

# INTEROPERABILITY SHOWCASE™



## Trauma Recovery in the Quiet ICU

Future use of IHE PCD Alert Communication Management (ACM) HL7 transactions to provide a quieter, more peaceful experience.

**Short Description:** Josephine (Jo) is in the ICU due to extensive injuries from a motorcycle accident. ICU clinicians recognize that motorcycle trauma is both physical and psychological. Treatment for Jo’s physical injuries and mental state require the support of her husband and daughter. By keeping the medical devices in her room quiet, Jo can rest peacefully, and her family can focus on her without wondering why nurses only respond quickly to certain alarms. Distribution of alarms based on the Quiet ICU model allows clinicians to respond to critical alerts while quietly tracking non-critical alarms. By eliminating the stressors from these alerts, Jo can heal and begin her journey back home.

**Participants:** Ascom, B. Braun, Getinge, Guard RFID, Philips

Scenario	Vendor	Products	Standards
<p><b>Welcome</b> The scenarios, devices and systems shown here represent a demonstration of a ‘Quiet ICU’. This demonstration represents innovative features that are not fully designed or developed yet. These features are not available. The intent of this video is to share future thinking technology. The content is based on alarm management system and alarm communication ‘actors’ as defined under the ‘IHE Patient Care Device Technical Framework’.</p> <p>The models and terminology of the IHE Alert Communication Management profile are used including defined actors Alert Reporter, Alert Manager and Alert Communicator.</p>			
<p><b>Vendor Introduction for the current patient condition -</b> In our ICU, Josephine is being supported by many of the devices seen by the patient bedside today, namely</p> <ul style="list-style-type: none"> <li>- Infusion Pumps from B. Braun</li> <li>- Patient monitoring from Philips</li> <li>- Servo-u Ventilator from Getinge</li> <li>- Alarm Management and Myco 3 clinical smartphone from Ascom</li> <li>- Real-Time Location System from GuardRFID</li> </ul>			

Scenario	Vendor	Products	Standards
<p>A Noisy ICU illustrates just how loud the ICU environment can be. An example is demonstrated as to what current patients must endure in a typical ICU today. Quiet within the ICU is important for the recovery of all patients including Jo. It allows her an opportunity to gain much needed rest so that her body can recover. Having a quiet environment helps to reduce stress by taking away unneeded disturbances for Jo and her family.</p>			
<p><b>Situation 1:</b> In this situation, Josephine begins to exhibit signs of respiration distress due to increasing secretions collecting in her airway. As a result, she triggers the high respiratory rate alarm on the ventilator. The Servo-u is currently displaying a "Family view" in which Jo's required support levels are easily seen and understood by her family providing a more calm and supportive environment without hearing any annoying alarms coming from the device. The alarm is transmitted via the Getinge Connect Alert Reporter to the Ascom Alert Manager and also to the PIC iX central monitoring station (for display).</p>	<p>Getinge Getinge</p>	<p>Servo-u Alert Reporter</p>	<p>PCD-04</p>
<p>At the same time, the high heart rate on the Philips patient monitor is also alarming but, again, only showing an illuminated screen with no sound. The alarm is transmitted to the Ascom Alert Manager.</p>	<p>Philips</p>	<p>PIC iX / MX550</p>	<p>PCD-04</p>
<p>The Ascom Alert Manager receives the alarm indications, determines where to route the alarms and sends a message to the appropriate caregiver to handle it. All alarms are visible from the Ascom Alert Manager in the central viewing station. For each alarm, the message is sent to the Philips Alert Communicator (to the clinician).</p>	<p>Ascom</p>	<p>Alert Manager</p>	<p>PCD-06 (multiple; one for each alarm)</p>
<p>Patient alarms are visible from the local patient monitor, but are also transmitted to the PIC iX central monitoring station as it functions as the Alert Consumer. In addition, the Philips Alert Communicator passes the alarms to the Ascom Myco3 smartphone w/ the Philips Care Assist app.</p>	<p>Philips</p>	<p>PIC iX</p>	<p>PCD-04</p>
<p>Once the caregiver has accepted the alarms transmitted from the ventilator, the Servo-u displays an "action icon" indicating that a clinician is responding and on the way. However, if the alarm is not resolved within the clinical timeout timeframe, the ventilator alarm will start sounding as a fallback solution. But in this case, the caregiver resolves the active alarm condition in time, without letting the ventilator generate any bothersome noise.</p>	<p>Philips Ascom</p>	<p>CareEvent Myco3</p>	<p>PCD-06 PCD-07</p>
<p>Likewise, the alarm condition on the Patient Monitor is resolved.</p>	<p>Ascom Philips Ascom</p>	<p>Myco 3 CareEvent Alert Manager</p>	<p>from device PCD-07 PCD-05</p>

Scenario	Vendor	Products	Standards
	Getinge	Servo-u Alert Reporter	to device
<b>Situation 2A: Alarm Escalation</b> Josephine moves her arm and causes her infusion line to be kinked which generates an occlusion alarm. The Infusion pump system sends the alarm message from the B Braun Alert Reporter to the Ascom Alert Manager.	Ascom Philips Ascom Philips	Myco 3 CareEvent Alert Manager PIC iX / MX550	from device PCD-07 PCD-05 to device
The Ascom Alert Manager determines the appropriate caregiver to handle it. The alert is then passed to Philips Alert Communicator.	B Braun	Space Pump & DoseLink	PCD-04
The Alert Communicator sends the message to the Ascom Myco3 smartphone.	Philips	Care Event	wctp
The caregiver sees the Alarm message on their mobile device running Philips Care Assist, but this time they respond with a NO answer because they are handling a more serious issue with another patient. A REJECT answer is sent back to the Ascom Alert Manager.	Ascom Philips Ascom	Myco 3 CareEvent Alert Manager	from device PCD-07 PCD-05
Ascom receives the REJECT and determines what caregiver it should redirect the alarm to. In this case, it has determined to route the alarm to the Ascom smartphone device of another caregiver. From here the designated alternative caregiver sees the alarm and is able to respond and accept it.	Ascom Philips Ascom Philips	Alert Manager Care Event AC Alert Manager Care Event	PCD-07  PCD-06 To Myco3 PCD-07 reply
The Ascom Alert Manager relays to the B Braun pump that a caregiver is on the way.	Ascom B Braun	Alert Manager To DoseLink	PCD-05
The nurse enters the room to address the patient's infusion pump and unkinks the line correcting the problem. The alarm condition is fixed at the device, all completed without making any bothersome audible noise.	B Braun	Space Pump	To device
<b>Situation 2B: Infusion Pump, RTLS, and EHR seamless integration</b> The nurse realizes she needs another pump since all other pumps in this room are already in use, so she looks to Guard RFID to help her find the nearest available pump. The RTLS tag that was placed on all the pumps allows the GuardRFID location software to determine where pumps are located. The three PCD transactions from the pump system allows it to show which ones are available.	B Braun sends Guard RFID receives and shows map	Space Pumps & DoseLink AllGuard	PCD-01 PCD-10 PCD-15

Scenario	Vendor	Products	Standards
<p>In the background, GuardRFID RTLS system sends pump location information to BBraun. This information will be included in future BBraun pump alerts to enable the caregiver not only to address pump alert, but to know where the pump and the patient are located at the time of alert.</p>	<p>GuardRFID to BBraun</p>	<p>AllGuard DoseLink</p>	<p>PCD-16 PCD-16</p>
<p>An available pump is found and brought to the room, plugged into the station, patient infusion line is set and pump is ready to be programmed. The nurse performs the BCMA procedure using the EHR barcode scanner to determine the right Patient, right Medication, and the right Pump. Pump program is sent to pump. Nurse reviews and accepts pump infusion program settings and starts the pump. Pump infusion data flows to the EHR.</p>	<p>EHR simulator B Braun</p>	<p>----- Space Pump &amp; DoseLink</p>	<p>PCD-03 PCD-01 PCD-10</p>
<p><b>Situation 3: Lost connection, fallback</b></p> <p>Josephine is being seen by physical therapy and working through a range of motion exercises. During the therapy session, the connection to the Servo-u is caught in the bed rail and disconnected. Once being disconnected from the network the ventilator reverts back to normal audible alarm operation. The Getinge Alert Reporter will also be aware of the lost connection and create a Lost connection alarm which will be sent out to the Ascom Alert Manager and also to the PIC iX central monitoring station (for display).</p> <p>In addition, the Philips Alert Communicator passes the alarms to the Ascom Myco3 smartphone w/ the Philips Care Assist app.</p> <p>The clinician then walks to the ventilator to fix the problem and resolve the alarm.</p>	<p>Getinge          Ascom</p>	<p>Servo-u/ Alert Reporter          Alert Manager</p>	<p>PCD-04          PCD-06</p>
<p><b>Summary:</b> We have presented three very relevant uses cases showcasing the capabilities adopting the Quiet ICU model -- which includes, a quiet handling of the alarms with caregiver response, an escalation to an alternative caregiver if the initial caregiver is unavailable and a fallback in case the connection is lost. The communication and interoperability achieved between and amongst the different vendors represented within this demo was possible by adhering to the developing IHE standards within this new area.</p> <p><b>Important Note:</b> Products displayed and the Quiet ICU feature are not available and only intended to represent future innovation.</p>			

Data Exchange Standards:

Vendor	Product	Category	Protocol	Interop Body	Interop Profile	Interop Actor	Interop Message	Send or Receive	Transaction Description
B Braun	Space Pump, DoseTrac & DoseLink	Infusion Pump transactions	HL7	IHE PCD	DEC	DOR	PCD-01	Send	Periodic Infusion Data
			HL7	IHE PCD	IPEC	DOR	PCD-10	Send	Event Infusion Data
			HL7	IHE PCD	PIV	IOC	PCD-03	Receive	Infusion Order
			HL7	IHE PCD	ACM	AR	PCD-04	Send	Report Alert
			HL7	IHE PCD	ACM	AR	PCD-05	Receive	Report Alert Status
			HL7	IHE PCD	MEMDMC	DMIR	PCD-15	Send	Report Device Management Information Observation
			HL7	IHE PCD	MEMLS	LOC	PCD-16	Receive	Receive pump location
GuardRFID	AllGuard RTLS	Location Services.	HL7	IHE PCD	MEMLS	LOR	PCD-16	Send	Report equipment location
	AllGuard RTLS	Location Services.	HL7	IHE PCD	ACM	AR	PCD-04	Send	Report button press on a wristband as a nurse call
	AllGuard RTLS	Automatic equipment enrolment	HL7	IHE PCD	DEC	DOC	PCD-01 PCD-10	Receive	Automatically enrolls equipment in RTLS system with all attributes
	AllGuard RTLS	Equipment utilization.	HL7	IHE PCD	DEC	DOC	PCD-01	Receive	Show equipment real time status (in-use or not-in-use), based on infusion
	AllGuard RTLS	Equipment non-clinical alerts	HL7	IHE PCD	MEMDMC	DMIC	PCD-15	Receive	Device Management Information related to equipment non-clinical

									status (plugged-in; battery status)
Philips	PIC iX	Patient Monitoring Data	HL7	IHE PCD	DEC	DOR	PCD-01	Send	Patient vital signs data
		Alert Event Reporting	HL7	IHE PCD	ACM	AR	PCD-04	Send	Patient monitoring alert event reporting
		Alert Event Consumption	HL7	IHE PCD	ACM	AR	PCD-04	Receive	Alert event logging & displaying from other alert sources
		Alert Event Status Management	HL7	IHE PCD	ACM	AR	PCD-05	Receive	Patient monitoring alert event status management
	Care Event	Alert Event Communication	WCTP	IHE PCD	ACM	AC	PCD-06	Receive	Alert event dissemination to end-user devices
		Alert Event Status Communication	WCTP	IHE PCD	ACM	AC	PCD-07	Send	Alert event status reporting from end-user devices
Getinge	Servo-u Getinge Connect Alert Reporter	Alert Event Reporting	HL7	IHE PCD	ACM	AR	PCD-04	Send	Patient device alarms

Ascom	Alert Manager	Alert Event Reporting	HL7	IHE PCD	ACM	AM	PCD-04	Receive	Alert event reporting
		Alert Event Reporting Status	HL7	IHE PCD	ACM	AM	PCD-05	Send	Alert event reporting status
		Alert Event Communication	WCTP	IHE PCD	ACM	AC	PCD-06	Send	Alert event dissemination to end-user devices
		Alert Event Communication Status	WCTP	IHE PCD	ACM	AC	PCD-07	Receive	Alert event status reporting from end-user devices