Synergy between eHR & Authenticated Data from Daily Patient Care

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More Health-related information ➔ Better Quality of Life?

Better information for monitoring personal health? Better insight on treatment effectiveness?

Traditional health records:
• Diagnoses from clinical visits
• Treatments from hospitalization
• Drug application records
• Manually taken vital signs

Non-traditional health related data:
• Continuous streams of vital signs
• Activity patterns during hospitalization
• Activity levels under different drug applications or treatments

• Too much to keep?
• How to use them?
• How to ensure their authenticity?
Traceability for Healthcare Risk Management

Extending to Other Industries & Professional Fields

Exporting to Global Healthcare Risk Management

Standard-compliant Platform to Share Healthcare Risk Management in Hong Kong

Real-time Tracking Patients’ Whereabouts & Monitoring Their Health Statuses During Inpatient Period

Traceability Database

Risk Analysis

Prevention Model for Better Care

Tracking & Monitoring Data

RFID, Sensor, Location

Patients

Sharing
HKSAR ITF-Funded Research Projects

- **RFID Traceability for Risk Management in Hospital**
  [ITP/020/09LP], HK$11M, Sept 2009 – Nov 2011
  - Developing low-cost, positioning-capable, sensor-pluggable active RFID system for tracking people and asset
  - Enhancing hospital risk management such as infectious disease outbreaks & hospital-acquired infections
  - Leveraging RFID traceability technologies for better patient care

- **Pilot Implementation in Prince of Wales Hospital (PWH)**
  - Alerting ward staff for certain patient activities that may be at high risk if lack of timely attention
  - Tracking people interactivities for tracing possible spreading paths

- **Prototype: RFID Traceability for Risk Management in Hospital**
  - Evaluating the prototype for the usage in other hospital departments
  - Enhancing RFID technologies for different usages with different packaging
Healthcare Risk Management Architecture Framework

- Clinical Management Systems
- Asset Management System
- Inventory System
- Other ISs

Risk Management Platform
- Proximity Model
- Spreading Model
- Analytical Engine
- Traceability Info System

Platform

Edge
- Active RFID Positioning & Sensing Technologies
  - Sensor-integrated Active RFID Tags
    - Low-cost, Small-sized
  - Active RFID Readers
    - Indoor Positioning System
    - Stationary or Handheld
  - Active RFID Reader Collectors

Middleware
- Passive, Active
- Spatial Interface
- Alert Engine
- Visualization Engine

Traceability Data
- ID + Time + Location + Sensor
- Context-sensitive Events
Traceability Enabled Ward Activity Management Applications

- **Ward Management Console**
  - Real-time & continuous monitoring system for alerting ward staff on some preset patient activities with potential risks

- **Authenticated Ward Event Messaging Service**
  - Authenticated event-based message delivery system for ensuring secured notifications to corresponding parties

- **Authenticated Activity Data from Daily Patient Care**
  - Audited patient activity data (treatment, visit, etc.) for ensuring their authenticity

Other Traceability Enabled Ward Activity Management Applications or Services

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**Positioning and Sensor Data Middleware**

**RFID and Wireless Sensor Network Infrastructure**
Event Monitoring for Alerting Issues that Require Attention

Context-sensitive Event Detection & Monitoring In Hospital

RFID Traceability Pilot Implementation in PWH
Authenticated Ward Event Messaging Service

PKI: Public Key Infrastructure

Using public key cryptography & digital certificates to ensure the integrity of the content & message communications

Message Compliance to Electronic Transactions Ordinance (Chapter 553)
### Context-Sensitive Event Detection & Monitoring for Enhancing Patient Care in Ward

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<tr>
<th>Patient Monitoring</th>
<th>Staff Management</th>
<th>Equipment Tracking</th>
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<td>Real-time location tracking</td>
<td>Specimen pickup route compliance monitoring</td>
<td>Out of ward monitoring</td>
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<td>Prolonged stay tracking in private areas due to any accident or change in health condition</td>
<td>Drug delivery schedule compliance monitoring</td>
<td>Equipment availability tracking</td>
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<td>Tracking high-risk or suicidal patients for leaving wards</td>
<td>Ward condition monitoring</td>
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<td>Vital sign monitoring for any unexpected change</td>
<td>Inventory checking &amp; maintenance scheduling</td>
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<td>Infectious disease monitoring by deriving people-to-people contact tracing for providing timely information to find spreading paths &amp; source of any nosocomial infection &amp; even any infectious disease</td>
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