

Electronic Medical Record Use and the Quality of Care in Physician Offices

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Background

- The adoption of electronic medical record (EMR) has been promoted as an important tool to improve the quality of care.
- Many of the existing ambulatory care studies were conducted in hospital outpatient department settings.
- Two recent studies using the National Ambulatory Medical Care Survey (NAMCS) did not find consistent associations between EMR use and quality.

Research objective

- To examine the association between EMR use and quality of care in physician offices
 - More detailed characterization of EMR use
 - More recent data
 - Added one quality measure
 - Four approaches that address gaps in the present literature

Study design

National Ambulatory Medical Care Survey (NAMCS) 2007-2008

- NAMCS is a national probability sample survey of visits to nonfederal office-based physicians in the U.S.
- NAMCS collects both physician and patient information.
- Analytical sample included:
 - Visits to patients' primary care provider, plus
 - Visits to physicians with primary care specialties, plus
 - Visits to physicians with certain specialties that are related to the quality measures

Electronic medical record measures

- NAMCS physician induction forms include a series of questions on the availability of EMR features in physician offices
 - Several EMR functions were added in 2007 and 2008 NAMCS
 - EMR features have been used to report the adoption of basic and fully functional systems

Basic and fully functional systems defined by items collected in NAMCS

	Basic	Fully functional
Patient demographics	X	X
Patient problem lists	X	X
Physician clinical notes	X	X
Medical history and follow-up notes		X
Guideline-based interventions and/or screening test reminders		X
Lab results	X	X
Out-of-range values highlighted		X
Imaging results	X	X
Electronic images returned		X
Computerized orders for prescriptions	X	X
Drug interaction or contraindication warning provided		X
Prescription sent to pharmacy electronically		X
Computerized orders for tests		X
Test orders sent electronically		X

Quality measures

- Aspirin use for ischemic heart disease or cerebrovascular disease (IHD/CVD) visits
- Smoking counseling
- Blood pressure check
- Controlled blood pressure for patients with hypertension
- No routine urinalysis
- Avoiding potentially inappropriate prescribing in elderly patients
- Avoiding prescribing antibiotics for upper respiratory infections

Four approaches

- Hypothetically related EMR features
- Common configurations
- Levels of EMR use
- Top vs. bottom quality performers

Hypothetically related EMR features

	Aspirin use for IHD/CVD visits	Smoking counseling	Blood pressure check	Controlled blood pressure
Patient problem list	X	X	X	X
Orders for prescriptions				X
Warnings for drug interactions or contraindications provided	X			
Prescriptions sent electronically to the pharmacy				X
Orders for tests				
Orders sent electronically				
Viewing lab results				
Out-of-range levels highlighted				
Medical history and follow-up notes	X	X	X	X
Reminders for guideline-based interventions and/or screening tests	X	X		X

Hypothetically related EMR features (cont.)

	No routine urinalysis	Avoiding potentially inappropriate prescribing in elderly patients	Avoiding prescribing antibiotics for upper respiratory infection
Patient problem list		X	X
Orders for prescriptions		X	X
Warnings for drug interactions or contraindications provided		X	
Prescriptions sent electronically to the pharmacy		X	X
Orders for tests	X		
Orders sent electronically	X		
Viewing lab results	X		
Out-of-range levels highlighted	X		
Medical history and follow-up notes		X	X
Reminders for guideline-based interventions and/or screening tests	X	X	X

Common configurations

- Used 8 EMR features to examine common configurations
 - Select the top 10 common configurations
 - “No EMR” is the reference group

Levels of EMR use

- One categorical variable to represent different levels of EMR use
 - No EMR
 - Some EMR, but not basic systems
 - Basic systems, but not fully functional systems
 - Fully functional systems

Top vs. bottom quality performers

- Created success to opportunity ratio for each physician
 - Number of successes / Number of opportunities for the quality measures
 - Top vs. bottom performers among those with at least 30 opportunities to provide high quality

Statistical analyses

- Multivariate logistic regression for the first three approaches controlling for:
 - Patient characteristics
 - Physician characteristics
- Cochran-Mantel-Haenszel chi-square test to compare the availability of EMR features between top and bottom performers. (n=43)
- Linear regression to examine the relationship between levels of EMR use and success to opportunity ratio. (n=1224)

Results

Findings associated with recommended care

	Aspirin use for IHD/CVD visits	Smoking counseling	Blood pressure check	Controlled blood pressure
Hypothetically related features	<ul style="list-style-type: none">•Having patient problem lists			
Common configurations				<ul style="list-style-type: none">•Having patient demographic info•Having patient demographic info, viewing lab results, viewing imaging results

Results (cont.)

Findings associated with recommended care

	No routine urinalysis	Avoiding potentially inappropriate prescribing in elderly patients	Avoiding prescribing antibiotics for upper respiratory infection
Hypothetically related features			
Common configurations	<ul style="list-style-type: none">•Having patient demographic info, orders for prescriptions, orders for tests, viewing lab results, clinical notes, reminders for guideline-based interventions		<ul style="list-style-type: none">•Having patient demographic info, viewing imaging results•Having patient demographic info, orders for prescriptions, orders for tests, viewing lab results, clinical notes, reminders for guideline-based interventions

Results (cont.)

- Levels of EMR use
 - No significant findings for any quality measures
- Top vs. bottom performers
 - Success to opportunity ratio did not differ by levels of EMR use.
 - A higher percentage of bottom performers had warnings of drug interactions or contraindications.

Limitations

- Lack of information on how EMR was used
- Quality measures from NAMCS may not be the right measures
- Small sample sizes for some quality measures

Conclusions

- No consistent relationship between EMR use and quality.
- A small percentage of physician offices has the same EMR features.

Implications

- Strengthen data collection
 - How EMR was used in physician offices
 - Appropriate quality measures for EMR features
- Create EMR systems that assist health professionals to provide high quality of care
- Moving towards meaningful use