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Original article

Mortality and Futility in Patients Undergoing Gastrostomy Between 2020 and 2023

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Abstract

Gastrostomy is a common procedure in hospitals and clinics, typically associated with a low complication rate, and is performed in patients requiring long-term artificial feeding. In daily clinical practice, uncertainty often arises regarding the potential futility of some of these procedures, particularly given the poor vital and functional prognosis of many patients who require them. This study collected data on patients who underwent gastrostomy between 2020 and 2023 at a tertiary care institution, aiming to quantify in-hospital mortality and determine the proportion of procedures deemed futile. Futility in this context was defined as the performance of gastrostomy in patients with advanced dementia, a persistent vegetative state, or death within the first week following the procedure. Overall, in-hospital mortality was found to be 13.1%, and 10.4% of gastrostomies were considered futile. Additionally, higher rates of procedure-related complications and in-hospital deaths were observed during the COVID-19 pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). A downward trend in futile procedures was noted following the implementation of an institutional protocol on the subject during the study period.

Keywords

Gastrostomy, treatment futility, SARS-CoV-2, mortality, bioethics.

INTRODUCTION

Gastrostomy represents one of the artificial feeding options available for nutritional support in patients with swallowing difficulties. Alternative approaches include nasoenteric tubes or total parenteral nutrition. Given the nasal complications associated with the former and metabolic/vascular complications of the latter, gastrostomy remains the preferred long-term management strategy for eligible patients[(1)]. The procedure is typically performed endoscopically with low complication rates and allows for prolonged use by either the patient or caregivers after proper training.

A significant proportion of patients undergoing gastrostomy present with severe health conditions and comorbidities that reduce life expectancy. Many lack decision-making capacity, requiring caregivers or medical staff to authorize the procedure when no family representatives are available[(2)]. In some cases, the patient's clinical status may be so critical or their life expectancy so limited that the procedure could be considered *futile*, according to the accepted definition: "treatments that fail to improve patient physiology or provide any benefit to either the individual or their representatives"[(3)]. This phenomenon can be assessed by examining post-procedural survival, as deaths occurring shortly after gastrostomy (when excluding procedure-related complications) would indicate no clinical benefit was achieved. In more specific instances, the procedure was performed despite meeting standardized futility criteria, contradicting

international medical deontology and Colombia's medical ethics code established in Law 23 of 1981[4].

This study aims to analyze in-hospital mortality among patients undergoing the procedure at a tertiary care institution during and immediately after the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic period, while also evaluating potential futility in selected cases. Additionally, it assesses the impact of an institutional patient selection protocol for gastrostomy candidates developed and implemented by the gastroenterology service in late 2020.

MATERIALS AND METHODS

We conducted a retrospective cohort study based on gastrostomy procedure requests performed using any technique between January 2020 and December 2023 at a tertiary care institution. This facility exclusively treats patients older than 16 years and does not provide care for pregnant women. From this patient list, we analyzed basic demographic variables, procedure indications, dates and techniques, patient location at time of request (hospital ward, intensive care unit [ICU], outpatient), discharge dates, and in-hospital mortality. We also collected nutritional variables, creatinine levels, and C-reactive protein values. We documented cases where life expectancy was recorded at procedure time, functional class, and whether cases were reviewed by the clinical ethics committee. We registered complications requiring endoscopic reintervention or gastroenterology evaluation. Finally, we excluded patients with existing gastrostomies (those undergoing device replacement).

Procedure indications were categorized as: SARS-CoV-2 infection, head and neck neoplasms, other gastrointestinal neoplasms, traumatic brain injury (TBI), cerebrovascular disease (CVD), advanced dementia (defined as a Clinical Dementia Rating score of 3[5]), and "other causes." This last category included patients with swallowing disorders from other morbidities or prolonged orotracheal intubation.

The institutional ethics committee of Clínica CES, in conjunction with Universidad CES, approved this study.

RESULTS

General Data and Procedure Indications

The medical records department provided a list of 962 gastrostomy requests during the study period. After excluding 217 patients undergoing device replacement (not their first gastrostomy), 56 device removal orders, 14 incorrectly processed orders or orders for other procedures, and duplicate electronic records, we included 519 patients in the final analysis (**Figure 1**).

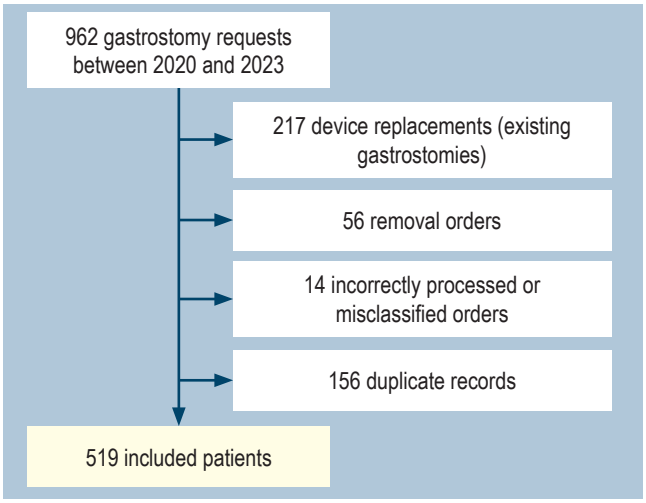

Figure 1. Patient selection flowchart. Image property of the authors.

Forty percent of patients were female. The mean age was 62 years, with 57% of procedures performed while patients were in the ICU. The most frequent indication was "other causes" (28.9%), predominantly comprising deconditioning associated with prolonged ICU stays, followed by SARS-CoV-2 infection (22%) and cerebrovascular disease (CVD) (21.2%). Complete data are presented in **Table 1** and **Figure 2**. Eleven gastrostomies (2.11%) were performed in patients with amyotrophic lateral sclerosis, while 29 patients (5.59%) underwent the procedure in outpatient settings. Endoscopic technique was used in 96% of cases, with surgical approach employed for the remainder. The radiologic gastrostomy technique described in literature was not performed at our institution during the study period. Most procedures (87%) were conducted in endoscopy suites, with the remainder performed in operating rooms due to anesthetic risk or technical contraindications for endoscopic approach.

Table 1. Patient Characteristics

Item	Variable	n (%)
Sex	Male	311 (59.90)
	Female	208 (40.10)
Mean age ± SD (years)	62.4 ± 16.4	
Procedure technique	Endoscopic	498 (95.95)
	Surgical	21 (4.05)
Patient location at procedure request	ICU	299 (57.61)
	Hospital ward/ER	191 (36.80)
	Endoscopy suite outpatient	3 (0.58)
	OR outpatient	26 (5.01)
Indication	SARS-CoV-2	117 (21.97)
	Non-SARS-CoV-2	402 (78.03)

SD: standard deviation; SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; ICU: intensive care unit. Table prepared by the authors.

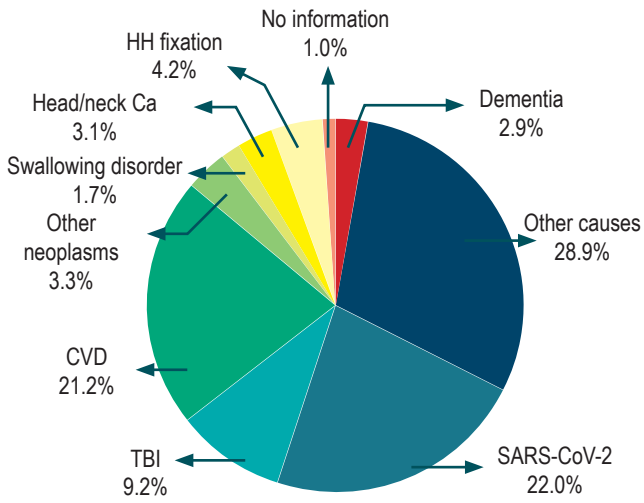

Figure 2. Medical indications for requested gastrostomies. Ca: cancer; CVD: cerebrovascular disease; HH: hiatal hernia; SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; TBI: traumatic brain injury. Image property of the authors.

The unspecified smaller percentages correspond to patients who shared two or more of the aforementioned categories, including six patients with advanced dementia.

Among surviving patients, most were discharged home or with home healthcare services (82.1%). Others were transferred to other Healthcare Service Provider Institutions (IPS) specializing in chronic mechanical ventilation patients (11.5%), while the remainder were referred to other clinics or hospitals (5.9%). On average, 11 gastrostomies were requested monthly at the institution, with no increase observed during SARS-CoV-2 pandemic years, though it became the primary indication during this period. Twenty-two procedures (4.2%) were requested for gastric fixation following surgical hiatal hernia repair (CHH).

Procedure Complications

Procedure-related complications occurred in 7.32% of cases, most commonly accidental tube removal (36% of complications), followed by buried bumper syndrome (31%). Twenty-one percent of affected patients experienced multiple simultaneous complications. Complication rates averaged 2-3 cases per quarter, except during Q2-Q3 2021 (peak pandemic), with 8 and 6 cases respectively. No deaths resulted directly from gastrostomy complications. Complete complication frequencies are shown in **Table 2**.

In-Hospital Mortality

The overall cohort mortality was 13.1%. When excluding outpatients, this figure increased to 13.8%. After further excluding cases with CHH indications, the in-hospital mortality rate for nutrition-indicated gastrostomies reached 14%. Among deceased patients, the primary indications for gastrostomy were SARS-CoV-2 and "other causes" (30.9% each), followed by cerebrovascular disease (CVD) at 16.2%.

Table 2. Gastrostomy Complications

Complication	n (%)
Accidental removal	14 (2.69%)
Buried bumper syndrome	12 (2.31%)
Infection	8 (1.54%)
Bleeding	6 (1.15%)
Gastric/other organ perforation	6 (1.15%)
Multiple simultaneous complications	8 (1.54%)

Tabla elaborada por los autores.

Procedure-specific mortality analysis revealed: SARS-CoV-2 indication: 18.4% mortality; Traumatic brain injury (TBI): 16.6% mortality; "Other causes" category: 13% mortality. The overall mortality rate for non-SARS-CoV-2 cases (excluding CHH procedures) was 12%.

Most deaths (44%) occurred within seven days post-procedure (**Table 3**), with 67% of cohort deaths happening within the first two weeks. Mortality peaked during the first half of 2021, coinciding with the period of highest SARS-CoV-2-related hospital occupancy (**Figure 3**). Of the 68 deceased patients, 54 (78%) were in the intensive care unit (ICU) at the time of gastrostomy.

Table 3. Deaths by Days Post-Gastrostomy

Days	Deaths	Percentage
0-6	30	44.1
7-14	16	23.5
14-20	10	14.7
21-27	4	5.9
28-34	4	5.9
35-41	1	1.5
42-48	1	1.5
49-55	1	1.5
70-76	1	1.5
Total	68	100%

Tabla elaborada por los autores.

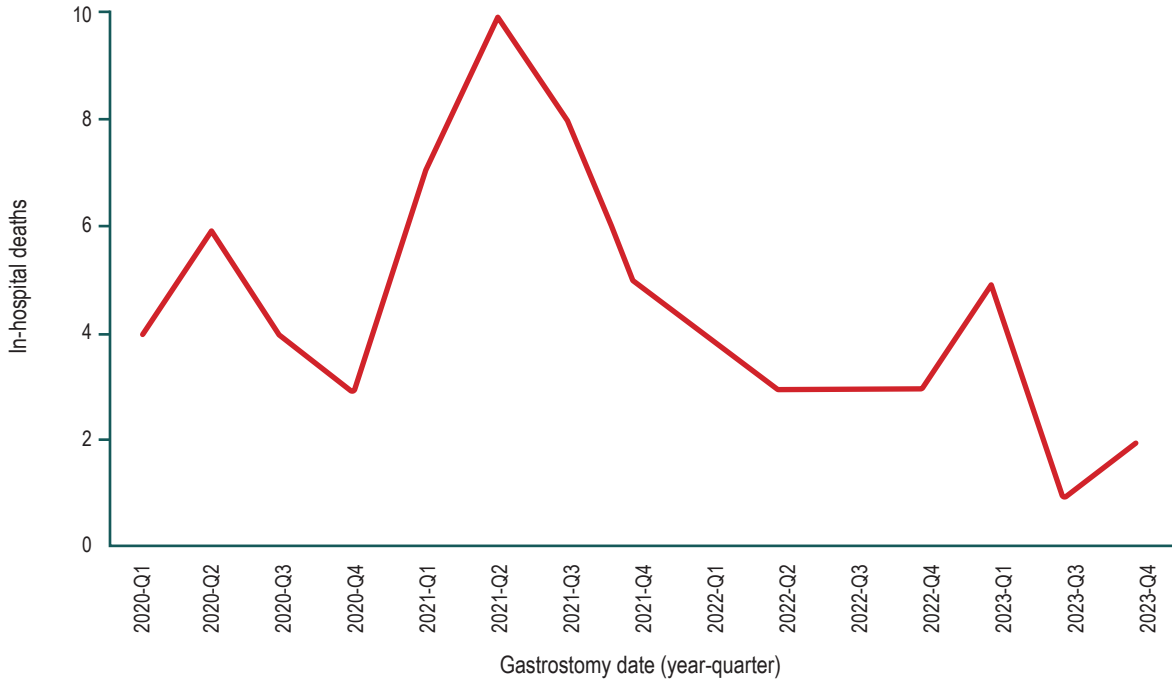

Figure 3. Quarterly mortality counts. Image property of the authors.

Procedure Futility

Documentation of patients' functional class prior to hospitalization and life expectancy in cases of neoplasms or terminal illnesses was notably absent in most medical records. No cases were presented to the ethics committee for procedure approval, as confirmed through separate review of institutional ethics committee minutes. Only three gastrostomies were performed on patients with established permanent vegetative state diagnoses, confirmed by neurology or neurosurgery specialists. Twenty-one gastrostomies (4.04%) were performed for advanced dementia indications—all before 2022, when this diagnosis became standardized as a futility criterion at the institution. Combining these two indications with patients who died within one week post-procedure suggests additional futile interventions.

The cohort included 54 futile procedures (10.4% of total), with a decreasing trend observed in later study quarters compared to initial periods (**Figure 4**).

Seventy-one point four percent of patients were unable to exercise autonomy regarding the procedure decision. In these cases, informed consent was obtained through patient caregivers or, in at least one documented case of social abandonment, through independent medical judgment. No gastrostomies were performed on unidentified patients.

DISCUSSION

This represents the largest study published to date in Colombia regarding gastrostomies and, more broadly, bioethical aspects of medical practice. The in-hospital mortality rate in our cohort aligns with the 2.4% to 23.5% 30-day mortality rates reported in other studies and systematic reviews[6-9]. A global downward trend in these figures has been documented, likely due to improved patient selection[10]. The quarterly number of gastrostomies remained stable throughout the four-year follow-up period, despite the shift in primary indications from SARS-CoV-2 to other causes during and after the pandemic, as hospital capacity did not increase during this time. However, procedure complications occurred more frequently in SARS-CoV-2 patients, potentially due to higher obesity rates in this population, which increased technical difficulty and likely multiorgan failure predisposition.

Most deaths occurred within two weeks post-procedure. This early mortality pattern was previously observed in Colombia by Dr. Atencio's study of patients over 60 years old, which reported 38% mortality within the first month after gastrostomy[11]. This phenomenon was also documented in a 2004 UK study that recommended implementing a one-week waiting period after gastrostomy request[11].

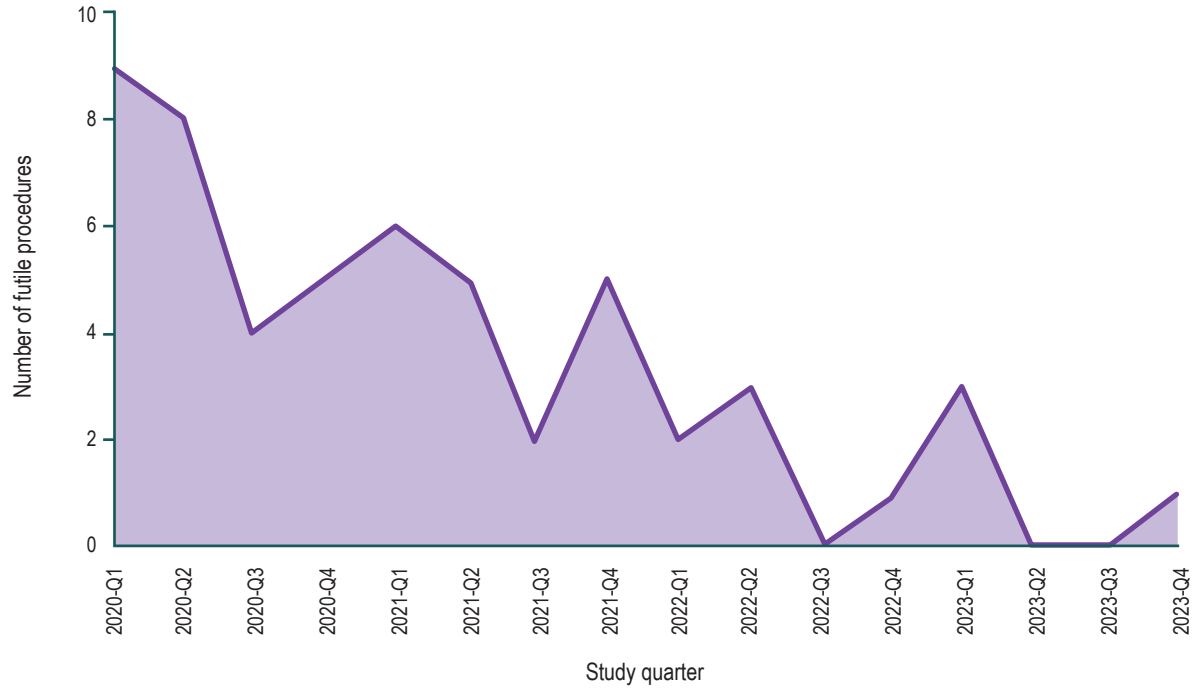

Figure 4. Futile procedures by study quarter. Image property of the authors.

This "reflection period" aims to better select patients who would genuinely benefit from the procedure and avoid potential futility. While challenging to implement in daily practice, clinicians are advised to prudently delay the procedure when patient conditions permit. Following this approach would allow gastrostomies to be performed on more stable patients with fewer coagulation disorders and less psychomotor agitation, thereby reducing complications. When procedure futility is uncertain, consultation with the institutional ethics committee is recommended. Furthermore, bioethical considerations, including potential futility, should be incorporated into institutional procedure protocols. For gastrostomies, procedures should be avoided when no benefit is expected–particularly in cases of advanced dementia, permanent vegetative state, or life expectancy under three months[12,13]. Unfortunately, gastrostomies for advanced dementia remain common practice in our setting, representing 30% of procedures in Dr. Atencio's study.

Our cohort demonstrated a progressive reduction in futile gastrostomies, most likely attributable to healthcare staff adherence to patient selection guidelines disseminated by the gastroenterology service in late 2020.

The 10.4% futile gastrostomy rate in this cohort may appear low or insignificant compared to research on new technologies or medications. For perspective, events such as post-ERCP pancreatitis (under 10%), herpes zoster in JAK inhibitor users, peroral endoscopic myotomy (POEM) failure for achalasia, and lifetime gastric cancer risk in untreated *Helicobacter pylori* patients all occur at rates below 10% yet warrant meta-analyses[14-17]. While gastrostomy represents a routine gastroenterology procedure, its ethical considerations often receive secondary attention. Preventing futile procedures simply requires careful consideration of short-term prognosis and clinical scenarios where no benefit is expected.

The study has several limitations. Its retrospective design resulted in scarce data regarding futility indicators such as patients' prior functional class and life expectancy, which are not routinely documented in medical records. Data on post-discharge mortality, subsequent hospitalizations, or home outcomes were also unavailable. While this study specifically evaluated in-hospital mortality, these additional data could help estimate short- to medium-term mortality. Gastrostomy site infection rates are likely underestimated, as complication data were obtained only from cases requiring endoscopic reintervention or gastroenterology consultation–services not always requested.

The study's strengths include its large patient cohort, comparison between SARS-CoV-2 pandemic and post-pandemic periods, and demonstration of the impact of an institutional gastrostomy indication protocol. Future

research could evaluate mortality prediction scales for various conditions requiring this procedure to help prevent futile interventions.

Notably, no medical records mentioned discussions with patients or caregivers about advance directives or prior informal expressions of treatment preferences. While institutional protocols required informed consent for all procedures, no documentation addressed patients' actual wishes regarding the procedure. This raises serious concerns about the ethical framework for obtaining medical intervention authorizations.

CONCLUSION

Approximately 10% of gastrostomies performed in the evaluated cohort met standardized futility criteria. Implementing a 1-2 week waiting period after procedure recommendation could reduce this percentage. Each institution should establish its own protocol regarding procedural futility or an ethics committee to provide guidance on this matter. **Table 4** presents recommendations for improved patient selection for gastrostomy, based on bioethical and legal considerations of this issue[18].

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Conflicts of Interest and Funding Sources

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Artificial Intelligence Use Statement

No artificial intelligence was used in the preparation of this study.

Table 4. Recommendations to Avoid Futility in Gastrostomy Requests

Step	Note
1. Confirm medical indication for procedure	- Avoid futile indications - Implement 1–2 week "reflection period"
2. Inquire about patient's concept of *quality of life*	- Remember, dignity interpretations are individual - Base decisions on patient's own quality of life standards
3. Obtain informed consent	- Ask about advance directives, prior informal expressions, or surrogate consent. In most cases, "medical best judgment" alone is unnecessary
4. Perform and re-evaluate indication	- Previous decisions can be reversed if the assessment changes

Table prepared by the authors.

REFERENCES

1. Tae CH, Lee JY, Joo MK, Park CH, Gong EJ, Shin CM, et al. Clinical practice guidelines for percutaneous endoscopic gastrostomy. Clin Endosc. 2023;56(4):391-408. https://doi.org/10.5946/ce.2023.062
2. Dietrich CG, Schoppmeyer K. Percutaneous endoscopic gastrostomy - Too often? Too late? Who are the right patients for gastrostomy? World J Gastroenterol. 2020;26(20):2464-71. https://doi.org/10.3748/wjg.v26.i20.2464
3. Hoyos JB. La futilidad como criterio médico, la prudencia como valor para mediar en la justicia de la atención de pacientes al final de la vida. Meridiano. 2022;1(2):2-12. https://doi.org/10.26852/28059107.625
4. Congreso de Colombia. Ley 23 de 1981, por la cual se dictan normas en materia de ética médica [Internet]. Congreso de Colombia; 1981 [consultado el 10 de diciembre de 2024]. Disponible en: https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=68760
5. Knight Alzheimer Disease Research Center. CDR® Dementia Staging Instrument [Internet]. WashU Medicine Department of Neurology [citado 10 de diciembre de 2024]. Disponible en: https://knightadrc.wustl.edu/professionals-clinicians/cdr-dementia-staging-instrument/

6. Lima DL, Miranda LEC, Lima RNCL, Romero-Velez G, Chin R, Shadduck PP, et al. Factors Associated with Mortality after Percutaneous Endoscopic Gastrostomy. JSLS. 2023;27(2):e2023.00005. https://doi.org/10.4293/JSLS.2023.00005
7. Pih GY, Na HK, Ahn JY, Jung KW, Kim DH, Lee JH, et al. Risk factors for complications and mortality of percutaneous endoscopic gastrostomy insertion. BMC Gastroenterol. 2018;18(1):101. https://doi.org/10.1186/s12876-018-0825-8
8. Sako A, Yasunaga H, Horiguchi H, Fushimi K, Yanai H, Uemura N. Prevalence and in-hospital mortality of gastrostomy and jejunostomy in Japan: a retrospective study with a national administrative database. Gastrointest Endosc. 2014;80(1):88-96. https://doi.org/10.1016/j.gie.2013.12.006
9. Stenberg K, Eriksson A, Odensten C, Darehed D. Mortality and complications after percutaneous endoscopic gastrostomy: a retrospective multicentre study. BMC Gastroenterol. 2022;22(1):361. https://doi.org/10.1186/s12876-022-02429-0
10. Stein DJ, Moore MB, Hoffman G, Feuerstein JD. Improving All-Cause Inpatient Mortality After Percutaneous Endoscopic Gastrostomy. Dig Dis Sci. 2021;66(5):1593-9. https://doi.org/10.1007/s10620-020-06396-y
11. Atencio DP, Blanco Pérez ÁG, Otero Regino W. Gastrostomía endoscópica percutánea en ancianos: indicaciones, seguridad y desenlaces. Rev Col Gastroenterol. 2015;30(1):3-10.
12. Culliane M, Gray AJG, Hargraves CMK, Lucas S, Schubert M, Sherry KM, et al. Scoping our Practice: The 2004 report of the national confidential enquiry into patient outcome and death [Internet]. Bristol, Inglaterra: NCEPOD; 2004 [consultado el 10 de diciembre de 2024]. Disponible en: https://www.ncepod.org.uk/2004report/Full_Report_2004.pdf
13. Kruse A, Misiewicz JJ, Rokkas T, Hammer H, Niv Y, Allison M, et al. Recommendations of the ESGE workshop on the Ethics of Percutaneous Endoscopic Gastrostomy (PEG) Placement for Nutritional Support. First European Symposium on Ethics in Gastroenterology and Digestive Endoscopy, Kos, Greece, June 2003. Endoscopy. 2003;35(9):778-80. https://doi.org/10.1055/s-2003-41589
14. Almonacid LT, Gómez M, Franco DMC, Rueda FEG, Quintero SR. Futilidad en cirugía: el caso de la gastrostomía. Rev Colomb Cir. 2020;35(3):429-35. https://doi.org/10.30944/20117582.728
15. Khaiser A, Baig M, Forcione D, Bechtold M, Puli SR. Efficacy and Safety of Peroral Endoscopic Myotomy (POEM) in Achalasia: An Updated Meta-analysis. Middle East J Dig Dis. 2023;15(4):235-41. https://doi.org/10.34172/mejdd.2023.352
16. Taxonera C, Olivares D, Alba C. Real-World Effectiveness and Safety of Tofacitinib in Patients With Ulcerative Colitis: Systematic Review With Meta-Analysis. Inflamm Bowel Dis. 2022;28(1):32-40. https://doi.org/10.1093/ibd/izab011
17. Lee YC, Chiang TH, Chou CK, Tu YK, Liao WC, Wu MS, et al. Association Between Helicobacter pylori Eradication and Gastric Cancer Incidence: A Systematic Review and Meta-analysis. Gastroenterology. 2016;150(5):1113-1124.e5. https://doi.org/10.1053/j.gastro.2016.01.028
18. Ardila-Suárez O. Aspectos éticos y médico legales relacionados con la realización de gastrostomía en adultos. Universidad CES; 2024 [consultado el 10 de diciembre de 2024]. Disponible en: https://repository.ces.edu.co/handle/10946/8644