Does Evidence Improve Practice?
Impact of the NOVEL Project 5 Years Later

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Northington
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Objectives
At the completion of this presentation, the participant will be able to:

• Describe the evidence surrounding NGT placement verification methods
• Understand dangers of unrecognized erroneous placement of NGT
• Discuss evidence-based best practice methods for NGT location verification
**Perspective**

Have you ever placed an NGT? Helped a colleague place one?

Did you experience ‘doubt’ or ‘question’ the tube tip location?

What method(s) were used for tube location verification?

What is the standard method in your facility/unit for determination of NGT location verification?

Have you ever cared for a patient following an adverse event directly related to a misplaced NGT?

* NGT – nasogastric tube

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**Background**

- Approximately 1.2 million NGTs are used in the US
- 2016 study reported 24% of US hospitalized children will require an NGT, orogastric tube or post-pyloric tube during their hospitalization, or 61% are preemies / neonates
- Greatest growth expected in pediatric (including NICU) and geriatric populations
  - Revenue estimate to exceed $474K by 2024
  - Enteral feedings, medication administration, fluid delivery, etc

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**Background**

- Access to the gastrointestinal (GI) tract
- Frequently placed and used device most often placed by nurses
  - without direct visualization, “blindly”
- Patient age, size/weight, ability to cooperate, degree of illness, contraindications
- Size and length of the tube
- Anatomic proximity of esophagus to trachea
- Methods to determine tube depth
- Discrepancies on method / “standard” for NGT location verification
- No consistent report requirement for misplaced or related adverse events
Identifying the Challenge

1st Do no Harm

What’s the Evidence?
- Single blind RCT (n=276) 23% NGT were misplaced
- 15 case reports of children with NGT located in pulmonary bed
- 59% of 381 neonatal radiographs demonstrated NGT misplaced
- Incidence of 1.3 – 2.4% misplacements in more than 2000 NGT placements (adults)


Patient Safety

2010
America Association of Critical Care Nurses
“...often considered an innocuous procedure, blind placement of a feeding tube can cause serious and even fatal complications…”

2012
Child Health Patient Safety Organization

SAFETY ALERT
Blind Pediatric NG Tube Placement – Continues to Cause Harm
A process intended to prevent NG tube placement errors remains inadequate.

ACTION STEPS:
- STOP auscultation
- Discontinue NEX as mode of measurement (nose-ear-xiphoid)
- X-ray verification for high-risk patients

American Association of Critical Care Nurses (AACN), 2010.

Patient Safety

2012
Child Health Patient Safety Organization
NOVEL Project

New Opportunities for Verification of Enteral Tube Location

**Who We Are:**
- Multi-professional, inter-organizational alliance of individuals focused on understanding challenges associated with NGT placement and location verification in pediatric patients

**Twofold Mission:**
- To identify and promote best practices for nasogastric tube placement and
- Explore the potential of technology development to allow for accurate determination of nasogastric tube placement for both the inpatient and outpatient pediatric populations

Current NOVEL Membership

- American Society of Parenteral and Enteral Nutrition (Sponsor)
- American Association of Critical-Care Nurses
- Association of Pediatric Gastroenterology and Nutrition Nurses
- Child Health Association/Patient Safety Organization
- Society of Pediatric Nurses
- Parent Representative

Addressing the Challenge

Where to Start / What to Address?

- Challenges with NGTs cross the continuum of care
- Evidence-Based Practice
Literature Review

**Navageal Tube Placement and Verification in Children: Review of the Current Literature**

Sharon Y. Irving, RN, PhD, CPNP; Beth Lesan, RN, MSN, CNOC; Leitharee Northington, RN, CENP; Jacqueline S. Havens, RN, PhD; Carol Knepper, RN, PhD, CPNP, and NOGIE Project Work Group

Dual publication:

Practice Inquiry

- What are the numbers in children
- What Methods are used to verify placement

Use of Temporary Enteral Access Devices in Hospitalized Neonatal and Pediatric Patients in the United States

Beth Lesan, RN, MSN, CNOC; Carol Knepper, RN, PhD, CPNP; Leitharee Northington, RN, CENP; Leitharee Northington, RN, CENP; Tracy Schleier, RN, BSN, MSN, CCRN; Linda Sherwood, BSN, MSN, CPNP; Linda Sherwood, BSN, MSN, CPNP; and Sharon Irving, PhD, RN

Results

- 63 Sites
- 39 Pediatric facilities
- 16 Adult with pediatric, NICU and newborn nursery
- 8 Adult with newborn nursery

<table>
<thead>
<tr>
<th>Verification Method</th>
<th>Primary Method</th>
<th>2nd Method</th>
<th>3rd Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspiration w/ Visual Inspection</td>
<td>33%</td>
<td>8%</td>
<td>19%</td>
</tr>
<tr>
<td>Auscultation</td>
<td>29%</td>
<td>32%</td>
<td>4%</td>
</tr>
<tr>
<td>Gastric pH</td>
<td>16%</td>
<td>9%</td>
<td>1%</td>
</tr>
<tr>
<td>Length Measurement</td>
<td>13%</td>
<td>6%</td>
<td>14%</td>
</tr>
<tr>
<td>Radiograph</td>
<td>1%</td>
<td>30%</td>
<td>21%</td>
</tr>
</tbody>
</table>

Table 1. Results from NGT Use Study

Note: Data from Lyman et al. 2016
Practice Inquiry - Homecare


Luttrell, Harding, G., Belo, H., Caudle, K., Collins, T., & Hardin, K.

Results

N = 144 responses

- 71% NGTs placed by the caregiver
- 14% returned to a healthcare setting
- 81% were taught / using NEMU method for measurement of tube depth
- 74% reported experiencing a misplaced tube

Qualitative Inquiry

“How did you know the tube was placed incorrectly?”

- Emesis
- No aspirate
- Intermittency
- Abnormal breathing
  - Gasping
  - Turning blue
  - Gagging/choking
- Unable to auscultate air
- Oral visualization
- Unable to flush
- pH paper reading

- Caregivers are taught and will mirror what nurses practice
- Auscultation was still being taught and used
Best Practice Guidelines

3 tenets to consider in assessment of NGT placement and location verification

- NGT is necessary
- pH appropriate
- Radiograph necessary
- Troubleshoot
- No aspirate
- Continuous feeds
- Before
- During
- After

Evaluating Impact

- Did we move the needle?

Evaluation of methods used to verify nasogastric feeding tube placement in hospitalized infants and children – A follow-up study

Results

Responses

<table>
<thead>
<tr>
<th>Category</th>
<th>Pediatric Facilities</th>
<th>RN/APN</th>
<th>Total Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>77</td>
<td>205</td>
<td>282</td>
</tr>
<tr>
<td>Adult/Ped/Neo</td>
<td>122</td>
<td>28</td>
<td>150</td>
</tr>
<tr>
<td>Adult/Neo</td>
<td>3</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

- 23 of the institutions are represented in both studies
- 81 respondents work in critical care areas
- 27 respondents were not in direct patient care

Results

- What were the respondents perceived best practice:
  - 24% → pH measurement
  - 64% → radiograph

- What method(s) were actual practice:
  - 40% → pH measurement
  - 20% → radiography

- Barriers to pH (34% responded barriers present)
  - POC testing challenges
  - Cost
  - Accuracy of pH measurement
  - Use of PPIs and/or H2 antagonists medications
  - Access to/availability of supplies
  - Color-blind staff

- Barriers to radiograph
  - Concern for radiation exposure to patients
  - Time and cost

- 38% of respondents reported practice variation in their institution
- Reluctance to change from long-standing practice (auscultation)
- Current institution policies did not support the use of pH or radiograph

Note: Data from Northington et al. 2022
Was Practice Influenced?

- Study findings suggest a decrease of 6% in use of auscultation alone
  - Suggesting a practice shift to evidence-based confirmation methods
- 46% of respondents knew of practice change in their institution, but were unaware why the change occurred
- ~10% of respondents were aware of the NOVEL project
  - Articles
  - Conference presentations
  - Webinars

What’s Next

- Continued evaluation of the literature
- Decrease literature gaps through research and QI initiatives
- Development of standardized practice
  - Identification and addressing barriers
- Empower nurses through information and evidence
- Educate nursing leaders, policy changers
- Educate all providers → caregivers

Thank You for your time & your attention

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References


