

Medication Errors and Potential Adverse Drug Events Among Outpatients

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Background

- Studies have shown that medication errors and adverse drug events (ADEs) are common in inpatients
- In addition, the impact of physician order entry on preventing inpatient errors is substantial
 - Reduced serious medication errors by 55%
 - Reduced overall medication error rate by 81%

Background (cont.)

- Prevalence of medication errors in outpatients much less well studied
- Ambulatory setting harder to study
 - Therapy not directly observed
 - Non-compliance issues
 - Injuries not directly observed
 - Injuries often not reported by patients
- Few data available on impact of outpatient computerized prescribing on errors

Goals

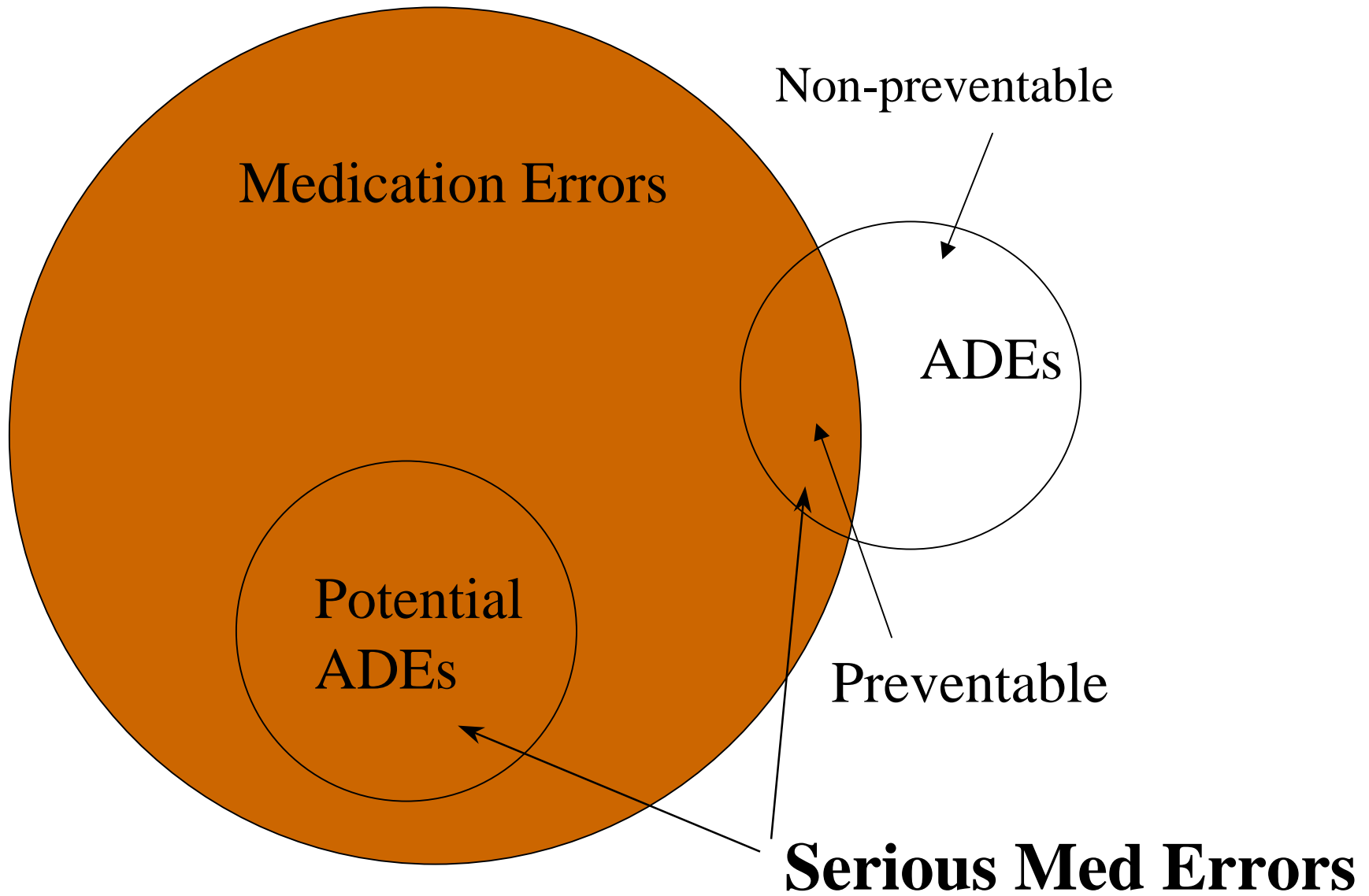
- Evaluate the frequency of medication errors in outpatients
 - Assess frequency of those with potential for harm
- Test the hypothesis that outpatient computerized prescribing decreases the incidence of medication errors

Definitions

- Rule violation
 - Violates strict standards but generally accepted
 - E.g. Leaving out “PO” as route for ibuprofen
- Medication error
 - Error anywhere in the medication process
 - E.g. Order for an appropriate dose, but no such physical tablet available (e.g. ibuprofen 250 mg)
 - E.g. Pharmacy dispenses wrong dose

Definitions

- Potential ADE
 - Subset of medication errors where injury is possible (but did not occur)
 - E.g. Two-fold overdose of digoxin
- ADE
 - Injury due to drug
 - Can be completely preventable or ameliorable (an injury whose severity could have been substantially reduced if different actions had been taken)



Methods

- The Improving Medication Prescribing Study
 - 4 ambulatory clinic sites in the greater Boston area
- Two sites have basic computerized prescribing systems
 - Computer systems require dose, frequency, and route (no defaults)
 - Optional or non-existent checks for allergies and drug interactions during study period
 - Printed-out prescriptions
- Two sites use traditional handwritten prescribing

Data Collection

- At computerized sites: daily collection of duplicate copies of prescription print-outs
- At handwritten sites: daily collection of carbon copies of written prescriptions
- Four week data collection at each site
 - Six providers per site randomly selected
 - Maximum 100 prescriptions per provider
 - Prescriptions collected Sept 1999 to March 2000

Data Collection (cont.)

- Prescription review
 - Prescription copies screened for medication errors by pharmacist
 - Max 3 prescriptions per patient
- Chart reviews and patient surveys (response rate 55%) also done to identify actual ADEs
- Pharmacist presented medication errors to 2 MD reviewers
 - Confirmation/classification of events (excluded if less than 50% confidence)
 - Severity and preventability ratings

Results: Prescription Review

Total 158 errors/1879 prescriptions reviewed

- Medication errors 158 (8.4%)
 - ADEs 3 (2%)
 - Potential ADEs 77 (49%)

- Rule violations 203 (11%)
 - Missing route 193 (95%)

Results (cont.)

- Most common errors resulting in potential ADEs
 - Frequency errors 39%
 - Dose errors 27%
- Severity of potential ADEs
 - Life threatening 1/77 (1%)
 - Serious 20/77 (26%)
 - Significant 56/77 (73%)

Computerized vs. Paper Prescribing

	Computer sites	Handwritten sites	P value
Medication errors	48 (5%)	110 (12%)	<.0001
Rule violations	89 (9%)	114 (12%)	.08
Potential ADEs	32 (3%)	45 (5%)	0.14

Results: Prevention

- More advanced computer prescribing checks with decision support would have prevented many events
 - 59/77 (77%) of potential ADEs
 - 138/158 (88%) of all medication errors
- Majority of prevention from requiring complete prescriptions, drug-dose, and drug-frequency checking (79%)

Limitations

- Only 4 sites
- Took advantage of natural experiment
 - Not rigorous trial of computerized prescribing
- Physicians not blinded to purpose of study

Conclusions

- The medication error rate for outpatient prescriptions was 8%
- Basic computerized prescribing systems
 - Reduced rates of medication errors
 - No significant reduction in serious error rates
- More advanced computerized prescribing with decision support may be required to substantially reduce serious errors
 - Dose/frequency/allergy checking