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# THE EFFECT OF EMR IMPLEMENTATION ON COMMUNICATION BETWEEN PHARMACISTS AND PRESCRIBERS.

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# Objective

- To determine the effect of a newly implemented EMR system on communication between pharmacists and primary care clinicians.



# Background

- In Canada, preventable drug-related hospitalizations cost the healthcare system an estimated \$2.6 billion per year.<sup>1</sup>
- Computerized decision-making support has been shown to result in fewer cases of inappropriate prescriptions and higher rates of discontinuation of drugs causing harmful interactions.<sup>2</sup>
- EMRs have potential to improve quality of care, but is this occurring?

1. Hohl CM, Nosyk B, Kuramoto L, Zed PJ, Brubacher JR, Abu-Laban RB, Sheps SB, Sobolev B: Outcomes of emergency department patients presenting with adverse drug events. *Ann Emerg Med* 2011, 58(3):270-279.e4.

2. Tamblyn R, Huang A, Perreault R, Jacques A, Roy D, Hanley J, McLeod P, Laprise R: The medical office of the 21st century (MOXXI): effectiveness of computerized decision-making support in reducing inappropriate prescribing in primary care. *J Am Med Inform Assoc* 2011, 18:732-733,734,735,736,737.



# MEDICAL CENTER HOSPITAL

500 - 800 WY 4TH STREET

ODESSA, TEXAS

PH 332 7111

FOR Vazquez, Ramon AGE \_\_\_\_\_

ADDRESS 12141 15th St DATE 6/23/95

- NO REFILLS
- REFILLS \_\_\_\_\_
- LABEL

Zendil 20mg # 120 -  
 20mg P.O. Q6hr  
 Ferrous Sulfate 300mg # 100  
 300mg P.O. TID c meals  
 Humulin N  
 30 units SQ QAM  
 Ramon K...

PRODUCT SELECTION PERMITTED

DISPENSE AS WRITTEN

D.E.A. #

FORM 207 2-90

PH 88-270



EXPLORER INNOVATOR PIONEER ADVENTURER VISIONARY TRAILBLAZER

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SAN DIEGO SPORTS MEDICINE AND ORTHOPAEDIC CENTER  
[REDACTED]  
[REDACTED] CA, U.S.A.

NAME James [REDACTED] AGE \_\_\_\_\_

ADDRESS \_\_\_\_\_

**R** JUN 07 1999

*Urechis # 1.750.14.100 (1.2.17)*

RE 4 TIMES [REDACTED]

DO NOT SUBSTITUTE  [REDACTED]

To assure brand name consistency, check all product labels.

*[Signature]*



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# Methods

- Retrospective chart analysis comparing **faxed** pharmacy communications captured before and after the implementation of an EMR in December 2011 at a family medicine academic teaching unit in Winnipeg.
- Rule of 3's:
  - Pharmacist requests during a 3 month period before EMR implementation and for 3 months, 3 years after EMR implementation.
- EMR used was QHR Accuro®



## Fax Prescription Renewals...



# Methods

- Requests were classified into various categories including:
  - **Medication/Service requests:**
    - refill accepted, refill denied, interaction, supplies request, continued care information, drug insurance/coverage application, new prescription request, substitution, opioid early release request
  - **Potential errors:**
    - clarification, incorrect dose, duplicate fax, confirmation of phone call and “other”





# Results

## ➤ Pre-EMR Implementation (Total of 555 Requests)

- Medication/Service Requests
  - Refill Accepted – 259 (46.7%)
  - New Prescription – 74 (13.3%)
- Potential Errors
  - Clarification – 64 (11.5%)
  - Incorrect Dose – 29 (5.2%)



# Results

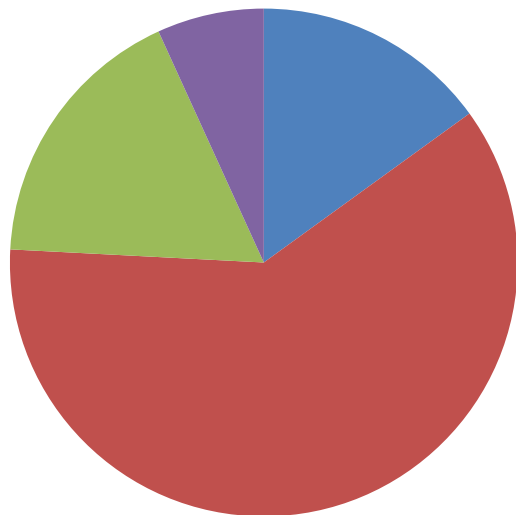
## ➤ Post-EMR Implementation (Total of 857 Requests)

- Medication/Service Requests
  - Refill Accepted – 497 (58.0%)
  - New Prescription – 160 (18.7%)
- Potential Errors
  - Clarification – 50 (5.8%)
  - Incorrect Dose – 13 (1.5%)



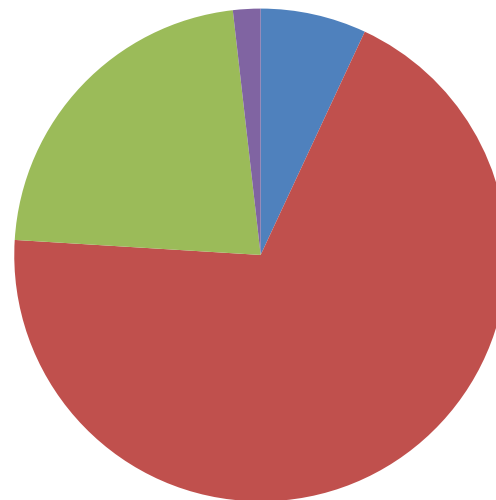
# Results

## Pre-EMR Implementation



- Clarification
- Refill
- New Prescription
- Incorrect Dose

## Post EMR implementation



# Discussion

- Statistically significant change in types of communication after the implementation of an EMR
  - **Reduced** volume of clarification and incorrect dose requests, with a slight decrease in the number of interaction requests.
  - **Increased** amount of refill requests and duplicate faxes.
- Findings agree with other studies that demonstrated that electronic prescribing significantly reduces risk compared to handwritten prescribing.<sup>3</sup>

3. Ammenwerth E, Schnell-Inderst P, Machan C, Siebert U: The Effect of Electronic Prescribing on Medication Errors and Adverse Drug Events: A Systematic Review. Journal of the American Medical Informatics Association 2008, 15(5):585-600.



# Interaction Requests

- Decreased in number, but very few were reported initially.
  - One possible explanation is that other forms of communication are being used to discuss drug interactions (ie: phone)
  - Another explanation is that decision support systems present in the EMR used in our study are not being monitored carefully enough and findings are being reported infrequently.



# Refill and New Prescription Requests

- Dramatic *increase* in volume.
  - Counterintuitive—we expected the EMR to be more efficient than paper records.
    - Provided a suitable amount of time for physicians to gain familiarity with EMR use.
    - Clinic practice sizes remained stable during the study.
    - What caused the increase?



## Possible Explanations for Increases in Refills

1. Ease of use of EMR allows prescribers to prescribe medications more easily, without requiring the patient to book an appointment.
2. Capture Bias
  - Faxes from pre-EMR period may not have been stored in binder, underrepresenting communications from that era.
3. EMR was not integrated with dispensing system (ePrescribing).
  - Workflow really captures a paper process on a computer
  - May represent sub-optimal utilization of the prescribing functionality (med list) in the EMR.



## Possible Explanations continued...

4. Telephone communication between pharmacists and prescribers was missed in both pre and post EMR workflows.
  - Pharmacist often call to speak directly with a doctor over the phone and the interaction therefore not captured as a faxed communication document.
5. Data may reflect a change in pharmacist practice between both time periods.





## Significance of our Findings and Our Limitations

- Demonstrated a significant change in prescribing patterns and improved safety after EMR implementation.
  - Our data implies that prescribing with a computer is safer than handwritten prescriptions
  - Adds a further mechanism for why this may be true
- Showed increases in the number of certain types of requests (refill requests, new prescription requests, and duplications)
  - Much room for improvement



# Limitations

- Lack of direct interface between prescribers and pharmacists.
  - Instead we relied on fax communications as a surrogate of the typical interaction beyond the usual piece of paper
- Single EMR, single clinic, one province, may not be generalizable.
  - Still indicates an interesting pattern

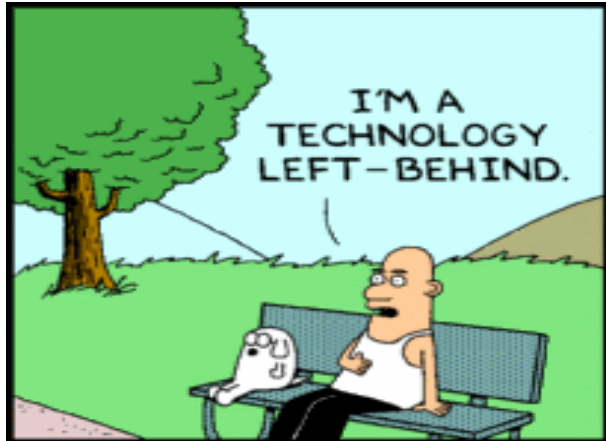


# Conclusions

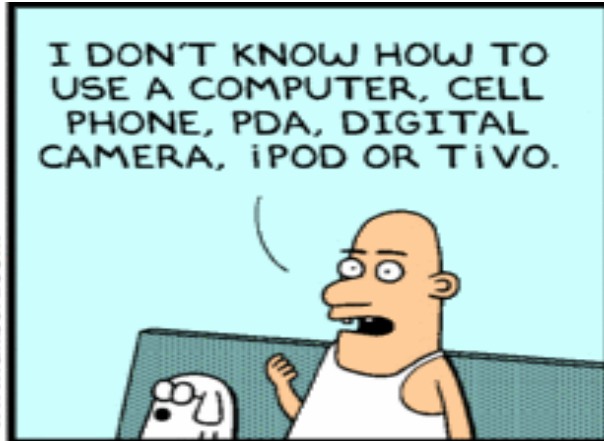
- EMR implementation in an academic family medicine clinic changed the volume of communication between pharmacists and prescribers in significant ways.
  - Clarifications and incorrect dosing communications decreased.
  - Refill requests and new prescription requests increased, suggesting that EMRs may result in improved capture and changes in prescription patterns.



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## Concluding Thoughts

- EMRs have a beneficial impact on patient safety and efficiency related to faxed communications
- Further improvements needed in prescribing technology to make full use of the benefits of digitization in primary care.



# QUESTIONS?



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# Results – Table 2

Table 2 Table listing request categories and their definitions

| Request Categories            | Definitions                                                                                                                                                             |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Refill Accepted               | Approved refill request.                                                                                                                                                |
| Refill Denied                 | Rejected refill request.                                                                                                                                                |
| Clarification                 | Requests requiring physician intervention to interpret. Ex: prescription illegible.                                                                                     |
| Incorrect Dose                | Dosage prescribed by prescriber did not match what pharmacists had on record.                                                                                           |
| Exception Drug Status Request | Application for drug insurance or coverage.                                                                                                                             |
| New Rx Request                | Request for prescription not on file for that patient.                                                                                                                  |
| Supplies Request              | Request for non-drug equipment. Ex: diabetic equipment such as touch strips.                                                                                            |
| Continued Care Information    | Requests for refills or new prescriptions relating specifically to individuals in continuing care communities.                                                          |
| Duplicate Fax                 | Copies of the same fax passed through the system more than once.                                                                                                        |
| Substitution                  | Request for an alternate medication to replace a current one.                                                                                                           |
| Fill Over Phone               | Request that was completed in a phone interaction between pharmacist and prescriber.                                                                                    |
| Opioid Early Release Request  | Application for release of opioid drugs to patient ahead of their intended time. Ex: patient is going away and would like to fill their hydrocodone prescription early. |
| Other                         | See Appendix 2.                                                                                                                                                         |





# Results – Table 3

Table 3. Description of categories counted as “other,” EMR era in which they appeared, and number of each.

| Other Categories                                   | Pre or Post EMR | Total Number of Each |   |
|----------------------------------------------------|-----------------|----------------------|---|
| Discontinued prescription                          | Pre             | 3                    |   |
| Update clinical records                            |                 | 1                    |   |
| Compliance packaging                               |                 | 2                    |   |
| Request unclear                                    |                 | 1                    |   |
| Early refill for non-opioid                        |                 | 7                    |   |
| Blisterpack request                                |                 | 3                    |   |
| Patient allergy                                    |                 | 1                    |   |
| Clinical error                                     |                 | 1                    |   |
| Missing prescriber signature                       |                 | 4                    |   |
| Patient no longer seen                             |                 | 1                    |   |
| Error by pharmacy                                  |                 | 1                    |   |
| Follow up request from doctor                      |                 | Post                 | 1 |
| Patient requests dose change                       |                 |                      | 5 |
| Notification of pharmacist authorized prescription |                 |                      | 3 |
| Home care program                                  | 9               |                      |   |
| Missing signature                                  | 3               |                      |   |
| Flu shot                                           | 1               |                      |   |
| Individual not a patient                           | 1               |                      |   |
| Limited use request form                           | 1               |                      |   |
| Physician initiated communication                  | 1               |                      |   |