Effect of Computerized Physician Order Entry with Clinical Decision Support on Adverse Drug Events in the Long-term Care Setting

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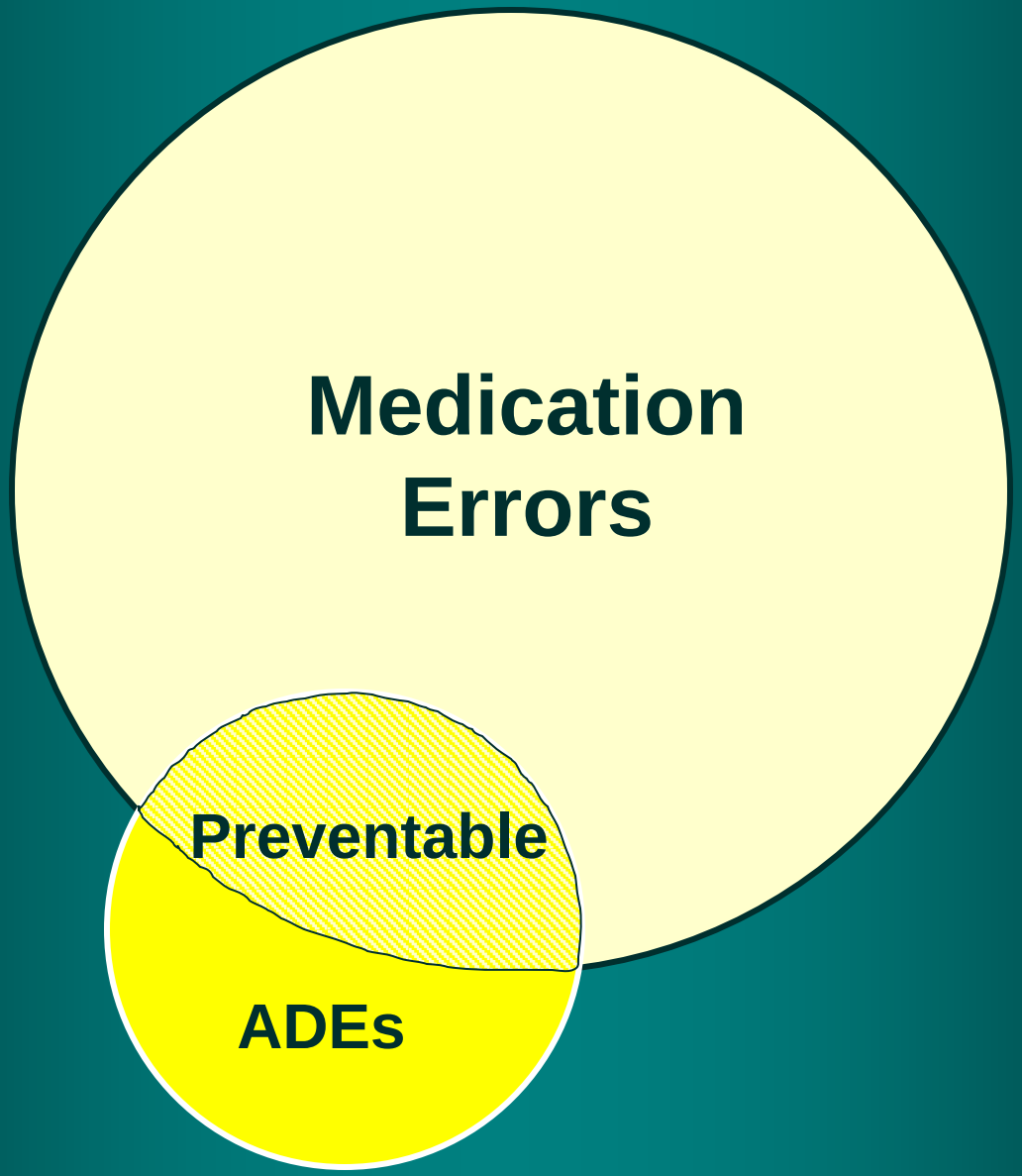
Adverse Drug Events



Introduction

Adverse drug events (ADEs) occur frequently among nursing home residents, and preventable adverse drug events are most commonly associated with errors in medication ordering and monitoring.

Incidence of ADEs in Two Large Academic LTC Facilities

- **Adverse drug events**
  - About 10 ADEs per 100 resident-months
- **Preventable adverse drug events**
  - About 4 preventable ADEs per 100 resident-months

Gurwitz et al. *Am J Med* 2005;118:251-8.

Error Stage for Preventable ADEs

Category	Percentage
Ordering	**59%**
Dispensing	5%
Administration	13%
Monitoring	**80%**

Gurwitz et al. *Am J Med* 2005;118:251-8.

What is the right approach?

A systems-based approach

Computerized Clinical Decision Support System (CDSS)

- High-severity drug interactions
- Potentially problematic laboratory test results
- Early identification of adverse drug effects through increased monitoring
- Recommendations regarding geriatric-appropriate dosing
- Recommendations for prophylactic measures

Rochon et al. *JAGS* 2005;53:1780-9.

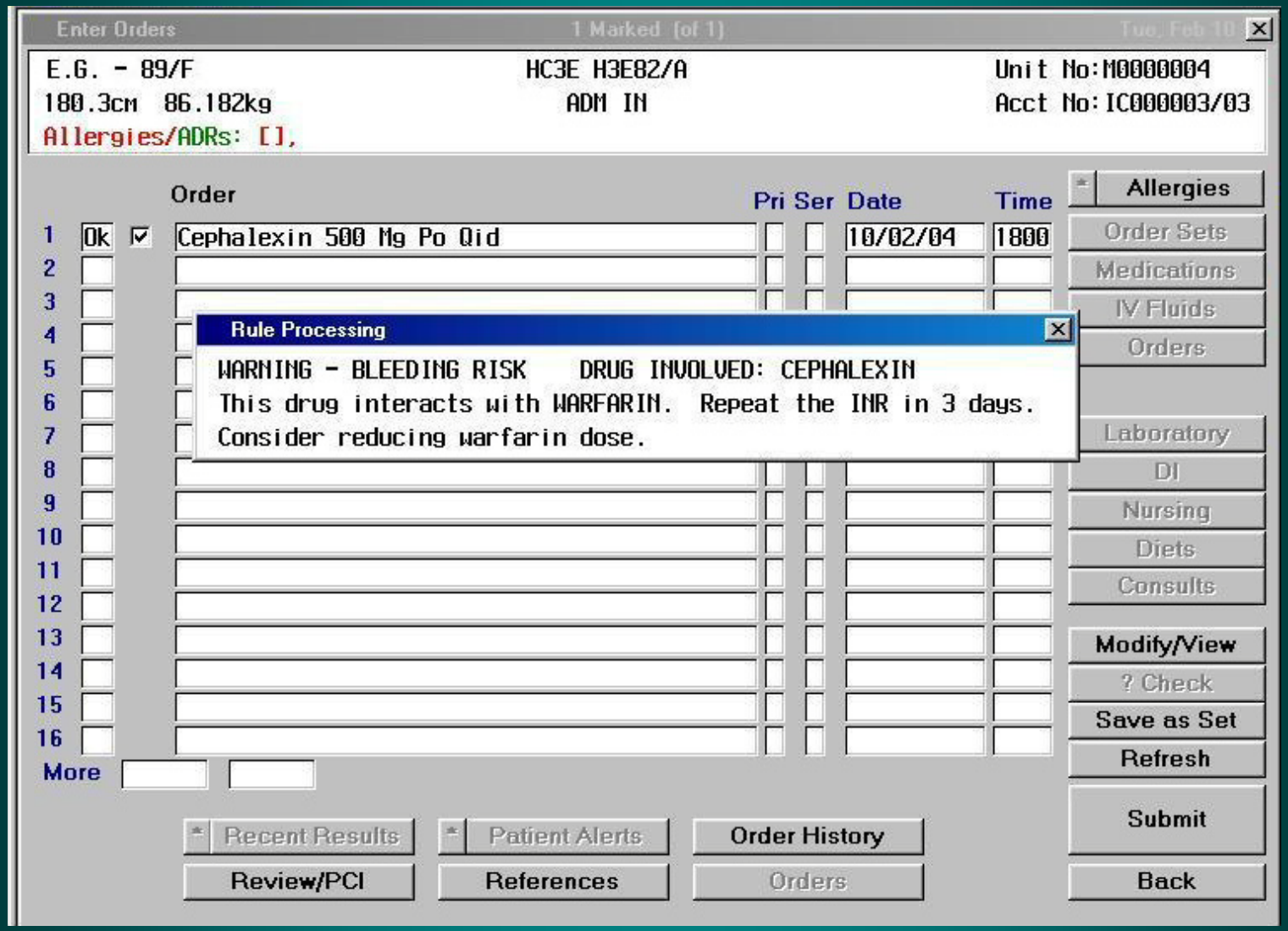
Purpose

The purpose of this study was to evaluate the efficacy of computerized physician order entry with clinical decision support for preventing ADEs in the long-term care setting.

Methods

- Study conducted in two large academic long-term care facilities
- Total of 1229 beds
- Total of 29 resident care units were randomized
  - All units had existing CPOE
  - Units randomized to having the CDSS or not

CPOE with Clinical Decision Support



Methods

Drug-related incidents were detected using multiple methods:

- Review of long-term care facility records in monthly segments
- Computer-generated signals

Computer Generated Signals

- Abnormal laboratory results
  - Elevated INRs, high potassium levels
- Medications (antidotes)
  - Vitamin K, sodium polystyrene sulfonate
- Abnormal drug levels
  - Phenytoin
  - Digoxin

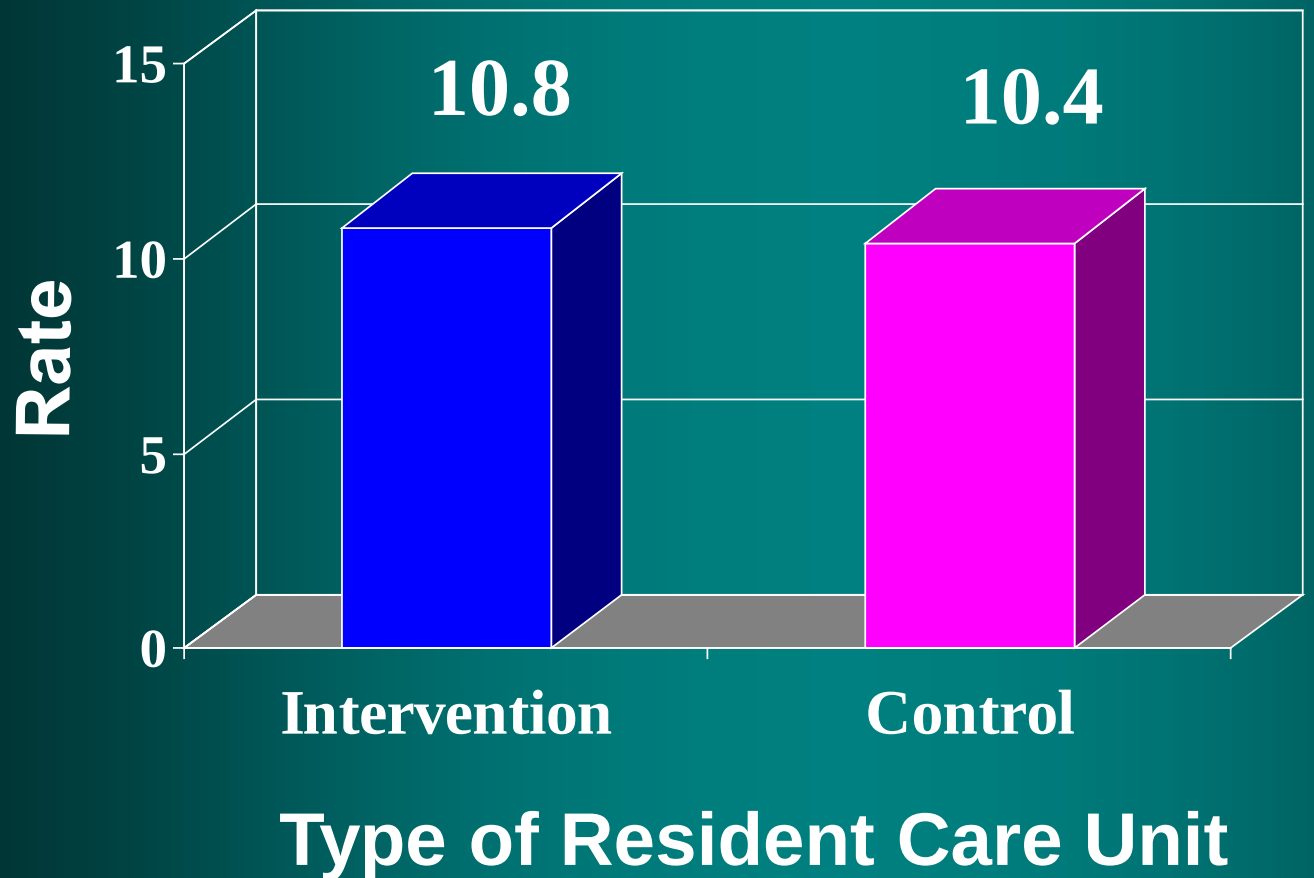
Methods

- Chart reviews were performed by trained clinical pharmacist investigators
- Incidents were classified independently by two physician reviewers:
  - adverse drug event
  - severity
  - preventability

Results

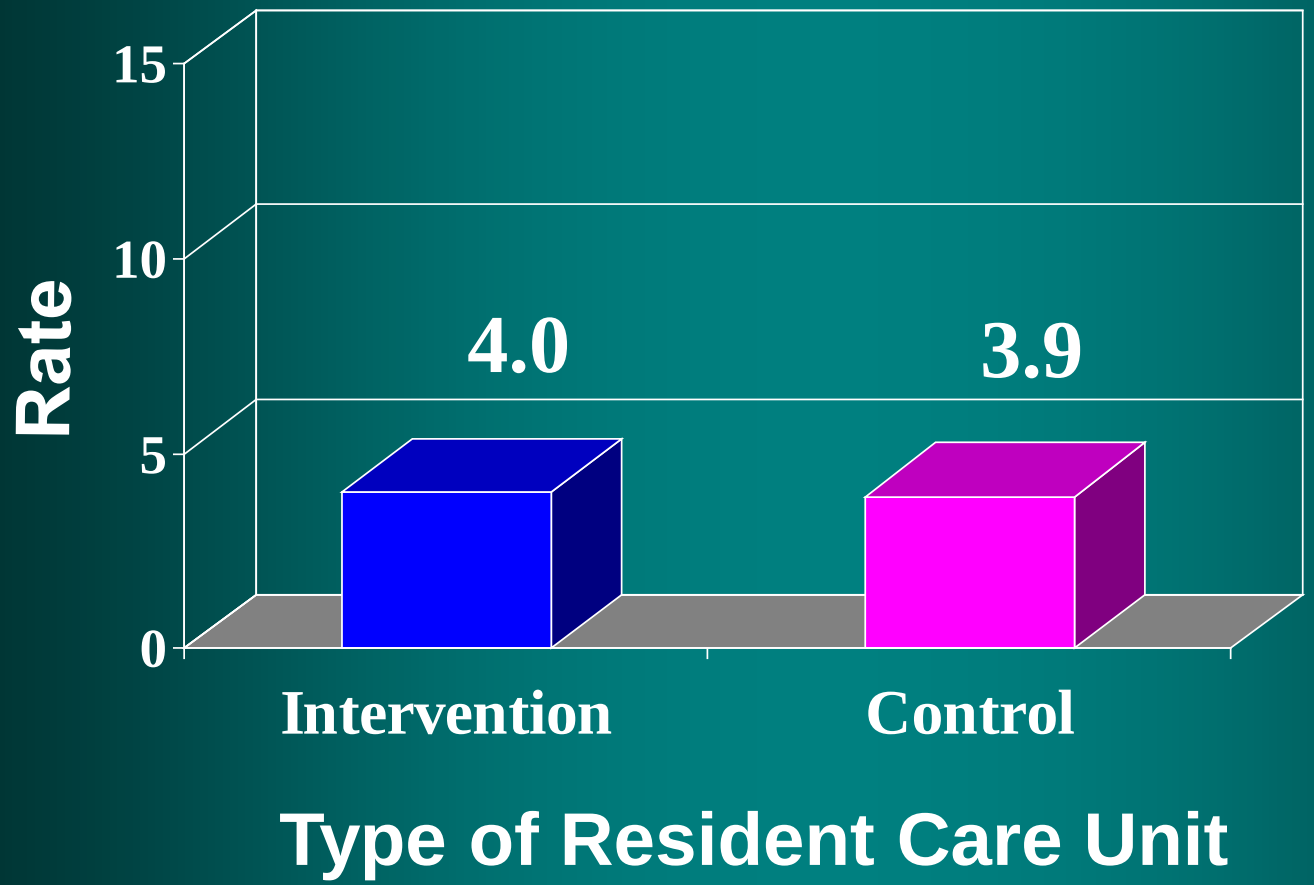
Unit Type	Resident-Months	Total ADEs	Preventable ADEs
Intervention	3803	411	152
Control	3257	340	126

Effect of CPOE with CDS on ADE Rates



Rate Ratio = 1.04 (95% CI 0.89, 1.20)

Effect of CPOE with CDS on Preventable ADE Rates



Rate Ratio = 1.03 (95% CI 0.81, 1.32)

Conclusion

Use of CPOE with this particular computerized clinical decision support system was not found to reduce the occurrence of ADEs in the long-term care setting.

Why?…

- The limits of a first-generation system
- Lack of specificity of alerts – alert burden
- Need to increase scope of system to address a broader range of ADEs
- Need to integrate more clinical information into the clinical decision support system
- Setting the bar too high: ADEs vs errors

Computerized Clinical Decision Support System (CDSS)

- Warnings to reconsider specific drug orders
- Recommendations for laboratory monitoring
- Alerts to monitor closely for selected adverse drug effects

Rochon et al. *JAGS* 2005;53:1780-9.

Computer on Wheels -“COW”