

# A Two-Year Single Institution Retrospective Analysis of Unscheduled GJ Tube Changes

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## Introduction

Gastrojejunostomy tubes (GJ tubes) are one of the most common procedures performed in pediatric radiology. They are placed for a variety of reasons such as prematurity, failure to thrive, neurologic or neuromuscular disorders, gastroesophageal reflux, and neoplastic disease. Despite the advances in minimally invasive procedures, there continue to be risks associated with placement and replacement of the tubes. In addition to evaluating mechanical complications, it is important to consider fluoroscopy time and radiation exposure for this tube replacement. There are two dominant companies in the space, Applied Medical Technologies (AMT) G-JET and Avanos Medical MIC-KEY. However, there is a lack of data exhibiting the utilization and guidelines for scheduled tube replacements and ideal timing of replacing a GJ tube in the pediatric population continues to evolve. The focus of this study is to independently determine the average length of time a GJ lasts and evaluate the effectiveness and safety of not scheduling a routine change.

## Research Question

What is the effectiveness, safety profile, and average length of time for a GJ tube without a scheduled replacement in the pediatric patient population?

## Materials and Methods

A retrospective chart review of patient data from June 1, 2017 to May 31, 2019 was performed. The institution from where data was collected does not routinely schedule GJ tube replacements/exchanges. Every pediatric patient who had a GJ tube replacement/exchange was identified in a MPower database. A replacement was defined as the tube being dislodged from its ideal location and requiring complete removal and placement of a new GJ tube. An exchange was defined as the tube in the correct location but just needing to be exchanged over a wire. Each patients' age, sex, ordering service, cumulative fluoroscopy time in minutes, dose area product of radiation, brand of GJ tube, and reason for replacement were recorded. IRB exemption was obtained, and data was de-identified.

## Results

Outcomes	Patient Level n=143
Age, years (median, IQR)	9 (4, 14)
Sex (male, %)	70 (48.9)
Number of Procedures (median, IQR)	2 (0, 4)
Time Between Change, days (median, IQR) (mean, range)	116.3 (66.6, 194.9) 140.6 (14.1, 448.1)
Flouro Times, min (median, IQR) (mean, range)	0.7 (0.3, 2.4) 1.76 (0.10, 18.9)
Estimate Skin Exposure, mGy (median, IQR) (mean, range)	2.75 (0.98, 7.87) 9.19 (0.18, 155.4)
Dose Area Product, Gy <sup>cm</sup> <sup>2</sup> (median, IQR) (mean, range)	428 (185, 1393) 1545 (48.3, 23,476)
Brand Name (n, %)	
G-JET	71 (49.7)
MIC-Key	69 (48.3)
Procedure (n, %)	
Exchange	103 (72.1)
Replacement	51 (35.7)

Table 1: Demographics and Descriptive analysis of Patient Population

	Exchange N=331	Replacement N=203	Exp (Beta, 95% CI)	p-value
Flouro Time, mins (mean, SD)	0.92 (7.01)	11.4 (97.4)	10.5 (8.75, 12.4)	<0.0001
Dose Area Product, Gy <sup>cm</sup> <sup>2</sup> (mean, SD)	576.4 (1294.26)	4200.8 (5737.0)	6.69 (5.31, 8.41)	<0.0001
Estimated Skin Exposure, mGy (mean, SD)	3.45 (10.4)	25.5 (34.6)	9.77 (8.00, 11.9)	<0.0001

Table 2: Differences between exchange vs. replacement on a case level with adjusting for age, gender, repeated measures, and number of procedures.

Reason for Change	GJET (N %)	MIC-Key (N %)	OR (95% CI)	p-value
Routine	29 (11.8)	44 (18.2)	1.75 (0.89, 3.48)	0.11
Any Tube	138 (56.1)	125 (51.7)	0.96 (0.59, 1.56)	0.86
Any Balloon	44 (17.9)	17 (7.02)	0.57 (0.26, 1.29)	0.18
Any Valve	22 (8.94)	8 (3.31)	0.30 (0.10, 0.86)	0.03
General Malposition / Malfunction/Leaking	13 (5.28)	48 (19.8)	3.01 (1.30, 6.90)	0.009

Table 3: Generalized Estimating Question assessing the odds of specified reason relative to GJ tube brand adjusting for age, gender, repeated measures, and number of procedures.

In our data, n=143 patients with 540 GJ tubes changes performed. Each patient underwent median of 2 procedures, and average length between exchanges was 140.6 days with an average fluoroscopy time of 1.46 minutes (Table 1) Cumulative fluoroscopy time annually was higher if patient needed a replacement vs. exchange.  $p < 0.0001$ , (Table 2). GJET brand malfunctioned at rate of 8.9% due to valve issue compared to MIC,  $p = 0.03$  (Table 3). OR of 3.01 was found for a MIC to be replaced for general malfunction,  $p = 0.009$  (Table 3)

## Conclusion

Though current guidelines put forth by manufacturing companies recommend scheduling changes of GJ tubes every 3 months, we found that the average tube lasts for 4.7 months. Tube replacements results in significantly higher radiation exposure than exchanges. Limitations include radiation exposure being dependent on patient size and procedural skill. Further studies comparing scheduled GJ tube change data are needed to ascertain if scheduling results in less replacements, which may have implications on radiation dose exposure.

## Summary

- The average GJ tube lasts approximately 4.7 months
- A tube replacement compared to an exchange results in increased radiation exposure
- GJET's are more likely to have a valve issue, whereas the MICs are more likely to have general malfunctioning and leaking.

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