

TREATMENT OF FEEDING TUBE OCCLUSION

Jill Lazar
CORPAK MedSystems, Buffalo Grove IL
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Introduction:

- The inability to provide adequate nutrition to patients who require enteral feeding is frustrating to nutritional support specialists.
- Feeding tube occlusion (FTO) is a leading cause of interrupted enteral feeding administration, with research showing occlusions in 12.5% to 35% of enteral feeding patients.^{1,2}
- Cranberry juice, cola products, water, MSG, proprietary devices and pancrelipase have traditionally been used as tube patency maintainers (TPMs). However, these approaches have had mixed results, and as of 2010, pancrelipase is no longer for sale by mandate of the FDA.
- Research has shown that papain, an enzyme found in papayas, is an effective and inexpensive substance for restoring patency to feeding tubes.³
- Tube occlusion may be caused by inappropriate administration of medication, viscous formulas, poor flushing techniques, partially digested protein, yeast, aspiration of gastrointestinal contents, and changes in the geometry of the feeding tube.³
- In addition to delaying enteral feeding, FTO may also result in additional cost, inconvenience, and decreased patient satisfaction.

Objective:

To determine whether a proprietary tube patency maintainer (TPM) is effective at eliminating feeding tube occlusion (FTO).

Main Outcome Measures:

An effective TPM would fulfill the following criteria:

- A decrease in tube reinsertion. If an occlusion cannot be treated, a patient may need to have a new feeding tube inserted. This is of special concern when considering enteral feeding costs, as tubes placed electromagnetically can cost as much as \$39 per tube.
- A decrease in nursing time. Current methods for treating tube occlusions are labor-intensive, messy, and time-consuming. An effective TPM would decrease the amount of time nursing staff needs to dislodge the occlusion, as well as provide a more convenient alternative to current methods.
- A decrease in trauma to the patient. All feeding tube insertions carry with them potential discomfort and adverse events for the enteral feeding patient. An effective TPM would decrease the risk of discomfort and adverse events associated with repeated feeding tube placements.

Background:

A proprietary TPM (Clog Zapper™; CORPAK MedSystems, Wheeling, IL) received FDA 510(k) clearance in July 1997, and is presently used in over 200 hospitals nationwide, in long-term care settings, and in home care. All the ingredients in the proprietary TPM are food-grade, GRAS (generally recognized as safe by the FDA), and are derived from plant and bacterial sources. The ingredients are specifically formulated to target protein clogs, starch clogs, fiber clogs, and to fight bacterial infection. The formula comes premixed and preloaded into a syringe, and is designed to work equally well with any feeding device, including NG tubes, jejunostomy tubes, PEG tubes, G-tubes, and low profile gastrostomy devices.

Ingredient	Benefit
Maltodextrin*	Density enhancer
Papain	Breaks down proteins
Alpha-Amylase	Breaks down starches
Cellulase	Breaks down cellulose (fiber)
Citric Acid*	Lowers pH, helps enzymes, antibacterial agent
Disodium Phosphate	Enzyme enhancer
Ascorbic Acid	Keeps enzymes fighting
Potassium Sorbate*	Antibacterial agent
Sodium Lauryl Sulfate	Helps enzyme mixture penetrate clogs
Disodium Edta	Keeps minerals from damaging enzymes in Clog Zapper

All ingredients are food grade.

*G.R.A.S. Generally Recognized As Safe by the Food and Drug Administration

Results:

According to a report of 17 cases of FTO, 17 (100%) of the tubes were cleared using a proprietary TPM that included an applicator/introducer and a pre-measured powder. Two (12%) of the cases required a second attempt. The mean time to clear the tube after the administration of the TPM was 29.4 minutes. Because the TPM was successful in clearing all 17 cases of FTO, none of the cases mentioned in the study required tube reinsertions or subsequent radiographic confirmation.⁴ In another study, the same proprietary TPM successfully restored patency in vivo to 27 of 35 cases of FTO, usually within 30 to 60 minutes of administration.³

	Number of FTOs studied	Number of FTOs cleared with proprietary PTM	% Cleared	Average time to patency, (minutes) after administration
STUDY 1 ⁴	17	17	100	29.4
STUDY 2 ³	35	27	77	30-60

Conclusion:

The proprietary, food-based TPM is a highly effective alternative to eliminating tube occlusions. It successfully reduces the number of tube reinsertions, dislodges several types of occlusions, reduces costs associated with repeat insertions, and results in a faster and more convenient administration than other FTO treatments.

Discussion:

Clog Zapper successfully fills all 3 outcome measures for an effective TPM. Studies have shown that Clog Zapper can dislodge FTOs in 77% to 100% of FTO cases,^{3,4} and papain, an ingredient found in Clog Zapper's proprietary formula, has also been shown to effectively restore feeding tube patency.³ Although not specifically measured in this review, there may be cultural, religious, and dietary concerns associated with current treatments of FTO. Use of MSG to restore tube patency may exceed the recommended dietary allowance for an FTO patient with hypertension, and cultural and religious differences among FTO patients may preclude the use of any treatment that includes animal products. These concerns can be circumvented by Clog Zapper's plant and bacteria-derived ingredients.

The importance of decreasing patient trauma and discomfort should not be understated. As an effective TPM, Clog Zapper obviates the need for repeated tube insertions, and as a result, reduces the risks and discomfort associated with tube misplacement. Patients may also be more comfortable knowing they are being treated with a food-based formula, rather than a chemical solution or a drug.

Although this review did not specifically measure the efficacy of a proprietary TPM with different types of FTOs, Clog Zapper's "enzyme cocktail" contains different enzymes to directly attack protein clogs (papain enzyme), fiber clogs (cellulose enzyme), and starch clogs (alpha-amylase enzyme). The proprietary formula also includes potassium sorbate, an antibacterial agent that kills microorganisms that could potentially give rise to further FTOs and infection.

Lastly, current treatments for FTO are messy and time-consuming. The preset design of Clog Zapper's powdered formula and syringes results in a faster, more orderly administration.



Cost Savings:

CLOG ZAPPER Cost Calculation Worksheet (Example)		
	Before Clog Zapper	After Clog Zapper
Feeding Tube Costs		
Replacement Feeding Tube	\$12.50	-
Total Feeding Tube Costs	\$12.50	\$0.00
Labor Costs		
Nursing (avg. salary of \$65/hr)	\$32.50	\$11.00
MD (avg. salary of \$200/hr)	\$50.00	-
Other	-	-
Total Labor Costs	\$82.50	\$11.00
Confirmation Costs		
X-Ray	\$120.00	-
X-Ray #2 if needed	-	-
Fluoroscopy	-	-
Endoscopy	-	-
Total Confirmation Costs	\$120.00	\$0.00
Cost of Clog Zapper	-	\$22.50
Total Cost to Dislodge Clog	\$215.00	\$33.50

Cost Savings with Clog Zapper **\$181.50**

References:

- Smith RM, Myers SA. 2 devices that unclog feeding tubes. RN. 2005;68(1): 36-42.
- Marcuard SP, Stegall KS. Unclogging feeding tubes with pancreatic enzyme. JPEN J Parenter Enteral Nutr. 1990;14(6): 668-669.
- Frankel EH, Enow NB, Jackson KC, Kloiber LL. Methods of restoring patency to occluded feeding tubes. Nutr Clin Pract. 1998;13(3):129-131.
- Lord LM. Restoring and Maintaining Patency of Enteral Feeding Tubes. Nutr Clin Pract. 2003;18(5):422-426

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