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## Hospitals Take SDOH Beyond Theory, Put Data to Use

The healthcare community is gradually accepting that social determinants of health (SDOH) can improve quality of care. Finding a way to apply the data can be difficult, but several hospitals and health systems are showing how it can be done.

SDOH involves socioeconomic and societal issues, such as lack of transportation to follow-up visits and poor nutrition, that can play a role in the delivery of healthcare, affecting outcomes and quality of care. The relevance of SDOH has been getting attention for several years, and some organizations are seeing success with applying the data in ways that directly affect patients.

However, not everyone is on

board, says **Adaeze Enekwechi**, PhD, former associate director for health programs in the White House Office of Management and Budget under the Obama administration. She also previously served as a policy authority with the Congressional Budget Office and the Medicare Payment Advisory Commission.

Enekwechi is now a vice president at McDermott+ Consulting in Washington, DC.

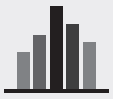
“I wouldn’t say it’s a foregone conclusion that everyone has accepted the importance of social factors and how they can adversely affect health. More people

are aware of it, but there are many nonbelievers despite the research and data,” she says. “Among those who understand the importance of social determinants, the systems that have been collecting data on things like

THERE ARE WAYS TO APPLY SDOH WITHOUT AN EXPENSIVE PURCHASE OF DATA AND ANALYSIS. EVEN A SIMPLE FOCUS GROUP CAN REVEAL INFORMATION ABOUT THE LIMITATIONS SOME PATIENTS FACE.

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race, ethnicity, and language access are finding ways to use that data in a meaningful way. But not every hospital has that.”

## Knowing Your Patients

Enekwechi says SDOH often boils down to simply knowing where your patients come from. She uses the example of a hospital in Chicago, where some patients might come from the affluent Hyde Park neighborhood, and others might come from the inner city, where resources are quite different.

“That kind of data on patients, broken down by ZIP codes or other factors, can help you address an issue like no-shows. You might find that many of these patients are reliant on public transportation and that for them to come from less than 10 miles away, they have to make a two-hour commitment to public transportation,” she explains. “That causes them to miss work. If you’re expecting them to leave their hourly job, lose that income because their lunch hour won’t accommodate the visit and the travel time, you’re expecting far more of that patient and it is not realistic.”

Matching no-shows to SDOH as simple as ZIP codes can identify patients who need intervention beyond the standard processes that might apply to all no-show patients, she says.

“Calling them and leaving messages or sending postcards is not going to solve the problem,” she says. “They have to work, they have to deal with transportation issues that you and I might not have, and no matter how much they want to do the right thing for

their health, those circumstances can’t come together in a way that gets them to their 11:00 a.m. appointment.”

## Some Simple Steps

There are ways to apply SDOH without an expensive purchase of data and analysis, Enekwechi says. Even a simple focus group can reveal information about the limitations some patients face, she says. Partial solutions might include a Saturday clinic for those who have a hard time making weekday appointments, she notes.

“That’s the kind of peeling-back-the-onion approach to using social determinants to understand your patients better. It’s not always a large program with lots of data analysis, but it can be. If you haven’t done this before, you need a place to start.”

Hospitals often have a wealth of data available to them, but merging that information in a way that improves quality can be challenging, she says. Layering another volume of demographic data on top of that only complicates matters, she says.

“I’m starting to see that health systems want to understand their patient populations in a holistic manner, and they’re starting to see social determinants of health as a key tool in achieving that. But so far, we’re seeing more in pockets, and I’m hoping to see growth in the near future,” she says.

Even the smallest hospital can use SDOH to address patient issues and improve quality, Enekwechi says. Payers can drive the use of SDOH because they have a vested interest in making sure patients have the

best outcomes and because they may have existing resources and data analysis capacity to help hospitals apply the information in a meaningful way. Hospitals interested in making more use of SDOH might first approach payers for assistance, she suggests.

## Data Reduces Readmissions

In recent years, the use of SDOH to improve care has focused mostly on reducing hospital readmissions, notes **Bita Kash**, PhD, MBA, FACHE, director of the Center for Outcomes Research at Houston Methodist hospital. Methodist has worked recently to collaborate with community not-for-profit partners to improve post-discharge self-care support for patients at highest risk of readmissions, she notes.

Some of the issues have involved food security, for instance, so Methodist worked with the local Meals on Wheels program, which has specially trained staff and volunteers who go into the home to deliver food but also make note of the recipient's health and any existing needs. Another community partnership uses the medical home concept to ensure discharged patients are seen by a physician after leaving the hospital.

"The research team at the Center for Outcomes Research realized that, not just at Methodist but nationally, this is the way to address some of the most challenging aspects of care. Research is showing that hospitals with the highest proportion of Medicaid patients are engaging in many, many partnerships," Kash says. "Methodist is investing

a lot of money into supporting community providers and energy into developing partnerships and key relationships in the community."

The center has researched the most useful ways to apply SDOH in reducing readmissions and found that the high impact strategies involve community collaborations, she says.

## Deprivation Index Helps

A good resource for hospitals seeking to use SDOH is the Area Deprivation Index Datasets, Kash says. Based on a measure created by the Health Resources & Services Administration, the datasets use census data at the ZIP code level to denote access to key health-related resources based on 17 indicators. The indicators involve issues such as poverty, education, housing, and employment. (*More information about the datasets can be found online at: <https://bit.ly/2IHU7m>.*)

"One of things we have realized is that those measurements need to be taken down to the census block measure because ZIP code still leaves a lot of variability in levels of poverty and health issues," Kash says. "We're also comparing that measure to older measures that most health service researchers have been collecting in the past, such as race, ethnicity, and insurance status, and looking for the best formula to use. Not one risk prediction model works for all hospitals and regions, so even within a hospital system, it's still very hospital-specific."

Commonly used measures such as Medicaid status, age over 45 years, and disease complexity are still strong predictors of an

avoidable readmission, Kash notes. They can be used in conjunction with other SDOH rather than abandoning any proven use of those measures, she says.

"I would encourage those working in hospital quality and safety to consider developing hospital-specific prediction models incorporating Area Deprivation Index data at the block level," Kash says. "Sometimes as researchers, you get stuck with your hypotheses, so you have to be careful not to get caught up in that one index that you thought was the coolest thing on earth but really isn't as effective as the old indicators of population at risk. It's still very important to pay attention to Medicaid, age, and the other measures that have been proven."

## Homelessness Addressed

SDOH play an important role in improving quality and outcomes for the members of L.A. Care Health Plan in Los Angeles, many of whom are some of the poorest in the community, says **Richard L. Seidman**, MD, MPH, chief medical officer. Seidman is responsible for developing and implementing strategies and initiatives to ensure quality for the health plan's more than 2 million members.

"Assessing and determining social determinants of health is a core strategy because of the very significant potential impact on outcomes, quality, and costs," Seidman says. "We've established a social determinants of health committee and recently hired a program manager for health equity who will help us target our efforts

and help those in the community with traditionally lower outcomes.”

The SDOH committee has identified the determinants that are most relevant to the health plan’s members. Those include homelessness and preventing homelessness, food insecurity, income insecurity, transportation, and early childhood education.

For homelessness, L.A. Care committed \$20 million in grant funding to an organization that subsidizes permanent housing for homeless members, Seidman says. The program is close to reaching its goal of placing 300 members in permanent housing over a five-year period. The health plan also partners with organizations that help prevent homelessness by identifying those at high risk.

When patients have severe asthma, L.A. Care sends healthcare staff to their home to look for triggers.

“In some cases, we have to partner with legal advocates to help negotiate and manage relationships with landlords. Mold abatement is a common concern with these patients,” he says. “The landlord may refuse to repaint or recarpet, even though the mold is the primary trigger that is preventing the patient from achieving good asthma control.”

## Aid Where Homeless Live

The health plan has provided additional grants to subsidize move-in costs and costs associated with the timely discharging of patients from an acute care facility to other housing such as a recuperative care facility.

L.A. Care also has healthcare

providers for the homeless that are funded through the federal government. They are designated as homeless clinic providers and included in the L.A. Care network.

“They are providers who are very skilled with the homeless population and excellent at identifying social determinants on top of meeting their healthcare needs,” Seidman says. “For income security, we work with a vendor that matches our members with available benefits and the earned income tax credit.”

One of the challenges in utilizing SDOH is identifying the organization’s business drivers and incentives, Seidman says.

“A business has to clearly understand their priorities and incentives to determine whether or not an investment in addressing social determinants may lead to returns that the organization can keep as a return on their investment, either to reinvest in the program or provide to the shareholders,” Seidman says. “Those business drivers are unique to each business. In our setting as a Medi-Cal managed health plan, there are some disincentives related to how we are funded. We have to be cautious in our investments to ensure an appropriate return, so we can reinvest those funds and sustain good outcomes, which is our goal.”

## Identifying Food Insecurity

L.A. Care’s SDOH application is still too new to generate data showing improvements in outcomes, length of stay, readmissions, or other metrics, Seidman says. He expects the results to be positive and in line

with research showing the benefits of SDOH.

“It is a challenge for healthcare providers, systems, and payers to step into a space that has not been traditionally considered a space for healthcare. We hear people talking about it as the medicalization of social issues,” Seidman says. “We intend to expand on our commitment in the space. We currently have a request for proposals for a community resource platform we can make available throughout the health plan but also for providers in our network.”

L.A. Care also tracks government funding programs, so it can direct the health plan’s grants to areas not adequately served by other funding. One priority identified by the health plan involves food insecurity, with L.A. Care providing \$2 million over the past three years to 24 programs addressing members’ lack of access to healthy food.

With one program, L.A. Care is providing funding for an initiative that provides medically tailored meals to patients recently diagnosed with congestive heart failure.

## Vulnerability Index Developed

Northwell Health, a not-for-profit healthcare network based in Great Neck, NY, that includes 20 hospitals, is creating what it calls the Social Vulnerability Index (SDI). At intake, every patient is given a “social physical” similar to the clinical physical, says **Ram Raju**, MD, senior vice president and community health investment officer.

“Based on that, we give them a risk index, and every time that

patient comes for an encounter, the physician will be able to see that this patient not only has clinical issues but also has social risk factors,” he explains. “When they click on the notice of a high-risk factor, the record will show why the patient has been designated that way and the specific risk factors that led to that high index.”

The network already uses a resource that identifies transportation resources by ZIP code and generates an email notifying the transportation service that this patient will need assistance. The SDI will be tied into that system, as well other resources.

“The idea is that we want to give social risks as much importance as the clinical risks. If the person has diabetes and lives in an area where fresh food is never available, he will not be able to follow the diet you give him, and the diabetes will never get better despite all the medications you give,” Raju says. “If we figure out that food security is a major issue in a certain ZIP code, we should be able to use our community funding dollars to focus on areas we know need help. We will be able to measure the food insecurity risks in that area before and after a few years of funding intervention and see if the effort was successful.”

One challenge has been how to weight SDOH against each other, Raju says. Every interest group — behavioral health, substance abuse, homelessness — will campaign to have its related SDOH weighted heavily in the SDI. Raju says the decisions must be based on metrics and data, but there still will be disagreements, and decisions will have to be made.

Raju recounts the tale of a woman with breast cancer who had lived in the same apartment for years. The woman, an undocumented immigrant, said that the landlord wanted her to move out so that he could raise the rent. She said that the landlord threatened to report her to immigration authorities, and that she resisted.

The woman underwent surgery and returned home. But she said that the landlord told her that the moment she stepped outside, for any reason, he would change the locks. She could not call the police for help because she was in the country illegally, he told her.

“She had to make a decision whether to go to her follow-up chemotherapy treatment and be homeless or stay in her house and let the cancer take care of itself. She chose to remain at home,” he says. “We could have had the best world class surgeons operating on her and

giving her the best medicine ever invented, but it wasn’t going to work if she faced that decision at home.”

Northwell Health responded to this SDOH by working with the New York Law Association to provide pro bono legal assistance to patients in such situations.

“We need people to understand it’s not just about the medication or how good a doctor you are. The real measure should be what happened to your patient in the end,” Raju says. “In medicine, we have a habit of measuring how well we did, when we should be measuring how well the patient got. There’s a very big difference.” ■

## SOURCES

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## Health Information Exchange Takes SDOH Forward for California System

**S**ocial determinants of health (SDOH) are deeply integrated with clinical care at San Mateo County Health in San Mateo, CA, says **Eric Raffin**, FACHE, CHCIO,

chief information officer. The county has about 130,000 Medi-Cal recipients, well over 10% of the population.

“In addition to providing

standard medical services at multiple locations across the county, we are intrinsically tied to our behavioral health and recovery services program, which covers the range

of mild to moderate mental illness through severely mentally ill patients who have very specialized needs and through to our alcohol and drug programs,” Raffin says. “We also have nonmedical, nonbehavioral social support structures like services for seniors, pregnant women, and kids with disabilities.”

Many patients are co-managed between, for example, a medical center and a behavioral health recovery organization in the community, Raffin explains.

“We had no way to understand who was co-managed because we had a very traditional best-of-breed working environment with four electronic health records, two case management electronic systems for behavioral management, and none of them really interoperated,” he says. “So, we had to start with getting all the stakeholders at the table to get on board with the idea that if we could first exchange information internally, then we could provide a richer experience for both day-to-day operations and decision-making, but also for strategic planning and care coordination. That is especially beneficial for our most complex clients, who tend to be co-managed between our medical area and behavioral health area.”

That led to formalizing an internal health information exchange (HIE) that went live in April within the organization, Raffin explains. A significant health information governance project produced a HIE that can provide broad patient information to clinicians, social workers, and care coordinators. The project involved hundreds of hours of measuring workflow processes at multiple sites, from the hospital emergency department to behavioral health

clinics and the local jail. “There were great opportunities to inject social determinants of health information in our nonclinical environments and make them part of the HIE,” Raffin says.

The HIE includes information about members who are incarcerated in the county jail, for instance. When that person is incarcerated, that encounter appears in the HIE, Raffin says. The information is publicly available, but the HIE automatically manages it, and anyone authorized to access the HIE can factor the incarceration into care treatment plans or offer resources.

Raffin and his colleagues also realized that the HIE could reflect whether the member is conserved, an important point to know because conservatorship can affect whether the person is able to make decisions about healthcare and financial issues.

“We realized we had that information because we manage that process for the county. So, we now bring in data on whether the client is conserved, as well as the conservator’s contact information,” he says.

The San Mateo HIE is moving into the optimization phase that will involve connecting it to external networks across the state. The goal is to improve quality of care for patients who transferred out of the San Mateo system to a specialty center, for instance, or who show up in another county’s hospital ED, Raffin explains.

“Another big improvement was that we are now getting the same information from our behavioral health and recovery centers as we do from our hospitals clinics. When you look at a diagnosis summary, or medications or lab results, you’re actually seeing a merged set of those

that include information from the hospital and the behavioral health centers,” Raffin says. “You don’t see a lot of HIEs out there that include behavioral health information, but in our system, you can pull up someone’s record and see that they are in the middle of a six-month treatment plan for behavioral issues, and you can see all the contact information for the person providing that care.”

For the next step, San Mateo is planning to make it possible to push some of that information from the HIE back into the electronic medical record.

“I think of this HIE as a stepping stone to being what a truly interoperable organization looks like, especially when we’re touching directly on social determinants of health,” Raffin says.

The benefits of the HIE are greatest for parts of the organization that were paper-driven or information-starved, Raffin says. Other departments may have had more access to data, but even then, they might have had to pull up several different screens of information in order to get a complete picture of one patient’s situation, he says.

“It’s still a challenge, because change can be hard when you are accustomed to doing work a certain way,” Raffin says.

“I think the medical community is hungry for this kind of information and will be far more engaged when the external information from outside the county is made available.” ■

## SOURCE

- Eric Raffin, FACHE, CHCIO, Chief Information Officer, San Mateo County Health, San Mateo, CA. Phone: (650) 573-2022.

# Some States Provide Funding When SDOH Used to Improve Quality

One health system is finding that the state it operates in is willing to support the use of social determinants of health (SDOH) to address health issues affecting the community.

Spectrum Health in Grand Rapids, MI, is applying SDOH in two major projects. The first is called Strong Beginnings and includes a contract with the state that focuses on reducing risk factors for racialized infant mortality.

Spectrum was prompted to address the issue when a report showed that the African-American infant mortality rate was six times the Caucasian rate in Kent County, MI, notes **Jeremy Moore**, director of Community Health Innovations. He also is a Robert Wood Johnson Culture of Health Leader studying health equity and social determinants and looking for ways to resolve the inequities.

Initial efforts to address the problem showed some success, but scaling up those efforts was made possible by an opportunity with the state of Michigan paying for Spectrum to address risk factors for infant mortality. Spectrum determined that the key risk factors were preterm birth and rapid, repeat pregnancies, Moore says.

“The state pays on those outcomes — about \$60,000 for each avoided preterm birth and \$15,000 for each avoided rapid, repeat pregnancy,” he explains. “They only pay on that as we reduce from the baseline infant mortality in the community, and it requires a baseline volume of 350 women. We also have to get a capital structure to put some of our own money and some foundation money.”

Spectrum launched that program about 18 months ago with a rigorous data component, Moore says. The hospital uses a third-party evaluator, Michigan State University, and the state uses the University of Michigan to validate the data, also.

## Asthma Also Addressed

Another Spectrum project emerged a few years ago when Spectrum identified a significant number of uncontrolled asthma cases presenting to the ED and researched the causes. Some of the common findings were home conditions such as old carpeting and bug infestations, Moore says, so Spectrum launched another program for home remediation aimed at reducing overuse of the ED for asthma cases. The state also pays for improvements in that area.

Obtaining data for such projects can be a challenge for hospitals and health systems, Moore says.

“Hospitals usually aren’t set up with that kind of data. We do have demographic data through insurance companies, but that data is very protected, and it’s not easily used,” Moore says. “None of these data systems talk to each other. Being able to translate all the vital records, Medicaid data, social determinants, and geographic census data is challenging because there are a lot of legal barriers and expertise barriers, and often, it doesn’t easily translate into finance.”

Any project involving SDOH will require bringing together a large number of professionals who speak different languages and organizations

that have different priorities, Moore says. A first step will be identifying the people who have access to the necessary data, followed by trying to make that data user-friendly, he says.

## Community Workers in New York

New York state also is supporting the use of SDOH through its 1115 Medicaid Waiver, notes **Karen Meador**, MD, managing director of the BDO Center for Healthcare Excellence and Innovation. The waiver is aimed at improving access, quality, and cost effectiveness of health services for needy and at-risk residents by allowing the state to implement a managed care program.

“There is a very strong emphasis on social determinants of health as a way to provide holistic healthcare. Each of the performing provider systems is incentivized to include in their projects, for which they are being compensated, those initiatives that emphasize the importance of social determinants of health,” Meador notes.

Meador notes the example of the growing use of community health workers to help reach the state’s goal of reducing unnecessary ED visits and hospitalizations by 25% over five years.

“They have varying backgrounds, but they know their communities, the residents, and the resources. They know how to get people connected to resources that can make a difference in their health outcomes,” Meador says. “Particularly in New York state, there has been a lot of effort put into training community

health workers who can be available to patients, particularly those with complex medical problems and at highest risk. They can help these patients navigate their appointments and home management, watching for red flags that mean they need to see a clinician, so they can avoid an unnecessary hospitalization or ED visit.”

Such efforts have been more difficult in the past because of the fee-for-service reimbursement system, Meador notes. A physician would be compensated for an office visit, and there was increasing emphasis on the physician discussing lifestyle and community issues that affect health, she says.

“Outside of that context, there hasn’t been a way to reimburse providers or support personnel for assisting patients outside of that office visit,” Meador says.

“But with the move toward value-based reimbursement and with physician practices increasingly taking on risk, there is financial value as well as overall social and healthcare value in providing resources and services that help patients be healthier at home and avoid unnecessary visits to the ED or hospital.”

## Maryland Reduces Readmissions

Maryland also has emphasized SDOH. In 2014, it revised its Medicaid system to become more of a global payment model in

which hospitals could benefit from decreasing utilization, notes **Andy Friedell**, senior vice president of strategic solutions and public affairs with Maxim Healthcare Services, a provider of home healthcare, medical staffing, and wellness services headquartered in Columbia, MD.

There also were significant goals around reducing readmissions that could result in bonus payments or penalties.

“Hospitals had strong incentives to be involved with programs that targeted readmissions. We began working with the University of Maryland on a program that is very focused on the social determinants side of nonclinical barriers to nonadherence,” he says.

“We started focusing on readmissions, but quickly realized that for a lot of patients, readmissions are only a symptom of these underlying problems. They’re suffering from socioeconomic challenges that are preventing them from following the care plan you’ve outlined, so if you can address those, the utilization comes down as a byproduct.”

Maxim’s work involves looking for patients with challenges in four areas: medical complexity, functional status, psychological issues, and social determinants.

“When we find people with those four factors in their profiles being discharged, we reach out and schedule RN visits in their homes,” he explains.

“They do assessments that focus

on those four areas and build a care plan that can be used by a community health worker over 90 days to address those factors. They bring in a lot of coordination of social services.”

The program has seen approximately 3,000 patients in four years, with good results, Friedell says.

“We started with a readmission rate for this high-risk population of 25%, and in the first year, we were able to bring that down to the 8-12% range. We’ve maintained it there over time,” he says.

“The lesson from our experience is that you have to have a marriage of people and technology to see the good results,” Friedell says.

“You have to get the data in the hands of people who can go out in the community and act on it, interacting directly with the patients who need their help.” ■

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# Cyber Security for Devices Improves Safety

**M**edical devices can pose a serious threat to patient safety and protected health information

(PHI) if they are compromised by hackers, and hospital leaders should not trust that the manufacturer

has adequately protected them, say experts in the field.

Many security researchers have



discovered vulnerabilities in medical devices that could be used to cause physical harm and potentially even death, says **Corey Nachreiner**, chief technology officer at WatchGuard Technologies, a network security vendor in Seattle.

“The good news is that so far it’s been the good guys who have identified and reported these issues, rather than hackers with malicious intent. That said, the potential for real-world harm or death is still very much a reality,” Nachreiner says. “For example, around a decade ago, a researcher named Barnaby Jack found flaws in implanted pacemakers that he could wirelessly exploit, in close proximity, to shock those who were equipped with such devices.”

This year, another medical device security researcher uncovered methods he could use to remotely hijack the back-end systems that manage many patients’ pacemakers and use them to deliver booby-trapped software to those pacemakers, Nachreiner explains. The method would enable the ability to shock patients through a completely remote attack, he says.

The same researcher also has found major flaws in insulin pumps, neurostimulators, and more, Nachreiner notes. Over the years, other security researchers have discovered flaws in medical imaging technology and drug injection systems used in hospitals as well.

“In short, the medical Internet of Things today appears to be just as insecure as the consumer Internet of Things, only with the potential to cause much worse — and often physical — damage,” Nachreiner says. “The risk that hospitals should remain most concerned about is insecure medical devices that end up causing harm to, or the death of, their patients.”

## Patient Data Also at Risk

At the same time, hospitals must address the great potential for breaches involving patient information, he says. Hospitals, by their very nature, tend to have more sensitive personal information about their patients on file than the average business would ever collect from its customers. Specifically, hospitals often require patients to share Social Security or national identification numbers, which are highly valuable credentials to identity thieves.

“However, I am less worried about hackers stealing this information from the actual medical devices. Rather, hackers would target the traditional IT systems in hospitals for this type of information,” Nachreiner says. “The risks inherent to the medical devices themselves are more about either not doing their job correctly — risking a patient’s health — or being misused to actively, physically harm a patient.”

The solution is two-fold, Nachreiner says. For existing devices that are already insecure and difficult to update or replace, hospitals need to use traditional network security and segmentation practices to separate these devices from the internet and protect them from network and malware attacks, he says.

“But the more long-term and complete solution here will require regulating bodies and the public to put pressure on medical device manufacturers to prioritize security design in their new networked devices,” he says. “Hospitals can begin to address the latter solution by not purchasing medical devices from manufacturers who neglect

to prioritize security, work with the FDA and other government authorities to identify which devices are least at risk, and start pushing for regulations that make vendors prioritize security.”

## Consider Security When Purchasing

Patient safety risks associated with medical devices often come from hospitals purchasing technology that was not designed with security in mind, says **Emil Hozan**, threat analyst at WatchGuard.

General information security risks within healthcare organizations also can surface due to the absence of adequate security training programs for staff and common security vulnerabilities found in just about every type of information system and network, regardless of size or industry, Hozan says. Hospitals looking to address security risks in medical equipment need to verify that their chosen manufacturer has aligned its product to comply with existing and sufficient security standards, and then make it a policy to only purchase from vendors who have proven their offerings are security-oriented.

“Training hospital staff on cybersecurity best practices should be a standard practice for every hospital, especially given that nurses and doctors are often targeted by spear phishing campaigns with intent to download malicious content,” Hozan says. “Without the proper training, medical staff that fall victim to these attacks enable malware to potentially siphon sensitive and confidential information from the network to a remote command-and-control center.”

Hospital IT teams can harden their networks to shore up common

vulnerabilities by implementing isolated virtual local area networks (VLANs), a group of devices configured to communicate as if they were attached to the same network, when in fact they are not, Hozan suggests.

“This means firewall protection for anyone trying to traverse between staff computers and medical equipment on the network,” he says. “Other key security strategies would be to enable advanced antivirus protections and religiously update software with new patches.”

## Know Your Devices

Realizing that these devices pose a risk to patient safety is the first step to protecting patients, says **Jeff Sanchez**, managing director in the security and privacy division of Protiviti, a technology and management consulting company in Menlo Park, CA. Healthcare organizations use the NIST Cybersecurity Framework (CSF) to protect key IT assets, and a similar approach is needed with medical devices, he says. (*More information on the CSF is available online at: <https://bit.ly/2ePWDZM>.*)

“We find that many healthcare providers have foundational-level issues with identifying and tracking medical devices throughout their environment. It may sound silly, but some organizations can’t give an accurate number of how many devices they own, lease, and/or support,” Sanchez says. “They can’t tell what types of devices are under their care — the manufacturer, make, model, version, etc., where they are used or stored, if they are connected to the corporate networks or other devices via wired or wireless mechanisms, and if they create, store, process, and/or transmit sensitive patient information.”

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Answering these questions with any degree of accuracy requires mature and robust processes to inventory devices and their key characteristics upon purchasing/arrival to the organization, and then implemented monitoring and tracking controls to ensure those assets are kept up with, Sanchez says.

Healthcare organizations also see many challenges in identifying whether any unauthorized devices have entered the organization and have potentially been connected to the corporate network, he says. This problem often occurs when vendors lend prototypes or trial devices to the organizations or to the medical professionals for try-out periods, he says.

Another common problem is a failure to physically secure medical devices.

“I should make a differentiation now that two very real risks exist here — one that carries malicious intent and one that very much does not. Many organizations see instances of employees and/or patients who have used available USB ports on medical devices and their accompanying PCs to charge their mobile devices,” Sanchez says.

“They weren’t trying to harm a patient or steal sensitive protected

health information; they simply wanted their cellphone to be charged so they could receive texts from family and friends. While we wait for manufacturers to come up with technical ways of disabling those ports, many companies sell USB locks/keys that don’t involve ruining a motherboard with hot glue, or other DIY port blockers.”

### Monitor Remote Access

On the more malicious side are deliberate attempts to steal protected data or harm patients, Sanchez says. The technology within medical devices is growing more complicated and compact, and the devices and their abilities to store information and connect to corporate networks are growing at a rapid rate. While those advances are beneficial, they also can make devices easier to physically steal or access, he says.

“Being able to identify when devices have left the umbrella of the organization and performing a comprehensive risk analysis on them could be a crucial component to understanding how patient information ended up on the internet months down the road,” Sanchez says.

“Remote access to devices is something that is often required for support and troubleshooting, but left ungoverned, it can be very dangerous.”

Healthcare systems need assurances that vendors can react in a split second to emergencies with certain devices, but other situations are not necessarily a matter of life or death, he explains.

For those vendors that do not need instant access at any time, Sanchez recommends that support access be suspended in times of business as usual, or that some type of emergency identification with transactional-level monitoring controls be put in place to verify when a credential is used and that it was for legitimate purposes.

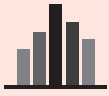
Additionally, any remote access to the provider’s network should require some form of multifactor authentication, Sanchez says. ■

### SOURCES

- **Emil Hozan**, Threat Analyst, WatchGuard Technologies, Seattle. Phone: (206) 613-6600.
- **Corey Nachreiner**, Chief Technology Officer, WatchGuard Technologies, Seattle. Phone: (206) 613-6600.
- **Jeff Sanchez**, Managing Director, Security and Privacy Division, Protiviti, Menlo Park, CA. Phone: (650) 234-6000.

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## CE QUESTIONS

- 1. What does Adaeze Enekwechi, PhD, say regarding the acceptance of social determinants of health (SDOH) in the healthcare industry?**
  - a. Few people are aware of the concept.
  - b. More people are aware of it, but there are many nonbelievers despite the research and data.
  - c. There is little research supporting the use of SDOH.
  - d. Almost no healthcare organizations employ SDOH to improve outcomes.
- 2. What does Enekwechi say regarding the application of SDOH?**
  - a. There are ways to apply SDOH that do not require an expensive purchase of data and analysis, such as creating a focus group.
  - b. Applying SDOH will always require a major investment of money.
  - c. SDOH will be useful only to large, multihospital systems.
  - d. SDOH will be useful only in accountable care organizations.
- 3. In the Michigan program offering compensation for using SDOH to reduce infant mortality, what is the approximate amount paid for each avoided preterm birth?**
  - a. \$20,000
  - b. \$40,000
  - c. \$60,000
  - d. \$80,000
- 4. Which of the following is true regarding the patient safety risks posed by hacking of medical devices, according to Corey Nachreiner?**
  - a. Many security researchers have discovered vulnerabilities in medical devices that could be used to cause physical harm and even death.
  - b. Despite extensive research, no vulnerabilities have been discovered that could cause patient harm or death.
  - c. Medical devices are vulnerable only to deliberate tampering by patients or family members, not outside parties.
  - d. Older medical devices were vulnerable to hacking, but newer generations have safeguards that eliminate that risk.

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Upon completion of this educational activity, participants should be able to:

1. Identify a particular clinical, legal, or educational issue related to quality improvement and performance outcomes.
2. Describe how clinical, legal, or educational issues related to quality improvement and performance outcomes affect nurses, healthcare workers, hospitals, or the healthcare industry in general.
3. Cite solutions to the problems associated with quality improvement and performance outcomes based on guidelines from relevant authorities and/or independent recommendations from clinicians at individual institutions.