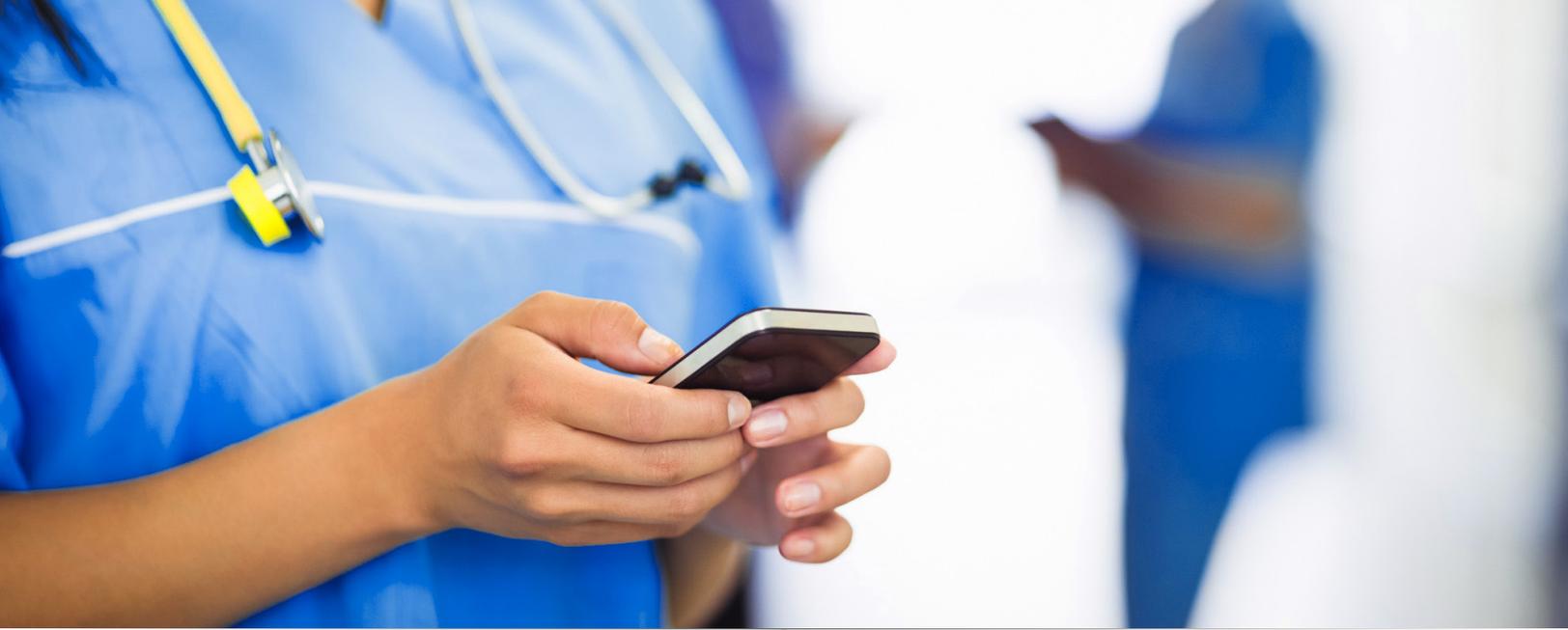




# SHARED SMART DEVICES 2020

THE LATEST GENERATION  
OF DEVICES FOR NURSES



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# EXECUTIVE INSIGHTS

# SHARED SMART DEVICES 2020

## THE LATEST GENERATION OF DEVICES FOR NURSES

Shared smart devices are devices used by multiple care team members—mainly nurses but also some hospitalists and therapists—within the walls of the hospital. These devices are increasingly popular in healthcare as a means of improving communication and potentially consolidating the nurse toolbelt. In this high-level update to KLAS’ [2018 clinical mobility report](#), KLAS spoke to organizations using the latest devices from Apple, Vocera, or Zebra (about 10 customers per device). Have new models addressed older versions’ challenges with connectivity, call quality, durability, and battery life? Which devices best meet customer needs? Do Apple and Zebra continue with high mindshare, and what (if any) adoption have Ascom, Samsung, or Spectralink generated? Where does Vocera fit in the market landscape?

### Apple a Solid Performer; Healthcare-Specific Zebra Strong with Some Limitations; Vocera Good for Communication, Limited Elsewhere

Organizations using **Apple** iPhones (model 7 or newer) say the consumer-grade devices have no significant weaknesses but are not ideal for healthcare. The biggest strengths are call quality and network connectivity, which has improved since a partnership with Cisco. The phones themselves are seen as more durable than older versions, though most clients still purchase mophie or OtterBox cases. Despite the cases’ added expense, overall cost is near average because customers often buy the phones at lower price points through local carriers. Some clients rate Apple lower because of the inability to swap out batteries and concerns about updates causing issues.

**Zebra’s** TC51-HC device stands out for its rugged design and the ability to hot-swap batteries, which enables the phone to be used continually. Zebra receives higher support and inpatient workflow ratings than other measured vendors; most respondents have replaced legacy phones as a result and are also using Zebra devices for barcode scanning and (to a more limited extent) photo capture. Weaknesses include the weight of the phones (some mention they can weigh down scrubs) and high cost. Also, the grill that protects the microphone can get gummed up and muffle the caller’s voice; multiple organizations have had Zebra replace the grills. Customers are hopeful the new TC52-HC design will fix this problem.

The **Vocera** Smartbadge is used primarily for its push-to-talk functionality and secure texting. The device has good connectivity and very strong underlying software and security. The cost of the Smartbadge is seen as high considering it has less built-in functionality (e.g., no scanner or camera)—thus, perceptions of value are lower.

#### Shared Smart Device Ratings

- Well above average
- Above average
- Average
- Below average

All ratings based on limited data (see page 5 for details)

|                                    | Connectivity         |                     | Features and functionality     |                  |                   | Device attributes |              |                     |            |                         | Cost per device  |
|------------------------------------|----------------------|---------------------|--------------------------------|------------------|-------------------|-------------------|--------------|---------------------|------------|-------------------------|------------------|
|                                    | Network connectivity | Call quality (VoIP) | Support of inpatient workflows | Barcode scanning | Camera            | Durability        | Battery life | Minimizes bulkiness | OS/updates | Native security/privacy |                  |
| Apple iPhone 7 or newer (n=12)     | ●                    | ●                   | ●                              | ●                | ●                 | ●                 | ●            | ●                   | ●          | ●                       | \$500–\$1,000    |
| Vocera Smartbadge (n=9)            | ●                    | ●                   | ●                              | N/A              | N/A               | ●                 | ●            | ●                   | ●          | ●                       | ~\$500           |
| Zebra Technologies TC51-HC† (n=10) | ●                    | ●                   | ●                              | ●                | Insufficient data | ●                 | ●            | ●                   | ●          | ●                       | ~\$1,000–\$1,400 |

† Zebra recently released an updated model, the TC52-HC, that some customers are just beginning to deploy. The vendor also offers the TC21-HC as a secondary device for disciplines like environmental services. Note: KLAS was not able to validate enough Spectralink, Samsung, or Ascom customers to include them in this performance chart. These vendors are included in later charts about purchase considerations.

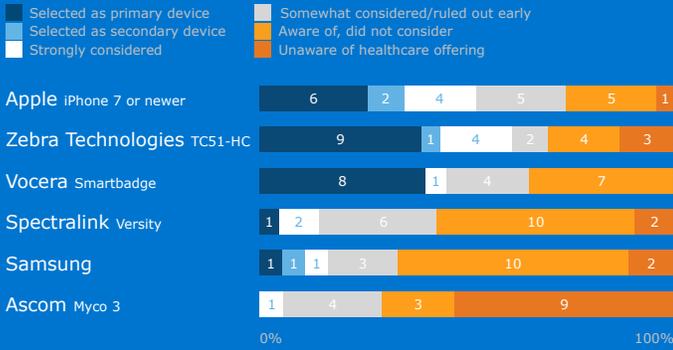
### Apple Most Broadly Considered Thanks to Epic Integration; Zebra Strongest Android Option; Some Spectralink Consideration; Samsung Infrequently Considered

The **Apple** iPhone receives strong consideration, especially from Epic EMR customers, who highlight integration with Mobile Heartbeat’s secure communication platform and Epic applications like Haiku and Rover. Of the devices with an Android operating system, **Zebra** is the most broadly considered. Respondents cite strong apps and the built-in barcode scanner and camera. Organizations report the TC51-HC is sufficiently ruggedized for healthcare while still enabling customers to hot-swap batteries. In contrast, lack of battery durability and the inability to hot-swap keep standalone **Samsung** devices from being seriously considered except as secondary devices for non-clinical staff. The **Vocera** Smartbadge is being used primarily by existing communication badge customers; these organizations have deployed the Smartbadge on a limited basis while evaluating whether to upgrade enterprise-wide to its additional features (e.g., ability to text, receive screen-based notifications). However, due to the lack of other shared device functionality, like a camera and barcode scanner, some feel the Smartbadge fits more of a niche workflow and have chosen more functionality-rich solutions as a result. **Spectralink’s** and **Ascom’s** first devices were largely viewed as inadequate—the Spectralink phone was much too heavy, and Ascom’s screen size was much too small for commercial apps. Newer versions of the vendors’ devices seem to have rectified these challenges, but this has not yet resulted in a significant uptick in consideration or market share.

## Purchase Considerations

Vendor consideration in purchase decisions since January 2018

(n=25 purchase decisions)

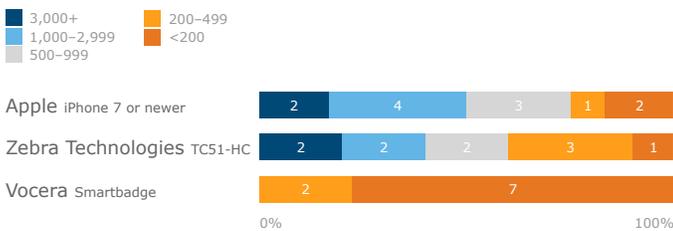


## Zebra Used for Most Applications; Apple Used Broadly; Vocera Deployments Still Early

The majority of **Zebra** respondents have implemented Zebra phones to replace legacy phones; they also leverage the phones' barcoding functionality (for medication administration, specimen collection, etc.) and, to a lesser extent, the cameras. Both Apple and Zebra customers report wider ranges of fleet sizes—from small deployments to very large rollouts with thousands of devices. **Apple** had the largest rollout validated in this study (10,000+ devices). However, most Apple respondents are still in the process of replacing their legacy phones. Deployments of **Vocera** Smartbadges tend to be smaller in scope—no interviewed customers have deployed more than 400 devices. Replacing legacy phones with Smartbadges is feasible (a couple of organizations have done it), but most have not, mainly because they deployed their devices only in the last year and only in pilots in limited departments (e.g., ICU for voice calls and nurse call integration). Only proprietary applications can be used on Smartbadges; the devices are not designed for broader functionality.

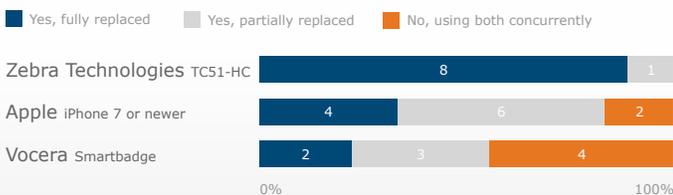
### Size of Shared Device Fleet

How many devices of this type have you deployed?



### Legacy Phone Replacement

Did you replace your legacy phones with shared smart devices?



## Vendor Bottom Lines

### Rated Vendors

**Apple:** Consumer-grade devices. Can replace nurse toolbelt. Most frequently used with Epic or MEDITECH EMR. Most respondents are in process of replacing legacy phones. Chosen for Epic integration, sleek UI, App Store (primarily used for EMR access and secure communications), and native device security. When not selected, reasons include perception as a consumer device, lack of ruggedness, cost, and frequent updates/app changes seen as difficult to manage.

**Vocera:** Healthcare-grade devices. Limited deployments; most respondents still piloting devices in limited departments. Robust push-to-talk capabilities. Not designed to replace nurse toolbelt; does not offer integrated camera or scanner. Most customers use Smartbadge for voice calls, secure texting, and nurse-call integration.

**Zebra Technologies:** Most respondents using TC51-HC (healthcare grade). Device considered a strong clinical tool that can replace the nurse toolbelt, including legacy phones, scanners, and cameras. Rugged device with ability to hot-swap batteries. Widely used at Cerner and Epic organizations; favored by Cerner organizations. Compatible with all clinical communication platforms. Downsides include overall device cost and bulkiness.

Note: Vendors fitting the scope of this report were invited to share a list of their healthcare client organizations. However, not all vendors responded, and some do not have enough customers for KLAS to measure their performance. As a result, performance could not be measured for Ascom, Samsung, or Spectralink. A short description of these vendors' shared smart device offerings is included below. As KLAS research in this market continues, updates on customer satisfaction will be shared on the KLAS website as available for these and other devices.

### Non-Rated Vendors

**Ascom:** First-generation device had very small screen, leading to minimal industry adoption. Newer device has larger screen, but mindshare and market share have not caught up. Little consideration in recent decisions. Those that did consider say users preferred the experience with other devices or felt the device had limited features or was too proprietary in nature.

**Samsung:** Several years ago, more commonly utilized as primary clinical shared devices. Most organizations making decisions today don't seriously consider Samsung devices (consumer grade), preferring to utilize more rugged hospital-grade Android devices that allow battery hot-swapping. Historically, some customers have used other vendors for their primary device and used Samsung for secondary devices for clinical support staff who need less broad functionality, like transport teams, environmental services, or food/dietician teams.

**Spectralink:** Hospital-grade devices. Average consideration due to vendor history in phone systems. Initial version of shared smart device was bulky, had limited uptake. Past issues contribute to middle-of-the-road consideration today; reasons for not selecting Spectralink include limited install base and inability to get applications/EMR to work on devices.

# REPORT INFORMATION

## About This Report

The research questionnaire for this study asked respondents to describe their own primary vendor's performance and to identify what other shared smart device vendors they considered and why.

The data in this report was collected over the last six months; the number of unique responding organizations for each vendor is given in the chart below.

|                                      | # of Unique Organizations Interviewed | Estimated Customer Base (Shared Smart Devices) |
|--------------------------------------|---------------------------------------|--|
| <b>Apple</b><br>iPhone 7 or newer    | 12                                    | ~100   |
| <b>Vocera</b><br>Smartbadge          | 9                                     | 20-40  |
| <b>Zebra Technologies</b><br>TC51-HC | 10                                    | ~100   |
| Other Validated Vendors              |                                       |  |
| <b>Ascom</b><br>Myco 3               | 0                                     | <20  |
| <b>Samsung</b>                       | 2                                     | <20  |
| <b>Spectralink</b><br>Versity        | 1                                     | <20  |

Note: Some organizations may have rated more than one product.

## What Does “Limited Data” Mean?

Traditional KLAS research often focuses on quantitative (numeric) ratings for products. This research is focused more on assessing whether shared smart devices meet healthcare needs. For this study, KLAS aimed to interview about 10 organizations per vendor for each of the main shared smart device vendors in healthcare (Apple, Vocera, and Zebra). Most interviewed organizations use hundreds to thousands of devices and can therefore offer a clear view of how well the devices meet the needs of healthcare users.

KLAS' traditional data threshold for displaying ratings as fully rated is 15 unique responding organizations. Since no vendor's sample meets this threshold, all ratings throughout this report are marked with an asterisk (\*) or otherwise designated as “limited data.” If the sample size was less than 6, no rating is shown. Additionally, a vendor's sample size may vary from question to question as individual respondents sometimes could not answer all questions, either because they were unfamiliar with a certain device aspect, their organization does not use a specific functionality, or their organization is too early in its deployment to comfortably comment.

## Reader Responsibility

KLAS data and reports are a compilation of research gathered from websites, healthcare industry reports, interviews with healthcare organization executives and managers, and interviews with vendor and consultant organizations. Data gathered from these sources includes strong opinions (which should not be interpreted as actual facts) reflecting the emotion of exceptional success and, at times, failure. The information is intended solely as a catalyst for a more meaningful and effective investigation on your organization's part and is not intended, nor should it be used, to replace your organization's due diligence.

KLAS data and reports represent the combined opinions of actual people from healthcare organizations regarding how their vendors, products, and/or services perform against their organization's objectives and expectations. KLAS findings are a unique compilation of candid opinions and are real measurements representing the feedback of interviewed individuals. The findings presented are not meant to be conclusive data for an entire client base. Significant variables—including a respondent's role within their organization as well as the organization's type (rural, teaching, specialty, etc.), size, objectives, depth/breadth of software use, software version, and system infrastructure/network—impact participants' opinions and preclude an exact apples-to-apples vendor/product comparison or a finely tuned statistical analysis.

We encourage our clients, friends, and partners using KLAS research data to take into account these variables as they include KLAS data with their own due diligence. For frequently asked questions about KLAS methodology, please refer to the KLAS FAQs.

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## Note

The findings presented are not meant to be conclusive data for an entire client base. Performance scores may change significantly when additional healthcare organizations are interviewed, especially when the existing sample size is smaller, as in an emerging market with a small number of live clients.



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# EXPANDED INSIGHTS

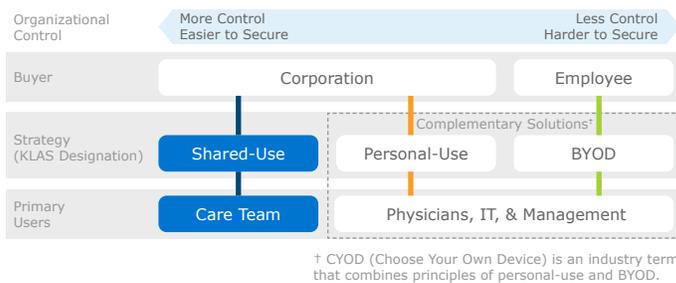
## Introduction

As consumer- and commercial-grade smartphones and smart devices continue to rise in prevalence, healthcare organizations continue to re-evaluate their strategies for clinical mobility to ensure their staff members have the best tools to improve patient safety and staff efficiency. This report is an update to KLAS’ previous report on shared smart devices, published in 2018. Since then, all vendors in this study (rated and not rated) have released updated devices. This report seeks to validate whether device manufacturers have addressed the challenges identified in that initial report—such as issues with connectivity/call quality, durability, bulkiness, cost, and battery life. Which devices are best meeting customers’ needs today in these critical areas?

## Clinical Mobility Market Context

KLAS’ previous report on [clinical mobility](#) included a framework for the use of smartphones in healthcare (see below). This report is focused on shared smart devices (called shared-use smartphones below)—devices that stay on location within the walls of the health system and are used by multiple members of a care team.

Figure 1 **Smartphones in Healthcare**  
From “Clinical Mobility 2018: Leveraging a Smartphone Strategy”

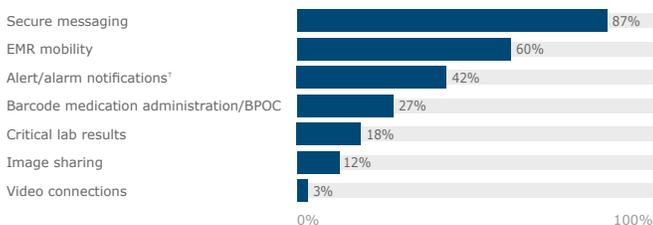


Also from the 2018 clinical mobility report, the charts below show what motivates organizations to adopt smart devices (either shared or personal) as they advance to next-generation technology. Since 2018, healthcare organizations’ desired capabilities and the devices they are replacing have remained about the same. It should be noted that most organizations replacing pagers (often for physicians) tend to leverage personal-use phones with secure messaging apps; those replacing other types of devices more often turn to shared smart devices (the focus of this report).

Figure 2

### Most Desired Capabilities

From “Clinical Mobility 2018: Leveraging a Smartphone Strategy” (n=60)

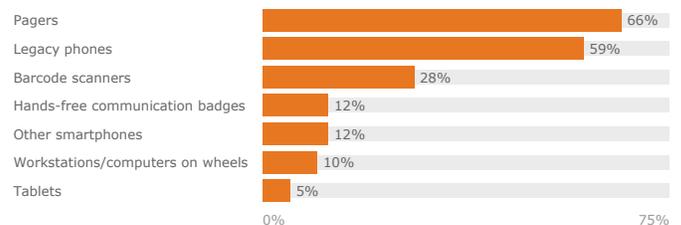


† Includes notifications from alarm management, nurse call, code blue, patient monitoring, and telemetry systems.

Figure 3

### Most Frequently Replaced Devices

From “Clinical Mobility 2018: Leveraging a Smartphone Strategy” (n=58)



## Shared Smart Devices Overview

Before considering the performance of shared smart devices, organizations need a baseline understanding of each device’s capabilities. The table below offers a short summary of what capabilities each measured device has, including whether the capabilities are native or require a third-party app.

Figure 4

|                            | VoIP calls | Asynchronous messaging | Camera | Barcode scanning       | Can fully replace legacy phones  |
|----------------------------|------------|------------------------|--------|------------------------|----------------------------------|
| Apple iPhone 7 or newer    | ●          | ● with third-party app | ●      | ● with third-party app | ● possible but not widely proven |
| Vocera Smartbadge          | ●          | ●                      | —      | —                      | ● possible but not widely proven |
| Zebra Technologies TC51-HC | ●          | ● with third-party app | ●      | ●                      | ● widely proven                  |

The next chart offers a high-level view of each vendor’s performance when it comes to key capabilities, functionality, and other metrics. Later sections dive deeper into each area.

Figure 5

## Shared Smart Device Ratings

● Well above average  
 ● Above average  
 ● Average  
 ● Below average

All ratings based on limited data (see page 5 for details)

|                                    | Connectivity         |                     | Features and functionality     |                  |                   | Device attributes |              |                     |            |                         | Cost per device  |
|------------------------------------|----------------------|---------------------|--------------------------------|------------------|-------------------|-------------------|--------------|---------------------|------------|-------------------------|------------------|
|                                    | Network connectivity | Call quality (VoIP) | Support of inpatient workflows | Barcode scanning | Camera            | Durability        | Battery life | Minimizes bulkiness | OS/updates | Native security/privacy |                  |
| Apple iPhone 7 or newer (n=12)     | ●                    | ●                   | ●                              | ●                | ●                 | ●                 | ●            | ●                   | ●          | ●                       | \$500–\$1,000    |
| Vocera Smartbadge (n=9)            | ●                    | ●                   | ●                              | N/A              | N/A               | ●                 | ●            | ●                   | ●          | ●                       | ~\$500           |
| Zebra Technologies TC51-HC† (n=10) | ●                    | ●                   | ●                              | ●                | Insufficient data | ●                 | ●            | ●                   | ●          | ●                       | ~\$1,000–\$1,400 |

†Zebra recently released an updated model, the TC52-HC, that some customers are just beginning to deploy. The vendor also offers the TC21-HC as a secondary device for disciplines like environmental services. Note: KLAS was not able to validate enough Spectralink, Samsung, or Ascom customers to include them in this performance chart. These vendors are included in later charts about purchase considerations.

## Performance in Key Metrics

From inpatient workflows to the durability of the devices themselves, organizations have a number of variables to consider when deciding which shared smart devices are the best fit for their clinical mobility strategy. KLAS asked customers about the quality of their devices in four main areas to understand how well these devices are living up to client expectations and helping provider organizations accomplish their goals: (1) connectivity, (2) features and functionality, (3) device attributes (such as durability and battery life), and (4) overall cost.

### Connectivity

In KLAS’ 2018 report, healthcare organizations reported that connectivity issues were among the biggest challenges hampering their overall device experience. Since then, vendors have begun offering or even requiring organizations to do Wi-Fi assessments as part of their device rollout. Of respondents using newer device models from these vendors, nearly 90% report they did an in-depth network assessment and/or upgrade as part of their rollout.

Figure 6 **Shared Smart Device Ratings—Connectivity**

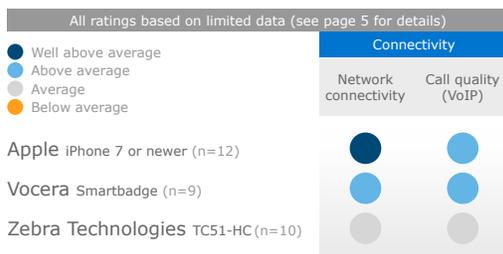
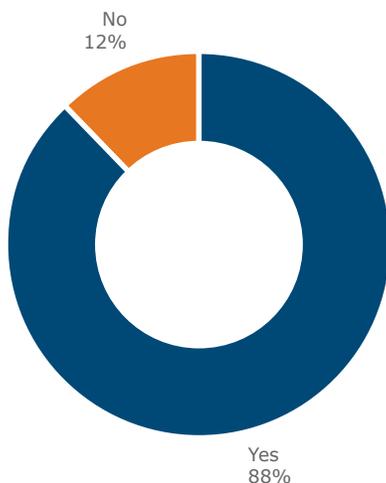


Figure 7 **Wi-Fi Coverage Assessments—All Vendors Combined**  
 Did you do an in-depth Wi-Fi hot spot coverage assessment or upgrade as part of your device deployment? (n=34)



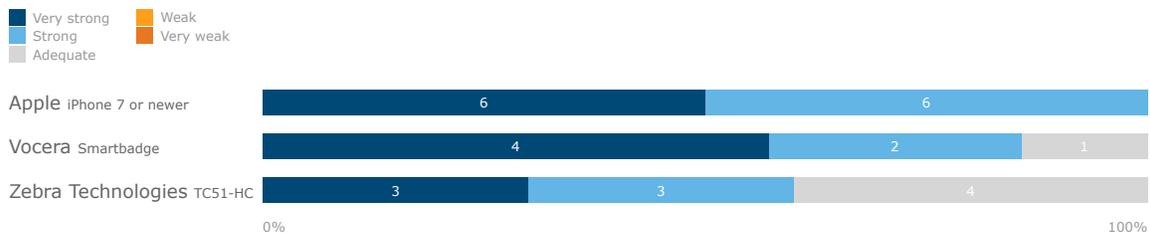
**Apple** has partnered with Cisco for infrastructure assessments and services to make sure customers’ networks are optimized for their devices. One CIO emphasized the importance of such an evaluation: *“Connectivity is composed of two parts. We have to upgrade our network so that the iPhones will work the right way. The phones have really good antennas that work well in the hospital, but the wireless access points have to be tuned to connect to the iPhones. I would tell anyone that there is a bunch of homework to do before the phones are deployed, but once that is done, they work well.”*

**Zebra Technologies** also provides a growing number of connectivity-related functionalities and services for their devices, including Wi-Fi assessments, though customers interviewed for this report did not specifically mention receiving these assessment services.

**Vocera** requires infrastructure testing as well. As an IT director explained, *“Vocera won’t install their product unless we have performed updates to our system, and then they come in and verify things. That is a qualifier for call quality.”*

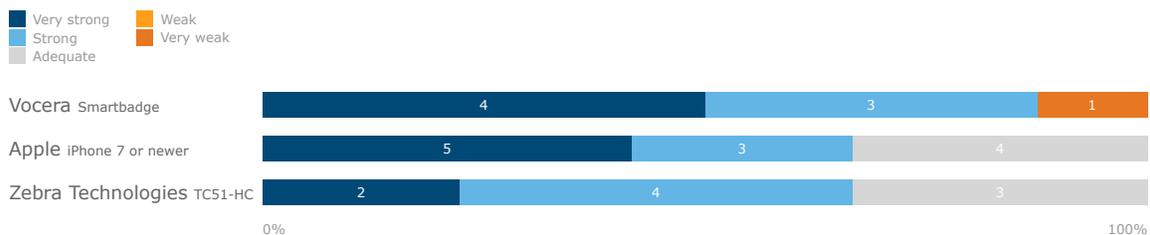
Regardless of vendor, organizations still encounter some Wi-Fi dead spots, and some have challenges connecting—stairwells and elevators are common culprits. But as these organizations have gone through network infrastructure assessments, they are made aware of where and why they may have connectivity issues and can proactively communicate about these issues with their teams. Smart devices themselves have also likely improved in terms of network connectivity. So in combination, updated device technology and improved Wi-Fi coverage have led to all respondents saying their device connectivity is at least adequate. Only one respondent said their call quality is less than adequate.

Figure 8 **Network Connectivity**  
Rate your shared smart device's network connectivity.



Both **Vocera** and **Apple** receive strong to very strong ratings for network connectivity from almost all respondents. Vocera receives top marks for call quality. In particular, Vocera customers cite the push-to-talk feature and appreciate that they can add secure texting into an environment where clinicians are already familiar with Vocera badges. A senior analyst using the Smartbadges said, “We can call landlines. I don’t know that there is VoIP, but the devices can call landlines. I think the call quality is great. That is part of the reason why we upgraded to them.”

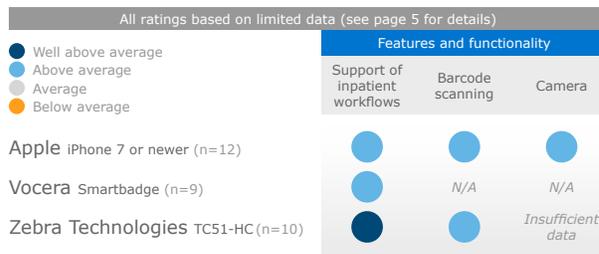
Figure 9 **Call Quality**  
Rate your shared smart device's call quality (if using VoIP).



While no interviewed **Zebra** customers report poor connectivity, Zebra’s customer base was the most likely to report having a history of varying network connectivity at some sites, and some have experienced issues like dropped calls. Also, users of the TC51-HC report issues with the grill that covers the microphone—a number say the grill can get blocked up over time, muffling the sound of the caller’s voice. Zebra has replaced the grills for multiple customers whose devices were under warranty. An IT analyst explained, “The call quality on the devices is very good. The biggest issue we have had is the grill issue. . . . In a hospital setting, we can’t really hear anything. Even if we shout, the sound is still muffled, [or] the other person might not be able to hear me. . . . That issue depends on how much wear and tear the devices have. We could have two devices that went live the same day, and one could be crystal clear while the other could have a grill problem. Recently, the vendor went from device to device and replaced the grills across the board [to fix the issue].” This customer and others believe that in addition to improving network connectivity issues, the newer TC52-HC design will remedy the grill challenges (thus fixing the call-quality concerns); however, organizations that have purchased the newer devices have not yet rolled them out to the floors, so it is too early to tell whether the issues have been resolved.

## Features and Functionality

Figure 10 **Shared Smart Device Ratings—Features and Functionality**



Both Zebra and Apple stand out when it comes to the functionality their smart devices offer for supporting hospitalists in their roles.

### Zebra Technologies

**Zebra’s** TC51-HC devices were designed specifically for inpatient workflows and to consolidate the nurse toolbelt. Zebra has delivered on this vision and is rated higher than the other vendors for their support of inpatient workflows. Most respondents have replaced their legacy phones with Zebra devices and are using them for barcode scanning and photo capture. These natively integrated, healthcare-specific features provide very strong support for clinical care teams, with multiple customers calling the devices “game changers.” An IT consultant shared, “We run a couple of systems on the phones, and from a workflow perspective, the nurses don’t have a problem. They are used to carrying our old phones, so for them, there is no difference between carrying our current devices and carrying their old phones. We haven’t found anything that we want to run that the devices haven’t been able to handle.”

The barcode scanner is built into the device, and customers say this approach is slightly more user friendly than needing to use the camera for scanning, as is customary on the iPhone. Nearly all respondents use the TC51-HC for barcode scanning, though only half use the device’s camera (too few to report on their satisfaction). The limited number using the camera generally report that it meets their needs, though the image resolution and/or flash could be improved.

Zebra customers also report using apps for things like on-demand translation over video or phone call, secure messaging or image sharing (including in real time with minors’ parents during a surgery), real-time patient monitoring (e.g., EKG monitoring), alarm management, security camera integration, and EMR access (mostly Cerner).

Figure 11 **Support of Inpatient Workflows**

Rate your shared smart device’s support of inpatient workflows.

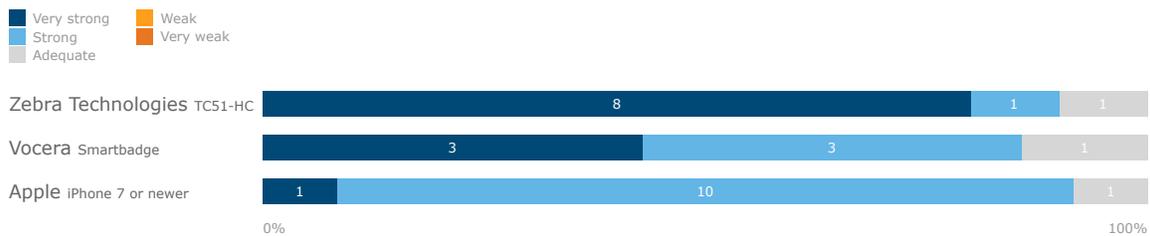


Figure 12

### Barcode Scanning

Rate your shared smart device's barcode scanning functionality.

- Very strong
- Strong
- Adequate
- Weak
- Very weak



## Apple

**Apple** customers report solid satisfaction with barcode scanning, support of clinical workflows, and the built-in camera. In particular, customers say the camera generally provides very high-quality images for a healthcare setting.

For barcode scanning, customers have two options: they can add a sled with a barcode scanner, or they can use the iPhone camera in conjunction with a third-party barcode-reading app. In the past, organizations expressed concerns about using the camera for barcode scanning, but that has since changed. A communications manager said, *“The only native barcode scanner that the devices have is a QR code reader. The devices do have a strong ability to integrate with third parties, though. We haven’t run into a problem with finding vendors to do the barcoding.”* Several interviewed customers recently decided to stop using their bulky scanner sleds in favor of the camera, and more recent Apple implementations have used the cameras for barcode scanning from the beginning. While nearly all respondents report using the camera, about one-third are not yet using the device for barcoding.

Other applications that are frequently used on Apple phones include apps for translation, secure messaging/image sharing, medication/nursing reference apps, and EMR access (most frequently Epic).

Due to these strong features, Apple devices tend to meet clinicians’ needs well. However, most organizations have not yet replaced all their legacy phones with iPhones across the enterprise. In a few cases, these organizations are leveraging other devices that can support hands-free communication: *“The support for inpatient workflows depends on what people are doing. . . . In terms of the phones supporting inpatient workflows, I would put a higher score, but I would put a lower score for the phones supporting the nursing workflows. Nurses are looking for a hands-free device, but the providers aren’t. . . . The nurses prefer the hands-free units”* (manager of IT systems).

Figure 13

### Camera

Rate your shared smart device's camera.

- Very strong
- Strong
- Adequate
- Weak
- Very weak

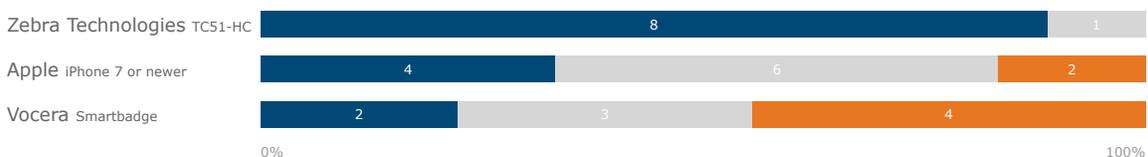


Figure 14

### Legacy Phone Replacement

Did you replace your legacy phones with shared smart devices?

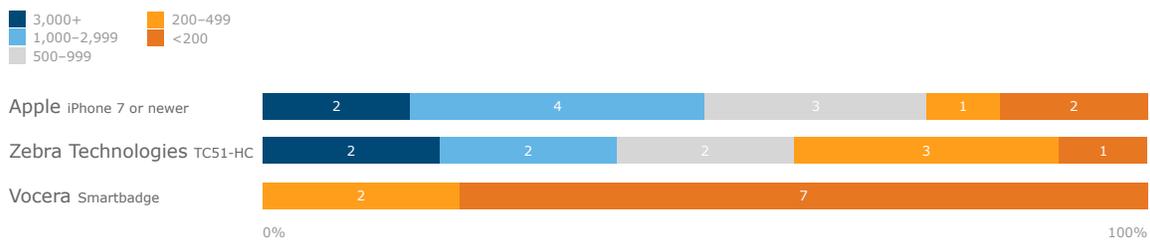
- Yes, fully replaced
- Yes, partially replaced
- No, using both concurrently



## Vocera

**Vocera** offers the hands-free talk feature mentioned above. Customers also praise the integration with nurse-call systems, allowing users to connect to other caregivers at the push of a button. Vocera also offers secure texting built into the device. However, beyond facilitating communication, Vocera devices are limited as a nursing tool for clinical mobility. The devices do not come with a scanner or a camera, so organizations cannot use them to replace other nursing devices. The devices also cannot add apps, like Apple or Zebra phones can. The Vocera Smartbadge was released in 2019, and all interviewed customers are currently using it solely in pilots in limited departmental settings, like the ICU. No interviewed customers have made the significant investment to roll out the device across their entire organization.

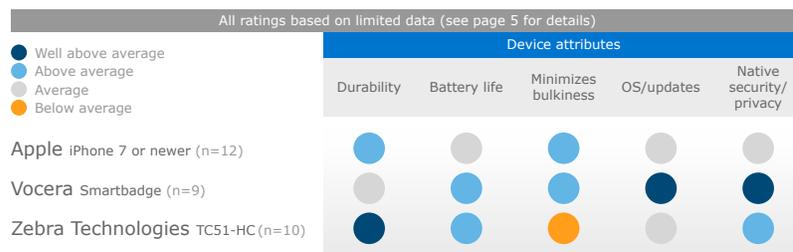
Figure 15 **Size of Shared Device Fleet**  
How many devices of this type have you deployed?



It should be noted that in contrast to Vocera, **Apple** and **Zebra** have customers using their devices broadly across the enterprise, with both having several customers each who have deployed over 1,000 devices.

## Device Attributes

Figure 16 **Shared Smart Device Ratings—Device Attributes**



Both the physical characteristics of shared smart devices as well as their underlying software and privacy features play a major role in device consideration as well as ongoing user satisfaction. Each device has its own relative strengths and weaknesses in this area.

## Zebra Technologies

The **Zebra** device shines when it comes to durability and battery life. The rugged, healthcare-grade device can handle rough treatment without breaking. An interviewed manager explained, “If a phone were dropped from six feet or dunked into liquid cleaner, the phone would hold up.” Also, the phone’s battery can last more than eight hours, and users can hot-swap batteries, allowing the device to be used 24/7.

The durability of the Zebra device comes with an inherent tradeoff: the rugged nature of the phone adds bulk and makes the device heavier, weighing down users’ scrubs or jacket pockets. While the TC51-HC is lighter than earlier MC40 versions, customers still feel it is a bit heavy: “The bulkiness is definitely a weak area. I understand all the reasons why. There is a battery and a scanner, and we understand those tradeoffs. The device is a beast” (IT manager).

Figure 17

**Durability**

Rate your shared smart device's durability.

- Very strong
- Strong
- Adequate
- Weak
- Very weak

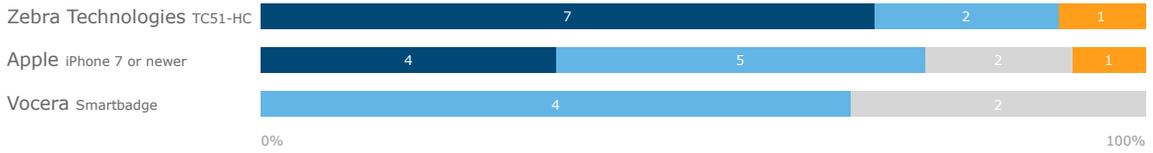
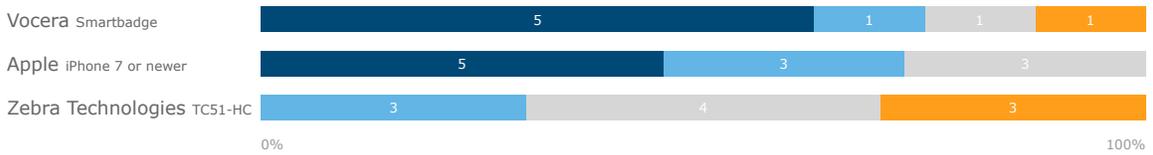


Figure 18

**Minimizes Bulkiness**

Rate your shared smart device for minimizing bulkiness.

- Very strong
- Strong
- Adequate
- Weak
- Very weak



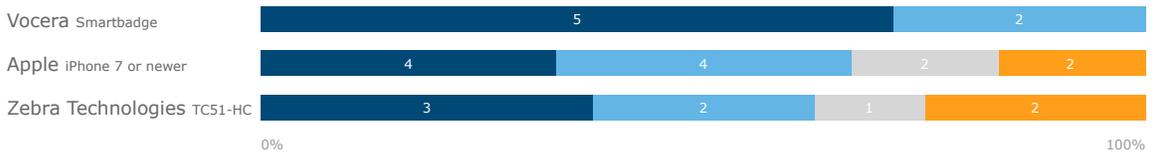
From a software standpoint, Zebra customers have had mixed experiences using mobile device management (MDM) products, like AirWatch, to try to push updates to devices. About half of respondents need to physically touch each device to implement updates, which puts phones out of commission for a period of time. The device's security, however, is strong; customers appreciate its inherent security and often use an MDM solution as a supplement to ensure devices are secure and patient information doesn't make its way outside the hospital. In addition to two-factor authentication, the device comes with additional security features. A senior IT director explained, "There are several things that I really like about the native security and privacy. One thing we talked with the vendor about was the ability to lock the device when we walk off campus so that the device becomes a brick. It is really nice to know that the device will shut down, and as long as the device stays within a certain radius, we can usually find it. We are in the process of updating our RFID capabilities, and the devices have internal RFID capabilities, so we are likely to build that functionality into our environment. That will be even better. From a data security perspective, everything is in the cloud, so when people get a device, we know they aren't going to get ahold of any patient information, and that is nice."

Figure 19

**Operating System/Updates**

Rate your shared smart device's operating system/updates.

- Very strong
- Strong
- Adequate
- Weak
- Very weak



## Vocera

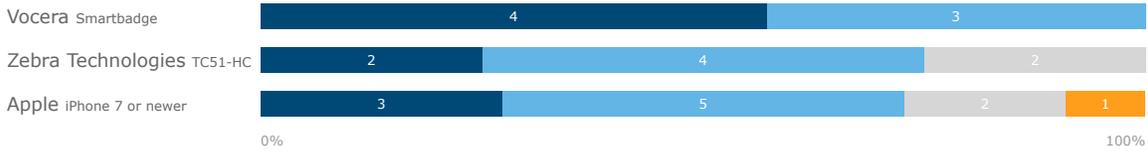
Compared to Zebra and Apple phones, the **Vocera** Smartbadge has more limited use cases (fewer software applications in use) and more limited deployments (fewer devices deployed at any one organization). Vocera customers describe the device as small and lightweight. The underlying software is responsive, and respondents feel Vocera’s updates are very strong. Device security is another strength. When it comes to the device itself, the one limitation customers mention is that the phone defaults to a speakerphone setting, so users must be aware of their surroundings to avoid privacy issues. A network administrator summed up, *“The security is very strong. The devices have end-point encryption. The devices are speakerphone devices, but we have the tools to overcome that. I would say the privacy is strong even with the speakerphone issue. The device starts out on speakerphone, but the user can choose to put it in handset mode and have a private call. . . . The operating system for the Smartbadge devices is way better than the operating system for the B3000 devices. The operating system is really fast now, and the badges are much quicker. From the time we put in the battery to the time the device is ready to use, the process takes about 15 seconds. With the B3000 devices, the process took about 45 seconds. Doing updates is a strong, solid process. If I push a firmware update in the middle of the day, I never get a complaint from anyone.”*

Regarding both battery life and durability, most Vocera respondents are still reserving judgment since many deployed their devices within the last year and have a limited number of devices in their fleet. Generally, the ability to hot-swap batteries is seen as a plus of the Smartbadge. A few customers say the clips that attach devices to caregivers’ clothing break too easily. One respondent said Vocera sent them lanyards to resolve the problem.

Figure 20

### Native Security/Privacy

Rate your shared smart device’s native security/privacy.

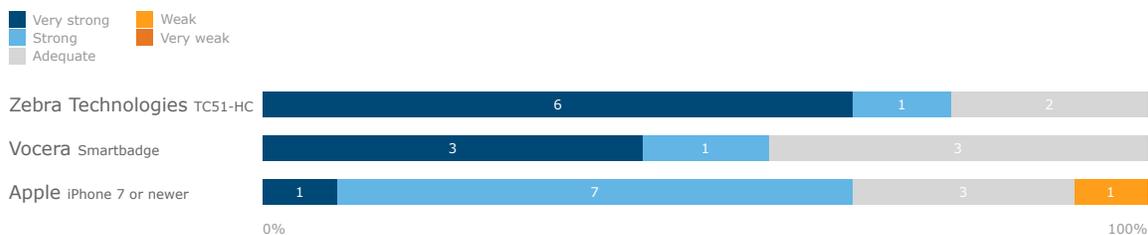


## Apple

In the broader consumer world, **Apple** is generally highly regarded for their software and security, so their average ratings from healthcare customers in these two areas are somewhat surprising on the surface. Respondents say that the native security of Apple devices is not adequate for a healthcare setting; all use an MDM solution and secure messaging solution to ensure the devices meet healthcare’s enhanced HIPAA privacy and security needs. Updates to the operating system also pose a challenge for organizations trying to manage their iPhone fleets. An MDM solution can help mitigate some of these challenges, though even customers who have one in place still note issues with end users pushing updates due to banner notifications. An informatics nurse stated, *“The challenge that we are subject to is the updates. We can’t control all the operating system updates that we take from Apple. Those updates can sometimes impact other applications that we use on the phone. Apple has previously made changes to how the banner notifications work, and those changes impact other applications. The updates are adequate, but they pose problems.”*

While Apple customers say recent versions of the iPhone (model 7 and later) are more rugged than earlier generations, most still opt to purchase mophie or OtterBox cases. Additionally, Apple phones do not have a swappable battery—this is a primary concern for users. Given the high usage that shared devices see in the healthcare setting, battery life decreases over time; Apple customers are more likely than any other client base to point to battery issues. Customers combat these issues by purchasing cases (like mophie cases) that double as battery packs or by making spare devices available at docking stations so clinicians can swap out low-battery devices.

Figure 21 **Battery Life**  
Rate your shared smart device’s battery life.



Across vendors, customers view shared smart devices as expensive products that represent a significant investment.

## Overall Cost

Figure 22 **Shared Smart Device Ratings—Cost**



## Apple

**Apple** customers often must incur the additional expense of buying cases to increase their devices’ durability and of buying extra backup devices since batteries cannot be swapped out. As mentioned earlier, mophie cases have been used by some to extend battery life. Even with these added expenses, customers say the cost of Apple devices is still below average for a smart device. Many customers purchase their iPhones through local carriers at a lower price point than they would get by purchasing

directly through Apple. Additionally, as Apple doesn’t have a specific healthcare-grade device, organizations can choose the device model (7 or newer) and price point that best meets their needs. Customers mention that base devices start at around \$500. An IT manager shared, *“The cost of a cell phone is pretty relative across the market, so the Apple phones aren’t insanely overpriced or dirt cheap. The price is in the middle of the road compared to the price of the Android devices or of anything else out there.”*

## Vocera

While the cost of the **Vocera** Smartbadge is comparable to that of some other devices in the market, the device lacks some of the built-in functionality that other devices have (e.g., barcode scanner, camera), and this negatively affects customer perceptions of cost. *“It absolutely blew my mind when I saw the cost of Smartbadge,”* said a director of nursing, *“but after talking to our CMO, there are apparently lots of things that cost that much . . . [and] Vocera has been just amazing to work with in terms of helping get the price down. They have been willing to give a little.”*

## Zebra Technologies

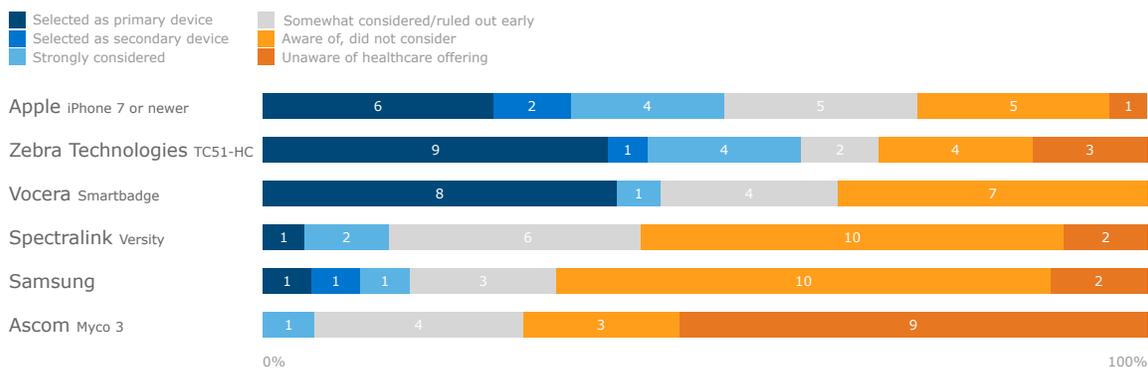
**Zebra** devices are seen as some of the most expensive in the market; customers say the cost of a device ranges from \$1,000 to \$1,400. As a CIO explained, *“Compared to what we have paid for our previous phones, the cost of the devices is a little on the high side. But I can’t find anything cheaper. The cost is too pricey when I think about how I could buy a full-blown laptop with a 14-inch screen for the same cost.”* This high cost is one of the Zebra devices’ biggest criticisms. That said, cost is not the only factor influencing customer perceptions of value, and comments from respondents suggest they get a lot of functionality for the cost. This strong base functionality also allows organizations to reduce future expenditures for things like barcode scanners, and the devices are rugged enough that they don’t need an additional case (which saves an additional cost). The ability to hot-swap batteries also helps with cost since organizations can purchase fewer total devices.

## Market Consideration

In addition to collecting customer satisfaction feedback, KLAS also asked organizations to share why they selected their device, what other devices they considered (besides the product they chose as their main device), and why these other devices weren't chosen.

The chart below shows how often each vendor was considered in decisions made since KLAS' last report in January 2018. Note that it does not include counts for a vendor selected by an organization as their primary device. This normalizes consideration findings and allows for comparisons among not only rated vendors but also vendors whose performance was not measured in this report (Ascom, Samsung, and Spectralink).

Figure 23 **Purchase Considerations**  
Vendor consideration in purchase decisions since January 2018 (n=25 purchase decisions)



**Apple's** prolific presence in the consumer market results in high mindshare in healthcare as well; the iPhone is the most widely considered shared smart device in healthcare. The phone's integration with Epic applications like Haiku and Rover give it especially strong consideration among Epic EMR customers, though KLAS has also validated significant usage by MEDITECH EMR customers. One systems analyst said, "Rover is built on inpatient workflows, and [it seems Epic] prioritizes iOS development." Prospective customers also consider or select Apple because of the iPhone's tight integration with secure communication solutions from Mobile Heartbeat and PatientSafe Solutions.

There are tradeoffs to the perceived alignment with the Epic EMR; Cerner EMR customers tend to feel their solution better aligns with Android devices. Also, the iPhone's prevalence as a consumer device leads some to worry its use sends the wrong message to patients, leading these organizations to choose other devices: "We saw the iPhones more as commercial-type devices. An issue that we had when clinicians used the iPhones was that the patients thought the clinicians were speaking to friends on the phone and not taking care of the patients. They didn't realize that the iPhones were the clinicians' clinical devices. There was a branding issue" (IT manager).

The challenge of enterprise device management mentioned by current Apple customers was also mentioned as a reason that potential customers ended up choosing other vendors. A CTO said, "We strongly considered iPhones. We have them in the fleet today, but we ruled them out because they are a consumer device without enterprise controls. We struggle to maintain consistent app versions, and the iPhone OS changes frequently. We would have to buy something in order to put the system in because the iPhones don't come with barcode scanning natively or any of the enterprise functions that we need."

Among Android devices, **Zebra** phones are the most often seriously considered. This is partly thanks to organizations' prior success with the older MC40 devices, which were followed by the improved TC51-HC (TC52-HC devices were released too recently for feedback to be included). Zebra devices come with ready-made ruggedization and healthcare-specific functions, like scanning and camera functionality, and offer better fleet-management capabilities: "We chose Zebra Technologies' product because it is enterprise grade... [and] we are able to control the phone through enterprise management tools" (CTO).

Cerner's preference for Android devices also gave Zebra a head start in the market since their earlier device models were the most functional and healthcare grade of the primary Android options (i.e., Spectralink or Samsung devices). An IT director shared, *"At the time of our decision, another vendor and Zebra Technologies were the only ones that were approved through Cerner, and the other vendor's device was twice as bulky as Zebra Technologies, so we went with the latter."* Though Cerner EMR users tend to favor Zebra, it is not an exclusive relationship: KLAS has validated a number of large Epic EMR customers that are using the Zebra phones. So while Apple is used most frequently by Epic and MEDITECH EMR customers (as discussed above), Zebra is widely used by both Cerner and Epic customers and has also been validated in use by MEDITECH organizations.

Some organizations that considered Zebra but ultimately chose another vendor felt the Zebra devices were overkill for their needs—these organizations didn't feel ready to leverage all of the functionality and thus couldn't justify the cost. It is worth noting that Zebra also offers a sleeker solution, the TC20-HC, designed to be used by non-clinical staff (who don't require the same features or ruggedization as clinical users).

**Vocera** is primarily selected by organizations who already use the vendor's badges for communication and want to upgrade to the Smartbadge's additional features. Since they already have buy-in from their clinical staff, these organizations have chosen to roll out the Smartbadge primarily for its hands-free (or push-to-talk) calling feature with the added ability to text. However, the device's limited functionality has caused other organizations to look elsewhere, feeling that Vocera is a better fit for a more niche workflow. *"We were aware of the Vocera phones,"* an IT manager shared. *"One of our doctors wanted those phones because that person had used them before. There was interest in those phones for the ED because they had a push-to-talk feature, but one decision-maker didn't want to go down that road because of the cost. We also knew that we would eventually want to get devices that could do many different things, not just one thing."*

Spectralink's and Ascom's first device iterations were largely viewed as inadequate. Spectralink's Pivot device was perceived as much too heavy, and Ascom's screen was seen as much too small. The vendors' newer versions appear to rectify these challenges, but adoption of the solutions hasn't taken off.

**Spectralink** is considered almost as frequently as Zebra because their legacy phones are still in use at thousands of healthcare organizations. However, this has not yet translated into strong adoption of their latest shared smart device, Versity. The lack of adoption can limit interest, while limited interest also results in low adoption; a chief innovation officer demonstrated this issue, saying, *"We did look at Spectralink, but our secure communications vendor said they had hardly any customers using Spectralink's solution. That is why we went with another phone."* During device testing, other respondents had difficulty configuring the phone and setting up the applications.

**Ascom** has not seen a significant uptick in mindshare since releasing the newer Myco 3 device. Respondents in this study almost never considered it seriously. About 40% of interviewed organizations had not heard of Ascom.

Standalone **Samsung** devices are rarely considered today except as secondary devices for non-clinical staff. Being consumer devices, their lack of ruggedization and healthcare-specific functions, like barcode scanning, tend to take them off the table in favor of healthcare-grade Android devices from Zebra or Spectralink.



# VENDOR INSIGHTS

## Rated Vendors

### Apple iPhone 7 or newer

Figure 24 **Purchase Considerations—Apple iPhone 7 or newer**  
Vendor consideration in purchase decisions since January 2018 (n=23)

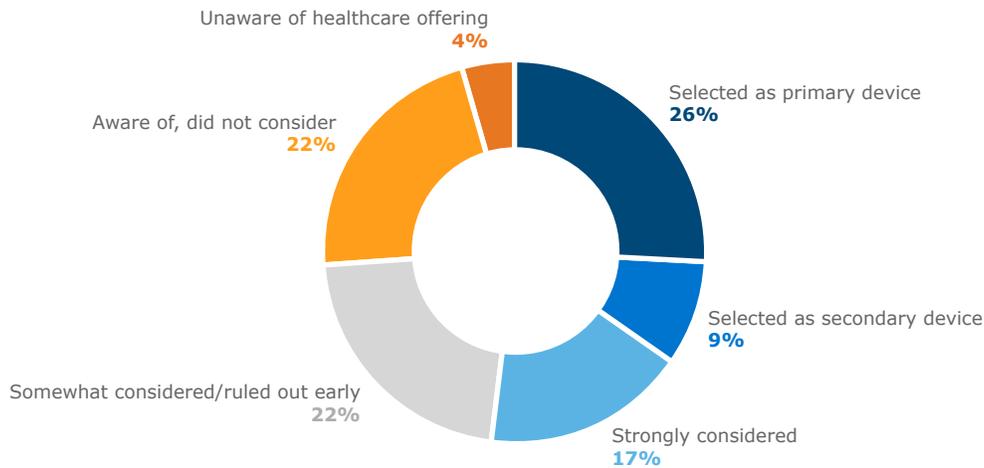
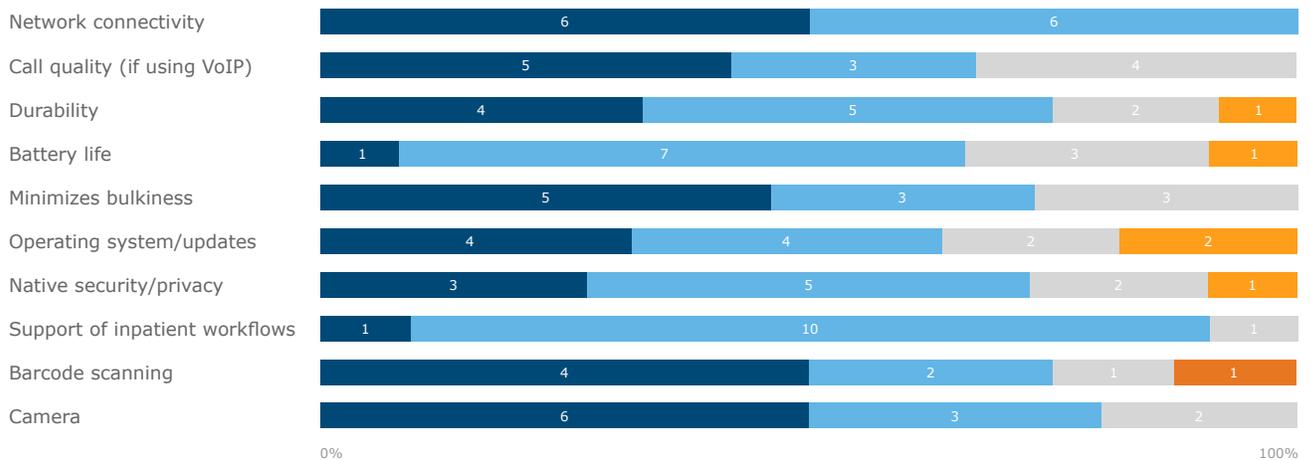


Figure 25 **Shared Smart Device Ratings—Apple iPhone 7 or newer**  
Rate your shared smart devices in the following areas.

■ Very strong    ■ Weak  
■ Strong        ■ Very weak  
■ Adequate



# Vocera Smartbadge

Figure 26 **Purchase Considerations—Vocera Smartbadge**  
 Vendor consideration in purchase decisions since January 2018 (n=20)

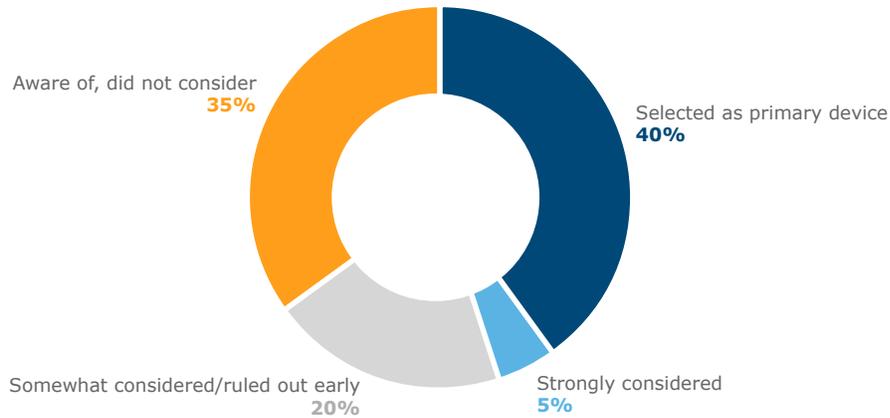
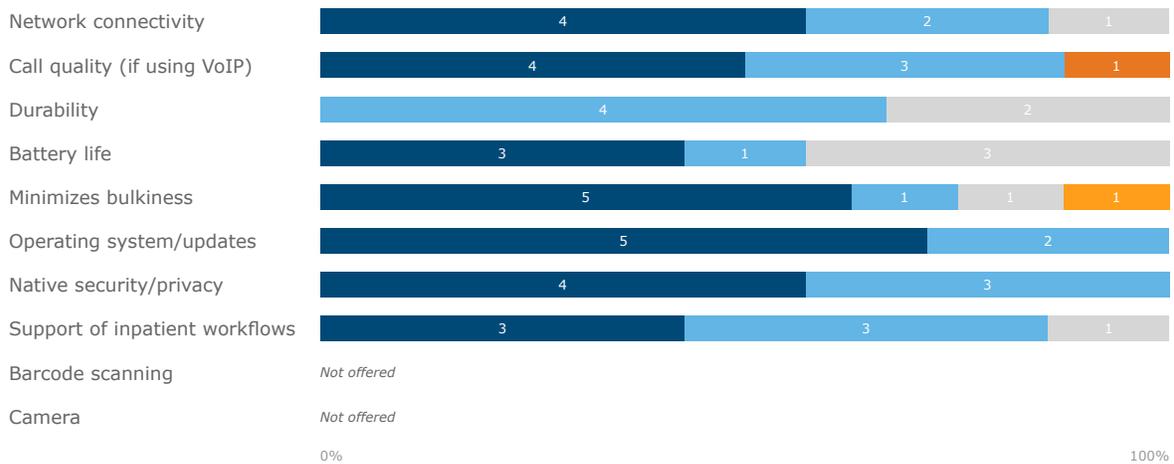


Figure 27 **Shared Smart Device Ratings—Vocera Smartbadge**  
 Rate your shared smart devices in the following areas.

■ Very strong    ■ Weak  
■ Strong        ■ Very weak  
■ Adequate



# Zebra Technologies TC51-HC

Figure 28 **Purchase Considerations—Zebra Technologies TC51-HC**  
 Vendor consideration in purchase decisions since January 2018 (n=23)

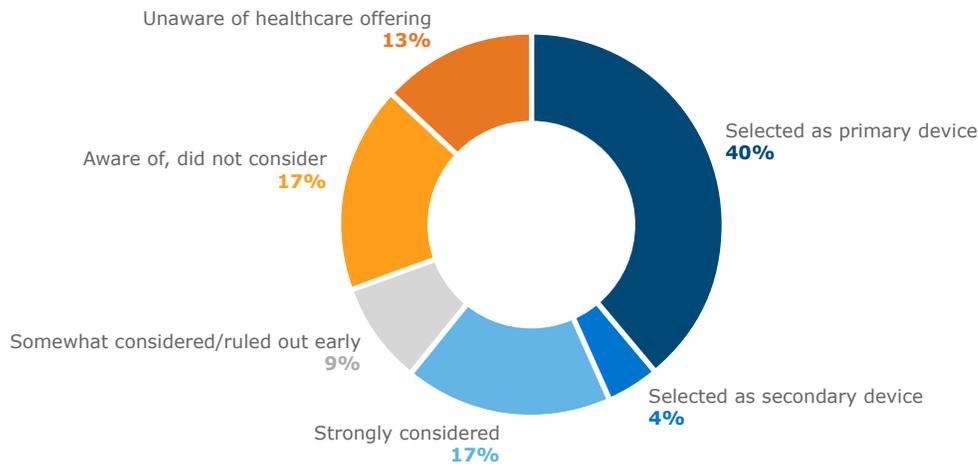
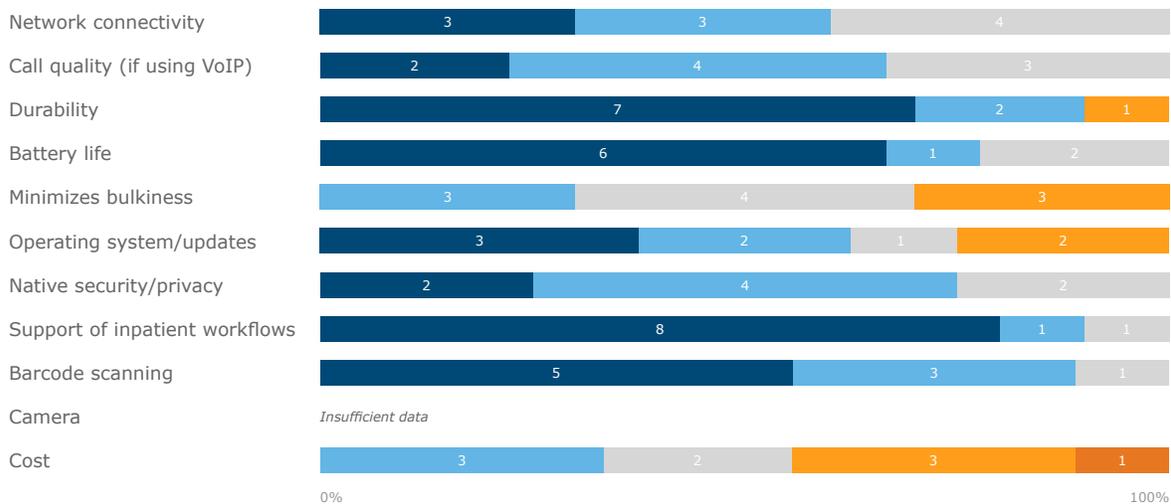


Figure 29 **Shared Smart Device Ratings—Zebra Technologies TC51-HC**  
 Rate your shared smart devices in the following areas.

■ Very strong    ■ Weak  
■ Strong        ■ Very weak  
■ Adequate

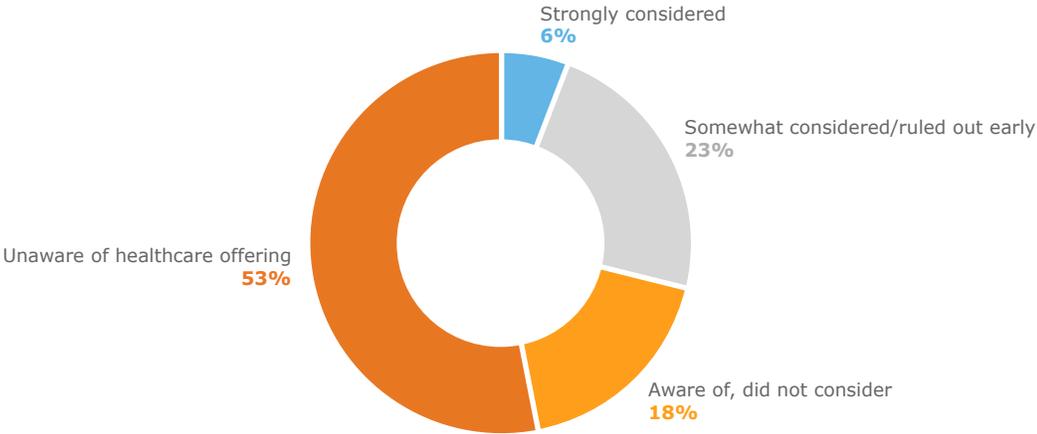


# Non-Rated Vendors

## Ascom Myco 3

Figure 30 **Purchase Considerations—Ascom Myco 3**

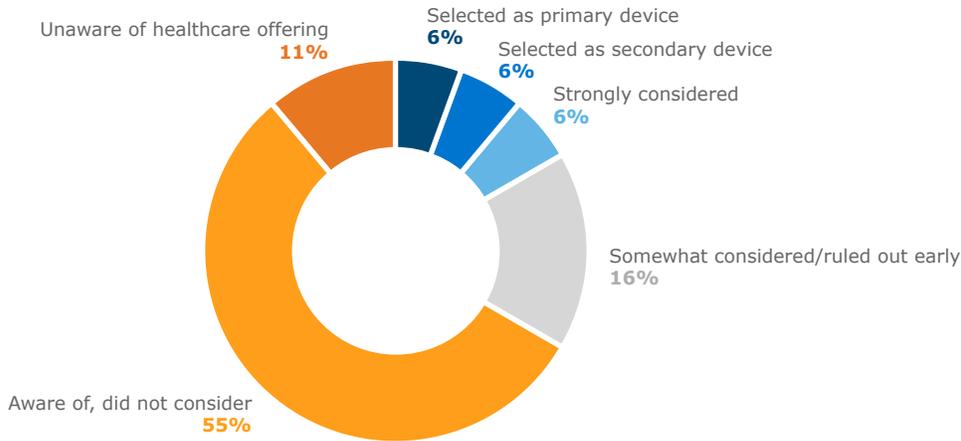
Vendor consideration in purchase decisions since January 2018 (n=17)



# Samsung Shared-Device Phones

Figure 31 **Purchase Considerations—Samsung**

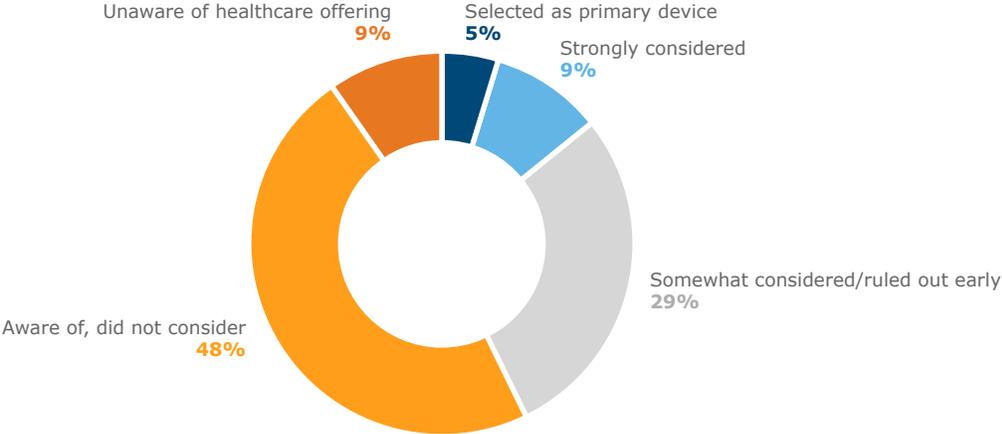
Vendor consideration in purchase decisions since January 2018 (n=18)



# Spectralink Versity

Figure 32 **Purchase Considerations—Spectralink Versity**

Vendor consideration in purchase decisions since January 2018 (n=21)





# DATA INDEX

Figure 33 **Survey Respondents—by Job Level**  
(n=27)

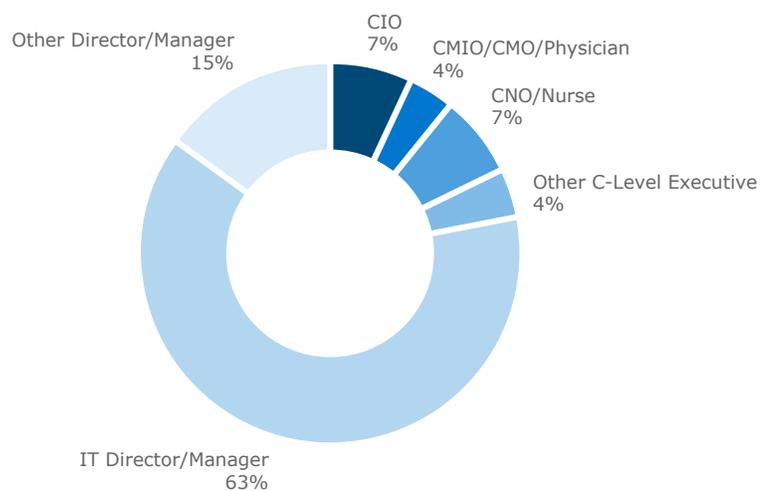


Figure 34 **Survey Respondents—by Organization Size**  
(n=27)

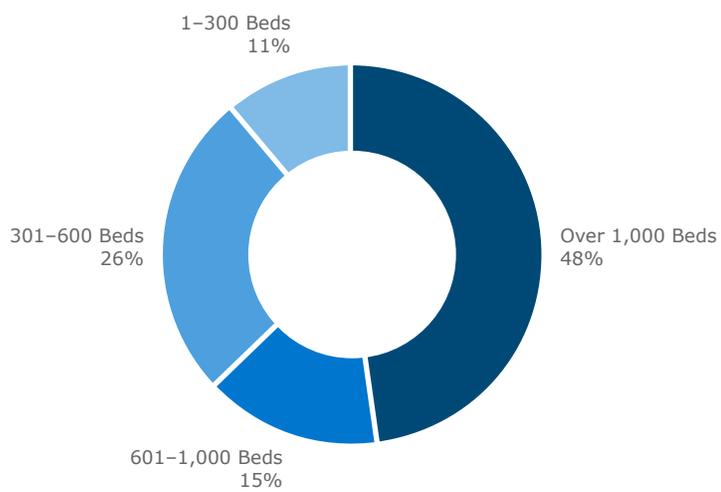


Figure 35 **Network Connectivity**  
Rate your shared smart device's network connectivity.

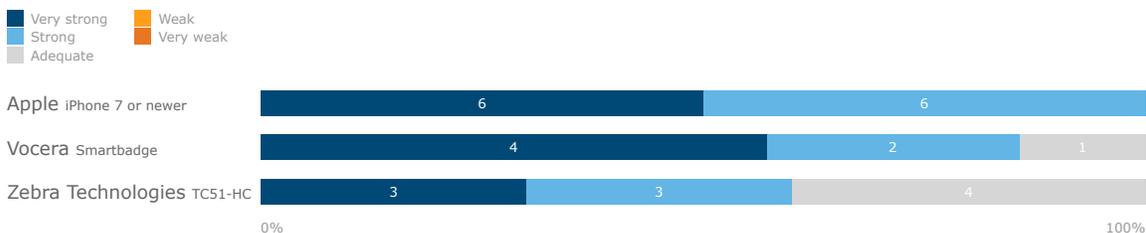


Figure 36 **Call Quality**  
Rate your shared smart device's call quality (if using VoIP).

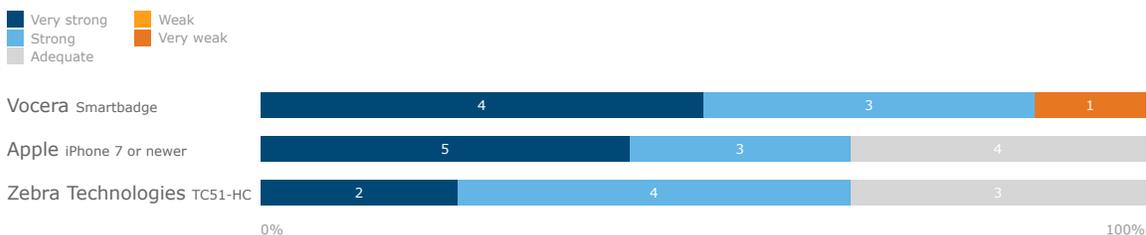


Figure 37 **Durability**  
Rate your shared smart device's durability.

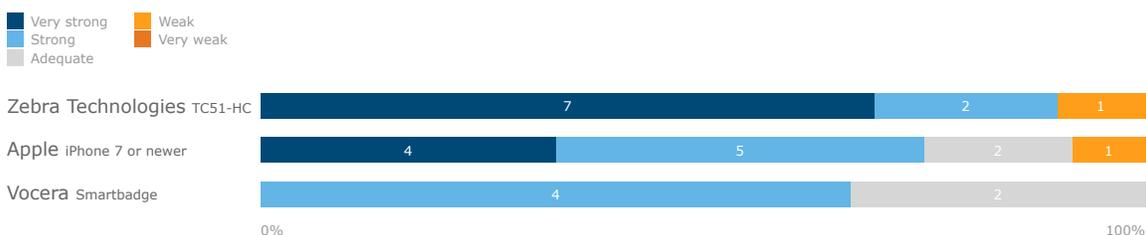


Figure 38 **Battery Life**  
Rate your shared smart device's battery life.

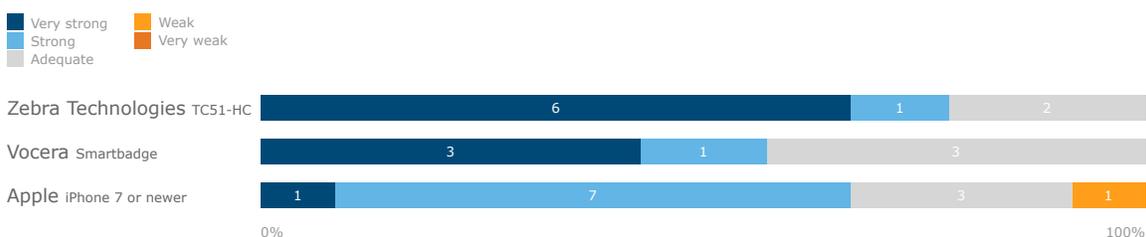


Figure 39 **Minimizes Bulkiness**  
Rate your shared smart device for minimizing bulkiness

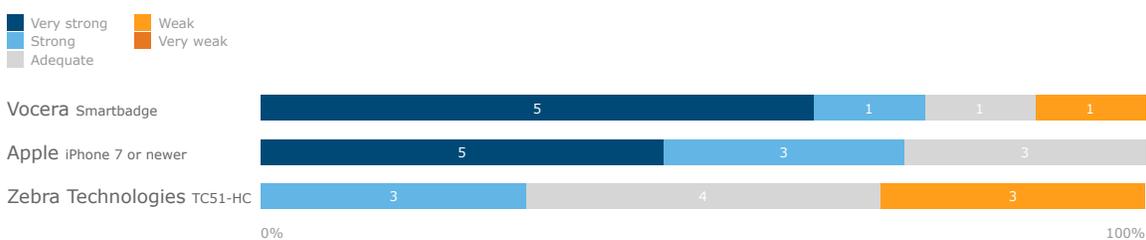


Figure 40

### Operating System/Updates

Rate your shared smart device's operating system/updates.

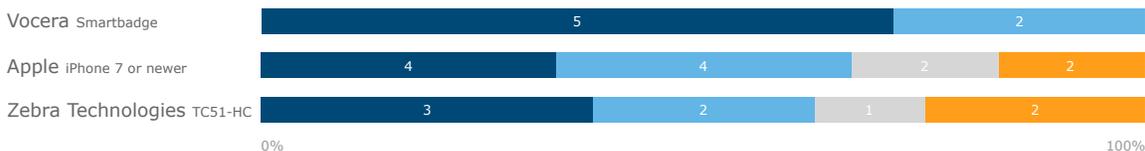


Figure 41

### Native Security/Privacy

Rate your shared smart device's native security/privacy.

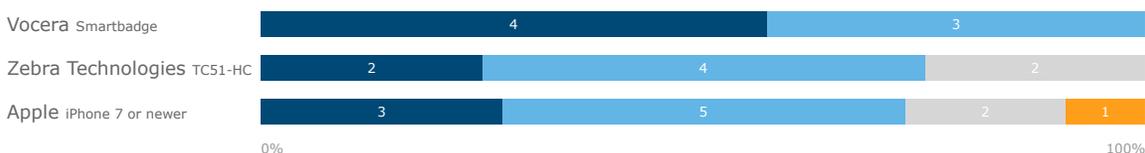


Figure 42

### Support of Inpatient Workflows

Rate your shared smart device's support of inpatient workflows.

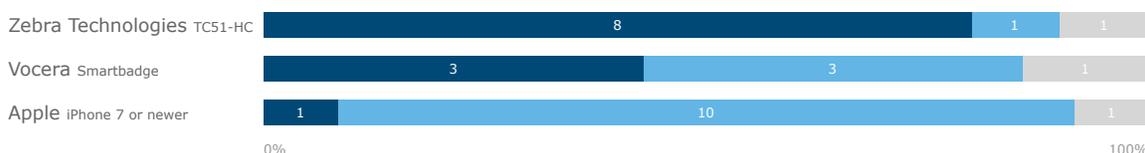


Figure 43

### Barcode Scanning

Rate your shared smart device's barcode scanning functionality.

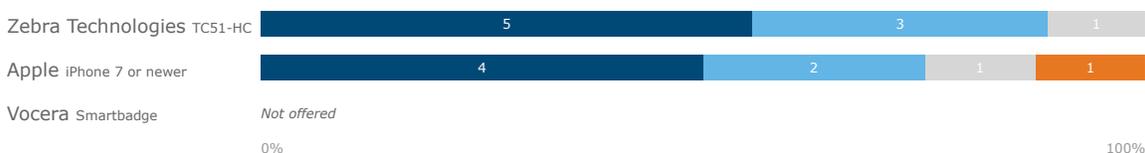


Figure 44

### Camera

Rate your shared smart device's camera.



Figure 45 **Legacy Phone Replacement—All Vendors Combined**  
 Did you replace your legacy phones with shared smart devices? (n=34)

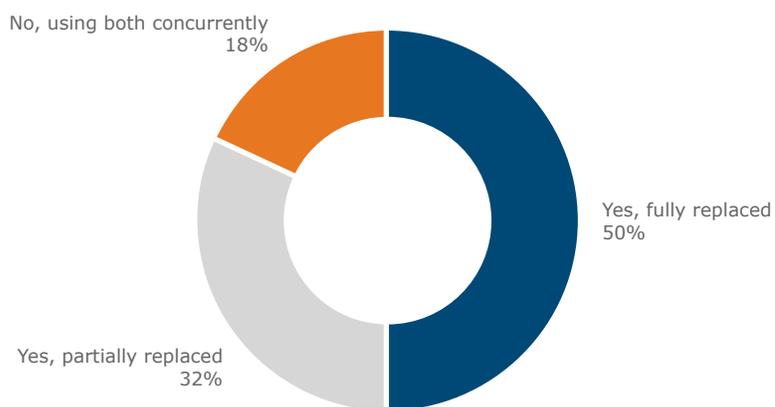


Figure 46 **Legacy Phone Replacement**  
 Did you replace your legacy phones with shared smart devices?

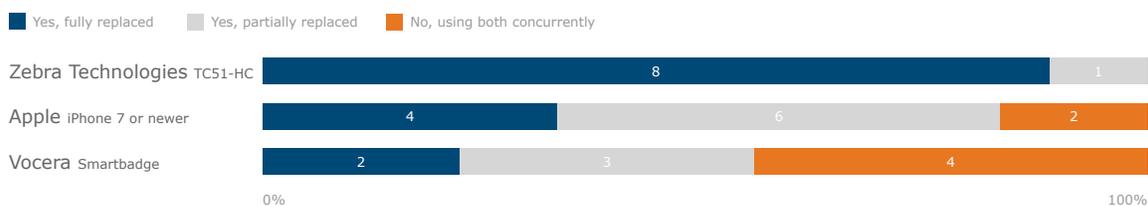


Figure 47 **Wi-Fi Coverage Assessments—All Vendors Combined**  
 Did you do an in-depth Wi-Fi hot spot coverage assessment or upgrade as part of your device deployment? (n=34)

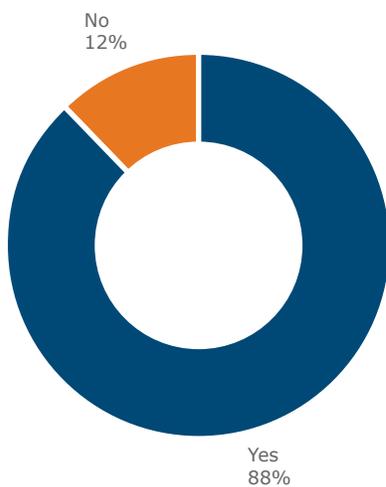
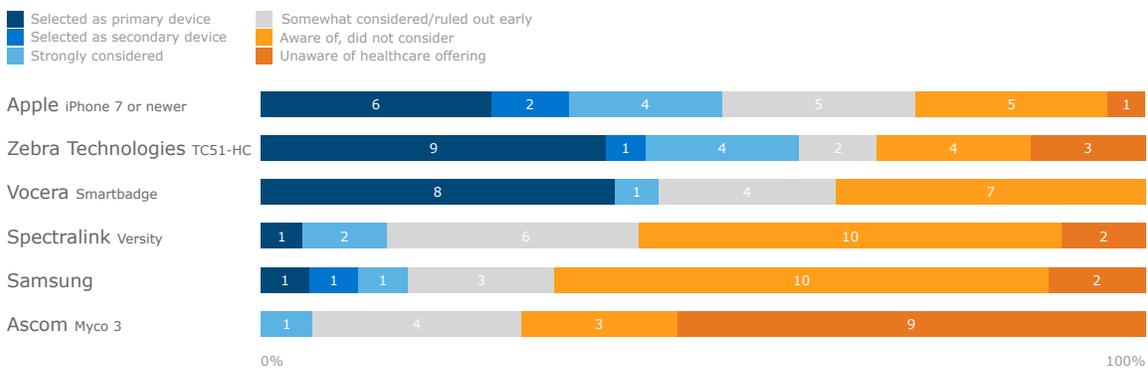


Figure 48

### Purchase Considerations

Vendor consideration in purchase decisions since January 2018 (n=25 purchase decisions)



A woman with dark, curly hair is smiling broadly while talking on a mobile phone. She is wearing a blue and white striped button-down shirt. The background is a blurred indoor setting. A dark grey semi-transparent box is overlaid on the bottom half of the image, containing the text 'CUSTOMER INTERVIEW DETAILS' in white, bold, uppercase letters.

**CUSTOMER  
INTERVIEW  
DETAILS**

## **QUESTIONS ASKED IN SUPPLEMENTAL EVALUATION**

### **Performance**

**Rate your shared smart device's network connectivity.**

**Rate your shared smart device's call quality (if using VoIP).**

**Rate your shared smart device's durability.**

**Rate your shared smart device's battery life.**

**Rate your shared smart device for minimizing bulkiness.**

**Rate your shared smart device's operating system/updates.**

**Rate your shared smart device's native security/privacy.**

**Rate your shared smart device's support of inpatient workflows.**

**Rate your shared smart device's barcode scanning functionality.**

**Rate your shared smart device's camera.**

**Rate the cost of your shared smart device.**

### **Purchase Consideration Factors**

**Apple iPhone 7 or newer**

**Ascom Myco 3**

**Samsung**

**Spectralink Versity**

**Vocera Smartbadge**

**Zebra Technologies TC51-HC**

## PERFORMANCE

### Rate your shared smart devices' network connectivity.

#### Apple iPhone 7 or newer

The connection depends on where we are. As we get down to the radiology department or other departments in the basement, the connectivity goes down, but I would say that overall, the connectivity is pretty strong.

The connectivity is strong as long as the Wi-Fi coverage is adequate.

New Fast Transition wireless devices have resolved past roaming issues.

The connectivity is strong. We did a Wi-Fi and cellular assessment for the pilot site. We know the other hospitals also have to have the Wi-Fi and cellular assessment because we know by people's personal phones that there are problems with connectivity. Once we move to another EMR vendor, everyone will have an iPhone.

For the most part, I think the devices are able to connect where they need to connect. There are known areas where their connection is spotty, but we understand why.

As long as the Wi-Fi works, the iPhones run the way they were set up to run. They can run on airplane mode if they are on Wi-Fi. They do not run on cell service. As long as the Wi-Fi is good, the phones are good.

Connectivity is composed of two parts. We have to upgrade our network so that the iPhones will work the right way. The phones have really good antennas that work well in the hospital, but the wireless access points have to be tuned to connect to the iPhones. I would tell anyone that there is a bunch of homework to do before the phones are deployed, but once that is done, they work well.

I want to add the caveat that connectivity is based on where the phones are in relation to our optimized network. In ideal situations, the connectivity is very strong. We haven't had any issues.

#### Vocera Smartbadge

I am having a little bit of an issue with connectivity right now, but I am guessing that we don't have something set up right with our Wi-Fi because we just changed a bunch of settings. I think the issue is on our side, not the vendor's.

We have had some issues as we have worked with Vocera to tweak the product, but I believe the connectivity is very strong.

Connectivity varies based on our network. The system is dependent on the wireless network, so if anything is amiss in the wireless network, the system is not fully strong. I am still working on troubleshooting some weak areas, but for the most part, the connectivity is somewhere between adequate and strong. I honestly don't think the issues are related to Vocera. There are configurations within our network that might need tweaking.

The connectivity is all about an organization's deployment and how they maintain the Wi-Fi in their health system. So if the organization is proactively doing their surveys and getting things set up properly, they are not going to have an issue with connectivity. We don't have an issue with connectivity or anything with our V5000 devices because we already had it deployed. We do the checkboxes; we say when we are going to remodel something and that when it comes back up, we are going to do walk-through surveys and ensure that the wireless is good in the area. It is really on the network engineering teams and the administrative team to ensure that the coverage is good. Voice is more sensitive than data, and I am the one who is always pushing the network engineers to collect the data and make it good. So the connectivity is strong; it is as strong as we want to have it in the health system.

We did an assessment and upgrade to our wireless option, so the connectivity is very strong.

There are some issues with the device that I don't personally like. However, I have to hand it to Vocera because when we tell them about an issue, they look at it and attempt to address it.

We saw some different areas where connectivity was very poor, but we placed APs in those areas, and things worked just fine. Initially, we had a lot of issues with our badges on the IT infrastructure side, and we finally discovered that a portion of that problem was with something on the Vocera side. We had a lot of connectivity issues that we had to work through, but once we were able to pinpoint exactly what they were, the Vocera team actually found them and immediately fixed them. Our connectivity is now very strong, but it was kind of a grueling process to figure out what the problem was. Looking at our usage right now, I would say that the connectivity is strong and maybe even leaning toward very strong.

The connectivity with the Smartbadge devices is definitely better than the connectivity with the B3000 badges. The Smartbadge devices are waterproof too.

At this point, it is hard to tell how the connectivity is with Vocera's devices because the devices haven't been rolled out for very long. Thus far, connectivity hasn't been an issue.

### **Zebra Technologies TC51-HC**

One of our hospitals is still having issues with dropped and incomplete calls. One of our hospitals has said their connectivity is very strong. That hospital started with Honeywell and moved to Zebra, so they probably felt that was a huge improvement. Our other hospitals went straight to Zebra, so I think they have a different perception. All of our hospitals' experiences average out to adequate.

The devices were great before we had an issue with the grills. The issue has taken away some of the connectivity, so it isn't excellent, but it is still strong.

We have many different sites. We have had different experiences at each site. We have had some issues. Once the Wi-Fi is working, the product is strong. But we keep having new issues at different sites when we think we have the settings where they need to be. Our EMR vendor offers Wi-Fi hotspot coverage. We used their services in the beginning, but the services were extremely expensive and didn't add a ton of value, so we just got the hardware ourselves. Our director is very tech savvy, so doing the work ourselves is more effective and saves us money.

The TC51-HC connectivity is adequate. We certainly have to be careful, and the devices require us to do some tweaking with the Wi-Fi infrastructure to ensure calls don't get dropped when people move location and move from one Wi-Fi access point to another. There is a tendency for the call to be dropped if the Wi-Fi infrastructure isn't tweaked appropriately. The TC52-HC devices correct that issue.

Overall, the connectivity is extremely strong. Very rarely do we have any issues with the TC51-HC devices. When we did, that was because we had a lot of iPads in our environment. We all signed on with the same username and password, and the iPad would get locked up, and that would lock up the TC51-HC devices too.

The connectivity has been okay. I don't think any lack of connectivity is the devices' fault. The problem is on our end. We use another system to manage all of our wireless devices. The only issues have been profile issues with connectivity, and that is our problem. When the devices are programmed properly, they work pretty well.

The connectivity is very strong. I have gotten a lot of positive comments about how people are able to have conversations in elevators and stairwells. It is nice to know that the devices continue to work.

## Rate your shared smart device's call quality (VoIP).

### Apple iPhone 7 or newer

We have relied more on the network than on VoIP. The situation just depends on our network infrastructure.

The call quality is very good with the iPhones. We know where the areas are that have issues with Wi-Fi coverage. The phones are on Wi-Fi if they are in-house. We very rarely use cellular coverage.

So far, the call quality has been good. We have had some support issues with Cisco Jabber's VoIP technology on phones losing connectivity after a certain number of days.

Occasionally, nurses will call a doctor who isn't on the secure communications platform or isn't texting, but the call quality is strong. There aren't any problems there.

We have had challenges with the call quality.

Most of our users don't use the Wi-Fi calling on the corporate devices. One of our devices uses VoIP, which is actually very good. I have not had any complaints. As long as the wireless connection is good, the transmission is good. The only time that I have had a choppy call was when somebody was in an area that didn't have good Wi-Fi, but that is to be expected.

We have had issues with the call quality that we have adjusted. Right now, we are doing okay. I haven't heard any complaints. The call quality is adequate.

We do use the voice functions, and I would say that the call quality is not excellent but is very good.

### Vocera Smartbadge

We can call landlines. I don't know that there is VoIP, but the devices can call landlines. I think the call quality is great. That is part of the reason why we upgraded to them.

The call quality is very strong. I have actually walked outside the building to test the device, and it works fine.

The call quality is adequate. But I don't think that is the devices' fault. That goes back to the network. It is fairly new, and we are still working with our networking engineers. If things had been configured as they should have been, the call quality would be strong. That rating kind of punishes the vendor even when the issue may not be the vendor's fault. The system is very dependent on the wireless network that is in place. A wireless assessment was done, and there are still changes that can happen from local networking teams that the vendor doesn't really have control over.

Vocera won't install their product unless we have performed updates to our system, and then they come in and verify things. That is a qualifier for call quality.

We knew we would have areas in our hospital that wouldn't have additional APs, so we warned our staff members about how if they are in an elevator or a stairwell or if they leave the campus, then the call quality will be poor or the calls may not even happen. Outside of those spots, the call quality is excellent in the nursing unit, cafeteria, and anywhere else. We found through trial and error a couple of spots in the hospital where there wasn't good call quality, but the issues were immediately resolved by our IT infrastructure team. The team placed another AP in those spots, and that fixed the problem. So that wasn't a Vocera issue; we just needed more coverage in that area, and we fixed that issue.

There is nothing phenomenal about Vocera's call quality. It certainly isn't at the same level as other vendors' products. But Smartbadge does have very good roaming capabilities, so as people walk through the organization, their calls don't get cut off.

The B3000 devices work great everywhere. They even work on our elevators when people go up and down. Vocera's V5000 devices aren't as good. We have a lot of static and issues with call quality. I would say the call quality is very weak right now. Vocera has been very helpful in trying to get to the root of the problem, but we don't know what the problem is at this point. But the Vocera team has been trying very hard to rectify the issue for us, so we hope the end will be in sight soon.

## **Zebra Technologies TC51-HC**

In terms of call quality, there are still issues with muffling. One of our facilities reported that they had an issue with speaker grills blocking the sound on the Zebra devices. I don't know what action the facility took, but it sounds like the vendor was responsive to getting that fixed.

The devices will be using VoIP calling because they will all be in-house. Thus far, things are great. We can take the Zebra Technologies devices into our elevators without getting disconnected.

The Zebra Technologies phones are good and have good microphones, but the vendor ran into some bad luck with the grill issues.

The call quality on the devices is very good. The biggest issue we have had is the grill issue, and the primary symptom of that is that call quality is affected. That issue depends on how much wear and tear the devices have. We could have two devices that went live the same day, and one could be crystal clear while the other could have a grill problem. Recently, the vendor went from device to device and replaced the grills across the board.

In a hospital setting, we can't really hear anything. Even if we shout, the sound is still muffled. That issue can affect the speaker. I could be talking, and the other person might not be able to hear me. The vendor said the issue was addressed in the first iteration of the replacement, but that wasn't the case. Hopefully, it is fixed now. Even on the TC52 devices, the issue should be fixed. The TC52 devices have a totally different design, so we are hopeful at this point.

I would almost put the call quality on the weak side, but I don't know how much our network contributes to the problems. So I would say the call quality is just adequate.

The call quality is excellent. We monitor call quality and a whole bunch of other metrics through another service, and that consistently comes back rated very highly.

The call quality is strong. We sometimes have infrastructure issues, so maybe the access points could be tweaked.

## Rate your shared smart device's durability.

### Apple iPhone 7 or newer

The new phones that Apple has come out with are a lot more durable, even without a case. We pretty much put every shared-use device that we have in a rugged case, so the durability is pretty adequate. The devices don't often break unless something out of the norm happens, like a forklift running it over.

The devices hold up very well. We have moved off of scanning sleds. We have some mophie cases for battery extension, but the phones get to rest and recharge. The mophie cases have held up strong.

With iPhones, we need protective cases so that we don't have to replace the iPhones very often. We need OtterBox or LifeProof cases, and the cases are another cost.

We added mophie cases to the phones.

The durability is fine thus far with the use of OtterBox Defender cases.

The durability has been good. We haven't had a lot of issues with breakage that I am aware of.

Screen damage is a risk with all smartphones, but I don't think we have a lot of breakage.

As far as the durability of the devices goes, we do get cases for our iPhones. Users can take those cases off, and I know some that have. They want to get their own cases, and they want a different color and things of that nature. When we put the devices in cases, I would say the durability is pretty good for the most part and that the cases are very strong. I would say we can get at least three or four years out of them. We are trying to get a system in which we upgrade the devices within that time. So within three years, users are likely to get another phone. When the phones are taken out of their cases, their durability is very low. Users can crack the screens very easily when they are not in their cases. The phone manufacturers are opting for the bigger screens, so just a little drop would damage the screen.

I will say that overall durability depends on the market. Historically, one of our organizations has more cases where individuals break their devices. Another organization does not have so many, and I think the difference is that accountability is tied to the devices. In one organization, the users could get charged if it was found that they neglected the phone to a point that damage was caused. The other organization, for the most part, would cover the damages, so users didn't necessarily have that accountability. I have seen cases when individuals have broken a phone five times, and it just gets fixed every time. That is changing. I have a responsibility to get mobility across the system now in those markets, and I am not doing that. If people want a phone, they are going to treat it like a proper piece of equipment. If they damage it within a certain period of time, they are going to pay for it, and if they refuse to, I will take their phone away. I am not driving my budget up because of somebody's neglect.

The phones are amazingly durable. We have had very few broken phones, and we have very thin cases on them. We have focused a lot more on not losing them. We haven't had a lot of breakage issues. We have had a few broken phones, but there has been nothing significant and no high volumes of broken phones.

The durability is very good. Our phones are leased on two-year cycles, and only one or two of them have broken to the point where we have had to replace them.

We have phones covered with mophie external charging cases, and I believe that helps. Some screens have cracked from being dropped. That is expected when a phone is dropped from a high level. We have the AppleCare Protection Plan, so we haven't had any issues exchanging those phones. I will add just for fun that one was dropped down an elevator shaft and survived.

We found that we have a lot of screen damage. Compared to Android's rugged devices, iPhones have a higher frequency of screen breakage.

## Vocera Smartbadge

I think the devices are very durable.

Vocera sent us the initial badges, and the batteries would fall out a lot. They weren't tightly placed. We sent all the badges back, and the vendor sent us replacements, and now the batteries stay in place. That aspect of the product's durability wasn't very good before, but it is strong now. Now the batteries are so tight that we sometimes can't even get them out.

One of our field service engineers recently told us that the newest badge is not extremely durable. Some of the older badges were great. The nurses could drop them accidentally, and they really had no issues when we were replacing the batteries. The newer devices easily break if we drop them. That isn't ideal for a healthcare facility because we get busy and things sometimes slip out of our hands. The new badges are not extremely durable and are not to my liking. The batteries are either too loose and fall out or too tight and can't be taken out. When we do get the batteries out, the clasp breaks. Vocera needs to revisit the durability of the badges.

We haven't had the devices deployed that long, so I really could not give honest feedback on how strong the V5000 devices are. I have had a couple of clips break, but that doesn't mean anything. Maybe the person didn't have things clipped on properly; there could have been mishaps there.

I am in the middle of the road with durability. The devices are just plastic. I have seen the badges and the back of the badges where the battery is put in. If the nurses are in a rush, they will mess things up or break the battery. People wouldn't do that to an iPhone, but we don't change batteries for iPhones. Some things break.

The only problem with the device is the clip that it holds onto. The badge itself does a great job. We have had a couple of them that broke because of extenuating circumstances, but the badge itself is very strong in terms of durability. There is a clip that attaches the badge to the scrubs, and that clip has poor durability. It is kind of similar to what the previous clips were like on their basic badges. What was not taken into consideration is that when we go to lift the badge up to look at text messages or any alerts, that clip pops off easily and causes us to drop the badge. The clips themselves are not durable; the badge is, but the first time we discussed this with Vocera, they immediately sent us a free shipment of lanyards that we can put on the badge. Those lanyards are fabulous; they are exceptionally durable and do a great job.

There are people who still prefer the clip over the lanyard, I am actually wearing a lanyard right now, and it doesn't bother me a bit. However, we have some staff members who say that they can feel it on their necks a little bit too much. It bothers them just kind of hanging around their necks, so we have a few staff members who still prefer the clips over the lanyards. We kind of have a hodgepodge of things being used.

From a durability perspective, the Smartbadge devices are superior to the B3000 devices but aren't on the same level as the Zebra Technologies smartphones.

We don't know about durability. The devices are brand new to us.

## Zebra Technologies TC51-HC

A couple of our hospitals think the device durability is strong, and one of them thinks it is weak because that hospital has had a few instances where the devices have cracked when they have been dropped. I believe the hospitals have put the devices in sleds, so they are probably fairly protected.

The product is very durable. I would give it good marks for that. It is excellent.

The durability of the devices is good. We had a grill issue where the speakers would get clogged up or the mics would get blocked and became muffled. We replaced the grills on the devices, and we haven't actually deployed the devices to the floors yet because they are still in the project space. Because of COVID-19, things got pushed back a lot.

I would say the devices are extremely durable. The users lose their phones, but after dropping them, there are no problems. No one has cracked a screen or a case.

We have used the devices for three years, and we have the advanced exchange program with the vendor. We probably send back two or three devices a month because they fell from high up and cracked a screen or something like that. Every once in a while, a nurse goes crazy and tries to rip off a button or something, but that is very rare. The vendor either repairs our existing phones or sends us new ones, depending on the issue.

We have not had the devices in use for an extended period of time. That is the one caveat, but we have had a really good experience to date.

I like the durability of the devices. The first day that people started using them, someone dropped a device, and we couldn't even tell afterward that it had been dropped. So the users are pretty impressed with the devices. They went through and added some of the accessories, like bands and cases, after the fact.

The screen is durable, but it limits audio quality due to the disinfectant that is used. That disinfectant messes up the sticker that acts as a covering.

## Rate your shared smart device's battery life.

### Apple iPhone 7 or newer

The battery life is strong. I can't speak to that without the mophie cases, though.

There have been no issues so far. We have been using drop-in and cabinet-charging solutions.

We do have a process and a charging station. We also put chargers on all of the nurses' workstations, so they have a lot of opportunities to charge their phones during the day. There are spare devices, so if nurses have to, they can switch to a different phone. We are using a secure communications app from a third party. As long as the nurses log in to their phone through the app, whatever phone they pick up will become their phone. That is very helpful.

Battery life has been a huge problem. It is weak because of the way we use the devices. These aren't personal devices; they are used in a commercial setting. We use them 24/7 all across the hospital, so the needs of users in the clinical setting are different than the needs of people who use the devices in a personal setting.

In terms of battery life, most of our users that have phones are high users, but not everybody knows to occasionally let the battery run out completely and then charge it. I know that. The phones probably get plugged in about every day. Users are supposed to let the phone batteries drain completely every so often. They are not supposed to keep a phone on the charger, even though the charger will turn off once the battery is full. People are supposed to pull the phone off of the charger, but not everybody does that.

The battery life is adequate. There are great opportunities with the batteries. There is a real challenge because the more we use the phone, the more the battery is going to die, and the longer phones are used over a greater period of time, the more the battery optimization is affected. Mobile Heartbeat did something new that we haven't taken yet that is supposed to optimize the battery. We are going to be taking that soon. So I am hoping that will help, but we definitely have had plenty of battery issues. We have to have phone etiquette and make sure that the phone is charged. If the battery hits 30%, we need to put it in the dock.

There are no swappable batteries. We had a formula for each unit based on the highest volume of things each unit could have at any given time. The units were given enough phones so that there are always phones charging.

I know the phones can get through a 12-hour shift, so the battery life lasts at least 12 hours. I think that is very good.

To rate the battery life would be hard for me because we use an external battery. That is very strong, but it is from mophie. The phones aren't used without the external charging case. I can't really speak to the iPhone's battery life by itself.

The battery life is adequate, and I qualify that by saying that we pair the phones with phone cases which are battery packs. And the battery packs that we pair with the phones have virtually the same capacity as the phone batteries. So we essentially have double capacity. That seems to be working okay for us.

### Vocera Smartbadge

I don't have an issue with the battery life.

I personally have not worn a badge all day working on a unit, but I have not heard complaints from my staff about the battery life. When I went around recording names, that process pretty much took two days. I used a battery for a day and a half, so the battery life is pretty strong.

I haven't had complaints on the battery life with the V5000 devices, but I will say if an organization's network is not strong and their device is constantly trying to find the network, that will drain the battery. Our network is strong, so we don't have that draining. I did use the device prior to the COVID-19 crisis, so when I was on campus, I didn't have a problem. My battery would last me, and I was

called all the time when I am there, and my battery would last me sometimes a couple of days before I changed it. So the battery life was very strong for me, but I only have data on myself and not on a whole group of people.

The battery life is excellent. None of my staff members thus far have had to change the battery in the middle of a shift. The only time that they have had to do that is when they have handed off the badge from shift to shift. If the staff members don't change the battery right then, they will get about halfway through the shift and then hear a beep. Each time that has happened, we have tried to follow up on that just to make sure that there is not a bad battery. Each time that has happened, that staff member will say that he or she forgot to charge the battery when the badge was handed off.

The ability to change the device by itself without having to take out the battery is pretty popular. When we swap a battery, we can just unplug the battery and put in the new one; the device doesn't have to restart. The batteries in the devices seem to be of higher quality than the batteries in the older B3000 devices. We haven't had to replace any batteries yet for the Smartbadge devices. Previously, if we got 6–12 months out of a regular Vocera battery, we counted that as good.

It is hard to tell how the battery life is at this point.

### **Zebra Technologies TC51-HC**

It looks like the battery life is adequate; the battery lasts an entire shift. Hospitals have reported issues when they swap the batteries; that puts the phone into airplane mode. It sounds like when people pop out the battery and put it back in, that changes the phone settings.

It is too early to tell how the battery life is, but unlike other phones, the Zebra Technologies phones do have swappable batteries.

I would rate the battery life as good because the batteries last 8 hours. The nurses think the batteries should last 12 hours, but I have never had a phone that lasted 12 hours, so I think that is asking for a bit much.

We buy additional batteries. We usually buy an extra set of batteries for each phone, but some sites might buy a little more. The only additional accessories that are attached to the device are the clips.

The battery life of the devices is pretty good. The devices last during the whole shift for the nurses and a little bit longer.

I don't know how to compare the battery life. If I compare the devices' battery life to the battery life of my personal phone, I would say the battery life is weak. But maybe that is just how lithium-ion batteries are when they have to work 24/7. I don't use my phone 24/7. I would say the battery life is adequate, but it certainly could be better. The battery life is adequate when people first buy the phones, but it seems to diminish over time.

We usually use the battery for stretches of 14–15 hours. That isn't perfect, but for a nurse that is finishing her documentation, that is a good amount of time.

Right now, the battery life is great. The batteries last well beyond a single shift. We know over time that battery maintenance will influence the battery life, and we are planning to replace the batteries after a 12- to 18-month cycle.

People are pretty happy with the phones. The phones are pretty durable, and people like the battery life and haven't complained about that. That is good because usually people are very vocal when things don't work. The batteries have been good. When I was programming, I would charge up the devices initially, and I would never have to touch them again to ensure they were charged. Every time I would look at them, they still had a pretty good battery life.

## Rate your shared smart device for minimizing bulkiness.

### Apple iPhone 7 or newer

When we don't have a case on the device, it isn't very bulky. If we have a case on it, the bulkiness is adequate. Using a case really comes down to personal preference.

The phones are great, and the nurses love them. But most of the nurses' experiences were tainted by scanning sleds. Once we took the sleds away, the nurses were ecstatic.

The devices' bulkiness has improved a lot since we had the old Rover devices with Honeywell sleds.

The covers are a little bulky, but they are not too bad. The covers aren't like the giant OtterBox cases. Our covers seem to be effective because we are not getting much breakage.

In terms of the bulkiness of the device, everybody likes the sizes that we have.

The phone is a very good size, but because we add the mophie external charger, it is bulky. None of our users use the phone without the charger case. The mophie case is bulky because it has an external battery back. The bulkiness of the device with the case is adequate; it isn't too bad.

I don't think that the devices are very bulky.

### Vocera Smartbadge

The devices are a lot lighter than people think they are going to be, and they are big enough. I have some vision issues, but I can actually read things on the devices whereas I can't on others.

The devices are a good size. We hear that our users don't like the lanyards, at least not at first. But the devices aren't bulky. I don't think anyone has issues with that. Our users like the clips over the lanyards, but not the lanyards themselves. Users say the pressure is too heavy around their necks.

The devices are slightly bulky in the sense that the staff members feel like the devices pull their shirts down. The devices are a little too big, but I personally don't think the size is bad.

I put the device on some of my team members, and I did not find that it was bad at all because I have an adjustable lanyard, and I prefer the lanyard because I don't want my shirt pulling down on me. Even my ID badge and things can pull my shirt to the side or something, especially if I am leaning over and trying to be a caregiver to a patient. So I didn't have an issue with the device because of my lanyard.

I really liked the large screen. My eyes are not the greatest, and I could easily look at that screen; however, I had team members who don't really like that the screen is so big. There are team members who don't want to wear a lanyard, and if they don't want to wear a lanyard, then they feel the device pulls on their shirt. That just depends on each person's opinion. The device does not weigh that much more than the B3000 or the B3000n devices. So I think there is just a question of what people prefer. Some people love the devices, and some do not. And the people who don't love the devices are the people who aren't using the screen.

I think the device is a perfect size. It is not as big as a smartphone. It hangs on me. If people have a lot of the modules, they can scope the device. We don't have the modules, and I think the device is the perfect size, but there are team members who won't agree with me.

The devices are a good size.

We notice the devices. They are not as lightweight as our hospital badges per se, so we do notice them there. However, that is not something that gets in the way or really pulls on us.

The Smartbadge devices are very strong, but they don't weigh a lot. They weigh more than the B3000 devices, but we can't tell because the weight is spread out. The devices don't pull our shirts down or anything.

I don't think the Vocera devices are that heavy.

## **Zebra Technologies TC51-HC**

The reports across the board are that the devices are pretty bulky and heavy. One specific piece of feedback was that the devices rip the pockets of the paper OR jackets consistently, and those jackets are used frequently by nurses who get cold on the floors. That feedback was interesting.

The Zebra Technologies phones are a bit larger than our other phones, so that isn't fantastic, but the phones work and are fine.

The devices are definitely bulky.

We have heard many nurses and people complain about how big the device is and how hard it is to put in their pockets without dragging down their scrubs. We get complaints about the size of the device. From a technical perspective, I am not sure how much smaller the devices could get. We get a lot of feedback saying that the device is like a brick because it is so heavy.

The nurses had the MC40, which was bulky. When they got the TC51-HC devices, they absolutely loved them and thought they were great. The nurses love how the phone feels and works. They like the distance between the keys.

The devices are very thin. A thinner version is coming out for physicians, but it doesn't have a scanner on it. Based on the functionality that we are getting, that is more than adequate. There is a belt loop hook or clip that attaches to pants, and there is also a band that goes around the back so people can hold the device. The nurses are using the band to hang it on their lanyards. I don't see anyone that doesn't carry around the devices, so I don't think bulkiness is a problem.

The bulkiness is definitely a weak area. I understand all the reasons why. There is a battery and a scanner, and we understand those tradeoffs. The device is a beast.

For being such a small device, the phone is pretty heavy. But it does well despite being a little on the heavier side.

The bulkiness is average. The Zebra Technologies devices are larger than our old devices, but the new devices are also lighter.

## Rate your shared smart device's operating system/updates.

### Apple iPhone 7 or newer

The operating system and updates are very user friendly. We went with the Apple devices because of the operating system. The end-user experience is very simple. Most people can just pick up an Apple device and understand it quickly.

With the upgrade process, we have not been able to sufficiently lock things down. We very much get the impression that Apple remains a consumer-oriented company. There are different decisions that have to be made and different accommodations that we need them to make that they don't actually make when we are trying to operate a fleet of devices. That became a patient safety issue when Apple changed PushKit. We had conflicts with some of our applications regarding alert notifications that weren't going through, but the users were so aggressively being prompted to upgrade. So despite us telling Apple not to upgrade, we had a lot of challenges suppressing the upgrades. We have been able to lock down a lot of things, but iOS upgrades haven't been well managed because people are still receiving nudges to upgrade on their own.

The updates are controlled through AirWatch Mobile Device Management at the enterprise level.

Sometimes, the updates are an issue. Since we are doing a pilot, we aren't really leveraging everything that we can. We have an MDM piece that would help our facility better manage updates, but since we are just doing a pilot and different hospitals have different things, we aren't really using that piece to its full capacity. Right now, the operating systems and updates on the iPhones are adequate.

We enter the terms. The challenge that we are subject to is the updates. We can't control all the operating system updates that we take from Apple. Those updates can sometimes impact other applications that we use on the phone. Apple has previously made changes to how the banner notifications work, and those changes impact other applications. The updates are adequate, but they pose problems.

I would put the operating system at just below adequate because it still relies on the users to download and install the updated iOS. The devices need to be connected to Wi-Fi when being updated, but because users are often out in the field, the only time they really can update the iOS is when they are at home or in the office. They aren't often in the office for an extended amount of time. There are times when the iOS falls behind because users forget to connect to Wi-Fi and let the device update itself. Updating has always needed to be initiated by the users, even on personal devices. A lot of people in our user community are not aware that they need to be doing that.

I will feel more comfortable once we can initiate communication again. Then, we will be able to actually see what iOS version people are on, and they will start getting notifications from the system letting them know that they need to update. And if they don't update their device, we will start calling them and helping them through the process. Within the near future, the updating process should become very good.

I would say that the operating system is good with one little caveat. The iPhones are really useless to us without the Mobile Heartbeat app, so we have to keep the phones in sync when there are upgrades. It can be a little tricky to make sure that the phones are on the right release. When the phones are in sync and doing what they are supposed to do, then the operating system works really well, but if the phones are out of sync, they don't work so well.

I would say that the updates in the iOS are strong because we can control them. We use the Jamf product to push out updates and control phone profiles. Updating is a pain, but that is the nature of any application or device.

In terms of mobile device management, we now have the ability to schedule out specific levels of operating system upgrades to specific phones and areas at specific times. We can put that all on a schedule, which is really great for different departments that are 24/7. That really helps us manage our strain on the network and mitigate the impact on end users.

## Vocera Smartbadge

The operating system and updates work just fine.

We haven't had the system long, so we haven't really had a true update. We were supposed to have an update to fix some bugs, and Vocera pushed the update further out. So the updates are adequate in the sense that we need an update to fix some issues, and it keeps getting postponed.

Vocera is a great company. They really put a lot into their customer support for updates, and that has been great. There is definitely a lot of input from the engineers at Vocera.

We actually had to take an update recently, and that was part of the issue that Vocera was able to discover in some of our connectivity issues. We recently took an update with them, and I believe we are currently on the newest platform that Vocera offers. Vocera's staff was beyond outstanding and made sure that everything was in place and going smoothly. Vocera was right on top of any little hiccups and immediately fixed them for us. I don't know when the next update will be, but I know we are currently on the newest platform.

The operating system for the Smartbadge devices is way better than the operating system for the B3000 devices. The operating system is really fast now, and the badges are much quicker. From the time we put in the battery to the time the device is ready to use, the process takes about 15 seconds. With the B3000 devices, the process took about 45 seconds. Doing updates is a strong, solid process. If I push a firmware update in the middle of the day, I never get a complaint from anyone.

It is too soon to talk about the operating system or updates.

## Zebra Technologies TC51-HC

Some of the updates require a manual update by our IT support staff.

A lot of the updates don't have anything to do with the phones and everything to do with what MDM piece we purchased. Our MDM piece does well. We are able to push updates to the phones. We haven't mastered operating system updates, though. We still have to do those manually.

Updating the OS and the firmware is annoying. The devices are used daily, so we have to basically take them off the floors to update the OS. We want to make sure that the firmware is correct too. Even the patches basically take the devices out of commission, so the update process is cumbersome.

The strategy is to push updates out from the AirWatch console, but that hasn't worked well.

The operating system is fine. We don't have any problems with it. The constraint is with each device. The devices are designed to only handle up to a certain level of operating system. Because of that, we get stuck at that maximum level, and then we have to replace the devices. We haven't had any issues with the operating system itself on the device, so that is strong.

Zebra Technologies is actively engaged when we do major upgrades, and that has been nice for ensuring that we don't break anything. For the most part, the system probably has the easiest maintenance of any solution that I have had for quite some time.

We use our MDM solution to push out the operating system updates and keep the phones up to date. So far, we have had absolutely no issues, but without a good MDM solution, people are going to have issues with any device, no matter what the product is.

We go through another vendor for the operating system and the update process, and all the software updates are regulated. As far as the actual device goes, I would say it is very good.

The operating system and updates aren't applicable. It does take a long time to install the software, but no user interaction is needed. The time is related to the size of the files.

## Rate your shared smart device's native security/privacy.

### Apple iPhone 7 or newer

The security is adequate because we don't want to share the devices. We thought the iPhones could be shared, but sharing them was difficult because there were too many security issues. Users were uncomfortable with sharing devices, and I don't blame them for that.

Security and privacy are controlled through AirWatch Mobile Device Management with the ability to wipe lost or stolen devices. Logins are required to use the apps.

We really discourage using the phones for anything outside of their intended use. The native security is weak and not HIPAA compliant, which is why we have to use a secure-texting app.

Apple won't sign a business agreement for our HITECH and HIPAA needs.

The native security of the devices is very strong. We work with our information security team and our compliance team.

We use a mobile device management solution. The interest rate devices are pretty locked down, although the users can do some things on the Apple settings that we can't lock down.

We chose the iPhones because of their security features.

### Vocera Smartbadge

I haven't had the devices get hacked or anything, so the security must be okay.

The strength of native security and privacy is very strong. Some things have been encrypted to secure passwords, and no patient data is transferred to the reporting server.

The security of the system is very strong. The solution is used by the Department of Defense, so security is something that is engrained within the solution.

Privacy is part of the training with the staff members. If people have the solution on, there is a speakerphone around their neck. So if a call does happen, users have to be trained to remember that they are wearing a speakerphone. Just because someone is in a nurse's station does not mean that is a private environment. So that is part of the staff's training. With the V5000s, it is very easy to change the device to a hand-set mode. There is more privacy available, and there is easier access than in the previous versions. The other versions have hand-set modes, but it is easier to switch to the mode in the version we have. There is VoIP, so if people are on a network, they are using someone's voice. As long as the network is strong and people have things set for voice on all levels and that is part of the network engineering and administrative team, things are perfect.

Rather than having a patient overhear things in the room while a provider says things out loud, providers can communicate via text with the system.

The Vocera badge is very strong. Users can use Bluetooth technology and use a headset, but our facility doesn't allow the use of earbuds. So whenever people make or receive a call using Vocera's product, everything is said out loud and can be publicized. The badges themselves are excellent; they are small, and if something pops up on the screen, someone standing nearby won't necessarily be able to read the pop-up. Our staff members have done a great job of moving into that ability and remembering whenever they are in a patient care area.

The security is very strong. The devices have end-point encryption. The devices are speakerphone devices, but we have the tools to overcome that. I would say the privacy is strong even with the speakerphone issue. The device starts out on speakerphone, but the user can choose to put it in handset mode and have a private call.

Native security would probably have to go through our IT group. I can't really talk about that.

## **Zebra Technologies TC51-HC**

The secure sending feature for secure communication isn't a staff satisfier.

The security is controlled by our MDM piece. We can control what we lock down. I would say that the phones allow for flexibility and are very good.

The AirWatch console locks the devices down so we can't get to the native application, and our EMR vendor stores the data on their remote servers. They don't actually store data on the device. The process works great, but it isn't really Zebra functionality.

We have not had any issues. We were able to set what we needed, and the devices have two-factor authentication, so the security is fine.

There are several things that I really like about the native security and privacy. One thing we talked with the vendor about was the ability to lock the device when we walk off campus so that the device becomes a brick. It is really nice to know that the device will shut down, and as long as the device stays within a certain radius, we can usually find it. We are in the process of updating our RFID capabilities, and the devices have internal RFID capabilities, so we are likely to build that functionality into our environment. That will be even better. From a data security perspective, everything is in the cloud, so when people get a device, we know they aren't going to get ahold of any patient information, and that is nice.

The users use the Zebra Technologies devices to message, but I don't know whether things are secure. If there were an issue with the security, the users would complain. They haven't been complaining, so I would say the security and privacy have been pretty strong.

There are no issues with security. There have been a lot of discussions around single sign-on. I don't know enough about that to know how the devices could be secured while allowing users to answer phone calls from our communication application without having to unlock their device. But I would rate the security as strong because security was part of our criteria assessment within our RFP. Anything that wasn't strong had negative scores against it.

## Rate your shared smart device's support of inpatient workflows.

### Apple iPhone 7 or newer

The vast majority of users are our nurses or clinicians. The lack of parity between systems is ridiculous. We made that really clear to our EMR vendor. The number of things that we still can't do on the iPhone is absurd, so there are software issues. Apple has mentioned that they would be willing to test the ability to profile a device using biometrics, but then COVID-19 happened. We are really limited because of the SSO experience for nurses because they have to sign in to four or five different applications, and sometimes that also requires them to go online at a desktop and sign in there to assign a certain role for a small group of charge nurses. They sometimes have to do that because our EMR vendor doesn't have that role functionality in their build. I think the support for inpatient workflows is somewhere between strong and adequate. I don't want to make Apple pay for our other system's limitations.

The iPhones are good for the physicians once we get them on board. The iPhones allow direct contact from nurses to doctors. The iPhones eliminate the middle person. The goal was to replace paging with iPhones so that people wouldn't have to carry a pager.

Rover is built on inpatient workflows, and the vendor prioritizes iOS development.

The support for the inpatient workflows is middle of the road. We are just in the pilot, and we aren't leveraging as much as we could. Once everyone has a phone, we will do a lot more.

The support for inpatient workflows depends on what people are doing with the workflow. I have to look at all the different use cases that the devices are used for, but I would say the support is strong. The workflow supports the providers quite well. The nurses seem to really home in on a different communication device, which is fitting into their workflow more than the phones. However, some units do find that the phones are very workable for what they need. In terms of the phones supporting inpatient workflows, I would put a higher score, but I would put a lower score for the phones supporting the nursing workflows. Nurses are looking for a hands-free device, but the providers aren't. The nurses would gladly use their own devices if we could ever get that approved for them. But we have not approved that for our nursing staff for a lot of reasons, so the nurses prefer the hands-free units.

The support for inpatient workflows is strong due to the application platform.

### Vocera Smartbadge

The vendor has always had great tech support.

I am very biased because I am the application admin and am not on the floor using the badges. But if I had still been on the floor, I would have been extremely excited about the badges. I don't have personal experience on the unit using the badges, but I would say that they have improved the workflows. People can easily get in touch with who they want to get in touch with right away as long as everyone is logged in. We don't have to memorize phone numbers. We can call people by name. I personally think that is a strong feature.

The product does very well in supporting our inpatient workflows. I go over the call flows with the new department leads, managers, and directors. I try to go over the call flows because we have so many different departments and sites, and I want to help people understand everything. The clinical leaders, like the hospital president and the VP of nursing, say the hands-free feature is so awesome. For me, the call flow goes above and beyond any other product's call flow. If I am a telemetry monitor person and call the nurse, the solution is going to try contacting that nurse, and if the person isn't available, the call is going to go to the nurse's buddy. If the buddy isn't available, the call goes to the charge nurse. We have a flow set in place. I initiate one call, and it goes through a set order to people who are the quickest to respond to my patient. When time matters, that quick response is what we need.

The support has always been good as far as inpatient workflow goes. Vocera doesn't really get into our workflow or the daily workings of the device.

If there is something that goes beyond exceptionally strong, I would give that rating to the support. I have worked on a lot of projects, but I have never truly been the lead on those. I have dealt with a few vendors here and there, but we cannot say enough amazing things about the Vocera team that we have. They have done calls with us at 9:00 p.m. to troubleshoot things, and they have stayed on the phone for hours and hours to deal with an instance of downtime that lasted 30 seconds. They also followed up and made sure everything was okay after that. Speaking to our IT team and our CMO, we have been blown away by the customer service that Vocera has provided to us throughout this entire deployment.

Vocera has a solid workflow platform. The Smartbadge devices just enhance that whole platform.

The Vocera devices are definitely helpful for the inpatient workflow. As time goes by and the users become more comfortable with the devices, the devices will definitely make a difference.

## **Zebra Technologies TC51-HC**

The touch functionality is sometimes not very responsive, so swiping can be a challenge.

The support for the inpatient workflows is just incredible. It is a game changer.

The support for inpatient workflows is very strong. The devices are good and manage a lot for us.

The devices are good at supporting our inpatient workflow. The workflow is really EMR driven. I haven't heard of any device issues.

We run a couple of systems on the phones, and from a workflow perspective, the nurses don't have a problem. They are used to carrying our old phones, so for them, there is no difference between carrying our current devices and carrying their old phones. We haven't found anything that we want to run that the devices haven't been able to handle.

We continue to be a development partner. We are looking forward to automatic pump programming and medical scans. We have needed that functionality for a long time, and that is really exciting.

I would give the devices the highest rating for supporting inpatient workflows. The devices are really game changing for us. Our physicians have everything they need right in front of them.

The support for the inpatient workflows is very strong. If a phone were dropped from six feet or dunked into liquid cleaner, the phone would hold up.

## Rate your shared smart device's barcode scanning functionality.

### Apple iPhone 7 or newer

We need specific things to put in barcodes. The only native barcode scanner that the devices have is a QR code reader. The devices do have a strong ability to integrate with third parties, though. We haven't run into a problem with finding vendors to do the barcoding.

We haven't used barcode scanning yet. We haven't integrated barcode scanning with iPhones.

The barcode scanning has vastly improved. We moved to soft-scanning integration in Rover to use the camera software. We removed the bulky 2D-scanner sled requirement.

When we go to our new EMR, we will employ barcode scanning features, but right now, we don't have those.

I believe that the lab group takes the phones and puts them inside of cases that scan things. Those cases are used for barcode scanning. The cameras on the phones aren't being used for scanning as far as I am aware. With the cases, the barcode scanning is very strong. I haven't heard any complaints.

We are using barcode scanning, and the nurses are very happy with it. Unfortunately, we have to buy a third-party scanner software to work on the phones.

Unfortunately, we have to buy a third-party scanner software to work on the phones, which is Epic Rover.

### Vocera Smartbadge

We are not using the barcode scanning yet.

### Zebra Technologies TC51-HC

Feedback is mixed across the board at our different hospitals, but overall, the devices mostly seem adequate. The hospitals say that the scanning works well but that getting to the scanning functionalities is a little tedious, like navigating to where they need to be and turning on the scanner.

We have only tested the scanning a bit, but it works brilliantly. But we haven't launched it from the testing phase, so we don't have a fair assessment right now.

I think the barcode scanning works very well.

We have a bidirectional interface for the pumps. We barcode the wristbands and the pump, and the order gets automatically downloaded to the pump. Then the order is validated. So that piece works great, and that is exactly why we purchased the devices. We replaced our current phones because of that capability.

I would say that the device's barcode scanning capabilities are very strong, especially with the connecting app. The accuracy of the capture is great. Using the device is much faster for nurses than wheeling equipment into a room, especially in light of COVID-19. We have really been limiting the equipment nurses take into the room. Having the TC51-HC devices has been great because they can check vitals and do other routine things. The devices can get a lot done, and we don't have to bring in bulky devices. It takes a lot less time to clean the devices after the nurses use them than it does to clean and dry a lot of equipment.

Barcode scanning uses just one button. The users have been happy with that. Back in the day, they had to go into the room and log in to the PC, and those scanners were expensive.

The barcode scanning is strong. The scanner is at the top of the Zebra Technologies phones, so we point our phones at the barcode to read it. There are other devices that have a scanner where the camera is. It would be beneficial if we could scan from different positions without having to bend our wrist to aim the device.

## Rate your shared smart device's camera.

### Apple iPhone 7 or newer

The camera is great. The only limitations with the camera have to do with our other vendors' products, not with the hardware, iOS, or even third-party apps. We need to increase our native application resolution settings. I have one complaint about the images, and that has to do with the image handling and secure chat. But other than that, the camera is great.

We are not rolling out the cameras yet. iPhones have cameras, but they aren't connected yet.

The camera excels in wound photos and EMR updates.

The iPhones do have cameras. We have a secure-texting system that we use on the phones. The clinicians can use that system if they need to send a picture. The phones don't store pictures for HIPAA reasons. Technically, the clinicians could use the phones for other things, but we strongly discourage that. If a clinician takes a wound picture and wants to share it, that person should do it through the secure-texting app because we don't have connectivity with our EMR yet. The app uses the phone's native camera feature, but it doesn't store photos on the phone.

I have an iPhone X. I think the iPhone X has a better camera, but right now, the staff is on the iPhone 7 or the iPhone 8.

We are using the cameras in some incidences. With our MDM program, we have the capability of disabling things that are not in use for HIPAA-compliance reasons. If there is not an application or a use case for the group to use the camera, we disable it. We do have the camera turned on for some groups. We set up specific device profiles for each use case, and if the use case does not call for the use of the camera, it is not turned on. The camera is very strong. We have no complaints.

I have seen some camera use for wound care, and telehealth uses the cameras a lot. Our rounding group does document things with the camera too. That is another application. There are some use cases for the cameras.

There is discussion around the iPhone camera. People have different opinions, but some groups here don't think that we can use the camera on the iPhone to take pictures of abuse or pictures that require really fine detail. The issue is that the electronics can be modified, but for regular picture taking, whether the picture is of a patient, a situation, a mass, or something that is broken, the camera works great. I would say the camera is very strong. But if the picture is of something that requires fine, sensitive detail, the camera is not great. That is my personal opinion. Some people swear that the iPhone camera is the best thing ever, so that answer is dependent on the person being asked the question.

We do use the camera, and it is excellent.

We haven't had any issues. Being able to send clear pictures has actually greatly improved our workflow. Of course, those pictures aren't being automatically transferred to the patient chart, but there are no issues with the cameras. They work well.

### Vocera Smartbadge

There are no cameras on the badges.

### Zebra Technologies TC51-HC

The camera is one of the strongest rated features with our hospitals. Having that camera is a huge staff satisfier. We do not currently have the functionality to upload pictures, but we are using the feature for secure texting.

Zebra Technologies' camera is a bit grainy.

We do tissue analytics with a third-party application at one of our sites. The site uses Zebra devices to take pictures of wounds, and then the site runs some algorithms based on the pictures. We also have an application for camera capture from our EMR that works well, and it has the ability to send picture messages in the texting application. An iPhone would definitely have a better camera quality than the Zebra devices.

Zebra Technologies is probably investing in the camera for the TC52-HC. The camera is strong. If it had a better flash, that would be nice. The vendor is also talking about incorporating measurements so we don't have to lay down a ruler. I know that is coming in the newer version. Right now, physicians lay a piece of paper or a paper ruler next to what they are measuring to denote the size. Zebra Technologies has definitely listened to providers' needs and have made that a part of the development process. That has been good; we just don't have it yet.

We use the camera rarely for wound photography.

We aren't currently using the camera, so I don't have much to share on that.

## Rate the cost of your shared smart device.

### Apple iPhone 7 or newer

The cost of a cell phone is pretty relative across the market, so the Apple phones aren't insanely overpriced or dirt cheap. The price is in the middle of the road compared to the price of the Android devices or of anything else out there.

We got great deals on the devices because we didn't get them through Apple.

We have been going to local provider carriers, and we get them to pay for the data plan for a year, and we remove the SIM cards. There is no obligation to keep the cards in, and we get the devices for free basically. Sometimes there is a charge at the end, but we completely take the phones off the cellular services.

We had some configuration issues with the application, but we corrected the issues, and things work fine now. The issue for us with the iPhones is that we can't really share the devices. The iPhones are all individual, and they come at a cost. If we had another vendor's phones, we could just hand off those phones without logging in or having passwords. We can't do that with iPhones. We have a few iPhones, but I don't know whether we are going to continue rolling them out because they are costly.

Our budget for iPhones is comparable to the cost of Cisco wireless phones now.

The phones themselves aren't that much of a cost, but the cellular service plan is. We have to get the data packages with the service, and the packages are a little pricey. There is a hefty price per month for the plan, and that adds up.

The price could always be cheaper. The devices are expensive. I don't have a lot of subscriptions for other products, and I don't have any concept of how the price compares to how long the devices last.

The cost is adequate. We pay several hundred dollars, which is very adequate compared to what we could have been paying. We would always love the devices to be cheaper if possible. We are making changes to the policies now. Before, there was a policy that said the physicians could pretty much get any phone they wanted, and physicians always wanted the latest and greatest phone. But we recently made changes as a cost-saving measure, so the physicians can no longer get any phone that they want unless they use a BYOD phone. We don't dictate any regulations with the BYOD devices.

The cost is about \$500 per phone with the case and everything. The cost is good and appropriate.

I don't know if we get a special discount because we order so much, but the cost is adequate. We are using the iPhone 8, but we are actually in the process of ordering the new iPhone SE, which is the same size as the iPhone 8. That will allow us to use the mophie cases and docking stations that we currently have. We really like that.

I find the devices to be very cost effective.

### Vocera Smartbadge

I think the cost is good for what the devices do.

I have not looked at the cost of other devices to compare costs. But because the size is so great and because the interactions with the product engage multiple systems and work through the device, I would say the device is priced very well.

The devices are expensive.

It absolutely blew my mind when I saw the cost of Smartbadge, but after talking to our CMO, there are apparently lots of things that cost that much. I know that Vocera's system is definitely top of the line and is a Cadillac of communication devices, so Vocera is a bit

more expensive than other systems. Just comparing what we would have gotten with other vendors, I don't think Vocera was that far off with anything. Vocera has been just amazing to work with in terms of helping get the price down. They have been willing to give a little.

The Smartbadge devices were too expensive. The vendor also doesn't provide hardware support, so we have to buy an extended warranty for our hardware. To get three years of warranty for the badges, customers are looking at over \$500. Whereas with Zebra Technologies' devices, customers can buy a phone and pay a support cost. If the phone breaks, they send it in, and the vendor gives them a refurbished one. With Vocera, we won't get a new device unless it is under warranty. If the vendor wanted to fix one thing, they should fix the cost. There needs to be a value proposition to the long-term use of a product, especially in the healthcare space.

As far as the cost goes, the prices of almost all the devices we looked at were pretty comparable to Vocera's price.

## **Zebra Technologies TC51-HC**

At the facility level, we don't have any visibility on the cost. I didn't get any feedback on that. Those costs are all managed at the corporate level.

The Zebra Technologies phones can do five or six things, whereas other phones can only do one or two things. There is more value in the Zebra Technologies phones.

The devices are expensive. One device costs about \$1,400 with a one-year warranty.

Zebra's main competitor right now for our use case is Spectralink. Spectralink's devices are similar in price to Zebra's devices. But for a smart device, Spectralink's devices aren't top notch and are pretty expensive.

Compared to what we have paid for our previous phones, the cost of the devices is a little on the high side. But I can't find anything cheaper. The cost is too pricey when I think about how I could buy a full-blown laptop with a 14" screen for the same cost.

Compared to other products, the devices are a little more expensive, but we haven't seen any additional costs, so I would say that the cost is reasonable. Getting the battery life that we wanted with the scanner pretty much doubled the cost of other products. There are products that are a little cheaper, but I have no idea what their durability is.

I remember the devices being pretty pricey.

The value we have gotten is adequate. The cost of the phones is one part. The implementation services, the speed, and the rebates are also part of the total package that we got from Zebra Technologies and another vendor. We are fairly pleased with the price considering that rates are always going up on cell phone products. Zebra Technologies didn't give us the phones for free, but they gave us a cheaper rate because of the bulk.

We went into the product with the hope of combining two products in one so that we could move other applications onto the phones and make things really convenient for our nursing staff and providers. There were a lot of reasons why we went with the Zebra Technologies devices.

## PURCHASE CONSIDERATION FACTORS

### Apple iPhone 7 or newer

#### Reason for selecting

In addition to being easy to use, the Apple devices aren't prone to viruses like the Android devices are. We get alerts from our MDM system about the security exploits of our Android devices almost daily. But those exploits are few and far between with the iPhones. From a security standpoint, we are able to lock the iPhones down and protect the organization data, so they just make sense. And more apps work on the iOS system than on the Android system. In terms of implementing security protocols, we have a lot more options and wiggle room with the iPhones. People can root the Android phones, and that basically means that we can hack the devices and put in our own custom software. Doing that creates a lot of holes in the security network. It is harder to root the iPhones, so from a deployment standpoint, they are a lot better.

We use Apple's device-enrollment program in conjunction with our MDM system. We just buy Wi-Fi. The iPads are linked with our Apple account, and they already come preloaded with our security software, so that cuts down on deployment time. Instead of getting 10 devices shipped to our office and having a crew work on them, we can ship the devices directly to the site. All the people have to do is turn the devices on and sign in with their IDs, and the devices pull down all the security protocols and get up and running. That makes the providers happy because they don't have to wait on us.

The iPhones integrated with our other systems.

We selected iPhone 7 devices initially and moved to iPhone 8 devices. Our strategy will be to shift focus to budget devices as we progress.

We are going to be using the iPhones when we move to our new EMR. The phones work well with our EMR, and that is one of the biggest reasons why we chose Apple. I don't know whether our organization looked at other smartphones, but any smartphone is a level up from our legacy devices, which were old and had limited capabilities. The iPhones are valuable because we have smartphone features and can download applications.

Our company feels like Apple is more secure in terms of the operating system. The Android operating system is more open sourced.

We try to stay standard with the Apple products. I do know of one area that has a couple of Android devices, but the iPhones just work better for the corporate environments.

A lot of developers are doing development on iOS. People think the Apple devices are not good or strong enough for a workplace environment, but the devices are a lot stronger and more durable than people think. Initially, there was concern that we would lose the devices, but they have turned out to have a better user interface than any other device we have looked at.

We compared iPhones with Androids, and the reason we liked the iPhone was because of the Mobile Heartbeat app, which works better with an iPhone. The phone could accommodate all the apps we wanted. That was the real selling point for us. The versatility of the iPhone was the main factor in our decision.

The iPhones were selected just because it was obvious that their security trumped any Android device out there.

When we selected iPhones, the biggest reasons for selecting them were scalability of provisioning, management, Apple's Device Enrollment Program, call quality, and cost. Those were the big driving factors for us.

#### Reason for considering but not selecting, or not considering

Our corporate strategy was to go with an Android device.

We didn't pick Apple's phones for two reasons. One was cost, and the other was that one of our MDM solutions didn't work with the iPhones. Our contract with another vendor included that MDM solution, but it only covered the Android devices.

I think our organization looked at iPhone devices before I was on the last project. We had initially decided to go with another device right as the Spectralink device was coming out, and at least in the last project, those were the only two devices we were considering.

We did use the iPhones on the virtual network computing program. That was okay but not great. Also, the iPhones are kind of spendy to roll out to each nurse. The iPhones were too expensive to roll out to everyone, and they don't work as well as the badges do.

The badges don't have any applications. There is a mobile app that we use on the older iPhone 7 phones. There are hospital-provided iPhones with the Vina app on them, and the app is the software we use from Vocera. The whole reason we gave people the iPhones was for the Vocera app. Some people use the phones without the app.

We aren't considering Apple right now but maybe in the future. Our clinical leadership is very in favor of the hands-free feature in the solution we have now.

Voalte was amazing. They had wonderful things to offer. Initially, we were going more toward Voalte just because our hospital uses iPhones for a lot of things, and we have the ability to get iPhones for a pretty decent price. Of course, Voalte's solution is just an app on a phone, so that was kind of why we were leaning toward Voalte. They offered all the things we needed in terms of communication.

I don't believe that we would be able to convince our nursing staff to completely adopt a BYOD solution. We will have to provide some type of smartphone. At this point, we will probably end up providing the new Apple SE phones. We could put those phones in docks, and the nurses would just scan their badge to sign in and be told which phone to grab. The phones are pretty simple. No decision has been made yet; we are still shopping. COVID-19 changed everything. It has certainly pushed everything back a year.

People can get a new iPhone SE with 64GB for roughly \$300. When we are buying in bulk, there is no way to beat that price. I have to buy extra devices anyway.

If we went with Apple, we would move away from the Vocera platform entirely. We would move to another mobile communication platform.

An iPhone is generally free. We don't pay for the phone. We have to pay for the case and the monthly fee, but we don't have to pay for the actual phone.

We saw the iPhones more as commercial-type devices. An issue that we had when clinicians used the iPhones was that the patients thought the clinicians were speaking to friends on the phone and not taking care of the patients. They didn't realize that the iPhones were the clinicians' clinical devices. There was a branding issue.

We were really not looking to go away from Androids. Our enterprise vendor's initial preference with the devices was to go to with Apple products, and the vendor had trouble getting updates out. We were kind of steered toward the Androids because they had flexibility and made quicker changes. Our leadership wants to support fewer device models and keep the same charging equipment.

The iPhone is somewhat bulky because of the phone cases, so that is why we did not go with the iPhone.

The cost and the possibility of the updates breaking the iPhones were concerns for us. We decided that it would be easy to break the iPhone without strong cases. I worried about continually breaking and replacing screens.

We strongly considered iPhones. We have them in the fleet today, but we ruled them out because they are a consumer device without enterprise controls. We struggle to maintain consistent app versions, and the iPhone OS changes frequently. We would have to buy something in order to put the system in because the iPhones don't come with barcode scanning natively or any of the enterprise functions that we need.

The reason we did not select iPhones for our inpatient nurses was they didn't support a dialer on the phone. Unless people buy another communication product, they can't make a phone call on a wireless device; they would need a cell plan. That ruled out Apple for us. Epic's product Rover on the Apple devices doesn't have the ability to make phone calls. That is a huge problem. We love Apple, and we would like to have more Apple products in-house. If that problem could be resolved, that would be awesome.

Apple has a small advantage over Zebra Technologies with user satisfaction. When we were asking the vendors questions, Apple scored slightly higher than Zebra Technologies, but we chose Zebra Technologies because of the overall cost of their solution.

## Ascom Myco 3

### Reason for selecting

[No comments shared by respondents.]

### Reason for considering but not selecting, or not considering

Our concern with Ascom Myco 3 was the screen size on the devices.

Ascom had a miniature Myco 3 device. It was cool and nice, but it was too small. We couldn't read the data. Ascom has a regular size now, but the old one was too small.

We looked at Ascom Americas. We pulled together a user group from the internal candidates that would be using the phones. We went to all the demos and the dog and pony shows for the vendors. Our users liked another platform better.

The reason we ruled out the Myco 3 devices was that there was a feature that wasn't ready yet.

We ruled out the solution because of the proprietary infrastructure and because the chipset was much older.

## Samsung

### Reason for selecting

Samsung was recommended to us by one of our other vendors. The cost was a factor as well.

### Reason for considering but not selecting, or not considering

We went with iOS devices since they align with Epic's strategy to go with Apple.

I did review Samsung at my level. We review the Android platform versus the iOS platform.

Our organization wanted to look at an Android device as a more cost-effective solution. But I don't think we were looking at Samsung's devices or anything specific.

We considered getting Samsung phones. The app we wanted made the decision for us. We did tests with Androids to see how they would do.

We didn't consider the Samsung Galaxy line. In terms of Android versus iOS, we were only interested in rugged devices from Android. We didn't entertain any consumer-grade Android devices.

Samsung was an option for us, but we are strictly an iPhone shop here.

The Samsung phones we had in our facility didn't work with a specific application that we wanted to use for scanning and printing labels.

I would like to see a company come out with a rugged Tier 2 device. I definitely don't think our Samsung choice was the best given the devices are not hospital grade. Zebra Technologies didn't make Tier 2 devices at the time that we were choosing, and a lot of other vendors have popped up since then that have those devices. But those devices are still relatively expensive.

We didn't look at Samsung. I don't think we were even aware that they had a device. We probably wouldn't have looked at the devices if we had known about them because of the battery life. Just like with iPhones, we wouldn't be able to replace the battery, and that poses a problem.

We considered the Samsung products, but they had drawbacks.

## Spectralink Versity

### Reason for selecting

We only considered the devices that Cerner told us were options. Those were Android and iPhone devices. We came upon the Versity devices late in the process but just in time. Spectralink's devices were a game changer in that we didn't need to use a bulky alternative.

### Reason for considering but not selecting, or not considering

We reviewed the prior Spectralink device and had difficulty with the initial configuration.

Our Spectralink devices were old and didn't have texting capabilities. The version was pretty old. I am not familiar with Versity at all. Our telecommunications team might have vetted it, but I wasn't involved in that. That team did look at different options, but I am not familiar with which options they looked at.

I considered Spectralink Versity, and at the time, the vendor didn't really give us any cost savings. They didn't offer much either for efficiency in provisioning and management. They weren't really a strong contender for us.

Spectralink's devices weren't verified as Android devices by Cerner. The only Android options were Zebra Technologies and Honeywell.

When we looked at the old SpectraLink phones, the issue was that users couldn't message or do anything like that.

We had Spectralink previously, and their solution just doesn't have the call flow ability. The vendor we chose has engaged the growth factor, and it is far beyond any competitor's.

We didn't consider Versity's products because of the cost.

We had the Spectralink phones, but the DECT devices weren't very versatile. Our organization purchased the integration for those devices, but then we never used them. The nurses thought the devices were too much, so our organization took them all away.

I believe the organization also tried out the Spectralink Versity.

We looked at the newer version of SpectraLink's devices, and we couldn't even get any applications logged in. We couldn't add our existing applications to those devices. There were some technical problems, so we just gave up.

We have reevaluated the new wave of rollouts to see whether we want to stick with them or entertain the Spectralink devices.

We did look at Spectralink, but our secure communications vendor said they had hardly any customers using Spectralink's solution. That is why we went with another phone.

When we looked at the product, I don't think it had been developed to the point that it has now. Spectralink wasn't very far along in the process of having a durable healthcare device.

I am aware of Spectralink Versity, but we didn't consider it.

I actually liked the Spectralink device, but it came out after we had completed our evaluation. The timing was just off.

We did invite Spectralink and Vocera to the ball game. One of them backed out, and the other didn't score very well. I don't recall which was which.

## Vocera Smartbadge

### Reason for selecting

I watched Vocera's demo, and the product was pretty nice and slick. They gave us a good deal.

The vendor supported hands-free functionality. That was good. My team thought the devices worked very well.

One of our executives had used Smartbadge at another facility and highly recommended it. Additionally, we have another executive who felt like it would be beneficial to the staff. So we had some buy-in from the higher leadership.

We wanted the hands-free feature.

We had nursing buy-in.

We were trying to get Vocera functionality in the door for texting, and the Smartbadge system was the easiest way to do that.

We didn't consider any other devices. We already had Vocera products in our environment as we were using Vocera's B3000N badges, and we liked the system. So I just brought in Vocera and had demos done to a department that wanted to go to Smartbadge devices, and that department liked them. We really didn't venture out. We have had Vocera's products in our environment for many years, and they are a favorite on all of our floors. We were enhancing what we had, and it was easier to go with something we already had in place.

The badges have a few different layers to each screen, so users can go to the badge settings and adjust things, or they can go to their account. Otherwise, everything is already built in. Users just have to hit a button and give a command, and then the solution does what is asked.

We really liked the Vocera badges. Vocera came out with their Smartbadge product, and that product is new for them. When the product came out, our representative called us and showed us the product, and that sealed the deal for us. The product was exactly what we wanted and was a combination of everything. The product has the hands-free portion that providers can use, and we absolutely loved that about the product. But the product also had the ability to send text messages and be secure. We have worked with various people at Vocera, from an executive all the way down to a project manager. I can't imagine working with anybody else who has been more helpful and more honest. Vocera is more outgoing and is more of an advocate for us than any other vendor.

Part of the reason we went with the Smartbadge devices is that we already owned some Vocera products. We already had the licensing to support the devices out of the box. We were literally just purchasing the hardware. The decision was kind of a no-brainer.

Some departments didn't want the Smartbadge devices for multiple reasons. For example, one of our teams watches patients to make sure they don't fall, and we don't want that team to be sitting there texting or anything like that. We want that team to be engaged and to only use voice communication. But there are some departments that only want to receive texts, even on a B3000 device.

We had some devices that were at the end of life. Our original intent was to replace those devices. Once we found out that we could do almost everything with the Smartbadge devices, we chose Vocera. The devices were also easy to use. Users could just press one button and make a call. With in-house communication, a one-touch button makes a difference. Vocera was not my choice, but the users seemed to think that the Vocera devices were the easiest to use and would best fit their needs. The decision was based on user feedback.

### Reason for considering but not selecting, or not considering

Vocera was considered for a little while for nurse communication. They were tabled because of us transitioning to an EMR. We had a group discussion and decided that no nurse wants to carry around 5 billion devices. Nurses don't want the Smartbadge device and a phone. Some nurses have iPads, so the devices can become cumbersome. When we can have everything on a mobile application and

give the nurses one device that has access to the EMR and communication software, that makes the nurses a lot happier. We decided to go the route of having everything in one place.

The Vocera Smartbadge was not available at the time of our purchase; only the Vocera badge was available.

At the time, Vocera didn't have a product that had the right smartphone functions.

For the nursing side, people seem to really like the Vocera devices because those fit into their workflows more than other phones. In some cases, units do find that the phones are very workable for what they need. But on the nursing side, people gravitate toward hands-free devices over the phones. If we could ever approve for the nurses to have their own devices, many of them would gladly use their own devices. However, we have not approved that.

We looked at Vocera Smartbadges, and we strongly considered them, but ultimately, we decided that the app we wanted was better than their app.

We did not consider Vocera because of internal opinions about HIPAA compliance.

Our organization does have several facilities that are up on Vocera's software, but I don't know whether Vocera Smartbadge was considered for the care or connection piece.

We were aware of the Vocera phones. One of our doctors wanted those phones because that person had used them before. There was interest in those phones for the ED because they had a push-to-talk feature, but one decision-maker didn't want to go down that road because of the cost. We also knew that we would eventually want to get devices that could do many different things, not just one thing.

We have one set of Vocera Smartbadges that allow us to speak to dial. One of the main goals from a corporate leadership perspective was communication. We were only considering devices that were validated with our EMR.

We did not look at Vocera. We looked at them several years ago, and we just didn't like how their solution worked. We would have had to use the Vocera software, and that didn't align with the decision we had already made for our secured communications vendor.

We own some Vocera Smartbadge products, but they aren't part of an enterprise rollout plan. The badges are just used in a unique workflow. They aren't smart devices.

Vocera's product was not out on the market at all. We had previously used Vocera's communication platform, and I like Vocera. But the platform for smartphones and smart badges isn't adequate. We actually retired that platform.

Vocera Smartbadge is strictly for communication through voice communication and messaging. That is all the device does. Our Vocera solution has everything encrypted.

## Zebra Technologies TC51-HC

### Reason for selecting

I reached out to the project manager who was working on things and got some insight into what the organization tried but not why the organization went with the devices we went with. We started with a Honeywell product, and based on the feedback from the connectivity and sound quality, we moved to the Zebra devices. But I don't know what was behind the decision to land with the Zebra devices.

Zebra Technologies has proven that their devices work, and the uses of the vendor's applications are appealing. There is a product that we use at the hospital, and the Zebra Technologies devices are compatible with that product. We previously were using that product with a different generation of Zebra Technologies devices, which didn't have mobile phone connectivity. Continuing with a newer version of Zebra Technologies' devices seemed like the best way to keep using the application.

The Zebra Technologies devices are more for clinical use, and they are branded appropriately so that patients know the nurses are using clinical devices and are not just talking on their personal phones. We have seen that issue with other vendors' phones, which look more like commercial cell phones.

At the time of our decision, another vendor and Zebra Technologies were the only ones that were approved through Cerner, and the other vendor's device was twice as bulky as Zebra Technologies', so we went with the latter.

We opted to go with the TC51-HC devices primarily because when we talked to our vendor of choice for secured communication across the enterprise, they had a huge number of clients that used the TC51-HC devices. We called several of those clients, and they said they had never had any problems. So that is why we ended up going with the TC51-HC devices.

We chose Zebra Technologies' product because it is enterprise grade and isn't bulky. Also, we are able to control the phone through enterprise management tools.

The primary drivers for us selecting the system were the dialer and the ability to make phone calls.

I like the Vocera devices because they are smaller and easy to carry around. So I would probably use the Vocera devices over the TC52 devices. But that is because of my job. If I had to do specimen collection and things like that, then I would probably much rather carry a TC52 device around and do all of that.

I totally would recommend the Zebra devices. They are easy to use and have so many functions that we can use them for. They don't just do lab collections; we can do all kinds of communications with them, like voice communication and messaging.

### Reason for considering but not selecting, or not considering

Epic's road map is focused on iOS first. Other sites are moving to iPhone devices and redirecting their strategy to iOS devices.

As far as I am aware, we didn't look at Zebra Technologies. That doesn't mean that someone didn't look at them, but we didn't look at the vendor at my level.

We evaluated the devices way back, but we went with another solution. We never strongly considered the Zebra devices.

We had begun to refresh our fleet, and we previously had the Zebra MC40 devices. We began to refresh before the Zebra TC51 had been publicly released. We had already begun some of the infrastructure changes to accommodate iPhones and had already made a good business case for the change.

When we were looking at options, the Zebra Technologies devices were very expensive. We weren't ready for the technology that Zebra Technologies had because we weren't doing scanning and all of the other cool things their devices could do. The issue was about where we were on our road map.

I remember when we initially looked at the project, we were looking at the MC40 devices. That was the vendor's first recommendation, and then there was a new one called the TC51 device. It looked like it was still several years old when they released it. I understood what the vendor was doing. We were looking at a durable device, and it was Zebra Technologies that made that device. For what it was meant for, it was great. But then Spectralink changed the game a bit.

We didn't look at Zebra Technologies, but I was aware of them. We used another vendor that gave us a deal.

We have Zebra products in-house, but they are running through a different vendor.

Nurses like the devices for different reasons. Some of them don't like the devices, but all of them support the ability to swap the battery. Even without a battery, the devices have 30 minutes of life before the phones shut off. That is super nice. Everyone likes that feature and the fact that all of the models are water resistant. The devices have clear screens and work with gloved hands. But everyone complains about the size of the devices.

We didn't choose the Zebra Technologies devices because they are very expensive and the battery reminded us of the Spectralink phones that we had. We always had issues with the battery and the clips for those phones.