum, or replenish all of the dopamine, you just need a small amount."

So the game plan is good; the only sticking point is in the details, Ricaurte says, and these need to be worked out ahead of time. Previous surgical attempts to cure Parkinson's disease have had mixed results, and it remains unclear whether improvement comes from the treatment, from stimulation of the brain by the act of surgery itself, or even from some placebo effect. Similarly, although some hospitals in Europe are already using stem cell therapy, "there remain so many variables to be worked out yet, to see how to carry out the procedure appropriately," adds Ricaurte, who finds this troubling. "I've been involved in animal research for much of my life, and to me, it seems obvious that you would want to work out these variables in a very good animal model, make sure you've got your i's dotted and t's crossed, before you take this approach to humans." In other words, the best way to find answers is to test the heck out of this treatment in the lab before subjecting the people who need it most to something less than ideal – implanting too few or too many stem cells, for example, not putting them in the site where they will work best, or using one type of stem cell when another type might work better.

"We've got a terrific animal model of Parkinsonism," says Ricaurte. It's built on studies he and others have done of a highly toxic drug called MPTP – the inadvertent discovery, in the 1980s, by drug dealers who were looking to make a synthetic form of heroin. MPTP kills the same dopamine-making neurons targeted in Parkinson's disease, and "one of the beauties of MPTP is that it can be delivered to the brain in such a way as to produce hemi-Parkinsonism," or damage only on one side of the brain, "so we can then compare one side to the other."

With a mix of funding, including support from the State of Maryland, the Department of Neurology, and the Center for Innovative Medicine, Ricaurte is working out the nuts and bolts of stem cell transplantation in rigorous, systematic preclinical testing. First, the lesion is created, using the MPTP, and verified with PET imaging; then, the animals receive the stem cell transplants – and are monitored very closely, as Ricaurte and colleagues look for any improvements in movement, behavior, and general functioning, and attempt to correlate

"There's been a long debate in the literature," says neurologist George Ricaurte, M.D., Ph.D., "but the weight of evidence points to the fact that medications need the nerve cells in order to be optimally effective." Synthetic dopamine – produced from medication like L-DOPA – has a long way to go even to reach its intended site. "Patients take L-DOPA by mouth, it goes into the bloodstream, then crosses into the brain, where it's converted into dopamine. But where you really want that dopamine is where it's missing, at target sites of dopaminergic neurons that are degenerating." As long as a critical mass of these neurons is present, the drug helps control such symptoms as stiffness and tremor. "But once you lose more and more neurons, there's less of that replenishment that can go on, and not surprisingly, that's when L-DOPA loses its effectiveness." The philosophy behind using stem cells as a treatment for Parkinson's disease is that instead of providing a palliative drug, "in effect, you're putting in a drug delivery system."

these with changes seen on imaging. Ultimately, the scientists will examine the animals' brain tissue and see if the stem cells "took" – if they were able to repopulate the striatum, and if this is indeed responsible for any changes. The scientists, working with colleagues at Harvard and in South Korea, are also studying two different types of stem cells (both in the type called "induced pluripotent" stem cells, artificially derived from a line of adult somatic cells), to see if one works better.

"It's amazing how much remains to be delineated before you'd even think about doing human transplants," says Ricaurte. "We just think that this is an area where so much is unknown, that we'd do best to work out the relevant parameters in a well-controlled experimental model before taking the next step." If these tests prove successful, the next step will be clinical trials in humans. Ricaurte is collaborating with neurosurgeon Alfredo Quinones-Hinojosa, M.D., Ph.D., who has long been interested in the use of stem cells to treat brain tumors.

"There's no question that this has promise," says Ricaurte. "There's a lot of hype about stem cells. Let's just see how promising they can be in a controlled, experimental setting, and then use that information as a springboard for carrying out high-quality clinical studies in patients once we are ready. We're building the foundation." ■

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A Better Send-Off

The Aliko team is making the discharge process more patient-friendly

It's a milestone at once happy and uncertain: You've been in the hospital, and now it's time to leave – to go home, or perhaps to a rehab facility, or maybe a nursing home.

Although it's nice to be considered well enough to move on, many people leave the hospital with misgivings, usually after hours of "hurry up and wait," last-minute sign-offs from various doctors. If you've got family members with you, they may wonder if they should go ahead and grab some lunch – or dinner – while you just sit there, in that peculiar, last-day limbo.

"I think everybody recognizes that the discharge process from all hospitals is dismal," says cardiologist Roy Ziegelstein, M.D. He is executive vice-chair of the Department of Medicine, deputy director for education, and co-director, with Cynthia Rand, M.D., of the Aliko Initiative (see side story), a groundbreaking program in patient-centered care for interns and residents. "There's such a rapid

turnover, in and out, that some patients will use the expression, 'I was kicked out of the hospital.' They feel like they were rushed out; very few people feel that the discharge process is planned in any way."

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For doctors, nurses, and patients on the Aliko Service, the traditional, somewhat haphazard hospital discharge process is undergoing a huge makeover. With support from a challenge grant from the Picker Institute and Gold Foundation, two independent, nonprofit organizations dedicated to advancing patient-centered care, Aliko physicians are putting into place a new discharge curriculum, in which the patient becomes a vital part of the process. They believe ultimately, in addition to improving care, it will help reduce costs, lowering the rate of readmission by giving patients and their primary care physicians a better idea of what needs to happen after the hospital stay.

The plan will have several key features:

Patient education. Right now, at hospitals worldwide, there's not that much of this at discharge time, says Ziegelstein. "Even something simple – like when you bring your car to Jiffy Lube, and they go over what was done, what was not done, what you need done – nothing like that really happens." Patients, perhaps slightly overwhelmed by the process, or not functioning at top form because they're still pretty sick, need some teaching when they're about to go home – about their medications, for instance, or worrisome symptoms that mean they should call the doctor.

A moment to address any other concerns. Here's a question that should be asked, and usually isn't, says Ziegelstein. "'Do you have any other concerns that we haven't touched on here today?' We never do that."

The patient's perspective. "The things that might concern the doctor or nurse are probably very important," Ziegelstein says, "like, 'I'm concerned that your infection that seems to be getting much better might come back, so I'd like you to make sure to look at your leg every day, and if you see it start to get red again, or if it feels warm to the touch, please call me.' But this kind of exchange seldom happens now in this country at the time of discharge." Worse, he adds, is that what almost never happens next is for the doctor to ask the patient to share any concerns that should be passed on to the primary care provider. This is unfortunate, because the patient's next words might have

been something like, "Yes, I'm concerned because I have no money to afford the antibiotics that you are prescribing so my leg won't get red again," or "I'm concerned because you want me to see my doctor in a week, but when I go home, I have to start taking care of my husband, who is much sicker than I am, and I don't know how I'm going to find the time to do the exercises that you want me to do, or return for my follow-up visit to my doctor."

With the Picker/Gold grant, Ziegelstein and Rand, with help from Aliko residents like Melissa Datallo, M.D., and from key Aliko faculty members including Janet Record, M.D., Laura Hanyok, M.D., and Colleen Christmas, M.D., have come up with key questions for the resident to ask the patient at the time of discharge.

"The patient and the resident are actually co-authoring the discharge form," says Rand. "And the form will certainly have our perspective – that is, 'you were hospitalized for treatment of pneumonia, your medications at discharge are X and Y, we are asking you to take Z for five more days, and you have an appointment to see this doctor on Wednesday.' But in addition, we will include, 'We understand from talking to you that your concern is this, which will be communicated to your primary care physician. Here are some things you might be able to do, related to this concern.' So the discharge form will always include the patient's perspective."

The Aliko physicians are working with nursing leaders on the medical service to make sure that at the time of discharge, the doctor, nurse, and patient all meet face-to-face. "This may shock you; we're hoping it can be done," says Ziegelstein. "We're asking nurses, when they're ready to do their discharge process, to page the intern," who

will have 10 minutes to get to the patient's room. "We are instructing them very specifically and deliberately about that. If they can't go, we understand, because they may be tied up with an emergency, but then they have to page the resident to go in their place. And if the resident can't go, we understand, everybody's busy, but then they have to page the attending physician to go. So we're really invested in making this work."

What is the Aliko Initiative?

The first of its kind, the Aliko Initiative – made possible thanks to support from a remarkable woman named Aliko Perroti, a philanthropist from Greece – is designed for doctors to get to know their patients better. Launched in 2007 by the Center for Innovative Medicine, the Aliko Initiative offers old-fashioned medicine in a high-tech setting. Its features include:

- Fewer patients for each doctor, so the doctor can spend more time with each one.
- Doctor-patient relationships that don't end when the patient is wheeled out of the hospital.
- Knowing the patient as a person, so that evidence-based medicine can be custom-tailored for individual needs.
- Wise use of technology.
- Patient feedback, as patients report how well their doctors did.

This is an opportunity, adds Rand, "for us to help patients have their questions answered, for families to better understand what took place, to better equip patients and families to take care of the illness when they get home. Our goal is to improve our patient- and family-centered practices, and this clearly has an impact on the patient's overall well-being."

"I may be a Pollyanna," says Ziegelstein, "and this may be my view of Utopia, but I think this could be a big satisfier for everybody. I think everybody would agree that the patient would not get the feeling of being rushed out of the hospital if, in fact, there's a conference that involves him or her, gets some dialogue going and hopefully some teaching from both the doctor and nurse. We're really excited about this." ■

Meet the Newest Members of the Miller-Coulson Academy

They are the Miller-Coulson Academy's class of 2010.

Nine outstanding clinicians who were chosen by their colleagues and an external review board in recognition of their excellence in patient care at Johns Hopkins Bayview Medical Center. Made possible through major support from Sarah Miller Coulson and Frank Coulson, the Miller-Coulson Academy is a major initiative of the Center for Innovative Medicine. The first of its kind, the Academy recognizes master clinicians – the brilliant diagnosticians and gifted teachers who make medicine better for patients, and for the doctors who learn from them.

These newest inductees were recognized at the second annual Excellence in Patient Care Symposium, held in May. At the ceremony, two patients reflected on what it has meant to them to be on the receiving end of clinically excellent care, and Minghao Liu, a medical student, read a "profession of values" written by the first-year students at the Johns Hopkins School of Medicine. "As we embark upon the profession of medicine," she said, "we will look to these role models to light the way and exemplify how to stay true to our values."

Also speaking at the program was Edward Miller, M.D., Dean and Chief Executive Officer of Johns Hopkins Medicine. "It's wonderful that we have a way to recognize master clinicians, people who are really devoted to caring for our patients," he said. "If we want to make a difference at Hopkins, we're going to be a leader in showing that humanism is the most important thing that we can do for our patients." Here's some of what these fine clinicians had to say:



"I'm convinced that clinical excellence can be taught, and does improve patient outcomes, and the Miller-Coulson Academy of Clinical Excellence provides the ideal forum to address the importance of the art as well as the science of medicine."

Margaret S. Chisolm, M.D.
Department of Psychiatry and Behavioral Sciences

"It's a singular moment in someone's life, and they're looking at your eyes when you go in, and they're looking at your eyes the minute you come out of the operating room."

Mark D. Duncan, M.D.
Departments of Surgery and Oncology

"My mission is to use my clinical knowledge and communication skills to view my patient not as a diagnosis or a problem to be solved, but as an individual in need."

Duvuru Geetha, M.D.
Division of Nephrology

(Remembering one of his own outstanding teachers, who said), "We don't doctor *to* patients, we doctor *with* them,'... That simple comment made medicine very real to me."

H. Franklin Herlong, M.D.
Division of Gastroenterology

(Recalling when one of his patients, who lives two blocks from Bayview, needed to come to the hospital but was taken elsewhere, because Bayview was on Red Alert, and had no available beds), "That to me left a lasting impression about the health care system, and what a shame it was that it was broken." A few weeks later, Howell led a team that dramatically lowered the Hospital's Red Alert status, and streamlined the flow of patients from the Emergency Department into hospital beds.

Eric E. Howell, M.D.
Division of Hospital Medicine

"I don't operate on an MRI. I don't treat an x-ray. I take care of people, and medicine is about people."

Carl A. Johnson, M.D.
Department of Orthopaedic Surgery

"We must always remain cognizant of, and help as much as possible to alleviate, the inevitable emotional suffering experienced by each of our patients and their families."

Edward Kraus, M.D.
Division of Nephrology

"Our professional behavior needs to be role-modeled actively. Young people don't just follow their seniors around, but they see what's successful, and what's not successful..."

Rafael H. Llinas, M.D.
Department of Neurology

(On treating critically ill victims of trauma) "I made a promise to myself that if I can't help my patient, I'm sure going to help their family."

Steven J. Schwartz, M.D.
Departments of Anesthesiology and Surgery
Division of Critical Care Medicine



DO NOT DISTURB CONTINUED

can be hooked up to an IV, with tubing that pipes through a hole in the wall to an adjacent control room with monitoring equipment, King adds, "so when you see whatever the trigger is, you basically just open the stopcock in the tubing on your side of the wall, and get the sample at the precise time without ever disturbing the patient."

The Center also has a unit for the study of chronobiology – the body's "internal clock," or circadian rhythms, on which the outside environment has a huge influence. This unit, which has sitting areas as well as sleeping areas, is designed "so people can stay in there for days at a time without getting any information about what time of day it is," says King. "It has a series of doors, so you can enter, and seal the door, so there's no outside sound or light, and then open an interior door, so you can take food, get linens, and interact with the subjects without providing any clue about the exterior environment."

immediate is a device called a CPAP (Continuous Positive Airway Pressure), which keeps the throat open with a pipeline of pressurized air. The CPAP is known to lower blood pressure in people with sleep apnea; in a NIH-funded study currently under way, Punjabi and colleagues at Hopkins, Harvard, Case Western, and Boston University are looking to see if treating sleep apnea makes a long-term difference in other ways.

Punjabi's work, and that of Jonathan Samet, M.D., former chairman of epidemiology at Hopkins, "has really put a much finer point on the prevalence of sleep-disordered breathing," says King. "At the least, it's tens of millions of people, maybe 35 to 50 million people, who are estimated to have sleep-disordered breathing." Add to this other consequences of not getting a good night's sleep for years – including depression, and the increased risk of having a motor vehicle accident, "and you get a cadre of events that is impressively long," adds Punjabi. "Many people who have this don't even know about it, and it can have potentially dire consequences. It's a very neglected phenomenon." ■

CONTINUED FROM PAGE 13 sleep for a very short period of time (not long enough to cause any lingering health problems). "Two major things happen with sleep apnea," says Punjabi. "Your oxygen levels drop, and your sleep is disrupted." When he and colleagues disrupted sleep in these study volunteers, waking them up repeatedly with a series of tones for two nights, the participants became more insulin-resistant; in other words, their bodies (particularly, their muscle, fat, and liver cells) temporarily became less responsive to insulin, the hormone made by the pancreas that helps the body process glucose. People who are insulin-resistant over time can develop diabetes.

"At the least, it's tens of millions of people, maybe 35 to 50 million people, who are estimated to have sleep-disordered breathing."

This "fragmentation" of sleep, says Punjabi, is stressful. "When the airway closes and the oxygen levels drop, people make increasing efforts to get it open again. Then, when they can no longer sustain this struggle, this leads to that brief arousal." Even though the person doesn't wake up fully, research at Hopkins and elsewhere suggests that this miserable cycle can raise blood pressure, activate the central nervous system, and alter metabolism, he adds.

Punjabi and colleagues also simulated the repetitive drop in oxygen levels that happens when the airway closes up – the silence right before the snort – by having the volunteers sleep with masks, and for about five hours, lowering the oxygen level, just for a minute at a time, to that found at high altitudes. Even this brief change was enough to increase insulin resistance, as well. "Many lines of evidence seem to coalesce, suggesting that sleep apnea may be an independent risk factor for many adverse health outcomes."

Still another way to study the effects of sleep apnea is to treat it. There are several ways to do this, including weight loss, but the most effective and

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of people, and medicine is about people.”**

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