As director of biomedical engineering for Washington Hospital Healthcare System, a 359-bed facility in Fremont, CA, Paul Kelley keeps busy daily in all the ways that one might expect: dealing with work orders, keeping tabs on equipment, and attending meetings where purchases are proposed and budgets are discussed. Until recently, he had five people on his staff, not including himself. Now he has four, and he's feeling the heat.

“There is no shortage of things to do,” he says.

To keep things moving, Kelley, who's been in the business for more than three decades, has a bag full of tricks. His best, though, is exceedingly simple: Make yourself seen—especially among the nurses. “They’re our main customers,” he notes. “But if they don’t see us around, they’ll never realize it. They need to know that we’re here, that we’re a service and we want to help. But we have to volunteer that information. If we don’t, they won’t rely on us the way that they should.” And if that happens, he says, the well-oiled machine that is biomed doing its job will likely start grinding its gears. “If you’re just sitting back in the basement complaining that nobody ever asks you to do anything, you're in trouble. That's not the way to go about it.”

Kelley says that his team avoids such a fate by doing rounds every day. They may not speak to every nurse on every floor, but they do try to find the nurse managers, and they do make an effort to be approachable. “They go through and at least check in with each department to see if...”
there's anything we need to know about, if there are any problems. Because sometimes there are issues that for whatever reason don't get communicated to us through the work-order system, and when we [stop in], it reminds them—"Oh, by the way." Likewise, if a biomed, as he or she is walking through, sees a nurse having trouble with a particular piece of equipment, they're encouraged to stop and offer "a quick in-service or refresher or whatever is needed," Kelley says. And while such work is documented, the nurse is never mentioned by name so that they feel free to be open with any complaints they may have. "We want them to ask questions and not worry about anything else," he says.

A Crucial Connection
That sense of inclusion—that nursing and biomed can work together as a team—is something more and more healthcare technology management (HTM) departments are attempting to instill. After all, they've observed, one of the most crucial relationships in any hospital is the one that exists between nurses, who are on the front lines of patient care, and HTM professionals, who are responsible for the safety and functionality of equipment they rely on each day. When that relationship is strong, the needs of nursing (and, by extension, the needs of the physicians and patients who rely on their care) are clearly expressed and quickly addressed, and both sides benefit. When it's not—well, that's when things can get rough.

"It's really about better communication between these two groups of people that are typically siloed from one another," says Melissa Griffin, a human factors engineer with HumanEra at University Health Network's Centre for Global eHealth Innovation in Toronto. "When they start that conversation and work together and learn about the challenges that each side is facing," those silos fall and both sides benefit. When it's not—well, that's when things can get rough.

"Computers became a mainstay in nursing only about 15 years ago." Before then, she says, "we were working off of paper—and really, there was little need to understand their day-to-day work. And that, she says, has been eye-opening. "Nurses have to cope with a whole range of issues and pressures that I think engineers don't typically consider—time pressures, cost pressures, cultural pressures," and an ever increasing patient-to-nurse ratio. "And they're dealing with these things while they're with their patients and trying to care for them and empathize with them."

When you add to that mix a medical device that may not be easy to work with, the stress can become overwhelming. "So now, on top of everything else, they're trying to wrestle with this technology, to figure out what button they have to press to make this infusion pump work. It's the last thing they want to have to think about," says Griffin.

It wasn't always that way, adds Ken Maddock, a healthcare technology consultant who spent years as an executive with Baylor Health Care Systems in Dallas. When he entered the field nearly 30 years ago, he recalls, "nursing was not such a tools-based profession—they'd put their fingers on patients' wrists to take their pulse, and they looked up at the clock, and they used manual blood-pressure cuffs." Today that picture is very different, Maddock notes, and while observation skills continue to be critical, now "almost everything [nurses] do depends on the information they get from electronic devices," and HTM professionals "are responsible for the majority" of those devices.

Maria Cvach, RN, assistant director of nursing and clinical standards at The Johns Hopkins Hospital in Baltimore, agrees. She points out that "computers became a mainstay in nursing only about 15 years ago." Before then, she says, "we were working off of paper—and really, there was little need to
for a relationship between clinical engineering and nursing.” That’s not the case today, she says. “Now, working with biomed is an integral part of our daily job.”

That being the case, the obvious question is this: What can both sides do to ensure that relationship is as strong as it can be? In a world where hospital nurses face technological challenges every single day, and biomeds are the ones tasked not only with installing, maintaining, and replacing that technology, but also, in many cases, with training clinicians in its use, what can these two professions learn from each other? If alarm fatigue, for instance, is a hot-button issue in a facility, can biomed and nursing collaborate to arrive at a solution? Or if a device has an interface that is less than user-friendly, what can be done to avoid frustration? And finally, are there any ways to address such challenges before they become a problem? That is, can nursing and HTM professionals work together with vendors to ensure that any new devices a facility purchases are intuitive to use and improve efficiency while never interfering with patient care?

Cvach, who has been tasked by Hopkins to work closely with the facility’s clinical engineering and information technology (IT) departments to improve its alarm management system, considers her experience to be “a little different than that of most nurses.” She’s “walked in the shoes” of HTM and IT, she notes, and has learned a lot by doing so. “You see the types of calls they get, and how often it is that they don’t get enough detail about whatever it is that’s broken or not working.” On the other hand, she says, “the nursing staff gets frustrated because they get a piece of equipment that doesn’t work and they take it out of service and then biomed looks at it and says there’s nothing wrong.” But usually, Cvach notes, there is something wrong. “If the device you’re trying to use has a monitor with a thousand different features, and you haven’t been adequately trained in how to use it, and you have to go to a manual that's 400 pages long” to figure out what to do—that’s the problem. And biomeds, if they could look at that monitor from the perspective of the clinician, would know why. Every time, Cvach says, “you take care of the patient first and deal with the technology, and the flaws with the equipment, second. That’s just the way it is.”

Maddock, for his part, wonders how many HTM professionals “actually understand the clinical side anymore.” Years ago, he says, all the biomeds knew what the nurses did. It was part of their education, and part of their job. “What I see now is that too many people view this job as strictly a technical position, and not so much a clinical position; that we’re the technical guys, the people who understand the equipment.” That concerns him, Maddock says. “For this relationship to really be special, HTM needs to be a part of the clinical team.”

Going Clinical
Maddock, of course, is not suggesting that biomeds go to nursing school. But he and others would like to see more HTM professionals doing intermittent rounds—and not just technical rounds, where “you’re walking the floor and looking for cracked screens and duct tape on things,” but “people rounds,” where “you’re talking to clinicians and asking questions.” In addition, he says, most facilities would benefit by having all new
Hires, including biomeds, take part in a comprehensive clinical orientation when they first come on board. (While such training might show up on the spreadsheets as unproductive time, by improving efficiency it would pay dividends in the long run.) “They should spend several days shadowing a clinician,” he says. “And in a perfect world, it would be in the area they’re going to be assigned to.” Nurse managers he’s spoken with have had mixed responses to that suggestion, he admits. “Some have said, ‘Oh, that would be hard; they’d get in the way.’ But others think it would be awesome, and I think most would be willing to do it.”

Griffin, of HumanEra, agrees. And her advice? Be humble. “You should be the pupil who is learning from the master. Remember, you’re in their domain, and you’re there to listen.” Do that and the nurses “will really open up and share everything—the issues they’re facing, the workarounds they’ve come up with,” which in turn will allow you to do the things that you do best, like “come up with an interesting solution for a problem that otherwise you would have had no idea even existed,” she says.

Biomed also should make an effort to be present at clinical meetings, Maddock says. “If you tell the nursing staff you want to go their meeting, they’re going to be taken aback—they’re not used to it. But if you explain that you’re trying to get a better understanding of their needs so that you can be of better service,” they’ll welcome you with open arms. When he was at Baylor, he recalls, they did exactly that. “It really made our guys part of the team. They’d go to the meetings, everyone knew who they were, and the approach became one of, ‘How can I help them out?’ as opposed to, ‘OK, let’s go fix that.’ They really understood the challenges the clinical people were facing,” he says.

Along those same lines, Maddock says, if there’s an issue you’d like to discuss with the clinical team and a meeting seems the place to do it, instead of asking the nurse manager for a separate chunk of their time, “see if you can get 10 minutes either immediately before or immediately after a meeting that’s already...
scheduled. You have to think from their perspective, not yours, and you have to take advantage of activities that are already planned” to make it easier on everyone involved. Convincing nursing that you’re worth spending time on outside of the normal cycle of work orders shouldn’t be hard to do, Maddock adds. After all, what you’re offering is the equivalent of preventive maintenance—and preventive maintenance almost always saves money. “You’re trying to understand the problems they might face so you can solve them before they happen.”

A Collaborative Relationship
Finding ways to prevent problems—or at least to take care of them before they become serious—has always been a priority for Cvach at Johns Hopkins. At her facility, techs from clinical engineering are assigned to specific units. This allows them to “really get to know the clinicians on that unit,” creating an ownership mentality where “if you call them, they come up and fix things right away.” Those calls, meanwhile, are typically clear, concise, and appropriately directed, thanks in large part to a phone-based triage system Cvach and her colleagues created (with technical help from telecommunications) to deal with equipment problems. “We wanted to make it really easy for the nursing staff to know who to go to when something breaks. Do they go to IT or to biomed or to telecommunications? The answer wasn’t always obvious.” The solution, they decided, was to have one phone number for nurses to call when they ran into issues, and “the person who answered would triage the call to the right group, based on the complaint.” The system has a few “bugs that need to be worked out,” Cvach says, but it’s a vast improvement over clinicians guessing which department would be best equipped to handle a problem they can barely describe. And best of all, she notes, it saves everyone time. (Establishing a communication tree that branches in the opposite direction—from biomed to nursing—also is advisable, notes Maddock. “The biomed department should know who they are to inform if there’s an outage somewhere, like code blue goes down. Do they contact the chief nursing officer directly?” If a problem might affect them in any way, “the nursing staff needs to understand what biomed is doing about it.)

Kelley agrees, noting that biomeds who think the conversation with nursing ends once a work order is received are sorely mistaken. “I’ve said this before, and I’ll say it again: The ninja biomed is dead.” If an end-user, like a nurse, calls with an equipment problem, he explains, and an HTM technician “goes up and fixes it and then just leaves, all the nurse sees is that all of a sudden it’s working again.” That nurse will either assume the problem resolved itself (and that biomed never showed), or—even worse—get the sense that HTM doesn’t want to talk.

“I think you don’t make a pest of yourself, but you should make it known that you just fixed their problem, and you should have them verify that everything is working the way they want it to work. Don’t go in and out in the dark, or they’ll think it magically fixed itself.”
— Paul Kelley, director of biomedical engineering, Washington Hospital Healthcare System
purchase or utilization of new equipment, they say, nurses should be involved on the front end. At Washington Hospital Healthcare System, Kelley says, nurses were recently asked to attend a product fair so they could sample the physiological monitors that were on display. They were able to try the devices themselves, “to see if they were intuitive to use, if the screens were sized right, and if the whole usability piece was there,” and then they filled out a questionnaire, “so we could get their feedback before we moved forward. We wanted to make sure that whatever we purchased was going to work for them.”

Griffin agrees. “I think as engineers, we tend to like technology that’s really cool and has lots of features,” she adds. “But at the end of the day, it’s the nurses and the other clinicians who are using this technology. And what they need is not something with a lot of bells and whistles, but something that supports them in what it is that they’re trying to accomplish to provide safe patient care.”

Avinash Konkani, a clinical engineer at the University of Virginia Health System in Charlottesville, VA, says similar steps to Washington Hospital are taken prior to equipment purchases at his facility. After all, he notes, “the nurses are the ones who will be using it. So they’re the ones who should demo it and see what the screen will look like and how the knobs work. Is it easy to operate? Or is it confusing?” If the latter is the case, that device may not be worth it.

Nursing, in fact, in conjunction with HTM, should be “the linchpin” in any discussion about technical infrastructure, agrees Purna Prasad, director of clinical technology and biomedical engineering at Stanford University Medical Center. When those discussions take place, he says, both groups should lobby hospital administrators to ensure they are involved. “Because while the HTM professional is responsible for designing” that technical infrastructure to deliver safe, effective, and economical patient care, nurses are the ones who “sustain the workflow. Their input is crucial.” For example, Prasad says, consider a medical facility that is planning to develop an epilepsy-monitoring unit (Stanford did just that: http://neurology.stanford.edu/epilepsy) and needs to purchase the equipment that will support that unit. “In a program like this, usually what happens is the business end says it’s justified” and then “the finance people get together with some doctors and try to plan it out.” The problem, Prasad says, is that “neither the physicians nor the finance people are actually the ones who will have to operate this equipment. The doctor looks at [the monitor] and says, ‘OK, here’s the next thing I need to do,’ and he writes a prescription and hands it over to the nurse. It is the nurse who actually cares for the patient, and the HTM professional who maintains the technical tools” that are used in that care.

When administrators neglect to include HTM and nursing in the planning stages, notes Prasad, they leave “a huge hole” that
The Keys to a Better Relationship

Top-tier teamwork between biomed and nursing requires time and effort from both camps. Here are a few key strategies for optimizing the relationship:

1. Publicize your team. Nursing should know who you are—your name, your job, even your interests outside of work. When you get to know each other you also learn to understand each other, and everyone benefits. You can do this through rounds and, for your department as a whole, via monthly e-mail newsletters, one-page fliers, a Facebook page, or other media.

2. Listen first. No one likes a know-it-all. When you’re called up for a repair, resist the temptation to “grab and go” without first taking the time to ask questions and find out what’s really wrong.

3. Speak the same language. If you just talk tech, eyes will glaze over.

4. Do rounds. And not just technical rounds, but “people rounds.” Be friendly. Ask questions. Let nursing know that you really want to make their job easier.

5. Attend clinical meetings. Especially if you lead your HTM department, make it your job to stay on top of what’s happening on the clinical side. Likewise, invite nursing leaders to attend HTM meetings.

6. Involve nursing staff (and other clinicians) in purchasing decisions. After all, they’re the ultimate end-users. Getting their feedback early will make your job easier in the long run.

The relationship: strategies for optimizing the camps. Here are a few key time and effort from both HTM meetings.

Cover Story

Speaking the Same Language

As UVA Health System went through a recent series of upgrades that included the design and construction of a new children’s hospital, the clinical engineering department was tasked not only with procuring the medical devices the new facility would need, but also with installing them; and that, Avinash Konkani recalls, meant “really working closely with the nurses on each floor to make sure we got the right equipment in the right rooms and with all the setups that they wanted.” Throughout it all, Konkani says, one of the biggest challenges he faced was making sure that as they spoke their “two different languages”—his “engineering” and theirs “medical”—they were indeed on the same page. “We’d often be using different words to describe the same thing.” If there was ever confusion, he’d “ask them more questions to understand exactly what they were looking for, or I’d just ask them to show me.” He’s always done it this way, Konkani says, as he’s discovered that clear communication—even if it takes more time—is the key to both solving problems and avoiding new ones down the road. “So if a nurse calls in a work order and just mentions that the equipment is not working, I’ll ask them to be more specific. ‘What is not working?’ If you say something’s not working, it’s like a patient who comes to you and says, ‘I’m not feeling well.’ That’s fine, but what are you feeling? Do you have a cough? A headache? If you can talk about symptoms,” the clinician can begin to get a feel for what’s wrong.

Since he’s dealing with technology, Konkani explains, his questions are a bit different: “Is it not turning on? Or does it turn on but it’s not turning on but it’s not sensing the temperature or not sensing the blood pressure?” If they are a little bit more specific then it becomes much easier to investigate the problem.” By being thorough, Konkani says, he and his colleagues rarely see problems where there is “no fault found.”
What they typically find instead is that the user may not know how to operate the device, or may not understand the basics of its power supply (i.e., battery-operated). In that case, he says, the solution is not to return the equipment with a tag saying nothing was wrong; but to meet with the nurse, to show her how it’s used, and again—to take the time to slow down and talk. ("Usability issues," as HumanEra’s Griffin describes them, can often be justly blamed on poor device design. If more manufacturers would consult more closely with nurses and other clinicians as they designed these devices, she says, many such problems could be “nipped in the bud.”)

Gresch says healthcare facilities may want to consider tracking Unable to Duplicate (UTD) codes by care unit and device type to identify further training needs.

“Setting these thresholds as performance measures and reporting instances of thresholds exceeded and actions taken as a result is an important thing to report to safety committees and demonstrates that the biomed department is an integral and proactive part of the care delivery team.” Kelley, of Washington Hospital Healthcare System, says the issue of “two different languages,” is best addressed by choosing your words carefully. “If an interface is down, and what the nurse is seeing is that they can’t get something to work, we can’t go up there and start talking about switches and data servers and HA systems.” You have to drop the “techno-babble” or “they’ll just glaze over.”

On the flip side, Kelley adds, nurses “don’t have time to dumb things down for us, so if they call us up and say, ‘look at that, the ICP is 40, you’ve got to fix that’—well, we’d better understand what they mean.” If you don’t, you’ve lost your credibility. “They’re going to think this guy doesn’t know what he’s doing.”

Putting Patients at the Center

One nurse who knows what she’s doing is Mary Alexander, MA, RN, who spent almost two decades as an intravenous staff nurse before becoming chief executive officer of the Infusion Nurses Society. “I call us the super end-users of the equipment” used in patient care, she says of infusion nurses. “We’re right there with the patient, injecting or infusing directly into their bloodstream, giving them their therapy.” That relationship, Alexander adds, makes “it incumbent on us that we know how to operate these devices properly—that we’re using them in the way that they’re intended” to be used. And yet technology is changing so quickly, she notes, that “just keeping up can be extremely challenging.”

Alexander says she considers HTM professionals to be an important resource that all nurses—not just infusion nurses—can turn to when they have questions about equipment. “I also see them as a link between the field, where the patient is being cared for, and the bench and the industry,” where medical equipment is designed. There’s a disconnect, she says, between the controlled environment in which such devices are developed, and the clinical environment, with its alarms and people-traffic and where all kinds of things might be happening at once. “It’s an entirely different experience.” In infusion therapy, Alexander says, “it’s critical that we know that the devices that we’re using are working properly.” When you’re administering a solution through a pump, “it’s very easy for a decimal point to be in the wrong place, and that would make a big difference in the amount of medication the patient is getting,” which could prove disastrous. Biomed, Alexander says, make the nurse’s job easier, and far less stressful, by assuring them their equipment is calibrated correctly, that it’s operating correctly, and that they’re using it the way they’re supposed to. This can be accomplished through on-the-spot training on an as-needed basis, and through more-formal equipment-orientation sessions led either by staff from the HTM department or by vendors. For her, Alexander says, it all amounts to a collaborative approach to patient care. “It’s about putting the patient

“I’m a firm believer that none of us can do any of this by ourselves anymore. It’s not just nursing, it’s not just medicine, and not just HTM. We all need to be working together.”

— Mary Alexander, MA, RN, Chief Executive Officer, Infusion Nurses Society
first and making safety our top priority. There’s been a lot of conversation about interdisciplinary teams, and I’m a firm believer that none of us can do any of this by ourselves anymore. It’s not just nursing, it’s not just medicine, and not just HTM. We all need to be working together.” When each professional understands what the others are bringing to the table, and everyone remembers that “the patient is at the center, and always our focus,” the end result “will be safe and quality patient care.”

Marilyn Flack, senior vice president for patient safety initiatives at AAMI, agrees. She calls increased collaboration between nursing and HTM professionals “critical to patient safety,” and thinks the two professions, if they would find more ways to come together, would have a huge opportunity to improve patient care. “I know everyone is pressed for time, but if they scheduled regular meetings and spent more time on training,” and if ultimately, feedback on device design made it all the way back to the manufacturer, safety problems and usability issues would gradually disappear. “There is no way for somebody to learn how to use a complex piece of technology in a one- to three-hour training session” when in an ICU, for example, there are at least two dozen devices, all equally complicated, all being used at once. “How can anybody fully understand the ins and outs of every single piece of equipment?” asks Flack. “They can’t.”

There needs to be better device design, she says, and HTM pros, as they stand in the middle between clinicians and manufacturers, are in the perfect position to be agents of change. But there has to be a conversation. “Nurses, when they’re at a patient’s bedside and they’re having struggles with the technology, need to feel more comfortable talking to biomedical engineering. They need to know that it’s not their fault that they can’t figure it out; that these things could be designed better.”

And then HTM, says Flack, must respond in a way that shows that they understand. “If you tell them, ‘You just don’t know what you’re doing,’ they’re just going to clam up, and next time something happens they’ll be less likely to ask for help.” Instead, Flack says (and as Konkani says he does at UVA Health System), “go in with an open mind and start asking questions.” When you do, she notes, it’s your facility’s patients who will gain the most.