

## Hot Topics in Patient Care Device Integration

**Last Wednesday of Each Month at 12:00 PM (eastern)**



- **A community of learners focused on**
  - ◆ Achieving the promise of patient care technology solutions
    - Improved Patient Safety & Patient Care*
    - Improved Care Giver Productivity/Job Satisfaction*
  - ◆ Tackling the challenges of patient care technology solutions
    - The network as a “medical device”*
    - Governance of IT & Biomed/Changing Operations*
- **Previous Sessions**
  - ◆ Avoiding the Accidental Architecture – March 31
  - ◆ Clinical Transformation and PCDI – April 28
- **Upcoming Sessions**
  - ◆ Two hospital case studies – June 30 & July 28
  - ◆ Overview of IEC80001 – August 25

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BMoorman Consulting,  
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# *Patient Care Device Integration (PCDI)*

## **How Smart Are Your Medical Devices?**

May 26, 2010

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# Overview

- **Definitions**
- **Questions: Top ten questions to answer about your medical device inventory and environment**
- **Summary: Key information and steps to ensure knowledge of your medical device inventory and environment**

# Definitions



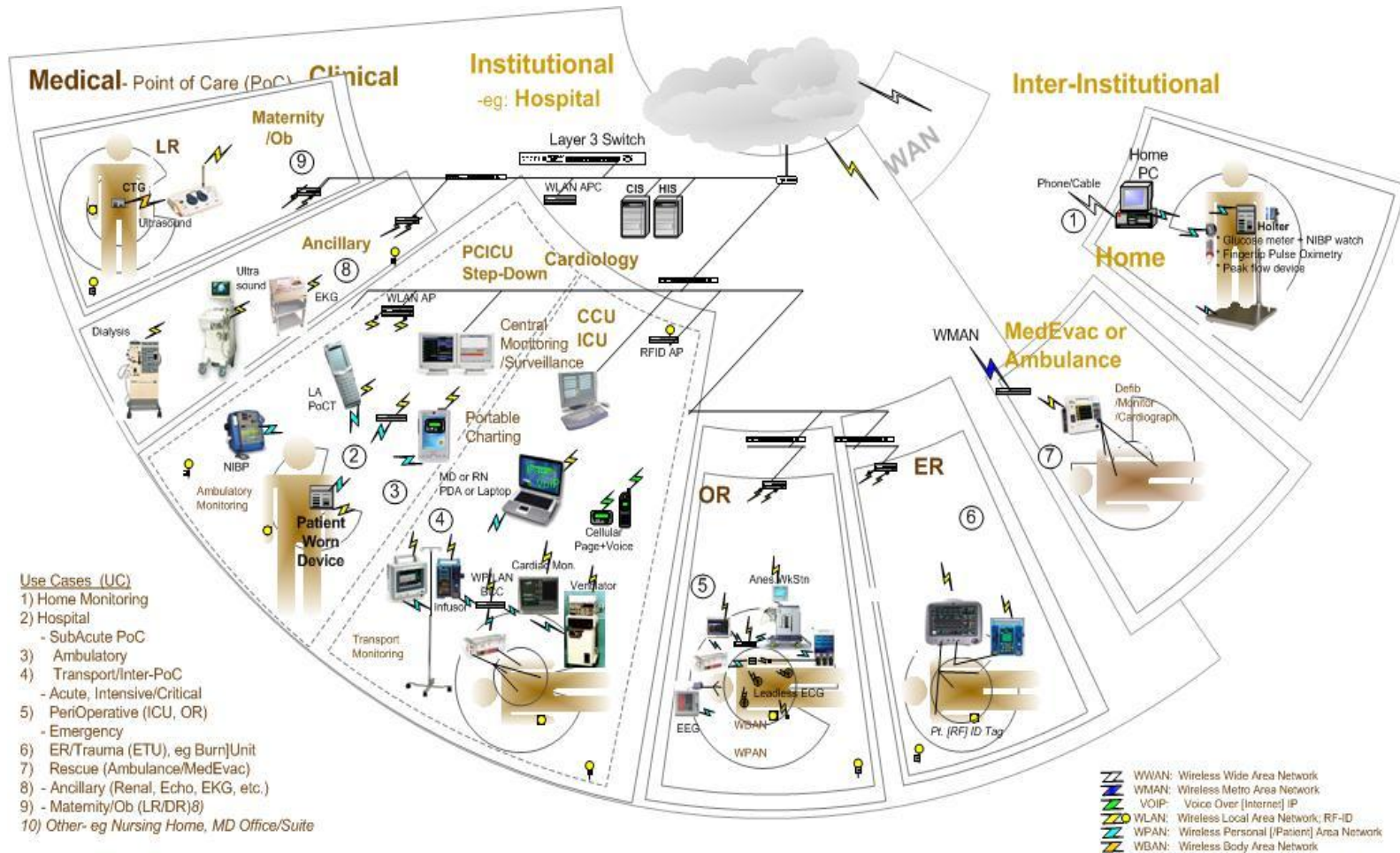
- **Ultimate goal of interoperability: flow of information to/from many disparate devices over a network to/from intended recipients**
- **Interoperable for this presentation is defined as the ability for the medical devices to send information to intended recipients without manual intervention**
- **Determination of interoperability status; both medical device inventory and environment**
  - ◆ Medical device inventory – what medical devices you have in your healthcare facility
  - ◆ Environment – infrastructure (IT, power), applications for interfacing

# Question 1



- **What are the patient care areas where you have medical devices that collect patient information that you'd like to have in your Electronic Health Record (EHR) or other clinical applications?**
  - ◆ Example – ICU, PACU, OR, clinics, OB/GYN
  - ◆ Example – by acuity: high, medium, low
  - ◆ Example – stand alone devices or devices as part of an integrated system

# Interoperability Panorama



# Question 2



- **Do you have knowledge of the data that can be captured from all medical devices in your environment?**
  - ◇ Example – how is the data used by clinicians and how might it affect a clinical workflow
  - ◇ Example – how is that data used by clinical applications
  - ◇ Example – is the data complete or does it need to be augmented
  - ◇ Example – is there data about the medical device and its status that would be useful

# Question 2



# Question 3



- **Does your Electronic Health Record (EHR) application pose constraints as to how medical device information can be integrated into the EHR application?**
  - ◇ Example – contractual obligations imposed by EHR vendor for interface mechanism
  - ◇ Example – restrictions on HL7 messaging format
  - ◇ Example – restrictions on ADT interfacing

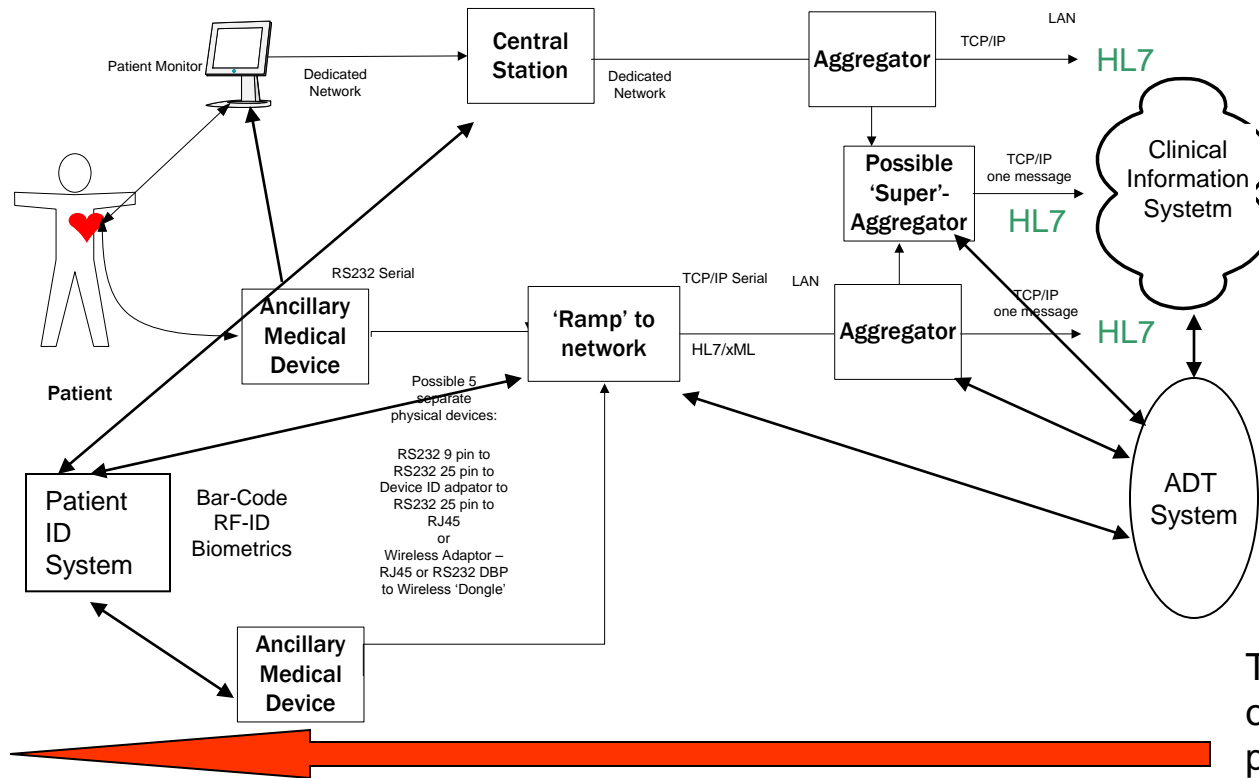
# Question 4



- **Based on your medical device inventory, where would you use an integrated, interfaced or mixed system for medical device connectivity?**
  - ◇ How do the integrated, interfaced or mixed systems affect medical device information flow to the EMR?
    - *Example – truncation of data when combined in integrated system*
    - *Example – direct versus indirect patient identification information*

# Interfacing Basics

## Generic Medical Device Interface to Clinical Information System Diagram



Trend – movement of computing towards patient/device location

# Systems to Interface



- Clinical/Functional Specialty Systems
  - ◆ Anesthesia Information Management System, Surgical Information System, Cardiovascular Information System, Infusion Pump Management System
- Third-Party Medical Device Integration Systems
  - ◆ Capsule Tech, Nuvon, iSirona, Hill-ROM/Cerner Care Aware
- Physiological Monitoring Systems
  - ◆ GE, Philips, Siemens, Welch-Allyn and more
- Other
  - ◆ Patient Demographic Systems
    - *Bar Code, RF-ID interfacing*
    - *Future - biometrics*

# Question 5



- **Do you have any information technology network policies or constraints that will inhibit data flow from medical devices?**
  - ◇ Example – requirement for OSI level 3 compatibility (routable protocol)
  - ◇ Example – requirement for dynamic IP addressing
  - ◇ Example – minimization of SNMP
  - ◇ Example – port assignment limitations
  - ◇ Example – specific resource group assignments

# Question 6



- **How will you handle positive patient identification?**
  - ◇ Example - Indirect or Direct mechanisms

# Patient ID



- **Indirect most prevalent**

- ◆ EMR system associates patient identification information to medical device measurement information based on bed number association
- ◆ Bed number provided in PV1 segment of HL7 message sent from medical device integration system

- **Direct is goal**

- ◆ Use of ADT interface at medical device integration system
- ◆ Bar-Code or RF-ID used for unique identification measurement
  - *Future use of Biometrics – fingerprints, DNA*
- ◆ Patient identification information inserted in PID segment of HL7 message at device integration server level
- ◆ Ultimate direct goal is patient identification at medical device level along with physiological measurement

# IHE-PCD HL7 2.6



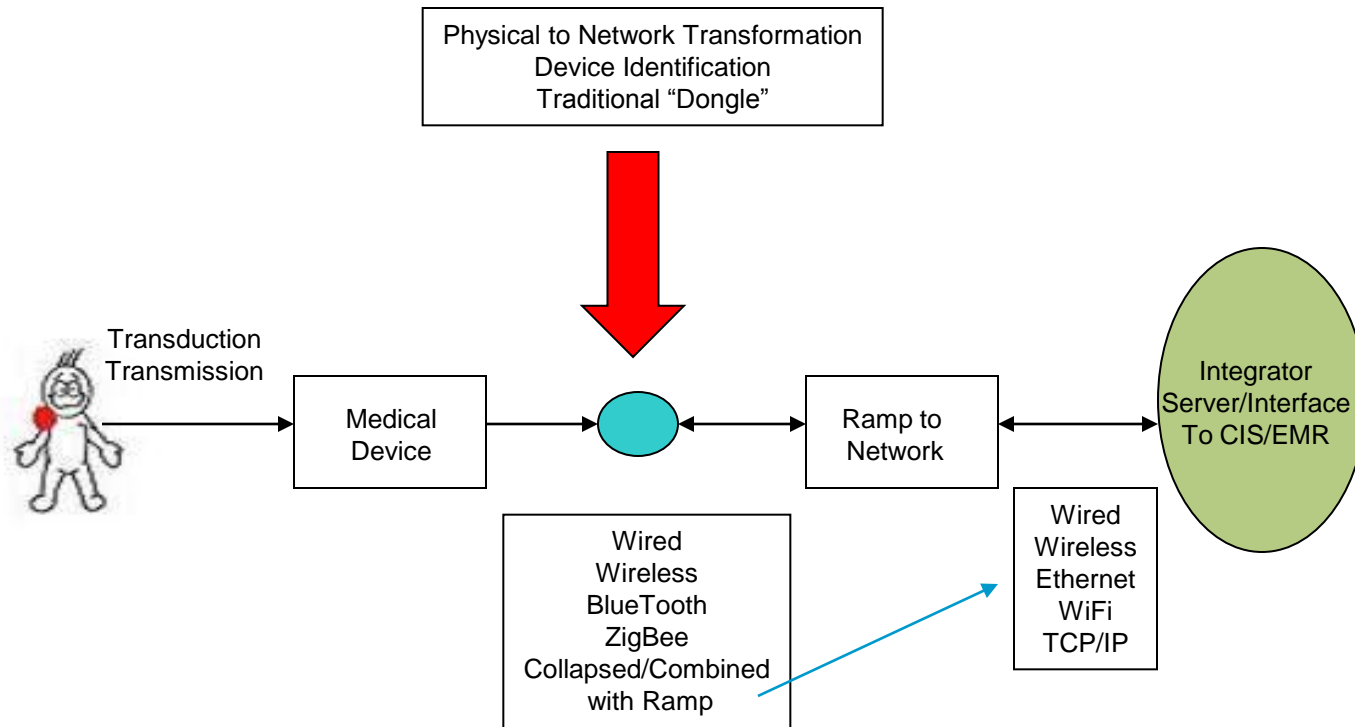
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- PV1|||UNIT\_1^^Bed1
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- OBX|2|ST|184327^MDC\_ECG\_STAT\_RHY^MDC|1.5130.1.184327|Sinus Rhythm|||F
- OBX|3|NM|150456^MDC\_PULS\_OXIM\_SAT\_O2^MDC|1.5238.1.150456|99|262688^MDC\_DIM\_PERCENT^MDC|||F
- OBX|4|NM|147842^MDC\_ECG\_HEART\_RATE^MDC|1.5130.1.147842|81|264864^MDC\_DIM\_BEAT\_PER\_MIN^MDC|||F
- OBX|5|NM|150037^MDC\_PRESS\_BLD\_ART\_ABP\_SYS^MDC|1.5190.1.150036|126|266016^MDC\_DIM\_MMHG^MDC|||F
- OBX|6|NM|150038^MDC\_PRESS\_BLD\_ART\_ABP\_DIA^MDC|1.5190.1.150036|76|266016^MDC\_DIM\_MMHG^MDC|||F
- OBX|7|NM|150039^MDC\_PRESS\_BLD\_ART\_ABP\_MEAN^MDC|1.5190.1.150036|92|266016^MDC\_DIM\_MMHG^MDC|||F

# Question 8



- **What information can you gather and track to determine your medical device connectivity capability?**
  - ◆ Network interface
  - ◆ Data interface
  - ◆ Protocol Interface
  - ◆ Transport Interface
  - ◆ Standards used at the interfaces

# Medical Device to Network



# What to Track



- **Network capability: Y-N**
- **Wired - Wireless**
- **Wired Physical: DB9, DB22, RJ45**
- **Wireless: BlueTooth, ZigBee, 802.11Z, other**
- **Transport: RS232, TCP/IP, Serial**
- **Data: Proprietary, 11073 general, 11073 104ZZ**
- **Other: Continua Certified, IHE conformance to specific use case (PCD-01), part of medical network (monitor connected to central station)**

# What to Track - Example



Device	Network capability: Yes-No	Wired - Wireless	Wired Physical: DB9, DB22, RJ45	Wireless: BlueTooth, ZigBee, 802.11Z, IrDA, other	Transport: RS232, TCP/IP, Serial	Data: Proprietary, 11073-10101/10201, 11073-104ZZ	Messaging: HL7 2.5/2.6, HL7 CCD, IHE XDR	Other: Continua Certified, IHE-PCD conformance to specific profile, part of medical network (monitor connected to central station), ICE compliant (ASTM F29.21)
Pulse Oximeter	Yes	Both	RJ45	Bluetooth	TCP/IP	11073-20601/10404	N/A	Continua V 1.0
Patient Monitor	Yes	Wired	RJ45	N/A	TCP/IP	11073-10101/10201	HL7 2.5	Connected to Patient Monitoring Central Station, IHE-PCD-01
Ventilator	Yes	Wired	DB9	N/A	RS232-Serial	Proprietary	N/A	None
Infusion Pump	Yes	Wireless	N/A	ZigBee	TCP/IP	Proprietary	N/A	Connected to Smart Pump Central Station

# Question 9



- **Are there any infrastructure assumptions required for implementation of a medical device connectivity solution?**
  - ◆ Example – RF-ID/Bar-Code for patient identification
  - ◆ Example – underlying database application license availability
  - ◆ Example – specific web services capability
  - ◆ Example – specific security services capability
  - ◆ Example – specific operating system capability
  - ◆ Example – network access in medical device location
  - ◆ Example – server space in rack for another application server
  - ◆ Example – integration with networking applications for network access

# Question 10



- **What is your timeframe for acquiring medical device connectivity functionality?**
  - ◇ Helps drive medical device connectivity solutions as well as possible medical device replacement strategy
  - ◇ Manages expectations in clinical areas regarding medical device connectivity
  - ◇ Procurement requirements to ease medical device connectivity complexity

# Summary



- **Clinical Areas where medical device connectivity desired**
- **Type of systems available for connectivity**
- **Medical device connectivity capability**
- **EHR requirements**
- **Infrastructure requirements**
- **Information tracking to determine medical device connectivity strategy technology-wise and timing-wise**
- **Bottom line: do an inventory, document the information and discuss it with a multi-disciplinary team**

# Q & A



## Contact Information

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