The Human Side of Innovation
by Eric Heflin, CTO/CISO

For more Information:
www.https://sequoiaproject.org/pulse/
eheflin @ sequoiaproject.org
The Human Side of Innovation

• Purpose today: to not focus on technology, but instead to focus on the human impact of what the IHE, and quite possibly your organizations’, have enabled.

• So I’m going to tell a few stories about how these standards and systems are helping people. And how technology is helping them.
Learning Objectives

• Describe how PULSE supports data access during nationwide disaster response.
• Explain how PULSE will benefit patients during emergencies.
• Recognize how data sharing capabilities will impact local communities.
• Identify the importance of IHE and FHIR to enable seamless nation-wide interoperability.
Supporting a Nationwide Disaster Response Network
Patient Unified Lookup Service for Emergencies

What Does PULSE Do?

PULSE enables authorized disaster healthcare volunteers to access health records to treat people injured or displaced due to disasters.

How Does PULSE Work?

- Disaster Healthcare Volunteers log into the PULSE portal and are authenticated against the state’s credentialed volunteer database.
- Authorized volunteers in alternative care facilities, search for patient records from all connected providers and networks.
- Volunteers retrieve view patient records while treating them at the alternative care facilities.
PULSE connects to health information networks so that providers and emergency responders have a way to access health information across systems.

Leveraging Existing Interoperability

PULSE Queries for Records
Earthquake Disaster Scenario

• Magnitude 7.0 earthquake strikes Hayward Fault
  – 52 miles in San Francisco Bay area with 7 million people
• Main shock impacts 77,000 households
  – 800 fatalities
  – 18,000 nonfatal injuries
  – > 2,500 rescued from collapsed buildings
  – 22,000 rescued from stalled elevators
• Subsequent events (landslides, fires, aftershocks) impact 152,000 households / 411,000 people

Play video (without sound – 1st 43 seconds) while disaster scenario described

https://escweb.wr.usgs.gov/content/learn/topics/shakingsimulations/hayward/HaywardM70_OaklandEp_mapview.mp4
The 1st 72 hours

- State declares disaster and activates command and disaster response
- Damage assessed
  - Injuries greatly exceed available medical treatment resources
  - Significant damage to existing care delivery facilities
  - Loss of power and water supply for 7 days - 6 months
- Net impact
  - Tens of thousands of people will need treatment outside of the regular care delivery system
Disaster Healthcare Volunteers Deployed to Alternative Care Facilities

PULSE is activated and available for use

Volunteers use PULSE to request and access critical patient information to treat patients who are displaced or seeking care in Alternate Care Facilities
Harvey Hits Texas
Harvey Evacuees Leave Their Belongings—and Health Records—Behind
Thomas Area Fires
Thomas Fire is the largest blaze in California history

By Nicole Chavez, CNN

Updated 11:15 AM ET, Sat December 23, 2017
Helping California – From Pilot to Live in 12 Days!

• Dec 7: Leslie Witten-Rood contacted several Sequoia staff about the possibilities of quickly onboarding to support “Thomas” Calif wildfire
• Staff immediately began work on policy and technology fronts
• Dec 9: Within 24 hours the eHealth Exchange Coordinating Committee approved the request and contracts were in place
• In parallel technical testing and coordination had begun
• Dec 11: Multiple organizations were live with PULSE and validated
• Dec 19: Within 10 days, PULSE was connected to the majority of eHealth Exchange Participants in the impacted region for production use (9 organizations)
• Live with KP, Dignity, OCPRHIO, Cottage, Providence, CVS, Sutter, Walgreens, VA,
• Went live with CVS in 8 minutes of work (from scratch)!
• Organizations “moved mountains” to make this happen, such as lifting production freezes, changing policy, and granting temporary exceptions
• I had the honor of acting as the technical lead for 10 days 24x7 along with a few other Sequoia staff and organizations
• A very proud and humbling moment to see a system I helped design, implement, and operate saving lives in a new way helping evacuees in a matter of days
• PULSE deployment was much faster for subsequent uses!
The health IT response to the Nov. 9 Camp Fire immediately ran much more smoothly than in previous disasters.

| Justin Sullivan/Getty Images

HEALTH CARE

'Praying For Our Doctors': New Orleans During Filthy Pandemic
Acts of heroism at a Paradise hospital as the town burned

Allyn Pierce got in his pickup truck and tried to race out of town when the fire swept through Paradise on Thursday. But he hit a wall of flames and was forced to turn around. Dozens of people are grateful that he did. Mr. Pierce helped lead what is being described by many as a heroic effort to treat the wounded in Paradise.
Acts of heroism at a Paradise hospital as the town burned

He got in his pickup truck and tried to race out of town when Paradise on Thursday. But he hit a wall of

Dozens of people are grateful being described by many as
Displaced by Camp Fire, doctors and nurses open makeshift clinic for victims

BY SAM STANTON

NOVEMBER 13, 2018 03:00 AM, UPDATED NOVEMBER 13, 2018 08:47 AM
History of PULSE

April 2014: ONC evaluates use of HIE infrastructure for disaster preparedness and response

March 2015: PULSE use case and technical architecture published

July 2015: ONC awards EMSA a grant to advance HIE statewide during a disaster and regionally in daily EMS

March 2016: EMSA begins PULSE development

July 2017: PULSE Go-live in CA

January 2018: PULSE migrates to Sequoia; Advisory Council formed

November 2017: PULSE activated for CA fires
PULSE Advisory Council

- Nora Belcher, Texas e-Health Alliance (TEHA)
- Rim Cothren - California Association of Health Information Exchange (CAHIE)
- Tara Cramer Georgia Regional Academic Community Health Information Exchange (GRACIE)
- Kristen Finne, HHS Assistant Secretary of Preparedness and Response (ASPR)
- George Gooch, Executive Director, Texas Health Services Authority (THSA)
- Dan Smiley, California Emergency Medical Services Authority (CalEMSA)
- Lee Stevens, HHS Intergovernmental and External Affairs
- Sean Turner, Dignity Health
- Leslie Witten-Rood, California Emergency Medical Services Authority (CalEMSA)
- Jeremy Wong, Audacious Inquiry (Ai)
How It Works
Technical Architecture
PULSE Connects to Nationwide Networks

• Already connected to eHealth Exchange network, with California connections, and ability to connect nationwide
• Connectivity will be expanded through Carequality
Sample Workflow

Triaging Patients Seeking Treatment at a Field Hospital

Volunteer greets patient at triage

Finds patient match

Broadcast patient to all PULSE participants

Searches for patients using state ID, insurance card, or last known encounter

Searches for Document(s)

CCD Summary of Care Documents Retrieved and utilized by a disaster health volunteer
Sample Workflow – Standards Used

Triaging Patients Seeking Treatment at a Field Hospital

Volunteer greets patient at triage

IHE XCPD
HL7 FHIR

Searches for patients using state ID, insurance card, or last known encounter

Finds patient match

IHE ATNA and XUA

Broadcast patient to all PULSE participants

IHE XCA
HL7 CCDA

Documents Retrieved and utilized by a disaster health volunteer

CCD Summary of Care Documents Retrieval and utilized by a disaster health volunteer

IHE XCA
Live Demo
DHV Single Sign-On

Did you know?

Pulse is currently ACTIVE! Log In To PULSE

Updates

You don't have any updates.

Recent Messages

You don't have any messages.
Select ACF

About PULSE

ONC has funded the development of the Patient Unified Lookup System for Emergencies (PULSE) to ensure vital health information can be shared and used during disasters. California Emergency Medical Services Authority (EMSA) and Audacious Inquiry (AI) developed PULSE to prepare for disasters and connect healthcare across California.

Access Developer Resources
Patient Query

Patient Unified Lookup System for Emergencies

Search

Review

Patient Query

First Name *
Steve

Last Name *
Hardy

Gender *
Male

Date of Birth *
April 2 1961

SSN
XXX-XX-1961

Search Q

Queries (0)

Queried Patient Information

No current queries
**Patient Staging**

### Patient Staging

#### Queried Patient Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>Date of Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steve Hardy</td>
<td>M</td>
<td>04/01/1963</td>
</tr>
</tbody>
</table>

#### Possible Patient Records

<table>
<thead>
<tr>
<th>Location</th>
<th>Name</th>
<th>Gender</th>
<th>Date of Birth</th>
<th>SSN</th>
<th>View Details</th>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mock Clinic Facility 1</td>
<td>Steve James Hardy</td>
<td>Male</td>
<td>04/01/1963</td>
<td>999-88-6345</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mock Hospital Facility 1</td>
<td>Steve James Hardy-Smith</td>
<td>Male</td>
<td>04/01/1963</td>
<td>999-88-6345</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mock Hospital Facility 2</td>
<td>Steve Hardy</td>
<td>Male</td>
<td>04/01/1963</td>
<td>999-88-3300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mock IDN Facility 1</td>
<td>James Steve Hardy-Smith</td>
<td>Male</td>
<td>04/01/1963</td>
<td>999-88-6345</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mock IDN Facility 2</td>
<td>James Steve Hardy-Smith</td>
<td>Male</td>
<td>04/01/1963</td>
<td>999-88-6345</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Combined PULSE Patient

<table>
<thead>
<tr>
<th>Full Name</th>
<th>Steve Hardy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
</tr>
<tr>
<td>SSN</td>
<td></td>
</tr>
<tr>
<td>Date of Birth</td>
<td>April 01, 1963</td>
</tr>
</tbody>
</table>

© 2018 The Sequoia Project. All Rights Reserved.
### John Smith

**Gender:** M  
**Date of Birth:** Jun 5, 1966

<table>
<thead>
<tr>
<th>Status</th>
<th>Title</th>
<th>Class Name</th>
<th>Confidentiality</th>
<th>Creation Date</th>
<th>Size</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hospital Admission</td>
<td>ALLERGY NOTE</td>
<td>High</td>
<td>May 15, 2008</td>
<td>34.6 kB</td>
<td>St. Sebastian's Hospital</td>
</tr>
<tr>
<td></td>
<td>Hospital Admission</td>
<td>ALLERGY NOTE</td>
<td>High</td>
<td>May 15, 2008</td>
<td>34.6 kB</td>
<td>Santa Rosa Mental Health Institute</td>
</tr>
<tr>
<td></td>
<td>Status Note</td>
<td>SUMMARY OF EPISODE NOTE</td>
<td>Normal</td>
<td>May 16, 2008</td>
<td>34.6 kB</td>
<td>St. Sebastian's Hospital</td>
</tr>
</tbody>
</table>
### ALLERGIES, ADVERSE REACTIONS, ALERTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Substance</th>
<th>Reaction</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLERGIES</td>
<td>morphine</td>
<td>rash</td>
<td>Active</td>
</tr>
<tr>
<td>ALLERGIES</td>
<td>amoxicillin</td>
<td>anaphylaxis</td>
<td>Active</td>
</tr>
<tr>
<td>ALLERGIES</td>
<td>metronidazole</td>
<td>difficulty breathing</td>
<td>Active</td>
</tr>
<tr>
<td>ALLERGIES</td>
<td></td>
<td>nausea</td>
<td>Active</td>
</tr>
</tbody>
</table>

### MEDICATIONS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Start Date</th>
<th>Route</th>
<th>Dose</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability, [RxNorm:3852309]</td>
<td>20150102000000</td>
<td></td>
<td></td>
<td>Active</td>
</tr>
<tr>
<td>Crestor, [RxNorm:859749]</td>
<td>20150101000000</td>
<td></td>
<td></td>
<td>Active</td>
</tr>
<tr>
<td>Sucraid, [RxNorm:213337]</td>
<td>20150217000000</td>
<td></td>
<td></td>
<td>Active</td>
</tr>
<tr>
<td>Dilantin, [RxNorm:855871]</td>
<td>20150216000000</td>
<td></td>
<td></td>
<td>Active</td>
</tr>
</tbody>
</table>

### PROBLEMS

1. Allergy in Men (Reason: Active)

© 2018 The Sequoia Project. All Rights Reserved.
Clinician Leverages Document for Care Decisions, Prescription Refills, and more
Learning Objectives

• How does PULSE supports data access during nationwide disaster response?

• In summary: Via connections from Alternate Care Facilities to state, regional, and national networks via the eHealth Exchange
Learning Objectives

• How PULSE will benefit patients during emergencies?

• In number ways such as by allowing faster access to critical important information such as:
  – Problems
  – Medications
  – Allergies
  – Care Plans
  – Care Team Members
  – And much much more
Learning Objectives

• How will data sharing capabilities will impact local communities?

• PULSE is one example where community-wide data sharing can help treat those displaced by disasters more effectively than other means available today.
Learning Objectives

• What is the importance of IHE and FHIR to enable seamless nation-wide interoperability?

• PULSE, in order to fulfill it’s purpose of supporting providers in the context of a natural disaster, must be able to quickly find medical records from across providers where the patient has been seen. This requires validated interoperability and security. IHE and FHIR standards are the (proven!) way PULSE accomplishes this objective. Standards used include:
  – IHE XCPD, XCA, XUA and ATNA
  – HL7 CCDA and FHIR
Final True Story

• Two neighbors Joe and Pete (not their real names) lived in Paradise, CA
• Joe had recent significant back surgery and was on pain management and antibiotics
• Joe was at retail pharmacy in Paradise
• During the fill process the pharmacy tech announced that the building was on fire and operations were immediately ceasing leaving Joe without his medications
• Joe drove home to gather items to evacuate and he decided to check on an elderly neighbor with diabetes and limited mobility, Pete
• Pete was home, unable to walk and unable to get help
• Joe helped get Pete to a non-medical shelter undoubtedly saving Pete’s life
• When they arrived there were no medical staff
• But an off duty nurse (and neighbor) started asking each evacuee what their needs were she discovered both Joe and Pete needed vital medications
• PULSE was used (ad hoc!). Since the nurse was registered appropriately she securely confirmed the conditions and medications for both men and successfully facilitated getting their medications, likely avoiding additional suffering for both Pete and Joe
Q&A
For more info:
Eric Heflin, CTO/CISO
email: eheflin at sequoiaproject.org
https://sequoiaproject.org/pulse/
WHEN DISASTER STRIKES, IS YOUR HEALTHCARE COMMUNITY READY?