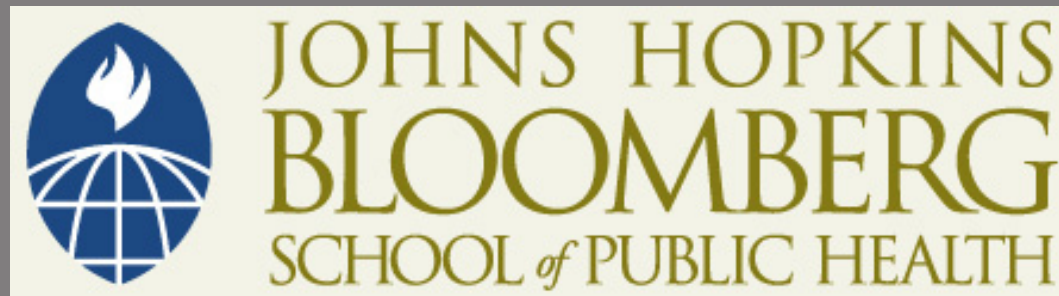


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## Medication Safety

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## Section A

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Case

## Case

- Infant born in Denver hospital to mother with past history of syphilis
- Incomplete information on past treatment and current serologic status
- Spanish speaking
- Decision made to treat infant for congenital syphilis

# Case

- Phone consult with ID specialists and health department
- Benzathine penicillin G 150,000 units IM

## Case

- Physicians, nurses and pharmacists unfamiliar with congenital syphilis and drug
- Physician consulted reference book
- Misread 50,000 units/kg as 500,000
- Pharmacist prepared 1,500,000 unit dose to be given as 2.5 mL IM

# Case

- Nurse concerned that 0.5 mL/injection in infants = 5 injections!
- Investigated possibility of IV admin
- Reference book mentioned
  - Crystalline penicillin G slow IV push
  - Penicillin G procaine IM
  - No mention of Penicillin G benzathine

# Case

- Hospital policy unclear on non-physicians changing Rx orders
- Neonatal NP assumed this was okay
- Decided to administer IV



## Case

- Penicillin G benzathine is a milky white substance that is insoluble and obstructs blood flow in the lungs necessary for the transfer of oxygen from the airways

# Case

- Syringe must be rotated 180 degrees away from name to see manufacturer's warning



## Case

- Nurses began to administer first syringe of Permapen slow IV push
- After 1.8 mL administered, the infant became unresponsive
- Resuscitation efforts were unsuccessful

# Case

- What went wrong?

# Medication Use Process

- Prescribing
- Ordering/transcription
- Dispensing
- Administration
- Monitoring

# What Went Wrong

- Poor transcription of health department order
- Physician order writing
  - U for units
- Lack of double check of doses
- Confusing drug information
- Lack of communication
- Poor syringe labeling

## What Should Be Done?

- Be more careful
- Better education
- Make a policy

# Case

- The three nurses indicted by grand jury for negligent homicide
- Expert testimony gave evidence of more than 50 latent and active failures
- Advised against tendency to focus on the errors of individual providers
- Clear evidence that med errors are almost never caused by failure of single element or practitioner
- Jury acquitted nurse in the case that went to trial



## Look Beyond Blaming Individuals

- Smetzer, J. L., and Cohen, M. R. (1998). Lessons from the Denver medication error/criminal negligence case: Look beyond blaming individuals. *Hosp Pharm*, 33, 6, 640-657.



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## Section B

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Understanding and Preventing Medication Errors

# Systems of Medication Use

- Patient information
- Drug information
- Communication of drug information
- Labeling, packaging and nomenclature
- Drug storage, stock, standardization and distribution
- Device acquisition, use, and monitoring
- Environmental factors
- Staff competency and education
- Patient education
- Quality and risk management issues

# Examples of Medication Errors/ADEs

- Medication error
  - Wrong dosage prescribed
  - Wrong dosage administered for a prescribed medication
  - Failure to give medication (by provider) or take (by the patient)
- Adverse drug event
  - Wrong dosage leading to injury (e.g., rash, confusion, loss of function)
  - An allergic reaction occurring in a patient not known to be allergic to the given medication

# Frequency

- Frequency of medication errors and preventable adverse drug events
  - On average, a hospital patient is subject to at least one medication error per day
  - Substantial variations in error rates are found across facilities

# Preventable Adverse Drug Events

- At least 1.5 million preventable ADEs occur each year
  - Hospital care
    - ▶ Classen et al., 1997, projected 380,000
    - ▶ Bates et al., 1995, projected 450,000
  - Long-term care
    - ▶ Gurwitz et al., 2005, projected 800,000
  - Among outpatient Medicare patients
    - ▶ Gurwitz et al., 2003, projected 530,000
  
- This excludes errors of omission

## Morbidity Due to Medication Errors Is Costly

- Our understanding of costs is incomplete
  - Hospital care: \$3.5 billion (2006 dollars)
    - ▶ Bates et al., 1997
  - Long-term care: no cost estimate available
  - Among outpatient Medicare patients: \$887 million (2000 dollars)
    - ▶ Field et al., 2005

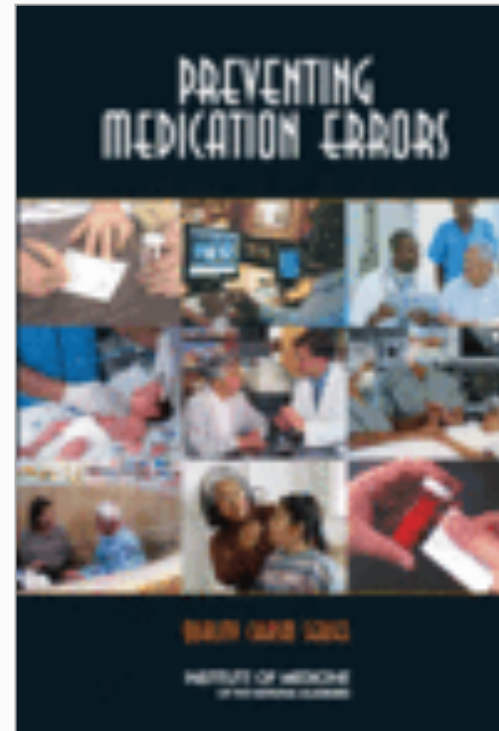
## Additional Costs

- Drug use without a medically valid indication
- Failure to receive drugs that should have been prescribed
- Failure of patients to comply with prescribed medication regimens
- Lost earnings, compensation for not being able to carry out household duties, and compensation for pain and suffering
- Errors that do not result in harm but create extra work



# Preventing Medication Errors

- Preventing Medication Errors
  - IOM, 2006



# Recommendations

- Improved provider-patient partnership actions for consumers and providers (rec. 1); improved consumer-oriented drug information (rec. 2)
- Electronic prescribing (by 2010) and monitoring for errors is essential (rec. 3)
- Enormous knowledge deficits must be addressed
  - Improved naming, labeling and packaging, and review of free sample use (rec. 4); standards for health IT (rec. 5); research agenda on safe medication use (rec. 6)
- Oversight, regulatory organizations, and payers should motivate error reduction and enhance professional competency (rec. 7)

# Improved Provider-Patient Partnership Is Vital

- **Recommendation 1:** Specific measures should be instituted to strengthen patients' capacities for sound medication self-management
  - Patients (or family) should maintain an active list of all medications
  - Providers should take definitive action to educate patients (or family) about the safe and effective use of medications
  - Consultation on their medications should be available to patients at key points along the medication use process

## Improved Provider-Patient Partnership Is Vital

- Consumers should be able to obtain quality information about medications not only from their provider, but also from the pharmacy, Internet resources, and community-based resources
  - However, current materials are inadequately designed for consumers to read, comprehend, and act on

# Improved Provider-Patient Partnership Is Vital

- **Recommendation 2:** Government agencies and consumer-oriented drug information and medication self-management support
  - Standardization of pharmacy medication information leaflets
  - Improvement of online medication resources
  - A national drug info telephone helpline
  - Personal health records
  - National medication safety plan

## Electronic Prescribing and Monitoring for Errors Is Essential

- Impossible for prescribers to have current knowledge about every medication they prescribe
- Paper-based prescribing is associated with high medication error rates
- Patient handoffs between care sites and providers often lead to medication errors
- Medication error reduction is an ongoing activity

# Electronic Prescribing and Monitoring for Errors Is Essential

- **Recommendation 3:** Health care organizations should implement the appropriate systems to enable providers to ...
  - Communicate patient-specific medication-related information in an interoperable format
  - Assess the safety of medication use through regular monitoring
  - Write prescriptions electronically by 2010
  - Subject prescriptions to evidence-based, clinical decision support

# Enormous Knowledge Deficits Must Be Addressed

- Better risk/benefit information is needed for prescription drugs, particularly, for specific populations—children, elderly, patients with renal dysfunction, patients with multiple comorbidities
- Drug naming, labeling, and packaging problems lead to medication errors



# Enormous Knowledge Deficits Must Be Addressed

- Large gaps exist in our understanding of medication error incidence rates, costs, and prevention strategies
  - Primary focus of research should be prevention strategies and implementation
  - Priority areas for research on incidence rates are care transitions, specialty ambulatory clinics, psychiatric care, the administering of medications in schools
  - A better understanding of the costs/consequences of errors in all care settings is needed

# Conclusions

- Medication errors are very common in every setting in which medications are used and present a risk to millions of Americans every day
- There are many proven approaches to make medication use safer
- Safe medication use will require actions at all levels of the health care system, including providers, patients, health care organizations, educator, regulators, payers, and legislators
- More information is needed so we can learn in the real world how to prevent medication errors