Assessing the Perceived Impact of EMR Systems on Physician Office Practice: A Review of Survey-based Research

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Background

An electronic medical record (EMR) is an electronic version of patient record that physician maintains for their patients which can be a simple office-based system, shared within a group practice or networked (Canadian Medical Protective Association, 2009).

According to the literature, EMR adoption has been slow (National Physician Survey, 2007) but expected to increase in the future (Ford et al., 2006). Therefore, it is necessary to evaluate the impact of such systems. Survey-based research consists of administering questionnaires to respondents to collect first-hand experiences or views.

We conducted a systematic review to 1) determine what areas of EMR impact have been addressed most in survey research studies and 2) compare perceived impacts between users and non-users. Here, we present the results of the first part.

Selected papers had to:
• be published between 2000 and 2009
• address an office-based EMR
• evaluate the perceived impact of system
• report original data
• have clinicians as respondents
• report relevant data clearly enough for extraction

Clinical Adoption Framework

The Clinical Adoption Framework defines dimensions and categories of health information system adoption factors at three levels: Meso, Macro and Micro (see diagram at right) (Lau et al., 2011).
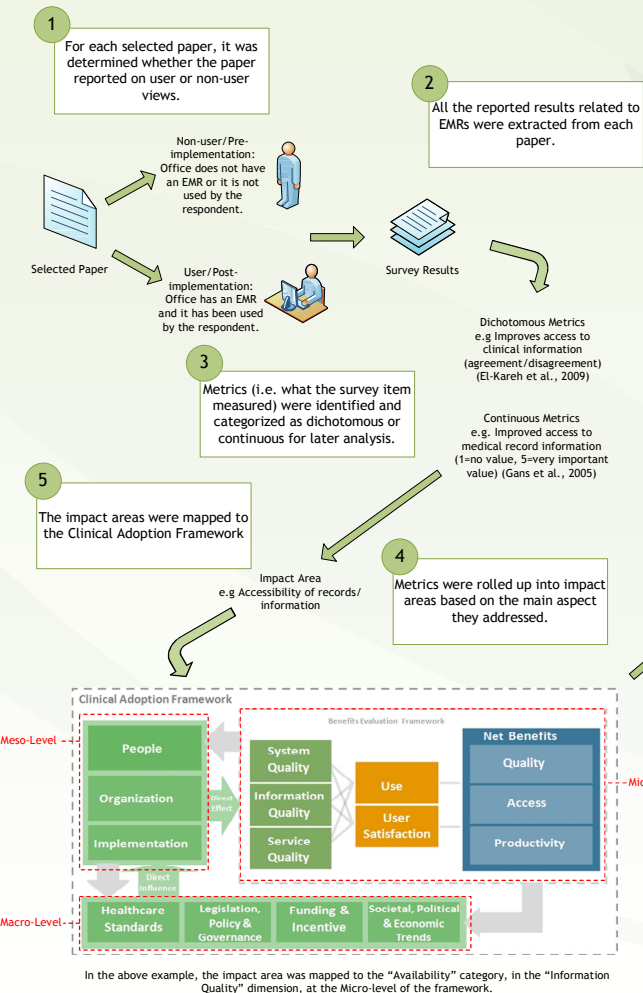
At the Meso-level, the key dimensions are people, organization, and implementation which contain corresponding factors that affect adoption at the organizational level such as personal characteristics, structure and processes, and adoption stage.

At the Macro-level, the associated factors are grouped into the dimensions of healthcare standards, funding and incentives, and legislation, policy and governance. Specific categories include practice standards, remunerations, and legislative acts.

The Micro-level dimensions address factors of relevance to the actual use of a system such as system quality, information quality, use and satisfaction. Also contained within this level are net benefits associated with adoption for quality, access and productivity.

We used the Clinical Adoption Framework as part of our gap analysis to determine which aspects were addressed in the survey papers.

Methods

1. For each selected paper, it was determined whether the paper reported on user or non-user views.

2. All the reported results related to EMRs were extracted from each paper.

Non-user/Pre-implementation: Office does not have an EMR or it is not used by the respondent.

User/Post-implementation: Office has an EMR and it has been used by the respondent.

Selected Paper

Survey Results

Dichotomous Metrics
e.g Improves access to clinical information (agreement/disagreement) (El-Kareh et al., 2009)

3. Metrics (i.e. what the survey item measured) were identified and categorized as dichotomous or continuous for later analysis.

Continuous Metrics
e.g. Improved access to medical record information (1=no value, 5=very important value) (Gans et al., 2005)

5. The impact areas were mapped to the Clinical Adoption Framework

Impact Area
e.g Accessibility of records/information

4. Metrics were rolled up into impact areas based on the main aspect they addressed.

In the above example, the impact area was mapped to the "Availability" category, in the "Information Quality" dimension, at the Micro-level of the framework.
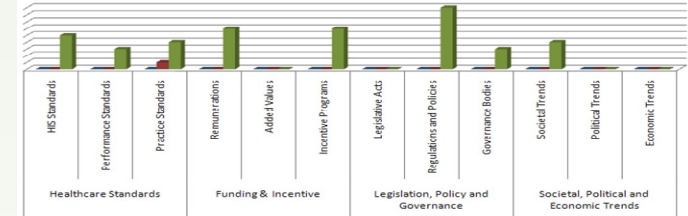
Preliminary Results

The three charts below represent frequencies of individual metrics for the areas which mapped to each level, dimension, and category of the Clinical Adoption Framework. Sometimes there were several metrics for an area within the same paper. The areas were also grouped into three categories for discussion: background, other, and impact-specific (which were considered for the second part of the review).

Meso-Level
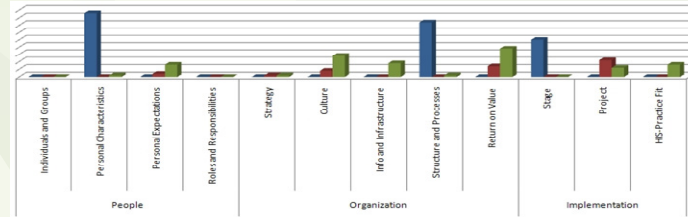
• Contained majority of background metrics
• Most common personal characteristics reported: gender, specialty, and age
• Most common areas for 'Structure and Processes': practice size (# of staff), practice size (# of patients), and practice location
• 'Use status' (under the category 'Stage') was used to distinguish users and non-users for later analysis

• Other areas addressed at this level included expense of implementation, physician/staff resistance, feelings towards practice in general, and maintenance costs
• A few impact-specific areas were identified at this level such as time costs associated with computerization, expected return on investment, attitude towards EMRs, and loss of productivity during transition
• Categories with no metrics/areas were 'Individuals and Groups' and 'Roles and Responsibilities', however, these areas were often related to respondent selection for survey distribution
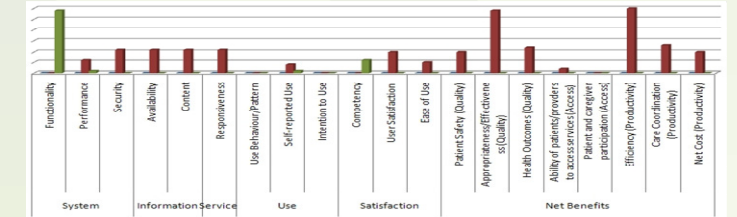
Micro-Level

• Contained most of the impact-specific areas for implementation within the office practice
• Several papers asked respondents about functionality, which were mapped as other areas. Examples of these are: features desired/functions that should be computerized, features available/functions computerized, features for patient use, features used, and intention to computerize functions
• Categories most addressed were 'Appropriateness/Effectiveness' and 'Efficiency'

• The most common area for 'Appropriateness/Effectiveness' accounting for the most metrics was 'patient-physician relationship/communication'
• The most common areas addressed for 'Efficiency' were 'business/practice efficiency' and 'accounting and billing/charge capture'
• Three categories had no metrics/areas mapped to them: 'Use Behaviour and Pattern', 'Intention to Use', and 'Access-Patient and caregiver participation'

Macro-Level

■ Background ■ Other ■ Impact-specific

• Consisted of other associated aspects of EMR implementation that have been addressed through surveys with the exception of one impact-specific area
• 'Regulations and Policies' had the most metrics such as: confidentiality and access to medical records/sharing
• The highest number of metrics for one area was five for financial incentives for purchase/implementation under 'Incentive Programs'
• Categories with no metrics/areas were 'Added Values', 'Legislative Acts', 'Political Trends', and 'Economic Trends'

From the impact-specific areas, we selected the top areas based on frequencies of reported metrics to include in a meta-analysis for the second part of the review. The seven selected areas were:

1. Security/privacy
2. Accessibility of records/information
3. Patient-physician relationship/communication
4. Quality of patient care or clinical outcomes
5. Business/practice efficiency
6. Communication with other providers
7. Costs/savings

Preliminary Findings

• Majority of background areas corresponded to the Meso-level and the most frequent may suggest respondent characteristics to consider for future survey design
• Expense of implementation and maintenance costs came up often at the Meso-level as well
• Other areas looking at aspects of implementation mainly corresponded to the Macro-level
• Impact-specific areas were mostly contained within the Net Benefits dimension at the Micro-level
• Categories most addressed for impact were 'Appropriateness/Effectiveness' and 'Efficiency'

• Metrics related to functionality often appeared but seemed to pertain mostly to availability rather than impact
• Gaps existed in a few categories at all levels e.g. there seemed to be a lack of attention to 'Access-Patient and caregiver participation' at the Micro-level
• Next Steps: compare positive and negative perception between users and non-users for the seven selected impact-specific areas

References

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(Full list of selected papers to appear in the published paper.)