

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

Jack Galbraith-Edge

Queen Mary, University of London

London, United Kingdom

ha201591@qmul.ac.uk

Mark Stanton

Critical Care Paramedic

Johannesburg, South Africa

trauma.1@mweb.co.za

Giles Cattermole

Queen Mary, University of London

London, United Kingdom

g.cattermole@qmul.ac.uk

May 14, 2025

I. ABSTRACT

II. INTRODUCTION

RATIONALE

In 1635, Daniel Schwabam performed a gastrotomy on a man who had swallowed a knife [1]. In 1738, Gorsauld is credited as the first surgeon to perform a cervical esophagotomy for the removal of a foreign body (FB) [2]. In 1906, José Goyanes extracted a coin impacted in the esophagus using a rigid esophagoscope [3]. The early 20th century saw the emergence of rigid esophagoscopy as the first large-scale method for foreign body extraction, with further case series detailing technical refinements appearing in the literature [Lerche 1991, 4].

Among the most extraordinary documented cases is that by Chalk, who reported a psychiatric patient ingesting 2,533 objects weighing a total of 21,268 grams [5]. The largest single ingested item reported measured 28 cm in length [6].

Psychiatric conditions most frequently associated with intentional ingestion of foreign objects (IIFO) include psychosis, malingering, pica, and personality disorders [7, 8]. The term “pica” originates from the Latin word for “magpie,” reflecting the bird’s tendency to collect unusual items [9], and has been reported globally [10].

Malingering can present in various forms, particularly in prison populations where manipulation to trigger medical transfer is a noted motivation [7, 8, 11]. In such cases, the optimal management often involves brief medical intervention with minimal reinforcement, followed by prompt return to custody [12]. In contrast, individuals with obsessive-compulsive disorder (OCD) may describe escalating anxiety prior to ingestion followed by a sense of relief afterward [7].

In cases involving borderline personality disorder, Gitlin et al. [8] suggest that IIFO may function as an affect regulation strategy, particularly during episodes of perceived abandonment. While such behaviour may appear life-threatening, it should not be presumed to indicate suicidal intent [7].

A wide range of psychiatric diagnoses have been associated with recurrent foreign body ingestion, including pica, personality disorder, impulse control disorder, OCD, autism spectrum disorder, factitious disorder (including Munchausen syndrome), intellectual disability, psychosis, and malingering [Guinan“2019e, Gitlin“2007]. In rare and severe cases, some authors have proposed a palliative care approach to repeated IIFO, recognising the limited prognosis associated with treatment-resistant psychiatric illness and the cumulative harms of repeated surgical intervention [13].

Motivations for IIFO can include relief from psychological symptoms, self-punishment, attempts to influence others, or command hallucinations [14]. Notably, ingestion alone should not be assumed to indicate suicidal intent [7].

Clinical outcomes are influenced by various factors, including patient age, comorbidities, object characteristics (size, shape, composition, anatomical location), and the time elapsed since ingestion [15]. In a seminal study of incarcerated individuals, Karp et al. [16] found that motivations for ingestion included suicidal ideation with and without command hallucinations, self-harm without suicidal intent, and manipulation of the medicolegal system.

In correctional populations, multivariate analysis has shown that the number of ingested items significantly increases the likelihood of hospital admission, endoscopy, and surgery. Endoscopic intervention, in turn, significantly reduces the odds of requiring surgical management [17].

A recent report from a UK acute NHS trust identified a rise in IIFO cases during the COVID-19 pandemic [18]. While motivation remains a complex and poorly understood element of this phenomenon, tools such as the SIMS-II Motivation Scale may provide standardised frameworks for future analysis [19].

More broadly, the global displacement crisis has reached unprecedented levels, with over 100 million forcibly displaced individuals reported by the United Nations High Commissioner for Refugees (UNHCR) as of May 2024 [20]. Refugees and

asylum seekers often endure extreme hardships, compelling them to seek asylum in foreign countries [21, 22]. This vulnerable population frequently faces compounded mental health challenges due to traumatic pre-migration experiences, hazardous journeys, and difficult post-migration realities, including detention and instability of legal status [23, 24, 25, 26].

Self-harm, encompassing various behaviours where individuals inflict harm on themselves, is a particularly alarming manifestation of these mental health challenges. Rates of self-harm are significantly elevated among asylum seekers and refugees compared to general populations, especially among those who are detained, with rates up to 216 times higher in offshore detention facilities than in the general population [**GlobalDetention“2024, 27, 28]**.

Methods of suicide and self-harm among refugees differ based on available means, cultural factors, and motivating factors [**AjdacicGross 2008**]. Common methods include cutting, self-battery, attempted hanging, self-poisoning by medication or chemicals, and ingestion of foreign objects [28].

Globally, rates of foreign object ingestion are increasing. In the United States, rates doubled in 2017, with 14

Most ingested foreign bodies (80–90)

Despite the rising prevalence and potential severity of IIFO, there is limited research exploring how motivations for ingestion differ across vulnerable groups and how these motivations may influence clinical outcomes [**HedrickBorschmann 2023, 29, 30**]. Literature to date largely focuses on IIFO in prisons or psychiatric contexts, with sparse data from displaced or asylum-seeking populations. In detention, where traditional communication channels are obstructed, ingestion may serve as a form of protest or distress signal [31]. Conversely, in psychiatric settings, ingestion may reflect mental illness or affective dysregulation [**AlFaham 2020, 8, 14, 32, 33**].

These varying motivations likely influence clinical management, including decisions around the need for endoscopic or surgical intervention. For instance, if ingestion is primarily intended as protest, patients may avoid behaviours that risk severe harm, potentially lowering the threshold for conservative management.

This systematic review aims to address these gaps by evaluating how motivation for IIFO influences clinical outcomes in vulnerable populations. Specifically, we aim to examine how different motivations impact the need for endoscopic and surgical interventions, thereby informing future clinical strategies and healthcare responses. The protocol is registered with PROSPERO and adheres to PRISMA guidelines [**Page“2020**].

Objectives

This systematic review aims to quantify the rates of endoscopic and surgical interventions following intentional ingestion of foreign objects in human populations. It also seeks to examine how individual factors—such as demographic characteristics and motivations for ingestion (including protest, self-harm, or suicidal intent)—influence the likelihood of requiring invasive intervention. Finally, the review assesses how the type of object ingested is associated with clinical outcomes, including the need for endoscopic or surgical procedures and the incidence of complications.

III. METHODS

Eligibility Criteria

The review included studies involving human participants of any age who had intentionally ingested foreign objects via the oral cavity. Eligible exposures included deliberate ingestion events, regardless of motivation. Studies were considered if they included data on motivations for ingestion—such as protest, suicidal intent, self-harm, or psychiatric conditions—as well as details regarding management strategies, including whether conservative, endoscopic, or surgical treatment was used. Object-related factors such as type (e.g., blunt, sharp, long, short, multiple objects) were also criteria for inclusion.

Studies were required to report on at least one of the following outcomes: endoscopic intervention, surgical intervention, conservative management, complication rates, or mortality. All clinical settings were eligible, and a wide range of study designs were accepted, including observational studies (cohort, case-control, cross-sectional), case series, clinical trials, and case reports.

A full list of eligibility criteria is available in Table ?? of Appendix ??

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.

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

All identified articles were collated using Python (Pandas) [34]. Duplicate articles were identified and removed based on non-unique combinations of author, title, and DOI.

Following duplicate removal, all remaining articles underwent independent title and abstract screening conducted by the first author (JGE). To ensure consistency, a randomly selected 10% sample of these articles underwent independent screening by a second author (MS). Any discrepancies identified between these two reviewers were resolved by a third reviewer (GC).

Articles included after title and abstract screening proceeded to full-text review, which was initially performed by JGE. Again, a random 10% sample of these full-text articles underwent independent assessment by MS. Discrepancies between JGE and MS at the full-text screening stage were similarly resolved by a third review from GC.

Inter-reviewer agreement at each screening stage was calculated using Python (Pandas for data management and Sci-kit Learn for statistical analysis)

Data Collection Process

Data were extracted by a single reviewer (JGE) into an Excel spreadsheet. Variables for extraction were developed through an iterative process of engaging with the literature and identifying consistent patterns in the data reported. A preliminary analysis of the first 30 case reports informed the development of additional data categories, which were subsequently applied to the remaining reports. Once the case report data were extracted, these structured variables were used to guide the extraction of aggregate data from case series. Studies were grouped for extraction according to their classification as case reports or case series. Where case series contained sufficiently granular data, cases were extracted individually and treated as case reports; otherwise, data were extracted at the aggregate level. Case grouping for analysis was based on whether they met criteria for inclusion as individual case reports or case series, as defined above. Relevant data from reviews and other literature types were recorded under the case report category.

Data Items

Data were extracted for a range of outcomes, including rates of endoscopic and surgical intervention, conservative management, mortality, and ingestion-related complications such as perforation or obstruction. Where reported, other outcomes including injuries requiring intervention or additional medical consequences were also recorded.

Additional variables included demographic characteristics (e.g. psychiatric history, prisoner or displacement status), motivational factors (e.g. intent to self-harm, protest, psychiatric or psychosocial drivers), and object features (e.g. length, sharpness, presence of magnets or batteries, and quantity ingested). Full definitions of all variables are provided in Appendix C.

The full dataset of extracted case-level and study-level data (including bias assessments), is available as Supplementary Tables S1 and S2 (provided as separate files).

Risk of Bias Assessment

Risk of bias was assessed manually for all included studies by a single reviewer (JGE), using the Joanna Briggs Institute (JBI) Critical Appraisal Checklists for Case Reports and Case Series [35]. Studies were first classified as either case reports or case series based on the level of granularity in the data. Case reports were assessed using the JBI checklist for case reports, and case series were assessed using the corresponding JBI tool.

Following manual appraisal, a secondary risk-of-bias filter was applied using Python. This logic-based filter identified studies where key variables — specifically *Outcome*, *Motivation*, or *Object* — were missing or marked as unknown (UK). For case series, if any of the derived aggregate fields (e.g. *Outcome_Unknown_Rate*, *Motivation_Unknown_Rate*, *Object_Unknown_Rate*) equalled 1, the study was flagged as high risk. Similarly, case reports where any of these variables were unknown were also considered high risk.

Studies classified as high risk through this process were excluded from analysis. This two-stage approach — involving initial manual assessment and subsequent automated validation — ensured both qualitative and quantitative scrutiny of bias across the dataset.

REFERENCES

- [1] F. G. Moehlau. "Gastrostomy in the Seventeenth Century". In: *Buffalo Medical Journal* 35.5 (Dec. 1895), pp. 395–397. ISSN: 1040-3817.
- [2] James H Saint. "Surgery Of The Esophagus". In: *Archives of Surgery* 19.1 (July 1929), pp. 53–128. ISSN: 0272-5533. DOI: 10.1001/archsurg.1929.01150010056003. (Visited on 04/15/2025).
- [3] J. L. Barros et al. "Foreign Body Ingestion: Management of 167 Cases". In: *World Journal of Surgery* 15.6 (1991), pp. 783–788. ISSN: 0364-2313. DOI: 10.1007/BF01665320.
- [4] Chevalier L. Jackson. "Foreign Bodies in the Esophagus". In: *The American Journal of Surgery* 93.2 (Feb. 1957), pp. 308–312. ISSN: 00029610. DOI: 10.1016/0002-9610(57)90783-3. (Visited on 04/15/2025).
- [5] S. G. Chalk. "FOREIGN BODIES IN THE STOMACH: REPORT OF A CASE IN WHICH MORE THAN TWO THOUSAND FIVE HUNDRED FOREIGN BODIES WERE FOUND". In: *Archives of Surgery* 16.2 (Feb. 1928), p. 494. ISSN: 0272-5533. DOI: 10.1001/archsurg.1928.01140020045003. (Visited on 04/15/2025).
- [6] G. C. Ricote et al. "Fiberendoscopic Removal of Foreign Bodies of the Upper Part of the Gastrointestinal Tract". In: *Surgery, Gynecology & Obstetrics* 160.6 (June 1985), pp. 499–504. ISSN: 0039-6087.
- [7] Brittany A. Poynter et al. "Hard to Swallow: A Systematic Review of Deliberate Foreign Body Ingestion." In: *General hospital psychiatry* 33.5 (Oct. 2011), pp. 518–524. ISSN: 1873-7714 0163-8343. DOI: 10.1016/j.genhosppsych.2011.06.011.
- [8] David F. Gitlin et al. "Foreign-Body Ingestion in Patients with Personality Disorders". In: *Psychosomatics* 48.2 (2007), pp. 162–166. ISSN: 0033-3182. DOI: 10.1176/appi.psy.48.2.162.
- [9] H. I. Kaplan and B. J. Sandock. *Kaplan & Sadock's Comprehensive Textbook of Psychiatry*. Philadelphia : Wolters Kluwer Health/Lippincott Williams & Wilkins, 2009. ISBN: 978-0-7817-6899-3. (Visited on 04/16/2025).
- [10] I. J. McLoughlin. "The Picas". In: *British Journal of Hospital Medicine* 37.4 (Apr. 1987), pp. 286–290. ISSN: 0007-1064.
- [11] J. E. Losanoff, K. T. Kjossev, and H. E. Losanoff. "Oesophageal "Cross"—a Sinister Foreign Body". In: *Journal Of Accident & Emergency Medicine* (1997). DOI: 10.1136/emj.14.1.54.
- [12] Kari E. Blaho et al. "Foreign Body Ingestions in the Emergency Department: Case Reports and Review of Treatment". In: *Journal of Emergency Medicine* 16.1 (Jan. 1998), pp. 21–26. ISSN: 0736-4679, 1090-1280. DOI: 10.1016/S0736-4679(97)00229-1. (Visited on 04/14/2025).
- [13] Paresh A. Jaini, James Haliburton, and A. John Rush. "Management Challenges of Recurrent Foreign Body Ingestions in a Psychiatric Patient: A Case Report." In: *Journal of psychiatric practice* 29.2 (Mar. 2023), pp. 167–173. ISSN: 1538-1145 1527-4160. DOI: 10.1097/PRA.0000000000000694.
- [14] Samuel Tromans et al. "Deliberate Ingestion of Foreign Bodies as a Form of Self-Harm among Inpatients within Forensic Mental Health and Intellectual Disability Ser-

- vices". In: *Journal of Forensic Psychiatry & Psychology* 30.2 (Apr. 2019), pp. 189–202. ISSN: 1478-9949. DOI: 10.1080/14789949.2018.1530287.
- [15] Steven O. Ikenberry et al. "Management of Ingested Foreign Bodies and Food Impactions". In: *Gastrointestinal Endoscopy* 73.6 (June 2011), pp. 1085–1091. ISSN: 00165107. DOI: 10.1016/j.gie.2010.11.010. (Visited on 11/18/2024).
- [16] Joyce G. Karp, Laura Whitman, and Antonio Convit. "Intentional Ingestion of Foreign Objects by Male Prison Inmates". In: *Hospital & Community Psychiatry* 42.5 (May 1991), pp. 533–535. ISSN: 0022-1597.
- [17] Poorvi P. Dalal et al. "Intentional Foreign Object Ingestions: Need for Endoscopy and Surgery." In: *The Journal of surgical research* 184.1 (Sept. 2013), pp. 145–149. ISSN: 1095-8673 0022-4804. DOI: 10.1016/j.jss.2013.04.078.
- [18] B Jones and A Roskilly. "Management of Deliberate Foreign Body Ingestion Requiring Endoscopic Retrieval". In: *Gut* (2023). DOI: 10.1136/gutjnl-2023-bsg.307.
- [19] Yolanda Madrid Morales and Peter Andrew Guarnero. "Non-Suicidal Self-Injury among Adult Males in a Correctional Setting". In: *Issues in Mental Health Nursing* 35.8 (Aug. 2014), pp. 628–634. ISSN: 1096-4673. DOI: 10.3109/01612840.2014.927943.
- [20] UNHCR. *UNHCR: A Record 100 Million People Forcibly Displaced Worldwide — UN News*. <https://news.un.org/en/story/2022/05/1118772>. May 2022. (Visited on 10/29/2024).
- [21] UNHCR. *Convention and Protocol Relating to the Status of Refugees*. <https://www.unhcr.org/media/convention-and-protocol-relating-status-refugees>. 2010. (Visited on 10/29/2024).
- [22] Amnesty International. *Refugees, Asylum Seekers and Migrants - Amnesty International*. <https://www.amnesty.org/en/what-we-do/refugees-asylum-seekers-and-migrants/>. 2024. (Visited on 10/29/2024).
- [23] Harmit Athwal. "'I Don't Have a Life to Live': Deaths and UK Detention". In: *Race & Class* 56.3 (Jan. 2015), pp. 50–68. ISSN: 0306-3968. DOI: 10.1177/0306396814556224. (Visited on 10/29/2024).
- [24] Maria Sundvall et al. "Assessment and Treatment of Asylum Seekers after a Suicide Attempt: A Comparative Study of People Registered at Mental Health Services in a Swedish Location". In: *BMC Psychiatry* 15.1 (Dec. 2015), p. 235. ISSN: 1471-244X. DOI: 10.1186/s12888-015-0613-8. (Visited on 10/29/2024).
- [25] Angela Nickerson et al. "The Association between Visa Insecurity and Mental Health, Disability and Social Engagement in Refugees Living in Australia". In: *European Journal of Psychotraumatology* (Dec. 2019). ISSN: 2000-8198. (Visited on 10/29/2024).
- [26] Francesco Bevione et al. "Risk of Suicide and Suicidal Behavior in Refugees. A Meta-Review of Current Systematic Reviews and Meta-Analyses". In: *Journal of Psychiatric Research* 177 (Sept. 2024), pp. 287–298. ISSN: 0022-3956. DOI: 10.1016/j.jpsychires.2024.07.024. (Visited on 10/29/2024).
- [27] M. von Werthern et al. "The Impact of Immigration Detention on Mental Health: A Systematic Review". In: *BMC Psychiatry* 18.1 (Dec. 2018), p. 382. ISSN: 1471-244X. DOI: 10.1186/s12888-018-1945-y. (Visited on 10/29/2024).
- [28] Kyli Hedrick et al. "Self-Harm in the Australian Asylum Seeker Population: A National Records-Based Study". In: *SSM - Population Health* 8 (Aug. 2019), p. 100452. ISSN: 23528273. DOI: 10.1016/j.ssmph.2019.100452. (Visited on 10/29/2024).
- [29] Dinesh Bhugra, Thomas K. J. Craig, and Kamaldeep Bhui. *Mental Health of Refugees and Asylum Seekers*. OUP Oxford, Aug. 2010. ISBN: 978-0-19-955722-6.
- [30] Elisa Haase et al. "Prevalence of Suicidal Ideation and Suicide Attempts among Refugees: A Meta-Analysis". In: *BMC Public Health* 22.1 (Apr. 2022), p. 635. ISSN: 1471-2458. DOI: 10.1186/s12889-022-13029-8. (Visited on 10/29/2024).
- [31] Raffaela Puggioni. "Speaking through the Body: Detention and Bodily Resistance in Italy". In: *Citizenship Studies* 18.5 (July 2014), pp. 562–577. ISSN: 1362-1025. DOI: 10.1080/13621025.2014.923707. (Visited on 10/29/2024).
- [32] Ioannis Pantazopoulos et al. "Intentional Ingestion of Batteries and Razor Blades by a Prisoner: A True Emergency?" In: *International Journal of Prisoner Health* 18.3 (2022), pp. 316–322. ISSN: 1744-9200. DOI: 10.1108/IJPH-06-2021-0054.
- [33] Guy Aitchison and Ryan Essex. "Self-Harm in Immigration Detention: Political, Not (Just) Medical". In: *Journal of Medical Ethics* 50.11 (Nov. 2024), pp. 786–793. ISSN: 0306-6800, 1473-4257. DOI: 10.1136/jme-2022-108366. (Visited on 10/29/2024).
- [34] The Pandas Development Team. *Pandas-Dev/Pandas: Pandas*. Zenodo. Mar. 2020. DOI: 10.5281/zenodo.13819579. (Visited on 04/03/2025).
- [35] S Moola et al. "Chapter 7: Systematic Reviews of Etiology and Risk". In: *JBI Manual for Evidence Synthesis*. JBI, 2020. ISBN: 978-0-648-84880-6. DOI: 10.46658/JBIMES-20-08. (Visited on 05/07/2025).
- [36] American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (5th Ed.)* 2013.
- [37] Francis Mading Deng, UN Representative of the Secretary-General on Internally Displaced Persons, and UN Office for the Coordination of Humanitarian Affairs. *Guiding Principles on Internal Displacement*. Tech. rep. UN Doc E/CN.4/1998/53/Add.2. United Nations Commission on Human Rights, Feb. 1998. (Visited on 03/31/2025).

APPENDIX A
KEYWORDS AND MESH TERMS

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*" "ingest*" "swallow*"	Self-Injurious Behavior [MeSH]
Ingestion Behavior		—
Interventions	"surg*" "endoscop*" "EGD" "OGD" "Esophagogastroduodenoscopy" "Oesophagogastroduodenoscopy" "manag*"	Endoscopy [MeSH] Surgical Procedures, Operative [MeSH] Conservative Treatment [MeSH] Drug Therapy [MeSH]

TABLE I: 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*" "ingest*" "swallow*"	"automutilation"/exp
Ingestion Behavior		"swallowing"/exp
Interventions	"surg*" "endoscop*" "EGD" "OGD" "Esophagogastroduodenoscopy" "Oesophagogastroduodenoscopy" "manag*"	"endoscopy"/exp "surgery"/exp "conservative treatment'/exp "drug therapy"/exp

TABLE II: 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*) ingest*	[mh self-injurious behavior]
Ingestion Behavior	swallow* surg* endoscop*	-
Interventions	EGD Esophagogastrroduodenoscopy Oesophagogastrroduodenoscopy manag*	[mh endoscopy] [mh surgical procedures, operative] [mh conservative treatment] [mh drug therapy]

TABLE III: 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 Esophagogastrroduodenoscopy Oesophagogastrroduodenoscopy manag*	ALL=

TABLE IV: 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* purpose* self PRE/0 injur* self PRE/0 harm*	ALL()
Intentional Ingestion / Self-harm	ingest* swallow* endoscopy surgery 'conservative' 'treatment' 'drug' 'therapy' surg* endoscop*	ALL()
Ingestion Behavior	egd esophagogastroduodenoscopy oesophagogastroduodenoscopy manag*	ALL()
Interventions		ALL()

TABLE V: 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* purpose* self injur* self harm*	—
Intentional Ingestion / Self-harm	ingest* swallow* endoscop* conservative treatment drug therapy	DE "Nonsuicidal Self-Injury"
Ingestion Behavior	surg* egd esophagogastroduodenoscopy oesophagogastroduodenoscopy manag*	DE "Ingestion"
Interventions		DE "Surgery"

TABLE VI: 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*" "purpose*"	–
Intentional Ingestion / Self-harm	"self-injur*" "selfharm*" "self-harm*"	–
Ingestion Behavior	"ingest*" "swallow*"	–

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

APPENDIX B
ELIGIBILITY CRITERIA

A. Inclusion Criteria

Category	Details
Population	Any human. Any age group.
Interventions or exposures	Humans that have: – Intentionally – Ingested a foreign object through the oral cavity (mouth).
Comparators / 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)
	Object characteristics: – Multiple objects – Blunt objects – Sharp-pointed objects – Long objects (>6 cm) – Short objects (≤ 6 cm)
	Setting/location – Endoscopic intervention – Surgical intervention – Conservative management – Complication rates – Mortality rates
Outcomes of interest	Any setting. – Observational studies (cohort, case-control, cross-sectional)
Setting	– Case series – Clinical trials – Case reports
Study designs	

B. 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 or 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 environments as part of a voluntary study.
9	Ingestions not explicitly stated to be intentional and history not suggestive of deliberate ingestion (i.e. Age ≥ 8 , 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).

APPENDIX C
VARIABLE DEFINITIONS

Used for case report data extraction. Aggregates of which were used to create Variable_Rate and Variable_Count.

Variable	Definition
Is_Prisoner	Documented in prison, police custody, or detained (including immigration detention) at the time of the encounter; 'N' if not detained; 'UK' if unknown.
Psych_Hx	Documented DSM-V mental disorder (including substance-related disorders) [36]; 'N' if no diagnosis; 'UK' if data unavailable.
Is_Displaced_Person	Meets International Organisation for Migration definition of a displaced person [37]; 'N' if not displaced; 'UK' if unknown.
Under_Influence_Alcohol	Evidence, suspicion, or self-report of alcohol influence at presentation; 'N' if no indication; 'UK' if unknown.
Is_Psych_Inpat	Admitted (voluntarily or involuntarily) to a psychiatric facility/ward at encounter; 'N' if not admitted; 'UK' if unknown.
Severe_Disability_Hx	History of severe learning disability or impaired consciousness; 'N' if absent; 'UK' if unknown.
Previous_Ingestions	Prior episode of foreign-body ingestion documented; 'N' if first ingestion; 'UK' if history unknown.
Motivation_Intent_To_Harm	Ingestion intended for self-harm, self-injury, or suicide; 'N' if other motive; 'UK' if unclear.
Motivation_Protest	Ingestion as protest, demonstration, or manipulation (e.g., objection to detention conditions); 'N' if not protest-related; 'UK' if unclear.
Motivation_Psychiatric	Ingestion driven primarily by an underlying psychiatric condition (psychosis, impulsivity, etc.); 'N' if not psychiatric; 'UK' if unclear.
Motivation_Psychosocial	Ingestion motivated by social or interpersonal factors (imitative acts, shock value, body-image, safekeeping, etc.); 'N' if not psychosocial; 'UK' if unclear.
Motivation_Uncertain	No clear motivation identified in documentation; 'N' if specific motive recorded; 'UK' if ambiguous.
Object_Button_Battery	Button battery ingested; 'N' if not; 'UK' if object type not recorded.
Object_Magnet	Magnet ingested; 'N' if none; 'UK' if unknown.
Object_Long	Ingested object length > 5 cm; 'N' if \leq 5 cm; 'UK' if dimensions unknown.
Object_Long_Sharp	'Y' when both Object_Long and Object_Sharp are 'Y'; 'N' otherwise; 'UK' if either unknown.
Object_Short	Derived: object length < 5 cm when Object_Long='N'; retains 'UK' if dimensions unknown.
Object_Short_Sharp	'Y' when both Object_Short and Object_Sharp are 'Y'; 'N' otherwise; 'UK' if either unknown.
Object_Sharp	Object described as sharp or pointed (e.g., blades, nails, needles); 'N' if not sharp; 'UK' if unclear.
Object_Multiple	More than one object ingested in same episode; 'N' for single object; 'UK' if number unspecified.
Object_Uncertain	Where object characteristics are unknown. 'N' if known; 'UK' if Unknown.
Outcome_Endoscopy	Endoscopic intervention performed during episode; 'N' if not; 'UK' if unavailable.
Outcome_Surgery	Surgical intervention performed (operative procedure under anaesthesia); 'N' if not; 'UK' if not documented.
Outcome_Endoscopy_Surgery	'Y' if both Outcome_Endoscopy and Outcome_Surgery are 'Y'; 'N' otherwise; 'UK' if data insufficient.
Outcome_Conservative	'Y' if managed without endoscopy or surgery; 'N' if either procedure performed.
Outcome_Death	Death causally related to ingestion complications; 'N' if survived; 'UK' if outcome unknown.
Outcome_Perforation	Clinical or radiological evidence of gastrointestinal or airway perforation; 'N' if absent; 'UK' if unknown.
Outcome_Obstruction	Confirmed or suspected gastrointestinal obstruction; 'N' if none; 'UK' if not documented.
Outcome_Injury_Needing_Intervention	Injury necessitating medical/procedural intervention and influencing decision for endoscopy/surgery; 'N' if no such injury; 'UK' if data unavailable.
Outcome_Other	Other clinically significant outcomes (aspiration, sepsis, prolonged stay, etc.); 'N' if none; 'UK' if data insufficient.
Outcome_Uncertain	Where no outcome identified; 'N' if outcome identified; 'UK' if Unknown.