

Does motivation matter? A systematic review and meta-analysis of outcomes following intentional foreign object ingestion.

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May 14, 2025

I. ABSTRACT

II. INTRODUCTION

A. Rationale

B. Objectives

This systematic review aims to achieve the following objectives:

- 1) **Quantify the rates** of endoscopic and surgical interventions following intentional ingestion of foreign objects in human populations.
- 2) **Examine the influence of individual factors**—including demographics and motivations such as protest, self-harm, or suicidal intent—on the likelihood of requiring invasive intervention.
- 3) **Assess the relationship between object type and clinical outcomes**, including rates of endoscopic and surgical procedures, as well as associated complications.

III. METHODS

Eligibility Criteria

Population, or participants and conditions of interest:

- Any human.
- Any age group.

Interventions or exposures:

- Humans that have:
 - Intentionally
 - Ingested a foreign object through the oral cavity (mouth).

Comparisons or control group:

- **Motivation/reason for ingestion:** protest, suicidal intent, self-harm, psychiatric and other documented motivations.
- **Intervention details:** number of ingestions, management strategies (Conservative, Endoscopic, Surgical), time to intervention.

- **Object characteristics:** multiple objects, blunt objects, sharp-pointed objects, long objects (≥ 6 cm), short objects (≤ 6 cm), food bolus.
- **Radiological findings:** location of foreign object (e.g., oesophagus, stomach, ileo-caecal region).
- **Setting/location.**

Outcomes of interest:

- **Endoscopic intervention:** undergoing a minimally invasive medical procedure using an endoscope (Goyal & Neumann 2020).
- **Surgical intervention:** any operative procedure involving an incision to retrieve or manage complications from foreign objects (Smith et al. 2019).
- **Conservative management:** any case not undergoing endoscopic or surgical intervention.
- Complication rates.
- Mortality rates.

Setting: Any setting.

Study designs:

- Observational studies (cohort, case-control, cross-sectional).
- Case series.
- Clinical trials.
- Case reports.

Exclusion Criteria

Information Sources

Relevant articles were identified through a systematic search of PubMed, Web of Science, Embase, Scopus, PsycINFO, CENTRAL and Google Scholar on 15th January 2025, with the assistance of a librarian. After title and abstract screening and full text review, included articles then had their bibliography's searched by the primary author (JGE) on 14th May 2025.

TABLE I: Exclusion Criteria

#	Exclusion Criterion
1	Full text not available in English.
2	Studies not focusing on intentional self-ingestion (into the gastrointestinal tract) of foreign object via the oral cavity (mouth) or where unclear if ingested.
3	Studies focussing solely on accidental ingestion.
4	Non-Human/ animal studies.
5	Reviews, editorials, commentaries, and opinion pieces without original empirical data.
6	Duplicate publications or studies with overlapping data sets (the most comprehensive or recent study will be included).
7	Studies focusing on ingestion or co-ingestion of substances (e.g. poisons, medications) rather than physical foreign objects.
8	Ingestions undertaken in controlled environment as part of voluntary study.
9	Ingestions not explicitly stated to be intentional and history not suggestive of deliberate ingestion (i.e. Age \geq 18, no history of previous ingestions, no psychiatric co-morbidities, not a prisoner/detainee/vulnerable group).
10	Does not meet inclusion criteria.
11	Ingestions where death resulted from other means (i.e. suicide)
12	Studies before the advent of Endoscopy (1906)

Search Strategy

The search was conducted using keywords and MeSH terms based on the concepts underpinning this review. The bibliography of each included article was searched for any further relevant articles. The keywords and MeSH terms used can be found in Appendix A.

Selection Process

APPENDIX

A. PubMed

Concept	Keywords	MeSH Terms
Foreign Bodies	"foreign obj*" "foreign bod*"	Foreign Bodies [MeSH]
Intentional Ingestion / Self-harm	"intent*" "deliberate*" "purpose*" "self-injur*" "selfharm*" "self-harm*"	Self-Injurious Behavior [MeSH]
Ingestion Behavior	"ingest*" "swallow*"	—
Interventions	"surg*" "endoscop*" "EGD" "OGD" "Esophagogastroduodenoscopy" "Oesophagogastroduodenoscopy" "manag*"	Endoscopy [MeSH] Surgical Procedures, Operative [MeSH] Conservative Treatment [MeSH] Drug Therapy [MeSH]

TABLE II: Concepts with associated keywords and MeSH terms used in PubMed search strategy.

B. Embase

Concept	Keywords	EMTREE Terms
Foreign Bodies	"foreign obj*" "foreign bod*"	"foreign body"/exp
Intentional Ingestion / Self-harm	"intent*" "deliberate*" "purpose*" "self-injur*" "selfharm*" "self-harm*"	"automutilation"/exp
Ingestion Behavior	"ingest*" "swallow*"	"swallowing"/exp
Interventions	"surg*" "endoscop*" "EGD" "OGD" "Esophagogastroduodenoscopy" "Oesophagogastroduodenoscopy" "manag*"	"endoscopy"/exp "surgery"/exp "conservative treatment"/exp "drug therapy"/exp

TABLE III: Concepts with associated keywords and EMTREE terms used in Embase search strategy.

C. Cochrane (CENTRAL)

Concept	Keywords	Cochrane MeSH Terms
Foreign Bodies	"foreign obj*" "foreign bod*" (foreign NEXT obj*) (foreign NEXT bod*) intent* deliberate*	[mh foreign bodies]
Intentional Ingestion / Self-harm	purpose* (self NEXT injur*) (self NEXT harm*)	[mh self-injurious behavior]
Ingestion Behavior	ingest* swallow* surg* endoscop*	—
Interventions	EGD Esophagogastroduodenoscopy Oesophagogastroduodenoscopy manag*	[mh endoscopy] [mh surgical procedures, operative] [mh conservative treatment] [mh drug therapy]

TABLE IV: Concepts with associated keywords and Cochrane MeSH terms used in CENTRAL search strategy.

D. Web of Science

Concept	Keywords	Search Field
Foreign Bodies	foreign obj* foreign bod* automutilation intent* deliberate*	ALL=
Intentional Ingestion / Self-harm	purpose* self-injur* selfharm* self-harm* swallowing	ALL=
Ingestion Behavior	ingest* swallow* endoscopy surgery conservative treatment drug therapy	ALL=
Interventions	surg* endoscop* EGD Esophagogastroduodenoscopy Oesophagogastroduodenoscopy manag*	ALL=

TABLE V: Concepts with associated keywords and Web of Science fields used in the search strategy.

E. Scopus

Concept	Keywords	Search Field / Syntax
Foreign Bodies	foreign PRE/0 obj* foreign PRE/0 bod* intent* deliberate*	ALL()
Intentional Ingestion / Self-harm	purpose* self PRE/0 injur* self PRE/0 harm*	ALL()
Ingestion Behavior	ingest* swallow* endoscopy surgery 'conservative' 'treatment' 'drug' 'therapy'	ALL()
Interventions	surg* endoscop* egd esophagogastroduodenoscopy oesophagogastroduodenoscopy manag*	ALL()

TABLE VI: Concepts with associated keywords and Scopus syntax used in the search strategy.

F. PsycINFO

Concept	Keywords	PsycINFO Descriptors
Foreign Bodies	foreign obj* foreign bod* automutilation intent* deliberate*	—
Intentional Ingestion / Self-harm	purpose* self injur* self harm*	DE "Nonsuicidal Self-Injury"
Ingestion Behavior	ingest* swallow* endoscop* conservative treatment drug therapy	DE "Ingestion"
Interventions	surg* egd esophagogastroduodenoscopy oesophagogastroduodenoscopy manag*	DE "Surgery"

TABLE VII: Concepts with associated keywords and controlled vocabulary (Descriptors) used in PsycINFO search strategy.

G. Google Scholar

Concept	Keywords	Search Field
Foreign Bodies	"foreign obj*" "foreign bod*" "intent*" "deliberate*"	—
Intentional Ingestion / Self-harm	"purpose*" "self-injur*" "selfharm*" "self-harm*"	—
Ingestion Behavior	"ingest*" "swallow*"	—

TABLE VIII: Concepts with associated keywords used in Google Scholar search strategy.