

# Protecting Fragile Neonates; Best Practice in Enteral Feeding

Presented by: Katie Cornwell, MSN, NNP-BC, CNS  
Clinical Support Specialist, Baxa Corporation



# Presentation Overview

---

- In the NICU, the risk of **enteral-to-parenteral misconnection** is particularly high because sick neonates are commonly fed using products and devices that look and function like those intended for IV use. If an enteral fluid is accidentally connected to a parenteral line, the outcome can be deadly.
- This webinar will examine the misconnection risk, options to prevent or eliminate it and current best practice recommendations regarding implementing a ***culture of enteral safety in the NICU***.



# Learning Objectives

---

- Describe enteral-to-parenteral misconnection risks in the newborn intensive care unit
- Identify options to prevent or eliminate the misconnection risk
- Detail recommendations by the FDA, ASPEN, ISMP and the Joint Commission regarding enteral safety



# What we'll cover

---

- Brief overview of enteral feeding in the NICU
- Key sources of the misconnection risk in the NICU
- Reports & consequences of misconnection errors
- Best Practice recommendations by the Joint Commission, FDA, ASPEN and ISMP regarding enteral safety
- Summary



# Enteral Feeding in the NICU

## Brief Overview



# NICU Enteral Feeding Basics



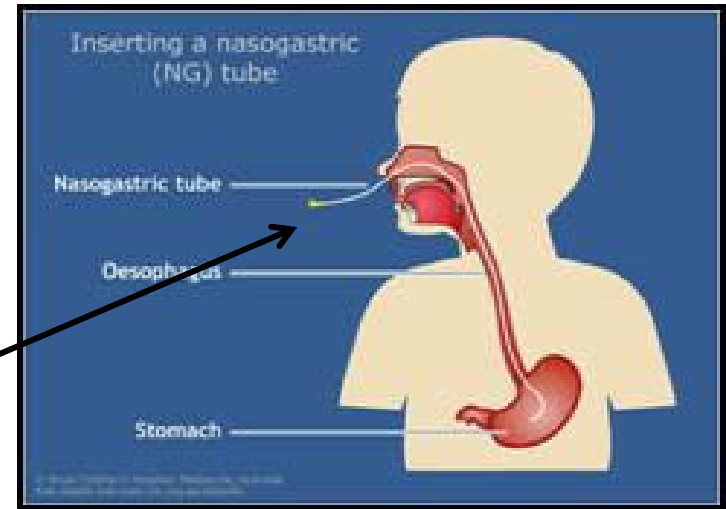
Due to significant physiologic instability and developmental issues, premature and critically-ill newborns, like this 24 weeker, are unable to take feedings by mouth.

Instead, they are fed through specialized feeding tubes.



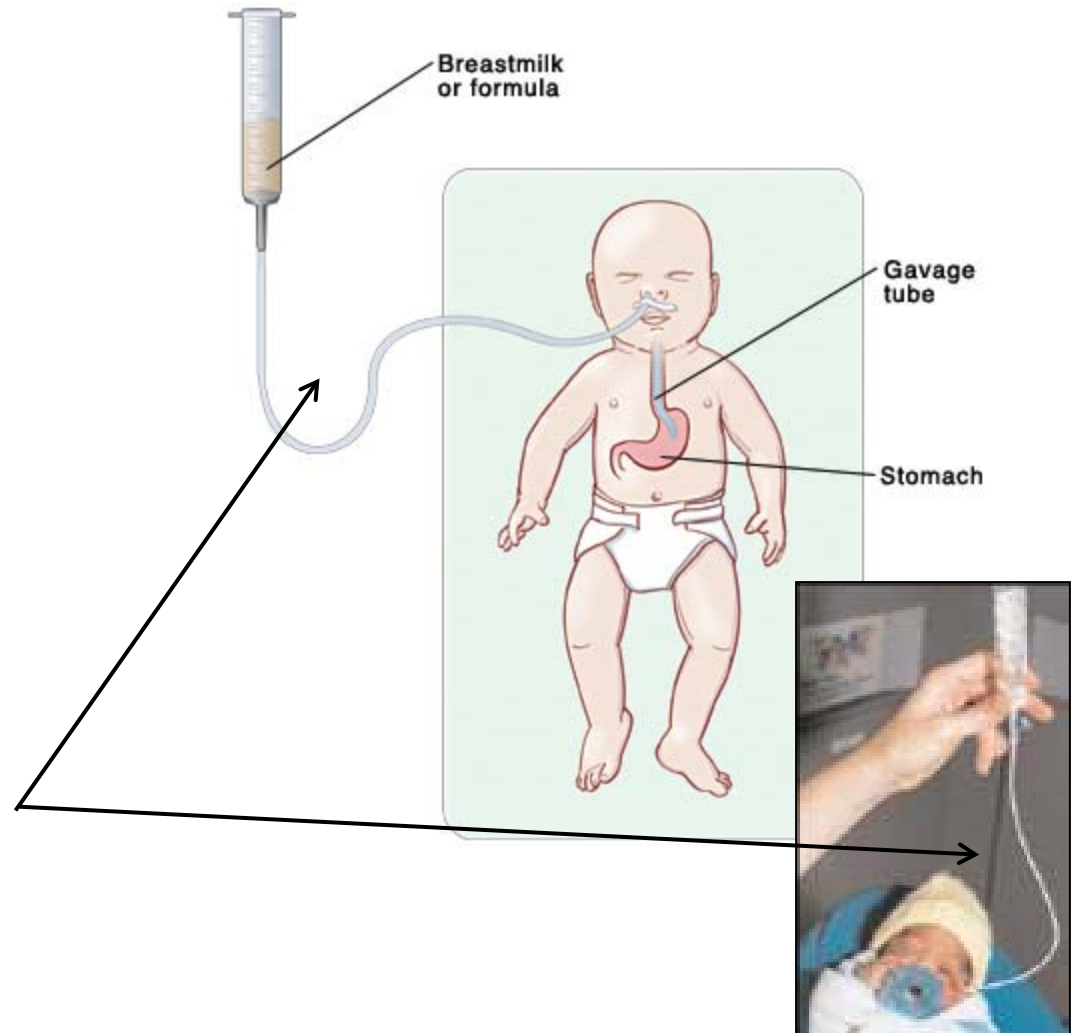
# NICU Enteral Feeding Basics

- Syringes filled with breast milk or formula attach to nasogastric (NG) feeding tubes through which the feeding drains directly into the gastrointestinal system.
- NG tubes are inserted into the nose (or mouth) to dwell in the stomach.



# NICU Enteral Feeding Basics

- Syringe pumps are used to deliver feeds at set rates over specific time periods
- Gravity feeds use the same syringes and tubes, but the syringe plunger is removed, and the contents drain through the tube by gravity.



# What we're covering:

---

- Brief overview of enteral feeding in the NICU
- **Key sources of the misconnection risk in the NICU**
- Reports & consequences of misconnection errors
- Best Practice recommendations by the Joint Commission, FDA, ASPEN and ISMP regarding enteral safety
- Summary



# Enteral Misconnection Risks in the NICU

Enteral-to-Parenteral Dangers



# Misconnection Risks

---

## Parenteral:

Infused directly into the circulatory system

## Enteral:

Provided directly to the gastrointestinal system

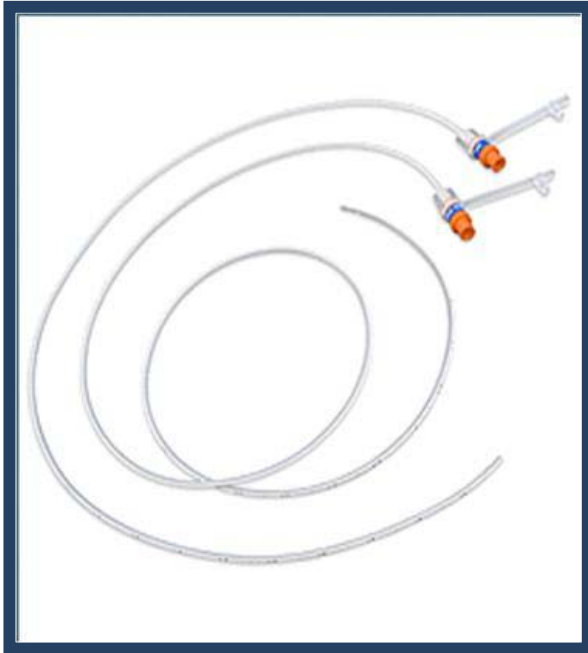
## Primary Risk:

Luer connections on common feeding products



# Misconnection Risks

NG Tubes



Extension Sets



IV Syringes



These connections are identical to those that mate to IV lines.



# Misconnection Risks

---

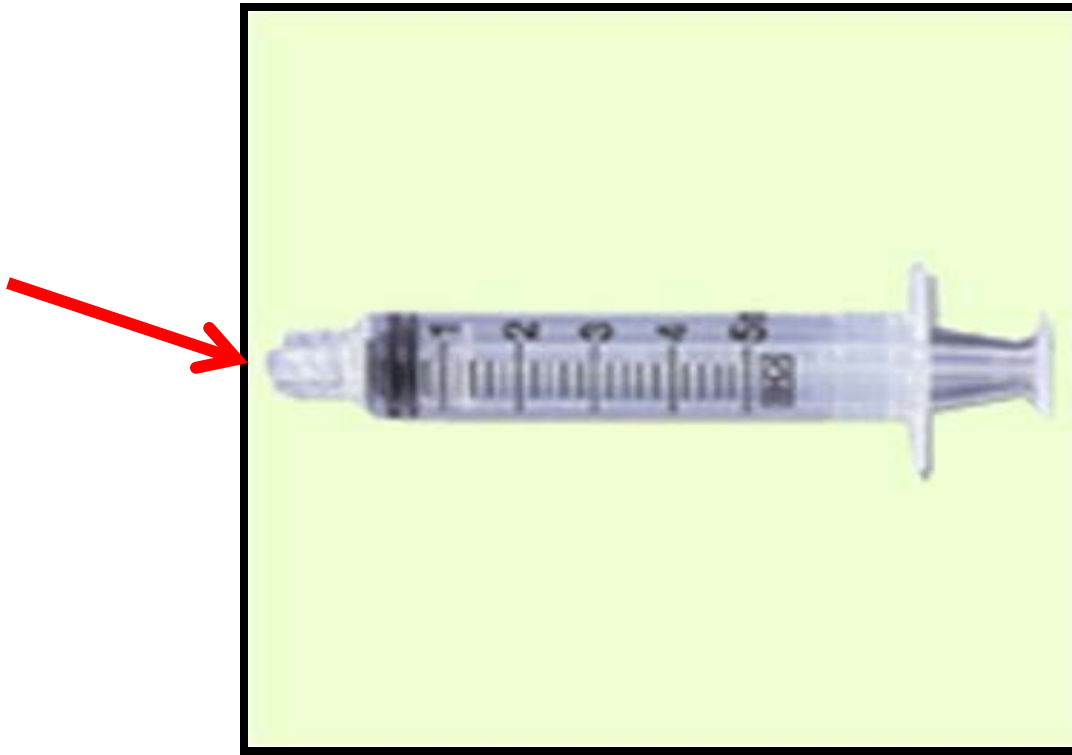


Examples of standard luer connections



# Misconnection Risks

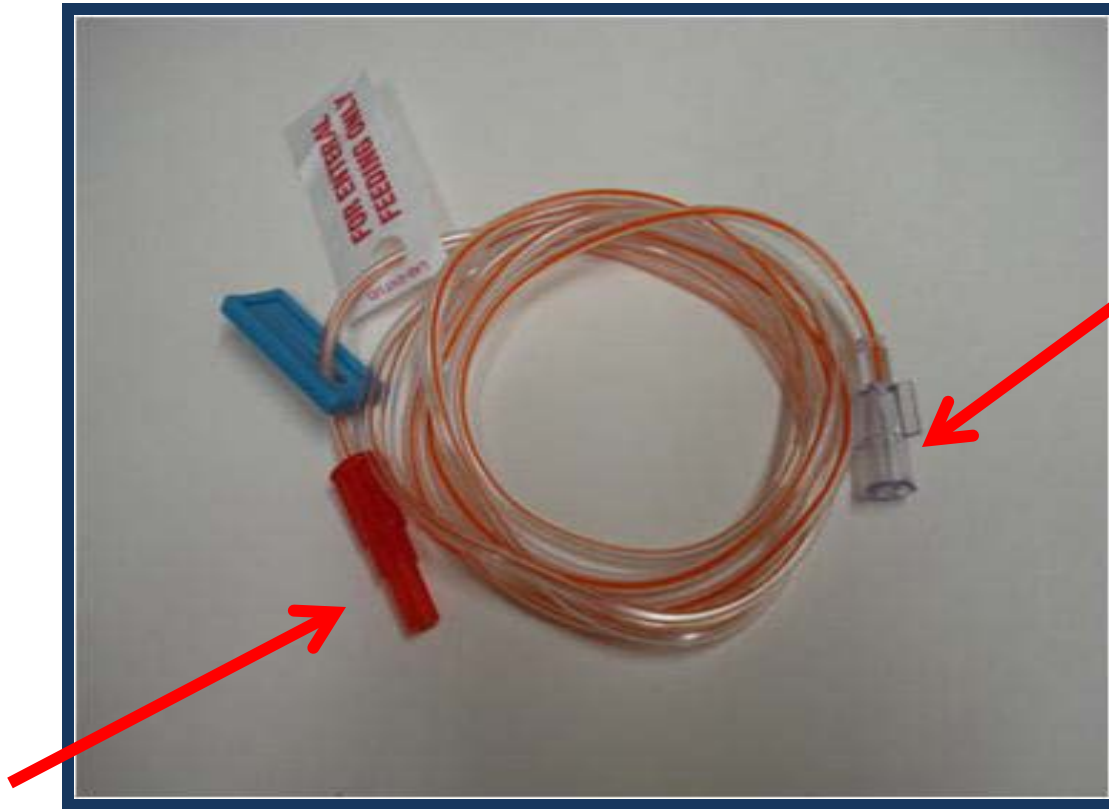
---



Standard IV syringe often used for enteral feeding



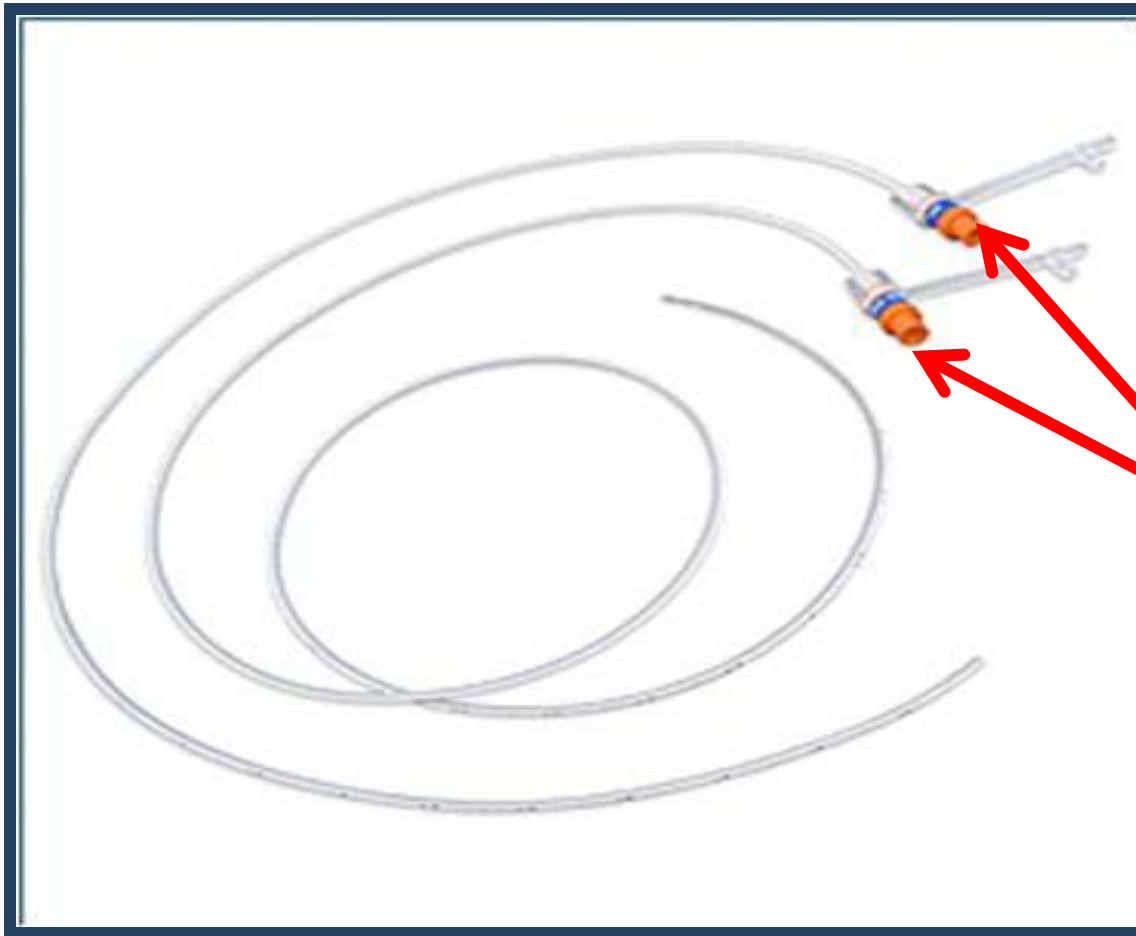
# Misconnection Risks



Feeding tubes with luer compatibility



# Misconnection Risks



Nasogastric tubes with luer connectors



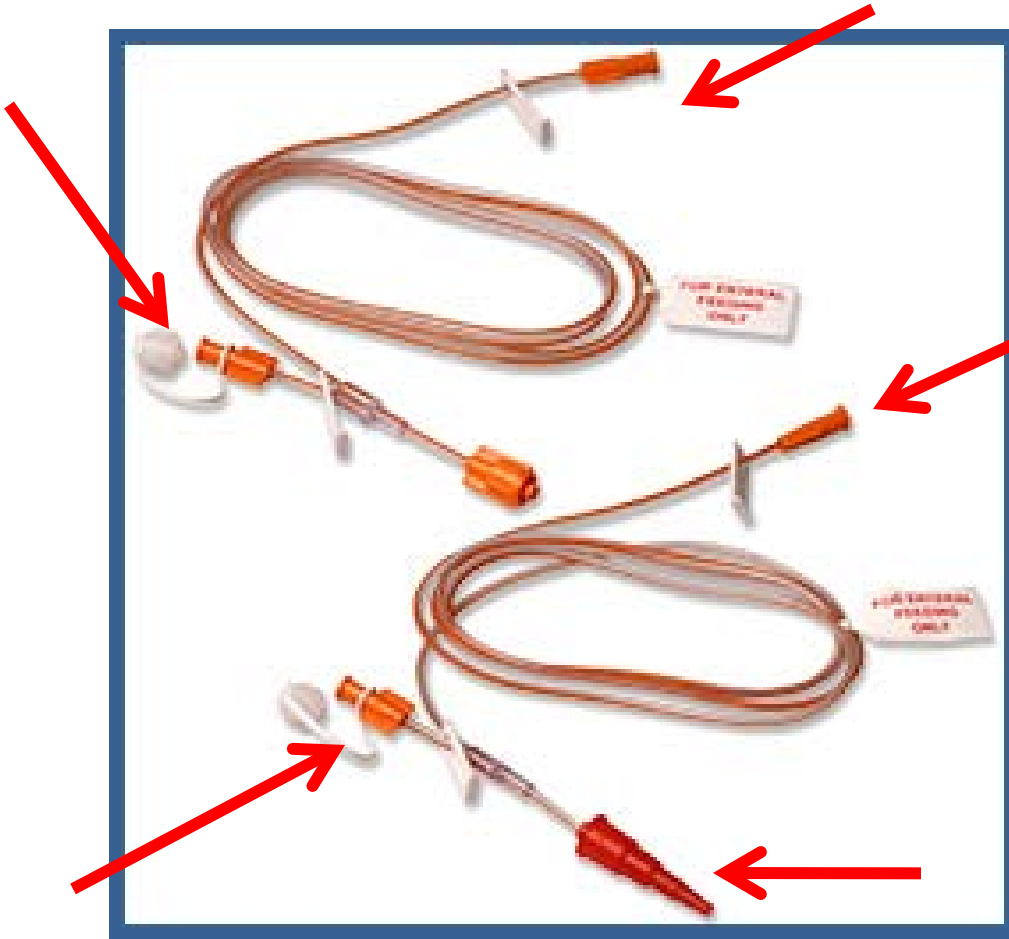
# Misconnection Risks



Orange-colored tubing and connections help signify enteral-only use.



# Misconnection Risks



But if the luer-compatible connections are still present...



# Misconnection Risks



A misconnection to one of these tubes  
can't be completely prevented...



# Misconnection Risks



A misconnection will happen.



# Misconnection Risks

---

And the results could be devastating

...What if???



# What we're covering:

---

- Brief overview of enteral feeding in the NICU
- Key sources of the misconnection risk in the NICU
- **Reports & consequences of misconnection errors**
- Best Practice recommendations by the Joint Commission, FDA, ASPEN and ISMP regarding enteral safety
- Summary



# When the Error Happens

Misconnection Reports

Oral/Enteral to IV/Parenteral



# It happened years ago...

---

- Reported as long ago as 1972
- Article the *Lancet* described
  - An accidental infusion of a “milk drip” meant to be infused intragastrically
  - Was “inadvertently” infused intravenously
    - That means it was misconnected to the IV line

Wallace, J., R. Payne, et al. (1972). “Inadvertent intravenous infusion of milk.” *The Lancet* 1972(1): 1264-1266.



# It happened in a peds unit...

---

- A 15 mg dose of VERSED (midazolam) syrup
- With 650 mg of Tylenol syrup (acetaminophen)
- Drawn into a parenteral syringe
  - Syringe contents ‘mistakenly’ administered via an 11 year old’s IV
  - The syringe full of oral meds was misconnected to the IV line

*From: <http://www.ismp.org/newsletters/acutecare/articles/20091022.asp>*



# It happened during a procedure...

---

- Barium sulfate was injected intravenously into a 17 month old's central line
- Her central line was 'mistaken' for her gastrostomy tube.
  - The barium was misconnected to the IV line

*Soghoian, S., Hoffman, R., and Nelson, L., "Unintentional IV injection of barium sulfate in a child." AJHP. May 1, 2010, Vol 67, pp. 734-736.*



# It happened in Labor & Delivery...

---

- 24-year-old woman, 35 weeks pregnant
- Hospitalized for vomiting and dehydration
- Bag of ready-to-hang enteral feeding was mistaken for TPN
- Nurse connected the tubing to the woman's PICC line
  - **Misconnected the enteral feeding to her IV**
  - *Her fetus died—and then she died, too.*

*"Enteral Feeding Misconnections: A Consortium Position Statement," The Joint Commission Journal on Quality and Patient Safety, May 2008, Volume 34, Number 5, pp 285-292.*



# And it has happened in the NICU...

---

- Premature infant in a neonatal unit in Spain
- Was receiving intermittent feedings and IV fluids
  - His feeding was drawn into a parenteral, luer-compatible syringe
  - The syringe and feed were misconnected to the luer on his IV line, instead of his NG tube
- *He died.*

*Institute for Safe Medication Practices, "Oral Syringes: A crucial and economical risk-reduction strategy that has not been fully utilized," October 22, 2009 issue, [www.ismp.org/Newsletters/acutecare/articles/20091022.asp](http://www.ismp.org/Newsletters/acutecare/articles/20091022.asp)*



# Remove the luers

- The presence of luers makes misconnection errors possible
- Remove the luers, remove the possibility



# What we're covering:

---

- Brief overview of enteral feeding in the NICU
- Key sources of the misconnection risk in the NICU
- Reports & consequences of misconnection errors
- **Best Practice recommendations by the Joint Commission, FDA, ASPEN and ISMP regarding enteral safety**
- Summary



# Recommendations for Best Practice

Making enteral feeding safer.



# The Joint Commission

---

## **2006 Sentinel Event Alert:**

Tubing misconnections—a persistent and potentially deadly occurrence

## **2007 Collaboration with TJC International & the World Health Organization**

Avoiding Catheter and Tubing Misconnections

## **2008 Journal on Quality & Patient Safety:**

Enteral Feeding Misconnections:  
A Consortium Position Statement



# What The Joint Commission Says

---

- Do not purchase non-intravenous equipment that is equipped with connectors that can physically mate with a female luer IV line connector
- Never use a standard luer syringe for oral medications or enteral feedings
- Emphasize the risk of tubing misconnections in orientation and training curricula
- *In addition, the Joint Commission urges product manufacturers to implement “designed incompatibility,” as appropriate, to prevent dangerous misconnections of tubes and catheters.*



# The Food & Drug Administration

- Currently working with several major organizations, including ISO, to develop a standard for connectors — expected to be finalized in 2010
- Assembled an advisory board in 2006 to establish and publish guidelines for safe enteral feeding
- Selected Recommendations:
  - Generally echo The Joint Commission, often word-for-word; consolidated in a 2009 Medical Device Safety Calendar specifically focused on Luer Misconnections
  - Statement: “Be aware that *changes to policy* and clinical practice may reduce, *but may not prevent Luer misconnections*”
  - Statement: “Do not purchase non-IV equipment with connectors that can physically mate with a female IV Luer connector.”



# American Society for Parenteral and Enteral Nutrition

---

- **2009 Enteral Nutrition Practice Recommendations**
  - **Enteral Safety Section**
    - Review currently used systems to assess practices that include the potential for misconnection, including nonstandard, rigged work-arounds (luer adapters, etc.)
    - Avoid buying enteral equipment that can mate with female luer connectors.
    - Do not modify or adapt IV or feeding devices because doing so may compromise the safety feature incorporated into their design.
    - When syringe pumps are used in neonatal ICUs for human milk or other feedings, they should be clearly distinct from syringe pumps used for IV or other medical purposes.



# Institute for Safe Medicine Practices

- The ISMP has written about enteral to parenteral misconnections more than a dozen times since its inception in 1994.
- **2009 Safety Strategies**
  - **Assess medical equipment connectivity**
    - “Use parenteral tubing with ports that are totally incompatible with oral syringes and enteral devices that only accommodate oral syringes”
  - **Supply all clinical areas with oral syringes**
    - “If possible, use oral syringes that have a different appearance from parenteral syringes”
  - **Reduce tolerance of risk**
    - Communicate “Include examples of external (and internal) errors that have happened, even if they did not reach the patient, and promote the belief that the error could happen [at any time]”
  - **Require staff to use oral syringes only when preparing and administering oral/enteral liquids**
  - **Improve awareness**
    - Ensure that all healthcare professionals...are familiar with the design and purpose of oral syringes and their important safety features, particularly their inability to be connected to IV ports. The importance of using oral syringes should be consistently emphasized.



# Summary

The Risk & How to Eliminate It



# Facts About the Misconnection Risk

---

- The use of luer-compatible connections on products intended for oral/enteral use is extremely common
- If a luer-compatible connection is present on a non-IV product, the risk of misconnection is impossible to prevent
- Luer connector misconnections are a well-known and well-documented issue
- Each misconnection event carries the potential for a lethal outcome



# The Most Dangerous Practices

---

Specialty NICU Feeding tubes that incorporate luer connections

Standard IV syringes, with or without enteral labeling

Multi-use 'smart' syringe pumps, used interchangeably with IV meds

## Why it's so common:

- Generally less-expensive
- Comfortable & familiar
- No change to purchasing practices



# Slightly Less-Dangerous Practices

---

Integration of a variety of manufacturers' 'partial' enteral-only solutions, including:

- Orange labels applied to standard luer syringes
- Orange 'oral' tips glued onto standard luer syringes
- 'Enteral-Lok' adapters attached to luer syringes
- Luer-compatible feeding tubes with orange striping
- Adapters on feeding tubes & extension sets
- Proprietary connections on syringes & tubes

## However:

None of these options fully eliminate IV-compatibility through the entire enteral feeding procedure, so the misconnection risk is NOT eliminated



Luers are not safe.

Partial solutions are not enough.



# Safe, Complete Solutions DO Exist

- Syringes with special tips that are not luer-compatible



# Safe, Complete Solutions DO Exist

- Feeding tubes and extension sets that will NOT mate with luer connections



# Safe, Complete Solutions DO Exist

- Dedicated, enteral-only feeding pumps



# Eliminate the luers, eliminate the risk



# Contact

---

**Katie Cornwell, MSN, NNP-BC, CNS**  
Clinical Support Specialist, Baxa Corporation

Phone: (303) 617-2137  
Email: [katie.cornwell@baxa.com](mailto:katie.cornwell@baxa.com)



*Please see [www.baxa.com/neothrive](http://www.baxa.com/neothrive) for links to the documents, guidelines and recommendations referenced in this presentation.*

