COMPATIBILITY OF MEDICAL DEVICE DATA WITH HOSPITAL INFORMATION SYSTEMS

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Imagine patient data speeding from bedside medical devices over the hospital network directly into a hospital's information system. Consider the efficiencies as device data autopopulates each field, exactly where that data needs to be.

Picture the satisfaction of caregivers as they abandon pens, clipboards and manual data recording, and the confidence of patients knowing that clinicians have the most accurate and up-to-date records upon which to make care decisions.

In the future, medical devices may even provide information that could automatically drive adjustments to other medical devices, while driving out wasteful practices and ultimately giving clinicians the required clinical data to help them deliver quality patient care.

In most hospitals, the barrier to this seemingly simple, yet extremely complex vision is that point-of-care devices are not designed to share this level of information. With vendor-specific interfaces and proprietary protocols, they often merely co-exist in limited worlds of their own.

The overarching goal is to achieve integrated device data with health care information systems (HIS).

After all, systems such as an EMR play a key role in patient care. They are often the crucial touch points between clinician and patient information and the juncture where data from multiple devices are compiled to create a comprehensive clinical record of care.

WHAT WOULD IT TAKE TO MAKE THIS VISION A REALITY?

One solution is to implement an enterprise-wide universal standard of communication across all medical devices, so that all device data is compatible from the start. **This is referred to as medical device interoperability.**

Another approach is to transform disparate data after it leaves devices and travels across the hospital network, making it compatible with these information systems before it arrives as a ubiquitous standardized output. **This is called medical device integration.**

While both approaches achieve many of the same goals, important differences exist.

MEDICAL DEVICE INTEROPERABILITY: A DIFFICULT ROAD

According to the Continua Alliance, medical device interoperability is considered as a "seamless flow of information between many disparate devices over a network to and from the intended recipients." [1] Many experts repeatedly describe this strategy as synonymous with open interfaces and common communications standards across all point-of care devices and all vendors.

Today, true interoperability is simply not available. While an admirable goal, achieving this would be difficult in an acceptable timeframe for hospitals seeking an immediate solution.

Adoption of a Universal Standard

A universal, open communications standard for all devices and a corresponding standard for information systems has long been discussed and debated. While some strides have been made towards establishing this, standardization is a long and arduous process involving device manufacturers, information systems vendors, and regulatory bodies such as the US Food and Drug Administration (FDA) and Medical Device Directive (MDD) for European certification.

Just because a standard is universal, doesn't mean it is always safe. If an alarm doesn't get communicated or the right parameter is returned in even the simplest yet 'unexpected' way, it can cause serious harm to life.

Additionally, health care providers themselves must be incentivized to support a universal standard. Historically, hospital departments have selected technology to meet their own department's clinical needs; however, today they must also consider the technology as part of an integrated enterprise solution. Such a strategy may call for the replacement of all devices hospital-wide, with enormous cost and workflow changes involved.

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BENEFITS OF INTEGRATED DEVICE DATA

The key benefit of integrated device data is the ability to transmit data directly from medical devices to an EMR or other information system. Without integration, busy clinicians, typically nurses must manually record that data and then repeat the process by keying it into an electronic system.

DIRECT INTEGRATION OF DEVICE DATA INTO AN ELECTRONIC RECORD RESULTS IN:

- Greater data accuracy due to the elimination of manual transcription.
- Improved timeliness of information due to immediate data transfer to an EMR.
- Enterprise-wide data access through the HIS.

IN TURN, THIS HIGH-QUALITY, TIMELY, AND WIDELY AVAILABLE DATA CAN SUPPORT:

- Improved patient care delivery through well-informed clinical decision making
- Greater clinician efficiency and satisfaction through the reduction of administrative tasks.
- Improved clinical documentation compliance.

## MEDICAL DEVICE INTEGRATION: A PROVEN PATHWAY

Medical Device Integration (MDI), also called medical device connectivity, enables the integration of data from multiple point-of care medical devices into health care information systems.

Unlike interoperability, device integration does not require a common interface or a shared protocol among devices. Instead, MDI vendors develop Device Driver Interfaces (DDIs) that extract and translate data from a wide range of equipment at the bedside and other key locations to enable communications over the hospital network. The software component of the system functions as a universal translator, standardizing the output of patient physiologic data into a consistent format (typically HL7) that can be accepted by the information systems involved.

Today, Medical Device Integration is available, proven and having a positive impact on hospitals today.

THREE KEY OPTIONS EXIST
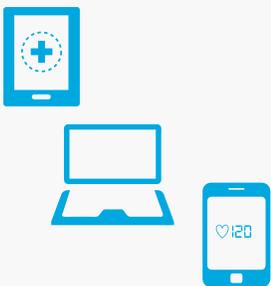
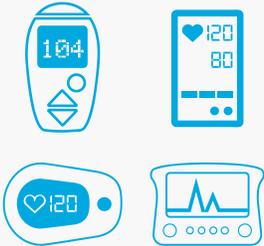### OPTION 1
Home-Grown Integration Solutions

Some organizations choose to take integration in-house by creating and managing their own solutions with multiple device types. In such environments, data typically flows from the devices or gateways into a custom interface engine, where the data is normalized and sent to the EMR. However, significant challenges may arise with this strategy because in-house IT departments must invest significant staff time and resources for system development, testing and maintenance of a large library of device protocols. Some elements may also require regulatory adherence. Adding new devices, device software updates and firmware also creates a new set of challenges, including potential incompatibilities, broken connections and questionable workarounds.

OPTION 2
Vendor "Gateways" for Multiple Device Types

Currently, some device vendors offer integration via proprietary gateways. These gateways range from integrating only the manufacturer's devices, to handling both their own and other manufacturer's devices. In the latter scenario the gateway supplier must collaborate closely with other device manufacturers to develop and keep up-to-date a library of device protocols that translate and normalize the data used to send a standard format to the EMR. This can sometimes be difficult for a gateway supplier to be informed of and maintain the versioning and testing of other manufacturer's protocols.

For organizations focusing on integrating a small number of devices in a particular care environment, a gateway may be a satisfactory solution. But, in a large hospital setting with diverse device types and brands, a gateway with a broad library would be needed.

OPTION 3
Middleware Medical Device Integration: Today's Solution

Middleware medical device integration represents a strategy that overcomes many of the challenges resulting from alternative integration methods. Like other device integration strategies, it can be successfully implemented today. But, unlike other strategies, it provides connectivity for a full range of device types, manufacturers and information systems. These MDI solutions run on an organization's existing information system infrastructure and support most devices already in place and, therefore, can maintain current clinical workflow.

Middleware systems are developed by vendor-neutral providers whose main focus is on proactive maintenance of a diverse device driver library, relationships with the device manufacturers, and the quality and safety of the data Preferred vendors have hundreds of drivers already developed, tested and implemented; and develop new drivers at the request of hospitals. Significantly, middleware medical device integration can save thousands of dollars by enabling sites to use their existing — perhaps even legacy — equipment instead of requiring new purchases. As a result, this strategy also eliminates any need to re-train staff on new devices. These systems often provide various deployment options for a range of care settings, clinical workflow and organization budgets. Data may flow to the EMR and other information systems through a single or small number of feeds, minimizing management and offering enhanced flexibility and scalability. This open architecture eliminates the complications involved in reformatting data at different points along the network for various information systems.

Adding new devices is virtually plug and play and there is no reconfiguration required in the EMR, as is often the case with home-grown solutions. Upgrades to the middleware are centralized, and new drivers can be pushed from the core connectivity software to all relevant devices.

CONCLUSION

Given its benefits, medical device integration middleware emerges as the strongest strategy for point-of-care device integration today. However, hospitals must be aware of all their middleware vendor options and select a solution that offers both the technical and clinical tools to meet their specific needs in the various and often quite different care areas of the hospital.

ABOUT QUALCOMM LIFE

Leveraging Qualcomm's 30 years of mobile and connectivity expertise, Qualcomm Life is powering new chronic care and remote patient management care models through our medical-grade platform. Our 2net™ Platform securely connects to one of the world's largest health care ecosystems, enabling near real-time informed care that surrounds the patient. The Capsule Medical Device Information System (MDIS), is a product built from 19 years of hospital medical device connectivity and integration experience. The MDIS solutions connect, monitor, integrate and analyze data into the EMR and other intelligent enterprise systems, helping enhance clinical workflows and improve operational efficiencies.

We are bringing a new generation of integrated care solutions to the hospital, the home and all points in between, creating a more seamless and informed care continuum. Our platforms are unlocking vital data, creating clinical context and making data and insights accessible when and where they are needed.

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