Use Case Title: Cardiac Care & Tribal Health

Short Description: The patient is a Native American and a Veteran. The patient has historical medical records in both the Indian Health Service Resource and Patient Management System (RPMS) used by their local tribal health centers, and the VA VistA system at the nearby VA hospital. The patient has chest pains, visits their primary care provider at a tribal clinic and is referred to a cardiologist in a non-VA, non-tribal network. The cardiologist performs diagnostic imaging and schedules the patient for interventional radiology in the hospital. The patient's hospital care team, informed by the outside interventional radiology images, performs cardiac catheterization and stenting. Due to undiagnosed kidney disease, the patient has an adverse reaction to the IV contrast solution used in placing the stent and becomes hemodynamically unstable with severe Acute Kidney Injury (AKI). The patient is prescribed CRRT on the Baxter PrisMax system with auto-documentation of treatment data to the EMR. The patient is also prescribed insulin delivered via Baxter NOVUM IQ syringe pump using auto-programming and auto-documentation interoperability to achieve normal glucose levels without contributing to patient fluid overload. After recovery, the patient later follows up with their cardiologist for additional imaging on progress.

Value: By leveraging interoperability standards such as HL7®, HL7 FHIR®, and DICOM, we are able to overcome siloed and fragmented data, disconnected workflow and legacy systems to achieve “care without boundaries” with shared medical records and continuity of care across technical, organizational and geographic boundaries.

The use of IHE standards within the hospital enables the exchange of data across devices, applications, and diverse clinical use cases by removing the barriers associated with disparate companies’ proprietary platforms. Improved accuracy, timeliness and automation of device communication creates clinical efficiencies that ease clinician workloads and reduces risk of clinical errors - which combine to contribute to improved patient outcomes.

Participating Vendors: Peraton, Qvera, Epic, Baxter

Scenario	Vendor	Products	Standards
Patient History Anthony Golon has a long history of healthcare for a collection of ongoing, complex medical conditions that include hypertension, emphysema, diabetes, and cancer. As a Native American and a Veteran, he typically gets treated for these conditions at his local tribal clinic and at the nearest Veterans Health Administration (VHA) facility. The tribal clinic he visits runs the Resource and Patient Management System (RPMS) and the VHA facility operates their VistA Electronic Health Record (EHR) platform. Both RPMS and VistA have been in operation for 20+ years and have amassed a long history of medical records. Although the VA and the Indian Health Service (IHS) intend to replace these legacy systems with modern EHR technology, the transition for both organizations span multiple years. During this transition, it is imperative to keep these legacy systems operational and to ensure interoperability between them, their contemporary replacements and any other EMR systems that support healthcare for Anthony and others like him. Anthony's historical medical records in these legacy systems include the diagnoses and treatments for his primary conditions with clinic visit notes and referrals, as week as prior surgeries (e.g., appendectomy, gallbladder removal and hernia repair), past and current medications, known allergies, and his social habits such as smoking and alcohol consumption history. Additionally, these systems maintain diagnostic records including imaging studies (e.g., prior EKGS and chest X-Rays) and lab tests (e.g., chemistry panels, complete blood count and cholesterol/lipid panels). The VistA and RPMS systems have proprietary data models and complex business logic to access and leverage the medical records they maintain. The data in these systems is not normalized and is not aligned to industry standards. As such, it is difficult to use outside of these two systems and it is not optimized for	Peraton	HealthConcourse	FHIR R4 resources, USCDI FHIR profile, terminology standards including SNOMED and LOINC, and CDS-Hooks

computability. In this step of the demo, we will show the data within these two legacy systems in its native state to create a baseline understanding of the patient's historical records. Then, we will demonstrate how we retrieve the medical records from these two systems, standardize them into FHIR resources and aggregate them to provide a longitudinal view that is computable and optimized for clinical decision support, analytics, automation, and semantic interoperability. As part of the standardization process, we will map and transform the data from its native format into FHIR resources, we will map and translate the contents of the records to industry standard terminologies (e.g., SNOMED and LOINC), we will reconcile local identities and demographics to ensure that records are properly aggregated for the correct individual, we will apply natural language processing technology to do real-time data mining against the unstructured clinical notes, we will apply metadata and data labels that help classify and organize the medical records, and we will validate the content and structure of the records against data quality rules expressed in FHIR profiles. This is all accomplished using the Peraton HealthConcourse solution – a Digital Integration Hub based on healthcare interoperability standards. HealthConcourse will then share this data with downstream clinical systems through modern, secure APIs accessed in the cloud. Anthony's journey starts when he experiences chest pain. After visiting his primary care provider at the local tribal clinic, he is referred to a cardiologist in a non-tribal facility. The EMR used by the cardiologist is able to retrieve key clinical data from Anthony's IHS and VHA records using the HealthConcourse FHIR APIs.			
Anthony is scheduled for cardiology consultation upon referral from his primary care provider. His prior medical history is critical to his evaluation and Peraton makes this information available and easily accessible through their HealthConcourse FHIR APIs. Unfortunately, our legacy EMR cannot natively support FHIR APIs out of the box. Our legacy EMR just doesn't have the capability. That's one of the reasons why	Qvera	Qvera Interface Engine	FHIR

we use Qvera as our Interface Engine. Using Qvera, we are able to connect to the HealthConcourse FHIR APIs, retrieve the medical history, and make them available to our clinicians at the point of care.			
The initial cardiology evaluation of Anthony indicates possible prior myocardial infarction with congestive heart failure. He completes EKG and echocardiogram and is scheduled with interventional radiology for angiogram, where it is determined he requires percutaneous coronary intervention.	Qvera	Qvera Interface Engine	Dicom
After completing the catheterization, we would really like to have the DICOM images combined with the chart notes into a documented report. Again, our legacy system natively lacks some of this DICOM interoperable functionality. This is yet another reason why we use the Qvera Interface Engine. Qvera can combine the chart notes with the DICOM images from the procedure to generate a PDF report. This report can then be made available using a Cross Community Access (XCA) gateway, which is also leveraging the Qvera Interface Engine. This PDF report, with embedded DICOM images, is available to other systems, including the Epic hospital.	Qvera	Qvera Interface Engine	IHE XCA profile
HOSPITAL			
In the EMR, the physician is able to pull up information related to Anthony's medical history. This includes the cardiologist's images from Qvera and medical history from Peraton.	Epic	EpicCare	IHE XCA profile FHIR
Anthony becomes hemodynamically unstable. He is moved to the ICU when his intravascular volume status and increase in serum creatinine levels indicate Acute Kidney Injury (AKI) requiring renal replacement therapy. His care team initiates Continuous Renal Replacement Therapy (CRRT) on a Baxter PrisMax device. The PrisMax device is equipped with TrueVue Connect, which wirelessly sends messages to the hospital EMR using the HL7 version 2.5 protocol. PrisMax sends over 100 parameters to Epic, including blood flow and dialysate rates and the prescribed and actual patient fluid removal. Data is sent as often as every five seconds. PrisMax auto-documentation unlocks an average of 16 minutes per	Baxter	PrisMax	IHE PCD-01

hour otherwise spent doing manual documentation and charting, reducing the risk of transcription errors.			
The hospital IT team is able to monitor the EMR connection & manage any network and configuration settings through the TrueVue Connect portal. As a byproduct of the CRRT therapy, the patient's blood glucose levels increase. To maintain normal glucose levels without contributing to fluid overload, they are prescribed insulin via syringe. To administer, the bedside clinician scans the patient wristband, which opens the patient MAR. The clinician then scans the appropriate syringe medication label, which selects the corresponding medication order to be infused. These steps ensure the right patient is receiving the right medication; two key elements of the 5-rights of medication administration.	Epic	Care Connect	IHE PCD-01
The Baxter Novum IQ Syringe Pump in combination with the Baxter IQ Enterprise application has been designed to support the latest communications standards and is capable of auto-programming to reduce risk of clinician order entry errors, as well as auto-document infusion data to the patient record - to increase workflow efficiency and help ensure accuracy and timeliness of infusion documentation. The nurse selects the appropriate Care Area on the infusion pump and scans the on-screen pump barcode that is displayed. At this point, the EMR knows the patient, drug and infusion pump that the medication will be administered from. The clinician confirms the infusion program parameters in Epic, then sends the infusion order to the Novum IQ syringe pump using an IHE PCD-03 standard message. The pump receives the order and, after user confirmation, auto-populates the infusion parameters into the pump.	Baxter	Novum IQ Syringe Pump	IHE PCD-03
Once the infusion is started, pump data flows back to Epic using IHE PCD-01 and PCD-10 standard messages, to confirm that the appropriate program is being run, and automate infusion documentation - which relieves nurses of having to manually remember, record and enter therapy data. Auto-documentation can	Baxter	Novum IQ Syringe Pump	IHE PCD-10, PCD-01

simplify patient care workflows and improve the completeness and accuracy of infusion records.			
After recovery, the patient later follows up with their cardiologist for additional imaging on progress. His kidney function has returned to baseline, his ejection fraction has improved, and he is no longer experiencing angina. He is completing cardiac rehab with good progression and improved quality of life. He is returned to primary care for management of medications and BP control with plans for annual cardiology follow-up. By leveraging interoperability standards such as HL7, FHIR, and DICOM, we are able to overcome siloed and fragmented data, disconnected workflow and legacy systems to achieve “care without boundaries” with shared medical records and continuity of care across technical, organizational and geographic boundaries. The use of IHE standards within the hospital enables the exchange of data across devices, applications, and diverse clinical use cases by removing the barriers associated with disparate companies’ proprietary platforms. Improved accuracy, timeliness and automation of device communication creates clinical efficiencies that ease clinician workloads and reduces risk of clinical errors - which combine to contribute to improved patient outcomes.	Qvera	N/A	N/A

Data exchange standards:

Vendor	Product	Category	Protocol	Interop Body	Interop Profile	Interop Actor	Interop Message	Send or Receive	Transaction Description
Peraton	HealthConcourse	Electronic Health Record	HL7	HL7	FHIR	Content Creator	ITI-65	Sender	HL7 FHIR R4 Resource Bundle
Epic	EpicCare	Electronic Health Record	HL7	IHE ITI	DEC	Device Observation Consumer	PCD-01	Receive	Communicate PCD Data
			HL7	IHE ITI	PIV	Infusion Order Programmer	PCD-03	Send	Communicate Infusion Order
			HL7	IHE ITI	IPEC	Device Observation Consumer	PCD-10	Send and Receive	Communicate Infusion Event Data
Baxter	PrisMax		HL7	IHE PCD	DEC	Device Observation Reporter	PCD-01	Send	Communicate PCD Data
Baxter	Novum IQ Syringe Pump	Infusion System	HL7	IHE PCD	PIV	Infusion Order Consumer	PCD-03	Receive	Receive Infusion Order
			HL7	IHE PCD	DEC	Device Observation Reporter	PCD-01	Send	Communicate PCD Data
			HL7	IHE PCD	IPEC	Device Observation Reporter	PCD-10	Send	Communicate Infusion Event Data
Qvera		Interface Engine	HL7	FHIR	FHIR	Content Consumer	ITI-65 ITI-68	Requestor	Mobile Access to Health Documents

	Qvera Interface Engine		HL7	IHE ITI	XCA	Content Provider	ITI-18, ITI-38, ITI-39	Responder	Cross Community Access
			DICOM	RAD	IM	Query	RAD-14 RAD-16	Send/ Receive	Query Images Retrieve Images

References:

IHE Device Enterprise Communication (DEC) Profile pg. 14
https://www.ihe.net/uploadedFiles/Documents/PCD/IHE_PCD_TF_Vol1.pdf

Point-of-Care Infusion Verification (PIV) Profile pg. 21
https://www.ihe.net/uploadedFiles/Documents/PCD/IHE_PCD_TF_Vol1.pdf

Infusion Pump Event Communication (IPEC) Integration Profile pg. 52
https://www.ihe.net/uploadedFiles/Documents/PCD/IHE_PCD_TF_Vol1.pdf

Fast Healthcare Interoperability Resources (FHIR)
https://www.hl7.org/fhir/

Mobile access to Health Documents (MHD)
https://profiles.ihe.net/ITI/MHD/index.html

Cross-Community Access (XCA)
https://profiles.ihe.net/ITI/TF/Volume1/ch-18.html

DICOM
https://www.dicomstandard.org/