Comparing Approaches to Measuring the Adoption and Usability of Electronic Health Records: Lessons Learned from Canada, Denmark and Finland

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How can we best measure the adoption and usability of Electronic Health Records nationally?

- Issue in Canada and other countries
- Technologies such as electronic health record (EHR) are rapidly being deployed in Canada and internationally
- However, there are many issues emerging related to the adoption of this type of technology (how to deploy, uneven acceptance across regions etc.)
- Issues of usability problems are affecting adoption in Canada
Background: “Adoption” Versus “Usability”

- **Adoption**
  - Typically refers to the degree of uptake of technologies in terms of number of users and extent of use of a technology

- **Usability**
  - Assessment of ease of use in terms of
    - Efficiency
    - Effectiveness
    - Enjoyability
    - Learnability
    - Safety (Preece et al.)
Background: Quantitative Versus Qualitative Approaches

- **Surveys**
  - Increasingly used to assess adoption across regions
  - Can be deployed efficiently over the WWW
  - Can lead to very large scale data collection
  - Can be extended to assessing usability

- **Usability Testing and Interviews**
  - Smaller scale studies
  - Typically very qualitative in nature
  - Can provide detailed information about usability and adoption issues
  - May be applied in assessing system usability regionally
Approaches in Canada

In Canada, to assess usability of EHRs several approaches have been employed:

- **EHR experience Websites**
  - Provincial websites that allow end users of EHRs (e.g. physicians) to post their ratings of particular vendor products (i.e. EHRs), which can be reviewed by other physicians considering purchasing one of those systems.

- **the National Physician Survey (NPS)**
  - A lengthy questionnaire sent out to all physicians, focused on a wide range of aspects of medical practice in Canada, including use of EHRs and other technologies.

- **Qualitative Approaches**
Emergence of provincial websites specifically about user experience with specific vendor products and solutions
- Part of provincial and regional programs to expand use and adoption of EHRs
- Allows for entry of subjective ratings of specific vendor products by physicians
- Can guide physicians in buying (procuring) systems

Ontario MD is a good example
- Allows physician users to rate EMRs (including rating of usability)
- Physicians interested in buying and EMR can check the ratings made by other physicians of that system
## OntarioMD Funding Eligible EMR Offerings

<table>
<thead>
<tr>
<th>Offering</th>
<th>Vendor</th>
<th>Type</th>
<th>Status</th>
<th>CanadianEMR.ca Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABELMed EHR - EMR/PM v12</td>
<td>ABELMed Inc.</td>
<td>LOCAL</td>
<td>4.1 Funding Eligible VCN Available</td>
<td>3.8</td>
</tr>
<tr>
<td>Accuro® EMR CMS4</td>
<td>Optemed Software Corporation</td>
<td>LOCAL</td>
<td>4.1 Funding Eligible VCN Available</td>
<td>4.5</td>
</tr>
<tr>
<td>Bell EMR v8.0 (formerly xwaveEMR)</td>
<td>Bell Canada</td>
<td>ADC</td>
<td>4.1 Funding Eligible</td>
<td>N/A</td>
</tr>
<tr>
<td>Clinic Information System (CIS) - Complete EMR v8.0 - Clinic Edition</td>
<td>P&amp;P Data Systems Inc.</td>
<td>LOCAL</td>
<td>4.1 Funding Eligible VCN Available</td>
<td>4.0</td>
</tr>
<tr>
<td>Clinic Information System (CIS) - Complete EMR v8.0 - Enterprise Edition</td>
<td>P&amp;P Data Systems Inc.</td>
<td>LOCAL</td>
<td>4.1 Funding Eligible VCN Available</td>
<td>4.0</td>
</tr>
<tr>
<td>EMR Advantage 3.2</td>
<td>Canadian Health Systems Inc</td>
<td>LOCAL</td>
<td>4.1 Funding Eligible</td>
<td>4.4</td>
</tr>
<tr>
<td>GlobeMed v2.0</td>
<td>Alpha Global IT Inc.</td>
<td>LOCAL</td>
<td>4.1 Funding Eligible VCN Available</td>
<td>4.2</td>
</tr>
<tr>
<td>JonokeMed 5.5</td>
<td>Jonoke Software Development Inc.</td>
<td>LOCAL</td>
<td>4.1 Funding Eligible VCN Available</td>
<td>4.3</td>
</tr>
<tr>
<td>Med Access EMR v4.3</td>
<td>Med Access Inc</td>
<td>LOCAL</td>
<td>4.1 Funding Eligible</td>
<td>N/A</td>
</tr>
<tr>
<td>Nightingale On-Demand</td>
<td>Nightingale Informix</td>
<td>LOCAL</td>
<td>4.1</td>
<td>N/A</td>
</tr>
</tbody>
</table>
- Averages are calculated to a .1 decimal, so that each question can receive an average rating between 1.0 and 5.0.
- The average for each category is made up of the averages for each set of three questions.
- The overall rating for each EMR is made up of the averages for each of the five categories.

<table>
<thead>
<tr>
<th>Number of Ratings</th>
<th>P &amp; P CSI Clinic Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td>37 Verified Rating(s)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase Experience</td>
<td>4.1 ★★★★★☆</td>
</tr>
<tr>
<td>Implementation Experience</td>
<td>3.9 ★★★☆☆</td>
</tr>
<tr>
<td>Support Experience</td>
<td>4.0 ★★★★☆</td>
</tr>
<tr>
<td>Usability</td>
<td>4.0 ★★★★★☆</td>
</tr>
<tr>
<td>Satisfaction with Product</td>
<td>3.9 ★★★★★☆</td>
</tr>
<tr>
<td>Average out of 5</td>
<td>4.0 ★★★★☆</td>
</tr>
</tbody>
</table>

Top
National Physician Survey (NPS)

- **Study Aims:**
  - To characterize key aspects of physician experience in Canada (e.g. type of practice, type of patients etc.)
  - Includes scales about use of health information technology (HIT)

- **Methods:**
  - Questionnaire mailed or emailed out to Canadian physicians

- **Sample:** Last version given mailed out (email and regular mail) to all Canadian physicians

- **Sample Size:** 12,076 replied (response rate of 18%)
Limitations

- Few questions specifically about usability/user experience in NPS
- Not offered every year
- Does not provide vendor specific information about usability or adoption
- National survey needs to be expanded to include greater emphasis on user experience
  - Recommendations made to government
Qualitative Approaches and Usability Testing

- Focus of usability testing methods on smaller scale studies (of specific systems)
- Can provide detailed information about specific vendor products
- Can be used to compare systems selected by regional EHR adoption programs – plans underway to start this information sharing about products based on collection of
  - Effectiveness, efficiency, enjoyability, safety and learnability measures
Two types of surveys have been deployed nationally

- Survey to describe the status and trends in EHR adoption and eHealth usage in Finland – adoption survey
- Survey specifically about the usability (users’ experience) with healthcare IT systems, with a specific focus on EHRs – usability survey
Finland – Adoption Survey

Study Aims:
- Created a separate questionnaire on usability
- To describe the status and trends in HIT and eHealth usage
- Used a web-based questionnaire
  - Questions about the adaptation of EHRs and adoption of different eHealth services

Methods:
- Web-based questionnaire

Sample and Sample Size
- Healthcare providers and management
- All hospital districts and 140 healthcare centres, some private
Finland – Usability Survey

Study Aims:
- To collect data on physician’s experiences with the usability of clinical HIT to explore
  - Compatibility among clinical systems and physician tasks
  - HIT support for information exchange, communication and collaboration in clinical work
  - Interopability and reliability
  - Usability of systems being used

Methods:
- Web-based questionnaire

Sample and Sample Size:
- Sent to all physicians working in patient care, response of 31%
Approaches in Denmark

- Denmark has been conducting national surveys on adoption of EHRs and HIT for a number of years.
- The dissemination of EHRs was surveyed for 6 consecutive years from 2001 to 2006.
- In 2010, a national survey of clinical use of health IT was launched and repeated in 2011 and 2012.
  - Web-based survey sent to physicians, nurses and medical secretaries.
  - Sections on IT system use, number of log-ins, number of passwords, time and frequency of computer use.
Unlike adoption, system usability has not been measured in national surveys in Denmark (but there are free text comments given about this)

However, work has been underway in using video recording and analysis of use of the five medication systems implemented in Denmark’s five regions

- Physicians from each region went through two patient case histories and prescribed drugs
- Has lead to identifying significant differences in design of the five systems
Comparing Approaches Internationally

- Adoption has typically been assessed using large-scale national questionnaires in all three countries (in Canada part of a larger survey, while Denmark and Finland have specific surveys)

- Assessment of usability in regions has varied
  - In Canada this has included product rating Web sites
  - In Denmark this has included carefully conducted usability tests of systems used in the 5 regions
  - In Finland this has also now included a national on-line survey specifically about usability
<table>
<thead>
<tr>
<th></th>
<th>Canada</th>
<th>Denmark</th>
<th>Finland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study Aims</strong></td>
<td>Survey the use of healthcare IT (including EHRs) by physicians</td>
<td>Provide user ratings of usability of commercial EHRs (to help physicians decide on systems)</td>
<td>Describe the dissemination and use of health IT systems on national level.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Describe usability in daily practice for physicians use of medication systems</td>
<td>Investigate usability in daily practice for physicians use of medication systems</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Describe the status and trends in healthcare ICT and eHealth usage in Finland</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Research physicians’ experiences on the usability of clinical ICT systems</td>
</tr>
<tr>
<td><strong>Methods</strong></td>
<td>Questionnaire (email and mail)</td>
<td>Web site user ratings in some province e-health observatory (questionnaire )</td>
<td>Simulation based usability test</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Web-based questionnaire</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Web-based tailored usability questionnaire</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>Given in 2004, 2007 and 2010, starting in 2012 it will become an annual survey</td>
<td>Several provincial EHR web sites have ratings</td>
<td>Once a year</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Single study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Latest in 2011, earlier ones made in 2003, 2005 and 2007 (all nationally)</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>First in 2010, (will be repeated in 2014)</td>
</tr>
<tr>
<td><strong>Sample</strong></td>
<td>Physicians, residents and medical students</td>
<td>Physicians already using commercial vendor systems</td>
<td>Medical doctors, nurses and medical secretaries selected by the respective professional organizations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Two physicians from each of five regions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Healthcare service providers (organizations ) (respondents: chief physicians,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Finnish physicians actively working in patient care</td>
</tr>
</tbody>
</table>
When should different methods be used for evaluating adoption and usability?

- Our experience internationally has been that data is needed in the large-scale about BOTH adoption and usability trends.
- Surveys can provide valuable information about both adoption and usability (proven by the case of Finland).
- However, in all three countries issues of usability must be addressed using MIXED METHODS.
  - Can involve detection of patterns of dissatisfaction from surveys, followed up by in-depth qualitative analysis (DOD example).
Adoption and usability are closely interrelated with usability problems detrimentally affecting adoption and uptake.

All three countries have national surveys that address adoption issues.

These surveys CAN be updated to include scales related to usability (as has been done in Finland).

However, the data collected using this approach needs to be complemented by focused in-depth usability studies.