

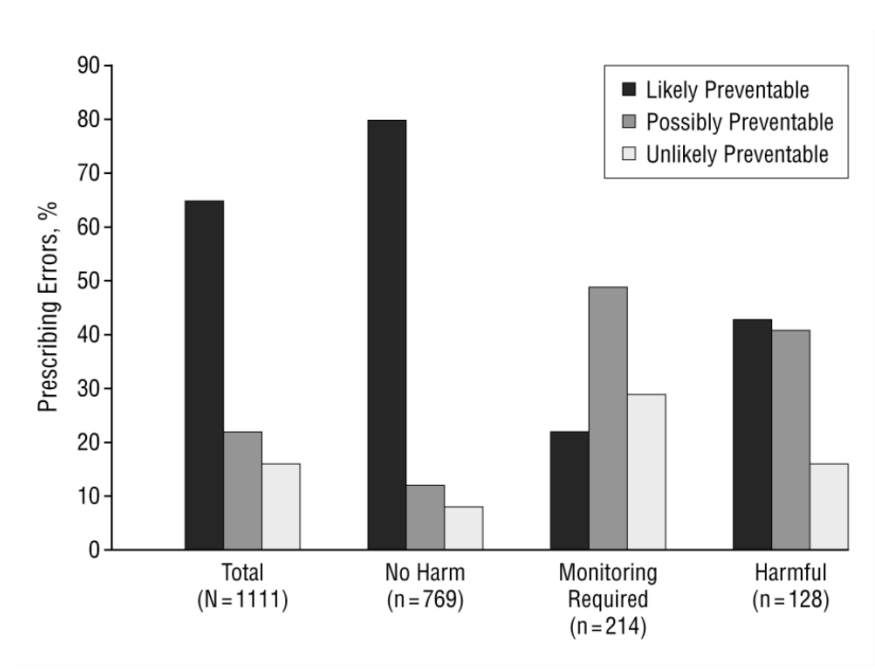
CPOE

- Medication errors resulting in preventable ADEs most commonly occur at the prescribing stage. Bobb A, et al. The epidemiology of prescribing errors: The potential impact of CPOE. Arch Intern Med 2004;164:785 – 792.
- Out of 1111 prescribing errors were identified (6.2% errors), most occurring on admission (64%). Of these, 30.8% were rated clinically significant and were most frequently related to; 1) anti-infective medication orders, 2) incorrect dose, and 3) medication knowledge deficiency.
- 64.4% were rated as likely to be prevented with CPOE,
- 13.2% unlikely to be prevented with CPOE, and
- 22.4% possibly prevented with CPOE depending on specific CPOE system characteristics.



From: **The Epidemiology of Prescribing Errors: The Potential Impact of Computerized Prescriber Order Entry**

Arch Intern Med. 2004;164(7):785-792. doi:10.1001/archinte.164.7.785



Severity of prescribing errors and rated preventability by use of a computerized prescriber order entry system.



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Table 1. Examples of Prescribing Errors Rated as Likely, Possibly, or Unlikely to Be Prevented With Computerized Prescriber Order Entry (CPOE) and the Most Likely Proximal Cause of the Error

Classification	Examples	Proximal Cause
Likely to be prevented with CPOE	Diltiazem, 240 mg by mouth daily. Sustained-release formulation not specified.	Medication knowledge deficiency
	Unasyn (ampicillin sodium/sulbactam sodium) prescribed for a patient with a penicillin allergy (allergy documented on order).	Medication knowledge deficiency
	Fluconazole, 400 mg × 1 dose, then 200 mg daily (intravenous vs oral not specified).	Slip
Possibly prevented with CPOE	Azathioprine, 200 mg by mouth 3 times per day. Order clarified to 200 mg by mouth daily.	Medication knowledge deficiency
	Change in amikacin dose and frequency based on age, creatinine clearance, and weight.	Medication knowledge deficiency
	Chemotherapy ordered without posttherapy antiemetics (per protocol).	Slip
Unlikely to be prevented with CPOE	Hormone patch daily (patient did not know what she was taking at home).	Patient knowledge deficiency
	Order for carmustine written. Pharmacist clarified that carmustine only to be given if patient was unable to swallow hydroxyurea, which was also ordered.	Slip
	Ritonavir, 200 mg by mouth twice per day ordered. Patient was appropriately taking 400 mg by mouth twice per day prior to admission.	Transcription error

Examples of Prescribing Errors Rated as Likely, Possibly, or Unlikely to Be Prevented With Computerized Prescriber Order Entry (CPOE) and the Most Likely Proximal Cause of the Error



- Adverse drug events (ADEs) are the most common cause of injury to hospitalized patients and are often preventable.
- A CPOE with an advanced level of CDS is needed to prevent many of the prescribing errors with the greatest potential to lead to patient harm.
 - Basic = drug-allergy, drug-drug interaction & duplicate therapy checking, basic dosing guidance, formulary decision support
 - Advanced = dosing for renal insufficiency and geriatric patients, guidance for medication-related lab testing, drug-pregnancy and drug-disease contraindication checking



Reasons for CPOE

- **Order Communication**
 - Clarity of Orders
 - Ease of Identifying the Ordering Physician
- **Standardization of Care**
 - Clinically validated order sets for
 - Clinical diagnoses
 - Procedures
 - Situations (post-op order sets)
- **Alerts and Reminders (Real Time Decision Support)**
 - Drug Safety Database (Conflict Checking)
 - Clinically validated rules



Adverse Drug Reaction (ADE's)

- Several studies have found a serious medication error in 3.4%-5.3% of inpatients
- The cost of a single preventable ADE is \$4,685
 - \$1.3 million annually for an average 300 bed hospital

Bates et al. *JAMA* 1997;277:307-311

Bates et al. *JAMA* 1998;280:1311-1316

Bates et al. *J Am Med Informat Assoc* 1999;6:313-321

Lesar et al. *Arch Intern Med* 1997;157:1569-1576



Medication Errors

- Two recent Harvard studies found that physician ordering errors accounted for 56%-78% of all preventable Adverse Drug Events

Bates et al. *JAMA* 1997;277:307-311

Kaushal et al. *JAMA* 2001;285:2114-2120



Medication Errors

- Physician drug ordering errors are most often due to one of two causes:
 1. Lack of knowledge about the drug
 - Wrong dose
 - Wrong frequency
 - Drug-drug interaction
 2. Incomplete patient information
 - Documented allergies
 - Recent lab results



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Table 3. Most Common Error Types for Clinically Significant Prescribing Errors and the Likelihood of Preventability With Computerized Prescriber Order Entry*

Error Category	Likely Preventable	Possibly Preventable	Unlikely Preventable
Dose (n = 134)	27 (20)	69 (52)	38 (28)
Frequency (n = 69)	17 (25)	35 (50)	17 (25)
Nomenclature (n = 32)	24 (75)	7 (22)	1 (3)
Drug allergy (n = 22)	16 (73)	5 (22)	1 (5)
Incorrect medication (n = 22)	5 (23)	6 (27)	11 (50)
Omission (n = 16)	5 (31)	4 (25)	7 (44)
Duplication (n = 12)	0 (0)	10 (83)	2 (17)
Route (n = 10)	2 (20)	6 (60)	2 (20)
Drug interaction (n = 7)	3 (43)	3 (43)	1 (14)
Other (n = 18)	4 (22)	11 (61)	3 (17)
Total (N = 342)	103 (30)	156 (46)	83 (24)

*Data are number (percentage) of errors. Percentages may not add to 100 due to rounding.

Most Common Error Types for Clinically Significant Prescribing Errors and the Likelihood of Preventability With Computerized Prescriber Order Entry*





CPOE Can Help Reduce Errors

- Brigham and Women's Hospital launched its first CPOE in 1993
- Since then, they have documented a 54% reduction in serious medication errors
- Resulted in 62% reduction in preventable ADE's






Improved Quality

- CPOE allows for physician reminders of best practice or evidence-based guidelines
- Indiana University study
 - Pneumococcal vaccine in eligible patients
0.8%  36.0%
 - Heparin prophylaxis
18.9%  32%



Improved Efficiency

- Maimonides Medical Center (Bronx, NY)
- 700 bed teaching hospital
- After CPOE, found substantial reduction in order processing time
 - Physician order to receipt by pharmacy
 - 3.4 hours  0.5 hours
 - Physician order to Delivery to Patient Care Area
 - 4.6 hours  1.4 hours
- Estimate 12%  in LOS following CPOE



IOM

- “the science and technologies involved in healthcare -- the knowledge, skills, care interventions, devices and drugs – have advanced more rapidly than our ability to deliver them safely, effectively, and efficiently”
 - IOM. 2001. Crossing the Quality Chasm: A New Health System for the 21st Century.



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THANK YOU

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