Exposing Privacy Concerns in mHealth Data Sharing

Aarathi Prasad, Jacob Sorber, Timothy Stablein, Denise Anthony and David Kotz

HealthSec 2011
mHealth Architecture

Electronic/Personal Health Record (Server)

Patient

Consumer (Client)

Courtesy: http://benchmark.bpcsites.com

Courtesy: http://ironmantriathlontips.com

Courtesy: http://medicallink.com

 Courtesy: http://hhs.state.ne.us

Institute for Security, Technology, and Society (ISTS) at Dartmouth College
Benefits vs privacy

- Consumers & personal information:
  86% of American shoppers use store cards, “and most say the benefits are worth giving up some privacy” [2004 poll]

- Health information:
  60% think benefits of electronic health records outweigh privacy concerns [2007 survey]

Is there a third option?
Expressive privacy controls

- enjoy health benefits
- limit exposure

Goal

Courtesy: bannerhealth.com
Focus Groups

- Students, hospital outpatients and residents of retirement home
- Scenarios

- Medication
- Exercise
- Location
- Interactions
Focus Group - Questions

- Benefits/disadvantages
- Privacy concerns
  - information type
  - time and location
- Sharing with doctor, family and friends
- Controls to limit transmission
Focus Groups - Results

- Sharing of personal health information
  - Medium of transmission
  - What is being shared
    - Sensitivity level
  - Social interactions
    - Location
    - Medication
    - Diet and exercise
  - Benefits outweigh privacy in case of serious illness

Courtesy: networkworld.com
Focus Groups - Results

- *Who* information is being shared with
  - Insurance companies and employers

<table>
<thead>
<tr>
<th></th>
<th>Doctors</th>
<th>Family and friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatients</td>
<td>Share all information</td>
<td>Share only with caregivers</td>
</tr>
<tr>
<td>Residents</td>
<td>Share some information</td>
<td>Share with trained caregivers</td>
</tr>
<tr>
<td>Students</td>
<td>Mixed responses</td>
<td>Share with trained caregivers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Share only if incapable of making decisions on their own</td>
</tr>
</tbody>
</table>
Focus Groups - Results

- Control
  - To turn device on or off
  - To choose what to share and with whom

Courtesy: http://comapleteorganizingsolutions.com
Privacy controls

- Annotations
- Access logs
- Sensible default settings
- Hierarchical controls

Activity ✗

- Steps
- Calories
- Type ✗
- Heart rate ✗
- Location
Fitbit study

- Students carry Fitbits for 5 days
- Share information with family, friends and third parties
- Goal: understand how people share their activity and sleep data

Courtesy: http://fitbit.com
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