



The Visscher Family says goodbye to baby Grant, who died from a misplaced feeding tube 11 days after birth.

New mother Deahna Visscher was feeling hopeful. Although her son Grant had been born with a heart defect, he was doing very well after surgery. Just 11-days old, doctors felt he could soon leave the hospital. But that didn't happen. A nurse incorrectly inserted a feeding tube piercing the little infant's trachea and filling his lungs with fluid. "The nurse asked me to go out into the hall and ask for help," recalls Deahna. "I told them my son was turning blue and I watched as 20 staff members tried to resuscitate him." Grant was pronounced dead at 9:10 p.m.

Sadly, Deahna isn't alone.

Although feeding and drainage tubes are routinely used in hospitals, they carry the risk of serious or even potentially lethal complications.¹ In fact, studies estimate that every year, nearly 500,000 nasogastric (NG) and percutaneous endoscopic gastrostomy (PEG) tubes and suction tubes are misplaced, which result in severe complications or death.² It was these risks that led one nurse to begin looking for answers.

"We had a couple of instances of misplaced feeding tubes [at Children's Mercy Kansas City]. I couldn't get over the fact that the nurses followed the right procedure, but it didn't work, so two nurses and families lives were

changed forever," explains Beth Lyman, the Sr. Program Coordinator of the Nutrition Support Team at Children's Mercy Kansas City.

With more than forty years of experience, Lyman discovered that despite the risks associated with this common procedure, no universal standard of practice exists for bedside verification because each method has limitations. As a board member of the American Society of Parenteral and Enteral Nutrition (ASPEN), Lyman developed the New Opportunities for Verification of Enteral tube Location (NOVEL) project an inter-organization, interdisciplinary and international effort to promote best practice for NG tube placement verification.

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X-rays are currently the gold standard for NGT placement confirmation because they can visualize the course of the NGT.³ Despite being the gold standard, it is not foolproof. Between

2005 and 2010, 45% of all cases of harm caused by a misplaced NGT reported by the United Kingdom's National Patient Safety Agency were due to misinterpreted X-rays.⁴

"What was surprising was that there still isn't consistency in practice for placement and verification of nasogastric tubes. People are still using non-evidence based practices. Nurses are resistant, but I think things are changing," says Lyman.

The non-evidence based practices Lyman refers to is the continued use of methods including aspiration or auscultation to verify NG tube placement. It has been well documented for almost 20 years that a common bedside method (auscultation) is often inaccurate; however, it is still widely practiced.⁵

"Research from the 1990's shows that auscultation is less reliable than tossing a coin. In test conditions, over 80% of clinicians failed to detect tubes in the lungs. In England, air auscultation is something we banned over 13 years ago, but when preparing for [the World Patient Safety, Science & Technology Summit], I was shocked to realize just how commonplace this method has remained in some other countries. I found materials teaching parents and physicians, apparently completely unaware of the research and the risks," explains Frances Healey, Ph.D., RN, Deputy Director of Patient Safety, National Health Service Improvement.

Lyman adds, "And it's not just children. A recent study in Pennsylvania found the largest number of misplacements were in the elderly followed by the next group, very tiny, babies."

Failure to detect misplaced NGTs are attributed to: use of non-evidence based methods to confirm initial placement (auscultation or aspiration), failure to recognize when an NGT has changed position, failure to properly read an abdominal radiograph, failure to accurately interpret an electromagnetic device screen.⁶



To confirm NG tube placement, NOVEL recommends a multimodal verification system which includes:

- **Use of pH⁷** – to check the acidity of the stomach to verify placement
- **NEMU** – nurses should measure NEMU (nose-ear-mid-umbilicus) every time they place an NG tube
- **Use Critical Thinking Skills** – if patients deteriorate during placement, then remove the tube
- **X-ray Verification** – x-ray verification remains the gold standard but raises concern with repeated exposure, particularly in neonates. When X-rays are done, it must be read by someone competent

“Tube placement and misplacement is not difficult, but it’s tricky because the signs of misplacement are tricky,” says Lyman.

Lyman acknowledges that pH isn’t perfect.

“We need technology companies to begin developing technology to help with this. There is a nurse who developed a tube with an LED light at the end which can show where the tube is placed but we need technology companies to begin investing in finding solutions,” Lyman urges.

But change is possible. Since Grant’s tragic death, Children’s Hospital Colorado has crafted procedures to ensure that such errors are not repeated. Their procedures and those of a multi-disciplinary team of experts created the foundation for the new “Actionable Patient Safety Solutions” (APSS) developed by the PSMF and



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follow NOVEL’s recommendations.

Clinical Nurse Specialist Christine Peyton, RN who spearheaded the changes at Children’s Hospital Colorado discussed the resistance to change and how the hospital found success.

“When we took auscultation out of the procedures, there was a lot of resistance. We had to go to our nurse managers and our home health agencies to educate and implement the new process. Since there was resistance, we had to take a step back. We told Grant’s story, and that was powerful. It was really hard for people to hear but they realized that

[the change to the policy] was the right thing to do and that the literature supports it,” explains Peyton.

“A couple of years after Grant died, I thought how do I know the hospital made all of the changes that they promised,” recalls Deahna.

“When I talked to them, I learned that they had implemented the changes. Chris was able to tell me that day that they were able to save four babies lives because of the policy changes they made.”

“It gives me strength, and it validates to me that Grant didn’t die in vain,” says Deahna.

¹ Verifying NG feeding tube placement in pediatric patients. (2016). *American Nurse Today*. Retrieved from <https://www.americannursetoday.com/verifying-ng-feeding-tube-placement-pediatric-patients/>. ² AHC Media. (2015). Misplaced NG tubes a major patient safety risk. ³ Turgay, A., & Khorshid, L. (2010). Effectiveness of the auscultatory and pH methods in predicting feeding tube placement. *Journal Of Clinical Nursing*, 19(11-12), 1553-1559. <http://dx.doi.org/10.1111/j.1365-2702.2010.03191.x>. ⁴ National Patient Safety Agency. Patient Safety Alert NPSA/2011/PSA002: Reducing the harm caused by misplaced nasogastric feeding tubes in adults, children and infants. London: National Patient Safety Agency, 2011. ⁵ Clinical Practice Guideline: Gastric Tube Placement Verification. (2010). *Emergency Nurses Association*. Retrieved from https://www.ena.org/docs/default-source/resource-library/practice-resources/cpg/gastrictubecpg7b5530b71c1e49e8b155b6cca1870adc.pdf?sfvrsn=a8e9dd7a_8. ⁶ October, T., & Hardart, G. (2009). Successful placement of postpyloric enteral tubes using electromagnetic guidance in critically ill children*. *Pediatric Critical Care Medicine*, 10(2), 196-200. <http://dx.doi.org/10.1097/pcc.0b013e31819a3668>. ⁷ Bankhead R, Boullata J, Brantley S, et al. A.S.P.E.N enteral nutrition practice recommendations. *JPEN J Parenter Enteral Nutr*. 2009;33(2):122-167.