Lesson from the Denver Medication Incident

KWH Pharmacy interns
Ken Cheung & Daisy Lam
22-01-2007

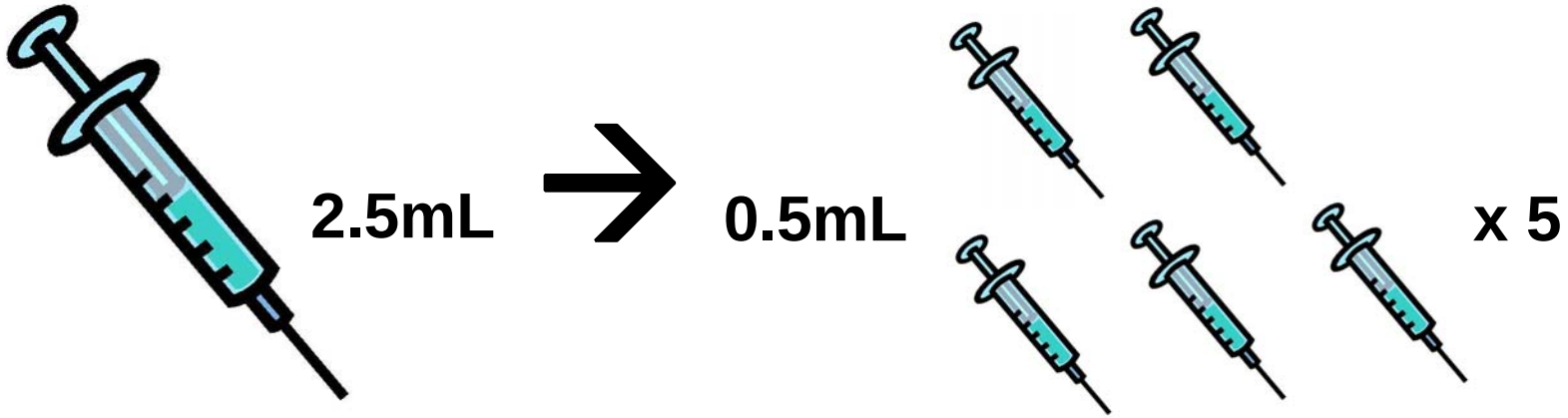
Scenario

16 October 1996, pm, in ward……

- A 10-fold overdose of Benzathine Penicillin G (1,500,000 units) was given IV by nurses to an infant who was suspected having congenital syphilis
- The dose should actually be 150,000 units and be injected IM according to the order form.

Why would Benzathine Penicillin G be administered IV?

Drug Administration Phase



- By assuming they had the authority to change the route of administration
  - Can we give it IV?

Drug Administration Phase

- To determine if Benzathine Pen G could be given IV
  - They consulted a reference book
  - It mentioned about aqueous crystalline penicillin G by slow IV push for congenital syphilis
- They assumed it was the same with Benzathine Pen G because:
  - They believed Benzathine was just a brand name
  - Misknowledge

Drug Administration Phase

- Though Benzathine Pen G is white and milky
  - past experience of administering IV lipids or lipid-based drugs made the nurses believe it was alright to give Benzathine Pen G by IV
- And they overlooked the “IM use only” warning on the Benzathine Penicillin G syringe

But…

Why did a 10-fold overdose of drug was sent to the ward and was undetected?

Drug Dispensing Phase

16 October 1996, pm, in pharmacy……

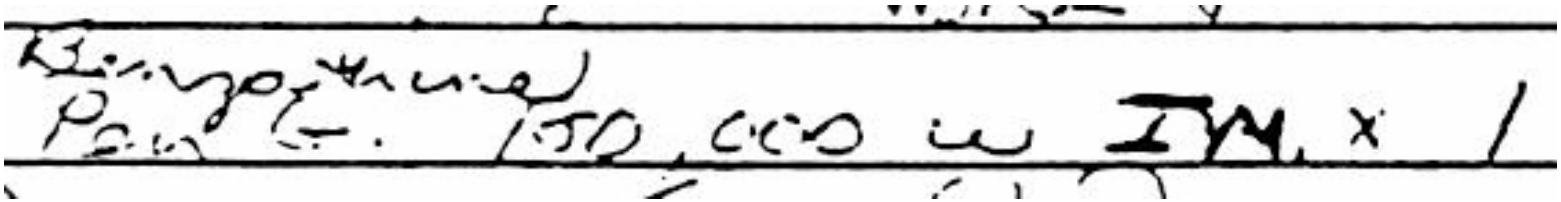
- The pharmacist
  - Was not familiar with the drug and the dosage
  - Consulted reference source but misread it and prepared the order as 10-fold overdose (1,500,000 units)
  - Had no idea a max volume of only 0.5ml can be safely administered to an infant per IM injection
- Now the dose she prepared would need 5 separate IM injections

Drug Dispensing Phase

- After preparing the drug
  - It was not checked by another pharmacy staff member against the original order.
- The 10-fold overdose was not detected and **was sent to the ward.**

But what made the pharmacist misinterpret the drug order?

Prescribing Phase



- Drug order copy:
  - Benzathine capitalized and placed above Pen G→nurses thought it was just a brand name
  - Too many zeros→difficult for pharmacist and nurses to read
  - IM looked like IV→nurse's mistake was justified
  - "U" looked like an extra zero→pharmacist's mistake was justified
- **What was the story behind the drug order?**

Prescribing Phase

15 October 1996, pm, in ward……

- After seeing the infant, an neonatalogist consulted a specialist, who recommended benzathine penicillin G IM 50,000 units/kg for suspected congenital syphilis.
  - But he did not document it.

A few hours later……

- Another staff consulted another source and got the same recommendation.
  - incompletely documented as

    “penicillin G 50,000 units/kg”

Prescribing Phase

16 October 1996, am, in ward……

- Finally the third staff wrote the drug order and his written order was unusual.

But actually……

This tragedy could be avoided at the very beginning if the infant was not treated!

The Decision to Treat……

- Though the infant's mother had a history of syphilis…….
  - Her own obstetrician had already confirmed her infant would not contract syphilis from her
  - But efforts had not been made to retrieve this piece of information

The Decision to Treat……

15 October 1996, am, in ward, right after the infant was born……

- Due to language barrier
  - Staff was not convinced that the parents understood the importance of follow-up if the infant was not treated.
- Despite incomplete clinical information and language barrier, **the physician made the decision to treat the infant!**

What are the causes of this Medication incident?

- Physician’s decision to treat
- Recommendation was documented incompletely
- Unusual drug order, unclear handwriting, many “zero”
- Pharmacists’ lack of knowledge
- Lack of checking in dispensing medication
- Nurses’ inadequate knowledge about penicillin G
- Decision to change route of administration due to assumed authority
- Warning on drug syringe not seen

They are all active failures

- It seems human error was the main cause of this MI
- Is it true?
  - We often tend to focus our attention to human fallibility (active failures) when talking about MI
  - “Latent failures” are often unnoticed

Medication incident is often the result of the combined effects of……

multiple “latent failures” in the system and “active failures” by individuals

- **Active Failures**
  - are errors committed by individuals such as physicians, nurses or pharmacists, who are in direct contact with vulnerable weakness in the structure of an organization
- **Latent Failures**
  - Are weaknesses in the structure of an organization such as faulty information management or ineffective personnel training
  - Are often unnoticed until an error occurs

Can you think of the latent failures in this case?

Prescribing Phase

Physician's decision to treat	■ Incomplete clinical information ■ Lack of systematic method to communicate of different party in healthcare system ■ Inefficient education and communication to parents about the treatment options due to language barrier
Recommendation was documented incompletely	■ Nonstandard method of communicating drug order
Unusual drug order, unclear handwriting, many "zero"	■ Nonstandard method of writing drug order

Drug Dispensing Phase

Pharmacists' lack of knowledge	■ Insufficient drug information ■ Insufficient information regard IM administration of drugs in neonates ■ Failure to staff pharmacy with neonatal/pediatric pharmacist
Lack of checking in dispensing medication	■ "zero" in drug order result in misinterpretation of dosage ■ Lack of max dose checking system in pharmacy computer ■ Lack of double-checking mechanism in dispensing procedure

Drug Administration Phase

Nurses' inadequate knowledge about penicillin G	■ Insufficient drug information ■ Inadequate drug references
Decision to change route of administration due to assumed authority	■ Conflicting information about IV use of milky liquids ■ Lack of warning about IV administration of Benzathine Pen G in drug monographs ■ Assumed authority of nurse to change doctor's drug order
Warning on drug syringe not seen	■ Manufacturer's warning label not prominently placed ■ "zero" on manufacturer's label

A lesson we learn……

Is there anything

we can do to prevent future medication incidents?

– The End –

Thank You!