



Top Five Challenges for Wireless Healthcare Deployments

According to the HIMSS Analytics™ Database, approximately two-thirds of U.S. hospitals reported using wireless technology within their healthcare delivery organization. In order to understand the issues, challenges and concerns surrounding the deployment and utilization of wireless networks, HIMSS Analytics conducted two focus groups in March 2009 with senior IT executives who have implemented wireless networks. Institutions represented in the focus groups range from large (1,000+ bed) urban health systems to small (100 bed) rural organizations. All of the participants manage IT for diversified healthcare companies with hospitals, sub-acute, ambulatory and home health operations. The findings from those focus groups are outlined in this white paper.

The respondents agree wireless has become a mainstream technology.

I'm beginning to forget when a particular computer is wireless as opposed to when it's wired. – Glenn Barge, Lodi Memorial Hospital

All respondents plan to expand their networks in the future. Used effectively, respondents have found wireless technology offers opportunities to improve the speed of care, the quality of care and the overall productivity of healthcare organizations.

We have noticed a significant improvement in patient care due to the fact that physicians do have immediate access to the results where they've been able to change their medications or order additional tests. Having the ability to order instantly wherever they are, and to see those results is very important for patient care. – Phyllis Paris, Hannibal Regional Healthcare System

We're also looking very hard right now at...some version of a virtual desktop...so that we can...have the docs...do sign off on orders and that sort of thing in order to get the process and the function into the billing system a lot quicker to see if we can use that to generate a little more revenue for the organization. – Bruce Whyte, UMass Memorial Health Care

A sample of the applications accessed over wireless connections includes electronic medical records (EMRs), picture archiving and communications systems (PACS), emergency department (ED), medical devices and clinical and nursing documentation. However, this access to information is not limited to clinical applications. Respondents report that their users access a wide variety of applications via their wireless connections, including registration systems, housekeeping systems, and other financial systems.

We have most clinical applications and several business applications available on the wireless. – Rob Quadri, Barton HealthCare System

The devices used to access clinical information vary by organization. These include computers on wheels (COWs)/workstations on wheels (WOWs), cellular telephones, tablet computers, desktop computers, smart pumps, RFID devices and electronic badges that allow users to instantly speak with others through a building or campus environment.

In total, we're about 600 wireless phones, tags, carts, laptops, PDAs, whatever you want to call them running on our wireless network – Mike Mistretta, MedCentral Health System

We've pretty much got full coverage of wireless throughout our campus. We're using wireless carts, wireless tablets, wireless notebook PCs. We're also using wireless IP phones. – John Peterson, Longmont United Hospital

Wireless technology isn't limited to use on the hospital campus. Many focus group respondents noted that they use mobile technologies in a wide variety of other healthcare environments. These include ambulatory facilities, home health organizations, mobile clinics and in ambulances used by first respondents/EMS crews.

We have cellular cards for our docs who use laptops remotely. They just have a VPN tunnel back to us to use our network. So they could be at an airport or hotel or in their office for all we care and they can get back to us. – Gregg Veltri, Denver Health.

We actually have a mobile clinic. It's an RV that was converted to a clinic. And we use a cellular device, and set up a virtual private network back to our network. – Mike Nichols, Southern Illinois Healthcare Foundation, Inc.

We purchased wireless access cards for [our home health nurses], and when they're out at patient's homes, they just connect through that. – Phyllis Paris, Hannibal Regional Healthcare System

This white paper will address the challenges healthcare organizations face with regard to their utilization of wireless technologies across their entire environment. Participants in the survey identified the following 5 key challenges: 1) Physical connectivity issues, 2) Technology connectivity issues, 3) User demand, 4) Security, and 5) Network management.

Physical Connectivity Issues

One key challenge to the use of wireless networks is the physical construction of healthcare facilities and difficulties accessing broadband networks. Specific challenges faced in this area include limitations of wireless signals, particularly in older facilities, on lower floors, in basement areas, and from some new construction materials such as steel encased buildings with glazed windows that deflect cellular signals.

We have some older facilities and it's difficult to really get good coverage in those facilities. – Patty Lavelly, Memorial Health

The basement and the first floor, about half of those two floors have no coverage at all. We call it the cone of silence. We're currently working through that problem. – Chris Ossenbeck, McAlester Regional Health Center

Wireless often presents a viable solution to these connectivity challenges when installing cable isn't an option. Several respondents noted that wireless networks are ideal where brick walls or other obstacles prohibit cabling.

If we have trouble wiring some location up, we can fall back on using wireless connectivity and from the users' perspective, we've responded quickly. – Rob Quadri, Barton HealthCare System

Wireless solutions also allow individuals working at off-site locations to access data needed to provide patient care.

Our home health folks are using the broadband USB cards or air cards in notebook PCs to connect. So, they're coming through wirelessly. – John Peterson, Longmont United Hospital

Connectivity challenges also result due to coverage gaps in wireless systems and mountainous or other unfavorable terrain that limits coverage. The latter is of particular consequence when healthcare organizations are trying to address connectivity issues for home health professionals, physicians and other care givers who work remotely.

You have to realize that we are in the middle of mountains and desert. So, using a [cellular] provider...is just not reliable. – David Chmura, Copper Queen Community Hospital

We're in the mountains of Northern California, so coverage is pretty spotty. We found that one carrier has better cell phone coverage. – Rob Quadri, Barton HealthCare System

Respondents have come up with a variety of solutions to overcome these barriers. Several noted that their organization has installed "universal repeaters" to enhance the wireless signal in their area.

We've put in a repeater system for not only pagers but cellular carries as well. We have installed a DAS since we were having many issues with missed pages or missed calls. – Michael Ward, Anderson Hospital

Other solutions include survival remote gateways (SRGs) and a distributed antenna system (DAS). This issue can also be solved by purchasing a mobile virtual private network (VPN) software solution. This kind of software maintains the stability of applications even when there is little or no wireless coverage, without the need to install extra repeaters or other hardware.

We had some issues in the beginning...they were issues with our COWs and we ended up installing a software application...which really helped...and completely took care of that issue...So, we really haven't had an issue with it hanging up. – Phyllis Paris, Hannibal Regional Healthcare System

Technology Connectivity Issues

Other challenges identified are the result of technology concerns. Many respondents, for instance, were concerned about the bandwidth available on their wireless network, which could limit clinician access to patient information. This is particularly of concern in environments where large files, such as PACS images or videos are viewed over wireless connections.

The expectation is that the response time is going to be similar on our wireless as it is...in a ten gig connection within Diagnostic Imaging. So bandwidth is certainly a big issue as well. – John Peterson, Longmont United Hospital

Respondents address this issue in various ways. Some add access points so that there is enough space available for all individuals requiring use of the network. Some ensure clinicians maintain access to appropriate patient information by segmenting their networks. They limit the bandwidth of their guest network to minimize the impact of large downloads, such as from streaming video sites.

We segment [our guest network] off onto a separate Internet pipe, so that we can control how much bandwidth [they have] ... We've done that because we were having the problem of more and more and more of our bandwidth being consumed by YouTube and those things that [were not] necessarily helping the patient care. – Ron Double, Parkview Health System

Another approach is to use management and policy software which enables IT administrators to centrally control, prioritize, and manage which applications and devices have access to the network. In addition, this software provides compression and optimization techniques which enable high-bandwidth applications to be utilized more efficiently over wireless networks.

Other IT professionals have identified connectivity issues that result from the addition of applications to the network that operate in a proprietary environment, while others note that they've had to incorporate devices onto their network that do not run at the same speed as their current environment which causes the entire network to slow down, resulting in user frustration.

Respondents have addressed these issues in a variety of ways, including working with their vendors to either move away from the use of proprietary solutions or to upgrade to an environment that accepts multiple versions of 802.11 standards.

Meeting User Demand

Whether clinicians are on hospital campuses, in ambulatory clinics, doing home health visits or on EMS transports, all respondents noted common user requirements. Their users demand systems that are transparent – they do not differentiate between wired and wireless technologies. Users expect the same performance and reliability on their wireless devices that they see on their wired devices. They don't care about the technical side. They just want to connect easily and quickly.

Most people don't think about it or don't even care [if they're on a wired or wireless network]. They just want to be connected and fast. – Mike Nichols, Southern Illinois Healthcare Foundation Inc.

A key concern is that the wireless technology fulfills its promise to improve productivity, without requiring the end users to become “IT experts.”

We have some home health people that travel and they use the cellular cards also. And when they come back in the office, they're either wireless to the access point or they plug in, and they struggle with understanding why they get three different speeds and not the one speed when they're plugged in hard. That's probably our biggest challenge. Setting, setting and meeting those expectations. – Mike Mistretta, MedCentral Health System

Another user concern is the ability to maintain a persistent application connection. This is important because respondents found that whether an application is running on a wired or wireless network, clinicians want reliable performance. When there are application persistence problems, clinicians seek alternative solutions that can further aggravate the network.

The reliability of the network, I think, is my biggest concern. It will hang up or freeze and the clinicians will have to either wait until it recovers or move to a wired workstation. – Patty Lavelly, Memorial Health

I get people who may be connected to ten different sessions...They just close and try to open it again...That creates problems on my...network because then I've got all these sessions open. Whereas if they had the speed and ...performance, they wouldn't [need] multiple sessions. – David Chmura, Copper Queen Community Hospital

Managing the expectations of clinicians is not always easy. Several IT professionals indicated that physicians trying to access patient clinical information via a wireless network have gone out and purchased technology, such as cellular phones or wireless access points, without first identifying whether the IT department can support that technology. Then when the technology doesn't perform up to expectations, the IT department is asked to rectify the situation, when this isn't always possible.

Doctors go out and buy phones. They expect everything to run through the phone and they want to get the information they need when they need it. – Jim Hauenstein, Enloe Medical Center

One solution to address this is to put a policy in place surrounding which devices will be supported by the IT department.

We also had the end user issue where everybody wants their own phone. And we just had to come to an agreement. We created a policy and everybody just had to adhere to that. We only support one brand, one model, from one vendor of phones. – Mike Nichols, Southern Illinois Healthcare Foundation

Wireless networks not only serve clinicians needing access to patient data for clinical care, but they also serve patients and their families via guest networks. Meeting the needs of these diverse groups is not an easy task.

We have an enterprise wide wireless network that covers eight hospitals and 20+ ambulatory and physician sites. We have [physicians] segmented off onto a separate VLAN so that they can connect with their own devices and access the Internet to go back to their offices. We also have it so that our patients and

families don't really have a hot spot, but anywhere in the system they can connect onto another VLAN for hot spot access back to wherever they need to go. – Ron Double, Parkview Health System

Due to anti-kickback and Stark regulations, many healthcare organizations must charge physicians who would like to connect remotely into the hospital for the wireless service provided. In order to reduce this cost, some clinicians are asking the IT department to cancel their service. However, not all of these clinicians are subsequently purchasing their own service. Instead, they are attempting to access patient information through the healthcare organizations' guest network.

To combat this issue, one organization has limited the bandwidth on their guest network to a megabyte, which limits the type of information that clinicians can access through the guest network.

We've had a lot of them say, 'I want to cancel my service'. We're thinking they're going to get their own, to find out they just moved it over to our public network. To get around that, we actually throttled the public down to where now they only get a meg throughput on the Internet access. – Chris Ossenbeck, McAlester Regional Health Center

IT professionals must also overcome unique challenges to meet the needs of highly mobile user groups, such as first responders who work with EMS crews. To address this group's connectivity issues, one respondent noted that they have put an access point directly into the ambulance. This allows the first responders to go on-site and connect back to the network using a mobile VPN connection.

Our first responders [are] also connecting back to the network wirelessly through an access point that's actually built inside the ambulance and they're using the VPN connection to come in to start transmitting data as soon as they get on-site about patient conditions. And we've deployed that through about 60 of our ambulances. – Bruce Whyte, UMass Memorial Health Care

The final group of users many organizations support are patients and their families. Most IT professionals indicated that they provide access to the Internet via a guest network. Providing this type of network, however, requires IT professionals to walk a fine line. They need to ensure that these users have ample access to notify family members of the patient's condition or provide a patient with access to the Internet during a prolonged treatment such as a chemotherapy session, while maintaining confidentiality and security of patient data.

A variety of mechanisms have been employed to manage this concern, including creating a special service set identifier (SSID) for guest access or setting up temporary accounts that time out after a predetermined length of time.

Security Considerations

There is a host of security considerations involved with managing a wireless network. These range from managing the security of the data being accessed by the systems to managing the expectations of the clinicians using the systems. The first concern surrounds security of the wireless environment itself. Individuals managing wireless environments must deal with issues ranging from rogue access points to individuals accessing unauthorized information.

My biggest worry is security on the WiFi networks, because a lot of devices that are being put on the network aren't secure by default. – Greg Veltri, Denver Health

I think we all share the same concern...protection of the wireless network, because now we rely more and more on it for more and more devices and uses. And if the wireless network goes down, it's just like the regular network going down. – Rob Quadri, Barton HealthCare System

One way to safeguard information is to provide a secure means of accessing data. Some organizations require security protocols, such as single sign-on, to secure patient data. However, this can create challenges for IT professionals and the additional security can also be frustrating for clinicians. Many organizations use a virtual private network (VPN) through which clinicians and other care providers, such as first responders, can access patient information.

We have air cards for our docs who use laptops remotely. They just have a VPN tunnel back to us to use our network. – Greg Veltri, Denver Health

Given the portability of today's laptops and PDA's, other concerns are lost or stolen devices and meeting HIPAA requirements to protect patient data. In addition to using desktop security software and passwords, some healthcare institutions utilize centralized device software, which enables IT administrators to quarantine lost or stolen devices and deny access to the network.

One of the biggest things is that the clinicians don't understand that we still have to comply with HIPAA and we have to protect the data. They just want to be able to walk up to a device and somehow through osmosis it knows who they are, it knows what they want, and they just want it to do that, so they don't have to log in. And what they want is unrealistic. – Chris Ossenbeck, McAlester Regional Health Center

Another security consideration is that clinicians are providing guest access to their networks for patients and their families. This means outside devices are regularly accessing some aspect of the hospitals network. Many organizations are solving this issue by segmenting their network to accommodate for different types of access, which provides an additional level of security for patient data.

Network Management Issues

In order to address challenges while ensuring that a secure connection is available to all users, IT professionals are in a position to manage the network on a daily basis. Many of these challenges, such as connectivity issues, security and meeting user demands, have been identified throughout this paper.

Network reliability is a big area of interest to the focus group participants, but their experiences vary by organization. Some are still working through network performance issues, while others have fairly stable wireless networks.

The reliability of the network, I think, is my biggest concern. – Patty Lavelly, Memorial Health

We've had all kinds of issues...with the...sensitivity of the network and people dropping off. – Mike Mistretta, MedCentral Health System

Our wireless networks are up most of the time. – Michael Ward, Anderson Hospital

Our wireless has not gone down in the last year, over a year. There's less concern on the wireless as there is for lightening strikes or something that may affect our routers and the switches for our local network connectivity to the desktops. – Jim Hauenstein, Enloe Medical Center

How do IT professionals know that they are successfully managing their environment? The volume of help desk calls is a good indicator for most IT professionals since smaller call volumes reflect a more successful network environment.

A lot of us measure our performance based on the satisfaction levels we have from our customers. And that is directly attributable to the number of unhappy calls we get, because we never get the happy ones. – Bruce Whyte, UMass Memorial Health Care

Other individuals have taken active steps to manage their wireless environment, so that they can identify a problem before it comes to their attention from a user. This is no small feat, because as one IT professional noted, with the addition of access points to the networks come an equal number of places where things can go wrong.

One method for doing this is through a formalized rounding program in which IT managers round with clinicians on a scheduled basis and survey staff about the issues they might be having. Another method is to run reports on the different devices so that those that are having the most problems can be monitored closely.

We also have a formalized rounding program where our IT managers round throughout the patient care floors of all the facilities on a scheduled basis and survey staff and identify any issues they're having. – Ron Double, Parkview Health System

Alternatively, there are mobile VPN software solutions that can proactively detect and alert administrators *before* impending problems occur. Network managers can establish thresholds for problems with servers or individual users or devices and

receive notifications via e-mail, SNMP or syslog (depending on the network environment) if a critical problem is likely to develop soon if not corrected.

If I throw a pump or some other medical device on the network, knowing that it's fallen off is just as important, probably more important, than if someone is trying to hack the network. – Mike Mistretta, MedCentral Health System

Future Use for Wireless Environment and Conclusion

Wireless technology is not a passing fad and in many cases has become a standard means of enabling people to access information.

*Moving forward the wireless infrastructure will play a significant role.
– Ron Uno, Kuakini Health System*

Wireless is here to stay. It's going to grow in its need and usefulness in our institutions. In order to give users the experience they get with their smart phones and other devices they use at home, we've got to be there. We've got to secure it. We've got to figure out the problem – Greg Veltri, Denver Health

A number of respondents noted that they are considering moving at least part of their network to an 802.11 n platform in upcoming months and years. Other plans for future expansion include adding additional devices and access points that will not only expand utilization within current areas, but extend the use of mobile technologies to new environments.

Other IT professionals reported that they will either add new applications to their wireless environment or will replace currently used devices with smaller devices, or simply add smaller devices to their environment.

We intend to do a lot more in the wireless environment. – Bruce Whyte, UMass Memorial Health Care

Wireless technology offers doctors, nurses and other clinicians' timely access to point of care and other mission-critical applications, both in the hospital and at remote or mobile locations. While there are challenges to overcome, solutions exist that enable IT professionals to provide reliable wireless networks at the point of care.

What we're really trying to drive, is always at the point of care, always at the best place and time, always in front of the right patient, kind of information. We're really trying to drive it that way and I think that mobility is one of the keys that will get us there – Greg Veltri, Denver Health

We know that we have a growing patient base and we have a reducing care provider base. ... We have about a shortfall of a million nurses nationwide and doctors are becoming more and more scarce and so we have to be able to provide tools to ... allow them to go and touch their patients in a much faster and more mobile area. We also have to make sure that the applications that they're logging information are time sensitive to what they're trying to get done. – Bruce Whyte, UMass Memorial Health Care

The utilization of wireless technology is not without its challenges. Individuals who manage wireless networks are faced with issues related to connectivity, meeting the expectations of users—both clinicians and patients—and doing all of this in an environment in which the security of patient data is of utmost concern. However, as IT professionals identify more and more solutions to ensure that their wireless environment runs reliably, wireless technology will continue to evolve as a viable solution to access patient information, improve quality of care and increase productivity of healthcare organizations.

In addition, the federal government's drive toward a total electronic, paperless environment will only accelerate the adoption and usage of wireless technology. The American Recovery and Reinvestment Act of 2009 includes \$20 billion to promote the adoption and use of health information technology (HIT) and especially electronic health records (EHRs). Although there is no specific mention of wireless technology in the legislation, it can be implied that since the funding is tied directly to migrating to an electronic health record environment, the use of wireless technology to capture and manage patient data electronically at the point of care, and to share this data with other caregivers will be a key driver in wireless technology adoption for the next five years.