Abstract

Measuring Quality of Prescribing: Where Does the Information Reside?

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BACKGROUND High quality clinical decision support relies on accurate and complete information input about the patient to measure the baseline quality of care before suggesting any changes. For prescribing, it has proven extremely difficult to capture all of the information required to judge quality of prescribing.

METHODS A nominal group consensus process (previously described) was used to establish domains for the Appropriateness of Prescribing Evaluation Questionnaire (APEQ). We tested the reliability of paper chart reviews (N=48 charts), both inter- and intra-reviewer then evaluated paper and electronic charts (N=136) of our primary care electronic medical record (EMR) network for their ability to inform APEQ using NSAIDs as test drugs.

RESULTS Despite 8 domains, each with 4 scoring possibilities for APEQ, chart review reliability was good with weighted kappas for inter-rater reliability of 0.68 (SE .07) and intra-rater reliability of 0.76 (SE .13). For the key domains of patient age, diagnosis, index prescription and previous therapies, definitive information was available in 72-100% of cases from paper or EMR chart. However, such information on contraindications was frequently missing. As the EMRs had only been in use for 2 years and were used by family physicians not consultants, significantly more information ($p<.001$) was available from paper charts on data elements of past diagnoses and previous therapies.

CONCLUSIONS Since EMRs are a new technology in Canada, there is insufficient longitudinal information and penetration amongst specialists to rely on them solely for information. Currently both paper and EMR chart reviews are required. Within the important domains of information in this analysis, contraindications were poorly documented.

The COMPETE II Study - Background

- Computerization of Medical Practices for the Enhancement of Therapeutic Effectiveness (COMPETE)
- Conducted by the Centre for Evaluation of Medicines, an academic research institute affiliated with McMaster University
- The first Electronic Health Record (EMR) research network in primary care in Canada
- A three year project studying the impact of EMR on practice efficiency, quality of care and privacy concerns
- 32 family physicians in 18 primary care clinics

Objectives

- To evaluate new technology (EMR) compared to Paper charts, assessing the quality of information available to measure the appropriateness of prescribing
  - Chart Review process to be used. This is a common technique, but virtually no data in literature on reliability and validity
- To test inter-rater and intra-rater reliability of a complicated chart review process
- For validity, to compare EMR and Paper charts as sources of information
  - Which is better as an information source?
  - Since EMR is new, is there improvement over time in the quality of information?

Methods – Chart Review Reliability

- 2 trained chart reviewers, each reviewed 48 randomly selected paper charts – for inter-rater reliability
- 8 charts selected for each reviewer, for a repeat blinded chart review one month later – for intra-rater reliability
- Chart data abstracted to answer the Appropriateness of Prescribing Evaluation Questionnaire (APEQ) with NSAIDs as test drugs
  - Domains previously established and validated (face and content) through Nominal Group Technique process
  - 8 domains (indications, dosage, treatment duration, treatment duplication, contraindications-drug/disease and cost) with 4 scoring possibilities related to appropriateness of prescribing

Methods – Chart Review (Paper vs. EMR)

- To review Paper and EMR charts from two study periods:
  - **Period 1** 0 – 12 months after computerization EMR implementation
  - **Period 2** 12 - 24 months after implementation
  - Charts from two periods are of different patients
- 6 Charts (3 for each phase) per physician. Each patient has variable amounts of important information in Paper and EMR
  - Both are abstracted
- Abstraction of data from charts done using APEQ questionnaire for MSK disorders and NSAIDs as drugs of interest
- Information was abstracted searching the data 7 years back from the "Index Visit" (*last MSK diagnosis in period of interest*)
  - 35 questions (for 8 domains) to answer, regarding the availability of information that is important to know to measure the appropriateness of prescribing

Results – Chart Review Reliability

Table 1 Inter-rater and intra-rater reliability - Overall

Reliability	Weighted Kappa	SE
Inter-rater	0.68	0.07
Intra-rater	0.76	0.13

Table 2 Inter-rater reliability – Domain specific

Domain	Kappa	SE
Indications (disease and prior therapies)	Perfect agreement	
Dosage of medication	0.86	0.06
Drug-drug contraindications	0.53	0.13
Drug-disease contraindications	0.38	0.12
Duplication of treatment	0.81	0.09
Duration of treatment	0.80	0.08
Cost	0.91	0.05

Results – Chart Review (Paper vs. EMR)

Table 3 How Often the Definitive Information was Available (% of charts)

Domain	Paper (N=136)	EMR (N=136)	Either (N=136)
Diagnosis (MSK)	68 %	67 %	100 %
Prescription (NSAID at Index Visit)	60 %	54 %	85 %
Previous Therapies (NPT + ACM)*	59-80 %	26 – 40 %	65 – 85 %
Concomitant Medications	63 %	53 %	81 %
Diagnosis from the past:			
- PUD**	19 %†	1 %	19 %
- CVS disorders**	43 %†	16 %	43 %
- Renal disorders	54 %†	8 %	54 %
- Liver disorders	13 %†	1%	13 %

*NPT=non-pharmacological treatment
** PUD = Peptic Ulcer Disease
† = p-value < .001 compared to EMR

ACM = acetaminophen
CVS = cardiovascular

Results – Chart Review (Paper vs. EMR)

Table 4 The Source of Information (% of charts, N = 68)

a) Period 1 (0-12 mo. after EMR implementation)

Domain	Paper Only % (#)	EMR Only % (#)	Both % (#)	Neither %(#)
Diagnosis	38 (26)	28 (19)	34 (23)	0
Prescription (NSAID at Index Visit)	35 (24)	21 (14)	25 (17)	21 (14)
Concomitant Medications	32 (22)	15 (10)	29 (20)	24 (16)

b) Period 2 (12 – 24 mo. after EMR implementation)

Domain	Paper Only % (#)	EMR Only % (#)	Both % (#)	Neither %(#)
Diagnosis	28 (19)	35 (24)	37 (25)	0
Prescription (NSAID at Index Visit)	26 (18)	29 (20)	34 (23)	10 (7)
Concomitant Medications	24 (16)	21 (14)	41 (28)	15 (10)

Results – Chart Review (Paper vs. EMR)

The AVAILABILITY of Information in EMR

Domain	First 12 months (N = 68)	After 12 months (N = 68)
Diagnosis (MSK)	62 %	72 %
Prescription (NSAID at Index Visit)	46 %	63 % †
Duplication of prescriptions (NSAIDs)	15 %	31 % †
Previous Therapies (NPT + ACM)*	27 – 32 %	25 – 47 %
Concomitant Medications	44 %	62 % †
Diagnosis from the past**	2 – 12 %	0 – 21%

*NPT=non-pharmacological treatment
ACM = acetaminophen
** PUD, cardiovascular, renal, liver diseases
† = p-value < 0.05

Discussion – Chart Review Reliability

- Inter- and intra-rater reliability of this complex chart review process was good, despite 8 domains and 4 different scoring possibilities for each domain

- The best reliability was achieved for the “indications” domain
  - consisted of current diagnosis and prior therapies

- Reliability was only fair for domain dealing with drug-disease contraindications

- Reliability of chart review process was judged adequate to use APEQ as outcome measure in trials of Paper vs. EMR studies

Discussion – Chart Review (Paper vs. EMR)

- The combination of both Paper charts and EMRs was needed to capture sufficient high quality data to judge the appropriateness of prescribing
- The key information about diagnosis, index prescription, previous therapies and concomitant medications was available in most cases
- Information on contraindications, corresponding to previous health conditions, was frequently missing
- Information from the past medical history (past diagnoses, previous therapies) was found more frequently in paper charts than in EMRs
- **Period 2** vs. **Period 1** comparison demonstrated improvement in EMR data quality over time

Conclusion

- Our comprehensive appropriateness of prescribing measurement tool [APEQ] can be used reliably for both paper and electronic chart evaluation.
- It is possible, although laborious, to complete a complex chart review examining quality of prescribing that is both reliable and valid.
- Electronic medical records are a new technology with insufficient penetration to allow them to replace paper charts as valid information sources. This will likely improve over time as more providers use EMRs.
- The true accuracy and completeness of chart information is unclear without external validation from the patient or provider directly, but would be sufficient to generate decision support messages.