Memorial Sloan Kettering Cancer Center

Pediatric Medication Safety Pearls

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Disclosure

- I have no vested interest in or affiliation with an ineligible company, or any affiliation with an organization whose philosophy could potentially bias my presentation

Pre-Assessment Question

What is the most common type of medication event associated with pediatric patients?

A. Wrong route
B. Wrong drug
C. Wrong dose
D. Wrong rate of administration

Objectives

Evaluate and consider unique characteristics of pediatric patients when delivering pharmaceutical care

Identify the most common types of medication events associated with pediatric patients

Background

Medication errors harm **millions** of patients annually

Pediatric patients are **more prone** to experience a medication error in the health care setting

These events have a **~ 3 times** greater risk to cause direct patient harm as compared to adults

Morimoto, T., et al. (2004). *BMJ Quality & Safety* 13.4, 306-314.

Makary, M. A., & Daniel, M. (2016). *Bmj*, *353*.

Past Tragic Events

(Medication events reported across the country)

- CISplatin **204 mg** dispensed instead of **20.4 mg**
- Zinc 330 **mg** used in a TPN instead of 330 **mcg** for a neonate
- Heparin **10,000 unit** instead of a **10 unit** flush
- Penicillin G benzathine administered **intravenously (IV)** instead of **intramuscularly (IM)**
- Trimethoprim-sulfamethoxazole **38.5** tablets administered instead of the indented **1** tablet
- Sodium chloride **23.4%** was used to reconstitute chemotherapy instead of **0.9%** normal saline

ismp.org
Action Agendas-Acute Care; Medication Safety Alert!

Hospital Specialties

Free-Standing Children's Hospitals:

- The entire environment is designed for pediatric patients
- The EHR can be devoted to only pediatric prescribing, dispensing, and administration
- Healthcare professionals are more familiar with the patient population

MSKCC Integrated Hospital:

Casimir, G. (2019). *Frontiers in pediatrics*, *7*, 305.

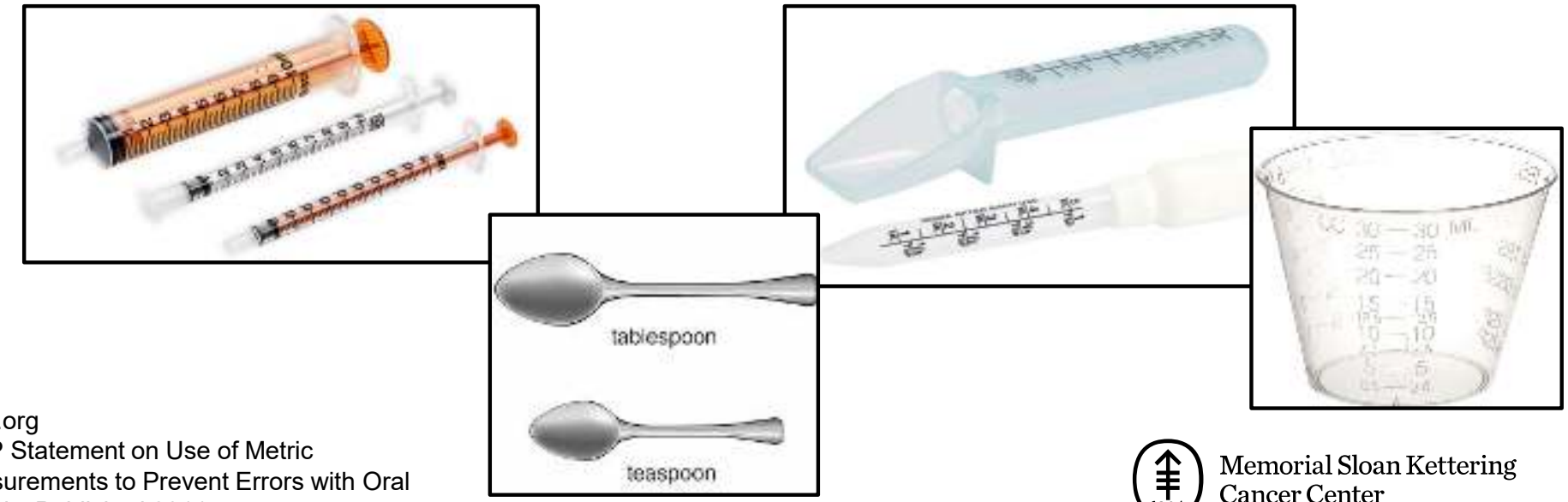
Safety Risks in Pediatrics

- Weight based dosing (e.g., dosing errors)
- Clinical presentation may be different depending on age
- Various growth and development processes
  - Age-dependent formulations (e.g., vaccines)
- Medications frequently used off-label
- Potentially limited volunteer reporting and follow-up evaluations

Mueller, B. U., et al. (2019). *Pediatrics*, *143*(2).

Dosing Errors

- Doses are not standard
- Mathematical errors
- Tablets may have to be cut
- Dilutions or aliquots may need to be made
- Suspensions often have to be compounded



ismp.org
ISMP Statement on Use of Metric Measurements to Prevent Errors with Oral Liquids. Published 2011.

Liquid medication errors and dosing tools: a randomized controlled experiment

Yin, H. Shonna, et al. (2016). *Pediatrics*: 138 (4)

- **Objective:** To evaluate dosing error rates related to label attributes and dosing tools, along with differences of these rates by health literacy and language

- **Study Design:**
  - Parents were randomized to 1 of 5 study arms with each parent being assigned 9 doses of medication to prepare
  - Dosing error (> 20% deviation), large error (> 2x the dose)

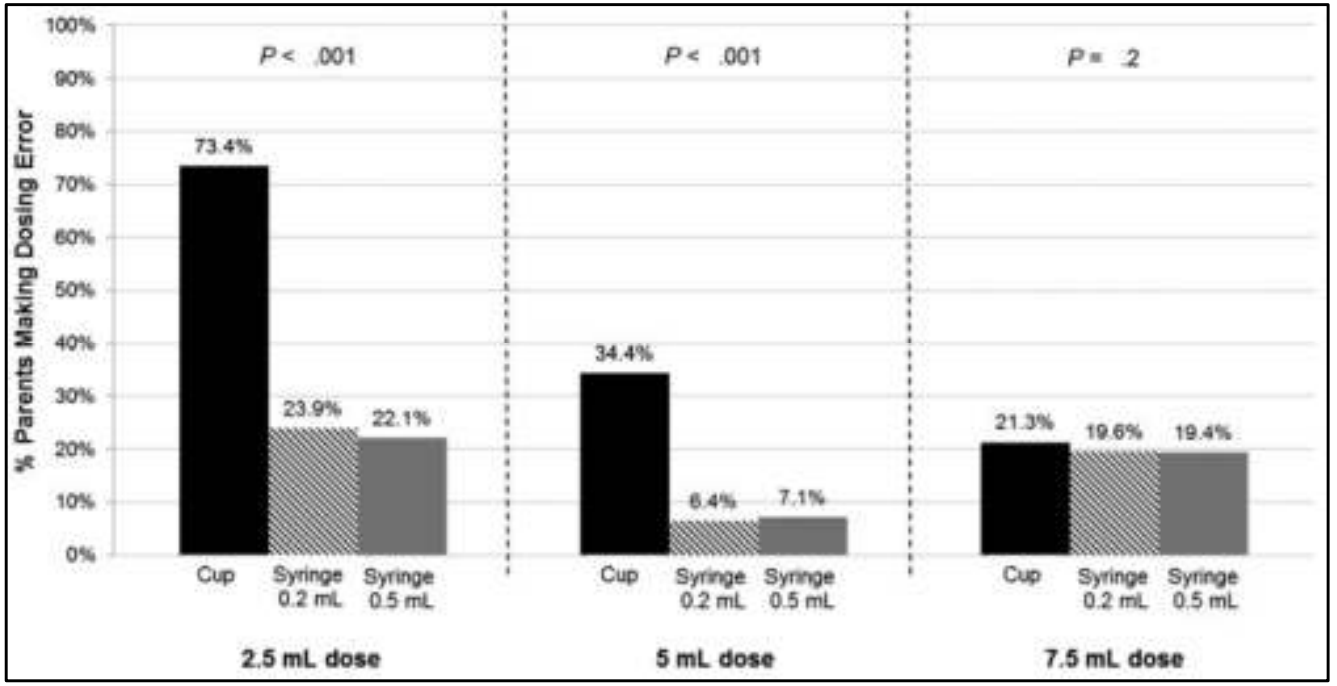
Group	Unit(s) Used on Medication Bottle Label[a]	Unit(s) Used on Dosing Tools[b]	Example of how 5 mL or 1 tsp amount displayed on Label	Concordance of Unit(s) Used on Bottle Label vs. Dosing Tool
1	mL	mL	5 mL	Fully matched pair; considered "gold standard" match, compliant with proposed mL-exclusive system[c]
2	mL and tsp	mL and tsp	5 mL (1 tsp)	Fully matched pair
3	mL and teaspoon	mL and tsp	5 mL (1 teaspoon)	Partially matched pair ("teaspoon" spelled out on label vs. "tsp" abbreviation on tool)
4	mL	mL and tsp	5 mL	Not matched
5	teaspoon	mL and tsp	1 teaspoon	Not matched

Results

- A total of **84.4%** of parents made ≥ 1 dosing error
  - 21.0% ≥ 1 large error

- More dosing errors were seen with cups vs syringes
  - Especially for smaller doses

- Teaspoon-only labels were associated with more errors



Yin, H. Shonna, et al. (2016). *Pediatrics*, 138 (4)

Strategies to Prevent Dosing Errors

- Confirm patient weights are measured/expressed in kilograms not pounds
- Only **use metric units**, not teaspoon or other non-metric measurements
  - Oral liquids using only weight or volume (e.g., mg or mL)
- Ensure patients have an appropriate device to measure oral liquid volumes
- Coach patients on how to use and clean measuring devices
  - Teach-back method

ismp.org
ISMP Statement on Use of Metric Measurements to Prevent Errors with Oral Liquids. Published 2011.

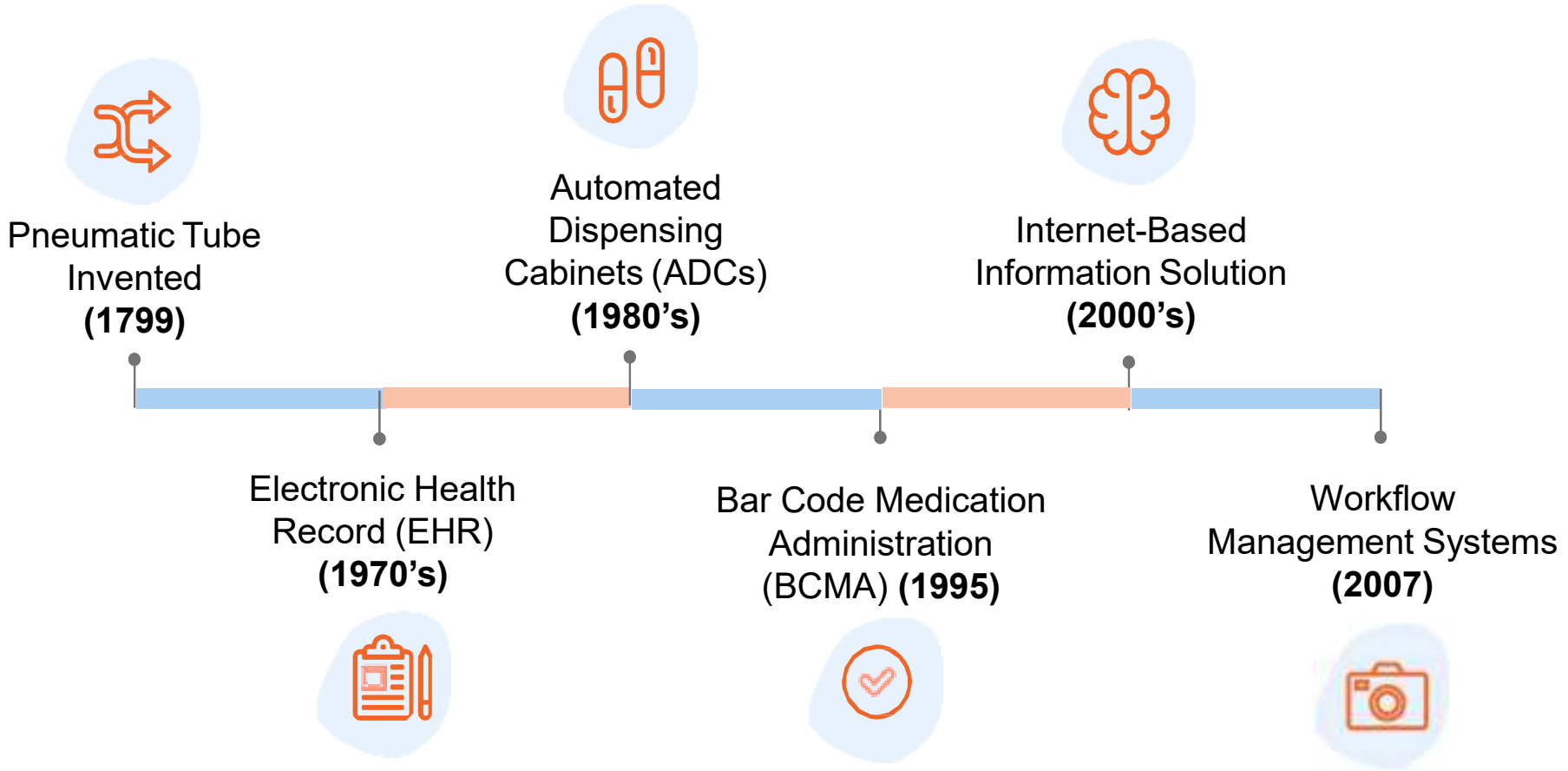
Additional Risk Reduction Strategies

- Applying restrictions to the formulary
- Computerized Prescriber Order Entry (CPOE), Smart Infusion Pumps, and Bar Code Technology
- Identifying error-prone processes
  - Reactive (event reporting)
  - Proactive (self-assessment surveys, ISMP Action Agendas)
  - Assess current state → formulate target state
- Clinical Pharmacy Specialists (CPS)

Fortescue, E. B., et al. (2003). *Pediatrics*, *111*(4), 722-729.

ismp.org
Action Agendas-Acute Care; Medication Safety Alert!

Technological Advances in Healthcare



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Tsao, N. W., et al. (2014). *The Canadian journal of hospital pharmacy*, *67*(2), 138.

Calloway, S., Akilo, H. A., & Bierman, K. (2013).. *Hospital pharmacy*, *48*(9), 744-752.

Summary

Pediatric patients are at a greater risk for medication events

Implementation of risk reduction strategies can help to prevent and mitigate safety concerns

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Post-Assessment Question

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