Embedded Real Time Location for Medical Equipment

Enhancing the Digital Experience

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Scott Phillips  
Principal, RFID Portfolio & Location Services  
Kaiser Permanente

- Leads the enterprise RFID portfolio and location services for 39 hospitals and 600+ medical office buildings
- 25 years in IT, 10 years at Kaiser Permanente
- Vice Co-chair of the IEEE RTLS standards committee and board member of the Intelligent Hospital Association
Ann O’Brien, RN MSN CPHIMS, FHIMSS
National Senior Director of Clinical Informatics
Kaiser Permanente

- Leverages EHR data, analytics and innovative technology to transform nursing care processes and improve outcomes.
- Leads a clinical transformation program that includes initiatives in the areas of optimization, technology adoption, biomedical device integration, performance improvement and value realization.
- Has a passion for improving nursing workflow to provide evidence based, personalized care and accurate data for outcomes improvement and clinical efficiency.
Conflict of Interest

Scott Phillips, Principal, Kaiser Permanente

*Has no real or apparent conflicts of interest to report.*

Ann O’Brien, RN MSN CPHIMS, Kaiser Permanente

*Has no real or apparent conflicts of interest to report.*
Agenda

- Learning Objectives
- STEPS™
- About RFID/RTLS
- Challenges
- Embedded RTLS
- Clinical Value
- Future Impact to Care Delivery
Learning Objectives

1. Define the breadth of application for real-time location services
2. Express the value of RTLS to clinical quality and safety.
3. Express the value of RTLS to patient satisfaction
4. Illustrate the cost-saving advantages of installing a robust RTLS system
Success stories at KP to date

RTLS identifies the closest equipment within 30 seconds, compared to the industry average of 36 minutes/shift that nurses spend searching for needed equipment.

3,200 “out-of-range” temperature alerts were remedied, ensuring medication efficacy, specimen quality, etc.

Preventative maintenance, security updates increased from 95% to 99%

Nurses spend much less time looking for equipment, more time providing care

Bed rentals reduced ~$180k in one department
Found assets ~$400k in one hospital
Found piece of equipment valued at ~$70k
## Technology-enable health care

- **70 years of providing care**
- **$62 billion in assets**
- **11.2 million members**
- **38 hospitals (#39 Q1 2017)**
- **600+ medical offices**

### Key Statistics:

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital admissions</td>
<td>433,413</td>
</tr>
<tr>
<td>Inpatient surgeries</td>
<td>225,000</td>
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### Technology:

- **188M visits to KP.org**
- **22M secure messages sent to providers**
- **150M lab orders per year**
- **78M prescription orders per year**
- **4.8M appointments booked online**
External forces shaping the industry

- Continued affordability pressures
- Expanding role of government in health care
- Care innovations and digitization of health care
- Consumerization of health
WHAT IS RFID?
Radio Frequency Identification (RFID): A technology that uses communication through the use of radio waves to transfer data between a reader and an electronic tag attached to an object, mainly to identify a target.

Real-time location system (RTLS): Also referred to as “active RFID” is one of a number of technologies that detects the current location of a target and places its location on a map.
## Location Systems in Healthcare

<table>
<thead>
<tr>
<th></th>
<th>PASSIVE</th>
<th>ACTIVE/RTLS</th>
<th>MOBILE Bluetooth</th>
<th>GPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BEST FOR</strong></td>
<td>Consumables</td>
<td>Medical Equipment</td>
<td>Indoor location</td>
<td>Outside Buildings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temperature Monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACCURACY</strong></td>
<td>Doorway/dock threshold</td>
<td>Varies 2-4 meters with threshold</td>
<td>Varies 2-4 meters with threshold</td>
<td>~3-8 meters</td>
</tr>
<tr>
<td></td>
<td>Postage stamp</td>
<td>~1”x1”x1”</td>
<td>No tag</td>
<td></td>
</tr>
<tr>
<td><strong>SIZE</strong></td>
<td>Postage stamp</td>
<td>~1”x1”x1”</td>
<td>No tag</td>
<td>Screen size</td>
</tr>
<tr>
<td><strong>COST PER TAG</strong></td>
<td>$0.15 to $5</td>
<td>$15 to $100</td>
<td>No tag</td>
<td>No tag</td>
</tr>
<tr>
<td><strong>POWER</strong></td>
<td>No internal power; cannot actively broadcast a signal</td>
<td>Power source (battery); transmits a signal</td>
<td>Smartphone - shared battery</td>
<td>Varies</td>
</tr>
</tbody>
</table>

**Notes:**
- Bluetooth: Indoor location
- GPS: Outside Buildings
- Doorway/dock threshold: Varies 2-4 meters with threshold
- Postage stamp: ~1”x1”x1”
- Power source: Smartphone - shared battery
- Varies: ~3-8 meters
- No tag: Screen size
ACTIVE/RTLS

MOBILE
Location Services at KP Today

- Retained Foreign Objects
- Medication/Pharmacy (pilot)
- Specimens/Lab (pilot)
- Supply chain (exploratory)

Passive RFID
Location Services at KP Today

Active RFID/RTLS

- Asset Tracking
  - Maintenance
  - Utilization
- Temperature Monitoring
- Infant Safety
- Patient Activity (exploratory)

165k tags on assets
55k location sensors
7k temperature sensors
Location Services at KP Today

Mobile Location

- Physician Announcement (pilot)
- Mobile Asset Tracking (pilot)
- Wayfinding (pilot)
- Member engagement (exploratory)
WHY DOES IT MATTER?
Why does it matter?

Connected devices

Some say this could be as high as 200 billion devices

What does it mean for health care?

http://www.gartner.com/newsroom/id/2684616
Why does it matter?

The health care landscape is changing …

High quality, affordable healthcare is achievable with enabling technology to support clinical processes and regulatory requirements.

Location Services are now as ubiquitous as electricity & Wi-Fi
CHALLENGES
Today’s challenges

MULTIPLE INFRASTRUCTURES

- Wayfinding & Mobile Engagement
- Asset Tracking & Temp Monitoring
- 802.X Wi-Fi Location
- Hand Hygiene
- Infant Security
Today’s challenges

TAG “FLEET” MANAGEMENT

- Labor intensive
- Cost per tag
- Tags fall off
Lack of interoperability
SOLUTION
What is Embedded Location?
Benefits to IT

ONE INFRASTRUCTURE

- Lower cost
- Encourages interoperability
- Enterprise consistency
Benefits to IT

ONE INFRASTRUCTURE

- Lower cost
- Encourages interoperability
- Enterprise consistency
Benefits to Clinical Technology

- 100% device visibility
- Saves time
- More natural workflow
Healthcare Trends

1. Shift of Acuity from Hospital to Ambulatory and the Home
2. Transition of In-Person to Virtual Care
3. Remote Monitoring, Sensors, and Big Data
4. New Patient Care Settings

HIMSS17
The Clinical Environment

Knowing the location of available clinical equipment and supplies
- Delivers higher quality of patient care;
- Eliminates search time/Increase time at bedside;
- Reduces capital expenditure and operating expenses.

Real-time visibility of the clinical environment
- Improves coordination and communications;
- Increases patient satisfaction;
- Promotes patient and staff safety.
Today’s challenges

LACK OF INTEROPERABILITY
This …

Instead of this …
Potential to Increase Throughput
Benefits – Clinical

Convergence of voice, secure text messaging, alarms, location, alerts, intelligent routing, simple documentation and BCMA on smart devices will improve safety by decreasing the cognitive burden.
**Service Quality:** Real time location updates the patient’s status as they move. Family members receive real time updates regarding patients status in OR/ Recovery/ ICU.

**Hospital Throughput:** All patients’ are tagged and their location and status are updated in the EHR. Improves clinician efficiency and deceases non-value added tasks.

**Security:** Data is accurate and secure for all patients and equipment. Improves regulatory compliance with asset tracking, temperature monitoring.

**Patient Engagement:** Patients/Families are engaged with indoor way finding & population management is enhanced with remote monitoring & patient generated data.

**Financial Value:** Asset tracking, patient throughput, decrease hosp. assoc. infections with hand hygiene reminders (based on tags). Direct care time back to clinicians from less time searching for equipment/ patients/ staff. Improved bed tracking and admission/discharge/ transfer flow. Improved access to real time information- Clinicians’ ID opens patient’s care board as they walk into patient’s room.
Real time location is an enabling technology that creates value:

- The number of medical and personal devices is growing exponentially.
- Location will be part of the overall clinical and technical architecture.
- Location enhances smart phones, hand hygiene technology, hospital throughput, real time dashboards, and locating people and equipment.
- Location will drive positive patient and family experiences such as wayfinding and patient tracking after surgery/procedure.
- Location services improves overall cost of equipment and supplies through improved asset utilization, tracking.
- Integrated mobile communication enhanced with location in smart phones enabling the closest clinician to respond to a red alarm or patient event.