Inside IHE: Patient Care Device
Webinar Series 2018

Presented by
Rob Wilder
Sr. Product Manager - Spok
IHE PCD Planning Committee Co-Chair
Patient Care Device (PCD) Domain

Formed in 2005 to address Point-of-Care Medical Device integration issues
To enable “Out of the Box”, Reliable, “Functionally Interoperable” solutions
Utilizing IHE and PCD open Processes and open Standards
Technical Underpinnings
HL7 version 2.6 baseline, with profile specific drawing upon 2.7, 2.8, and 2.8.2
IEEE 11073 Standards
  10101 – Standardized Nomenclature
  10201 – Standardized Information Model
Wireless Communication Transfer Protocol (WCTP) version 1.3
IHE ITI domain Consistent Time (CT) profile – Network Time Protocol (NTP)

IHE PCD Co-sponsors
Patient Care Device (PCD) Domain

Focuses on devices associated with patients, including…
Patient monitors, vital signs monitors, pulse oximetry, ventilators,
Infusion pumps, syringe pumps, PCA pumps, etc.

Collecting and reporting data from devices for immediate access and for
retrospective storage and retrieval (EMR)

Harmonizing terminology – nomenclature, enumerations, units of measure

Getting alerts (alarms & advisories) to staff (clinicians, physicians, clinical
engineers, IT, etc.) on local wireless, mobile, and desktop devices

Improving infusion order safety
Patient Care Device (PCD) Domain

Implantable Cardiac Device Observations (IDCO)

Device to Enterprise Communication (DEC) profile

Alert Communication Management (ACM) profile

Waveform support in observations and alerts (ACM and DEC)

Medical Equipment Management (MEM) with device management communication (DMC) location services (LS) and device cyber security
Patient Care Device (PCD) Domain

Point of care Infusion Verification (PIV) profile

Point of Care Identity Management (PCIM)

Infusion Pump Event Communications (IPEC) profile

Supportive efforts or resources include:
  • Rosetta Terminology Management (RTM)
  • Optimized Message Syntax (OMS)
  • NIST Testing Tools

For more information  http://www.ihe.net/Patient_Care_Devices
The DEC profile allows a consuming system (DOC) to receive patient clinical information including vitals, demographics, settings, and location from a reporting device/system (DOR).

The Subscribe to Patient Data (SPD) option allows the consumer to filter the data by:

- Medical Record #
- Device Class
- Update Interval
- Start & End Times
- Parameter Class
- Patient Location

![Diagram of Device to Enterprise Communication (DEC)](image-url)
Alert Communication Management (ACM)

HL7 Messages per ACM and WCM profiles

Parameters, waveforms, etc. as evidentiary data items

Device Specific graphics

Alert Source

Alert Reporter AR

Report Alert
PCD-04 →

← PCD-05
Report Alert Status

Alert Manager AM

Disseminate Alert
PCD-06 →

← PCD-07
Disseminate Alert Status

Alert Communicator AC

Alert Information
Source, Phase, State, Priority
Patient
Location
Instance
Alert text
Callback
Timestamp
Evidentiary data

Dissemination Status
Instance
Accepted by AC
Undeliverable
Delivered
Read
Accepted
Rejected
Cancelled
Callback start/stop
Point of care Infusion Verification (PIV)

Physician’s Order

Medication

Physician’s Order

Medication

BCMA to Pump (PCD-03)
Pump may provide data to EMR (PCD-01)

Medication Administered

Nurse confirms 6 Rights:
- Right Patient
- Right Medication
- Right Dose
- Right Time
- Right Route
- Right Device

Pharmacist Review

Pump may provide data to EMR (PCD-01)
Infusion Pump Event Communication (IPEC)

Infusion Pump Event Communication enables reporting of clinical and operational events from an infusion pump to a Bedside Computer-assisted Medication Administration (BCMA) system or EMR. Clinicians can then view and validate this information for infusion documentation.

BCMA/EMR

Prior to medication administration, nurse confirms the 6 Rights of administration using BCMA/EMR:
- Right Patient
- Right Medication
- Right Dose
- Right Time
- Right Route
- Right Device

Infusion-related events are displayed, validated, and/or recorded by the clinician using the BCMA/EMR

Infusion order sent from BCMA/EMR to Pump (PCD-03)

Pump provides information on infusion-related events to BCMA/EMR (PCD-10) such as:
- Delivery Start
- Delivery Stop
- Delivery Complete
Retrospective Data Query (RDQ)

Supports retrospective query of PCD data from databases. Supports Use Cases such as Clinical Decision Support, backfilling of EMR databases, etc.
Waveform Content Module (WCM)

Continuous Waveform Data

Alarm Evidentiary Data

Waveform Group

Waveform Data
- [1..*] Data [Num Array]

Waveform Data Attr.
- [1..*] Technical Cond. Map
- [1..*] Sample Rate
- [1..*] Wave Counts
- [0..*] Encoding
- [0..*] Resolution
- [0..*] Range

Waveform Attributes
- [0..*] Display Attr
  - [0..*] Sweep Speed
  - [0..*] Grid
  - [0..*] Color
  - [0..*] Scale
  - [0..*] Phys. Range

Waveform Filter Descr.
- [0..*] Filter Type
- [0..*] Filter Order
- [0..*] Filter String

In-Hospital Access

Mobile Access

Remote Access

PCD-01

PCD-04
Device Management (MEMDMC) & Location Services (MEMLS)

Profile based messages relay IV pump status including:
- Infusing
- Stopped

Profile based messages relay IV pump status:
- Infusing
- Stopped

RTLS uses location to interpret asset status:
- Biomed (PM / Repair)
- CS (Cleaning)
- Clean Utility
- Patient Room (In Use)
- Dirty Utility

Combined data generates asset state:
- Available
- In Active Use
- Unavailable but Idle
- Unavailable (PM / Technical Assessment): Future based on CMMS Data

Drives workflow and analytics:
- Where can I find idle pumps to return to circulation and meet requests?
- How often are pumps sitting idle in patient rooms?
- What is my true utilization?
- Is the pump leaving the building running (with a patient) or idle (possible theft)?
- Do I have more inventory than I need? (And what is related maintenance cost? Replacement cost?)
Optimized Message Syntax (OMS)

Adapts IHE PCD profiles for devices that have slow legacy RS-232 serial ports.

Will optimize the PCD messages to reduce their size but still maintain consistency with mainstream PCD messages.

OMS Messages

Bedside Computer

Data Collection System

EMR, CDSS, CIS, Etc.
Ensure the Right Patient, Right Devices, Right Time
Every measurement to a chart and to the right chart
Every patient affecting device command sent to the correct device
Testable Assertions: IHE-PCD Validation Requirements Used by NIST Test Tools
2018 Update

**Trends:**
- Representation in the IEEE P1847 Working Group for Location Services for Healthcare
- Expansion planning with nurse call, lab results and workflow management
- Continued to work to include PCD profile items in updates to IEEE 11073.
- Domain leadership utilizes opportunities to provide comments to federal standards directives.

**Summary of Future Plans:**
Increase interactions with end user communities (clinicians and CE).
Include in IEEE 11073-10101b terms for observations, events, and attributes for the MEMDMC and MEMLS profiles as well as a general rollup of events and alarms.
ACM supports optional ITI mACM AR originated FHIR transactions. This permits sharing of an installed base of ACM AC actors and endpoint communication devices with mACM reporters (avoids clinician’s “tool belt”). First use of FHIR within a PCD profile.
Extending MEMDMC to include remote command and control of devices in a device type agnostic generic manner, including speaking to safety and security issues. Initially a constrained set of use cases.
Promotion of MEMDMC into additional commercial CMMS/CEMS products at AAMI 2018.
Promotion of MEMLS into additional commercial RTLS products. 3 vendors now participating with 2 more considering.
Role of Device Vendors

Support the Mission of IHE PCD
- Become an IHE member
- Participate in PCD efforts
  - Increased consistency and conformance – listen and be heard

Plant the Seed
- Support IHE PCD Profile based Interoperability
- Encourage active IHE participation by vendors

Request customers purchase IHE PCD compliant products
- Provide IHE Integration Statements
- Participate in Connectathons
- Promote browsing of Connectathon Results and Product Registry sites
- Participate in Interoperability Demonstrations (HIMSS and AAMI)
Role of Device Users

Support the Mission of IHE PCD

Become an IHE member
Participate in PCD efforts
  Increased consistency and conformance – listen and be heard

Plant the Seed

Encourage active IHE participation by users

Purchase IHE PCD compliant products

  Expect IHE Integration Statements from vendors
  Expect vendor participation in Connectathons as external verification
  Look for products in Connectathon Results and Product Registry sites
  Visit Live Interoperability Demonstrations (HIMSS and AAMI)
  Purchase commercially available PCD profile interoperable products
Commercially Available Devices and Systems

The IHE PCD domain maintains a listing of commercially available devices and systems which have passed IHE Connectathons for PCD profiles. The list is cooperatively maintained by IHE PCD, contributing vendors, and comments from end users. This is an ever changing list that is too long to be easily presented here in its entirety.

The most recent version can be found at

ftp://ftp.ihe.net/Patient_Care_Devices/Deployment/Commercially_Available_PCD_Systems/
Additional Resources

IHE PCD web site
www.ihe.net/pcd/index.cfm

IHE PCD Wiki
wiki.ihe.net/index.php?title=Patient_Care_Devices

Tool web sites
PCD Pre-Connectathon
http://ihe-pcd-precon.nist.gov/PCD-HL7WebPreCon/
PCD Connectathon
http://ihe-pcd-con.nist.gov/PCD-HL7WebCon/#home.htm
Rosetta Terminology
https://rtmms.nist.gov/rtmms/index.htm
Contacts

- **IHE PCD Planning Committee Co-Chairs**
  - Rob Wilder – Spok
  - Kurt Elliason – Smiths Medical

- **IHE PCD Technical Committee Co-Chairs**
  - Tom Kowalczyk – BBraun
  - John Rhoads – Philips Healthcare

- **IHE PCD Technical Project Manager**
  - Paul Sherman [pcd@accenet.org](mailto:pcd@accenet.org)

- **IHE** – [www.ihe.net](http://www.ihe.net)
- **IHE PCD** – [www.ihe.net/Patient_Care_Devices](http://www.ihe.net/Patient_Care_Devices)
- **Connectathon Results** – [http://connectathon-results.ihe.net](http://connectathon-results.ihe.net)
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