

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

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I. ABSTRACT

II. INTRODUCTION

Rationale

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 [1]. Refugees and asylum seekers often endure extreme hardships, compelling them to seek asylum in foreign countries [2, 3]. 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 [4–7].

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 [8–10].

Methods of suicide and self-harm among refugees differ based on available means, cultural factors, and motivating factors [11]. Common methods include cutting, self-battery, attempted hanging, self-poisoning by medication or chemicals, and intentional ingestion of foreign objects [9].

Intentional ingestion of foreign objects is defined as non-accidental ingestion of a true foreign body (non-nutritive items) for parasuicidal reasons [12]. Most ingested foreign bodies (80–90%) pass spontaneously, but 10–20% require endoscopic removal and up to 1% need surgery. Timely assessment and intervention are critical [13, 14]. In refugee contexts, however, geographic isolation and limited access to advanced care complicate timely management, potentially increasing morbidity and mortality [15].

Globally, rates of foreign object ingestion are increasing. In the United States, rates doubled in 2017, with 14% of cases deemed intentional [16]. A 2009 review found intentional ingestions in up to 92% of adults from lower socioeconomic populations, suggesting that rates may be even higher among refugees and asylum seekers [17].

Management of IIFO has been evolving since 1635, when Daniel Schwabam recorded the first gastrotomy on a man who had swallowed a knife [18]. In 1738, Gorsauld is credited as the first

surgeon to perform a cervical esophagotomy for the removal of a foreign body (FB) [19]. In 1906, José Goyanes extracted a coin impacted in the esophagus using a rigid esophagoscope for the first time [20]. 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 [21, 22]. 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 [23]. The largest single ingested item reported measured 28 cm in length [24].

Clinical outcomes are influenced by various factors, including patient age, comorbidities, object characteristics (size, shape, composition, anatomical location), and the time elapsed since ingestion, hence current guidance provide guidance based on these factors [13].

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 [25]. Conversely, in psychiatric settings, ingestion may reflect mental illness or affective dysregulation [26–30].

Psychiatric conditions most frequently associated with intentional ingestion of foreign objects (IIFO) include psychosis, malingering, pica, and personality disorders [26, 31].

Malingering can present in various forms, particularly in prison populations where manipulation to trigger medical transfer is a noted motivation [26, 31, 32]. In such cases, the optimal management often involves brief medical intervention with minimal reinforcement, followed by prompt return to custody [33]. In contrast, individuals with obsessive-compulsive disorder (OCD) may describe escalating anxiety prior to ingestion followed by a sense of relief afterward [31].

In cases involving borderline personality disorder, Gitlin et al. [26] 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 [31].

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 [34].

Despite the rising prevalence, the heterogeneity in populations engaging in, and the potential severity of IIFO, there is limited research exploring how motivations for ingestion differ across populations and how these motivations may influence clinical outcomes [35–37]. Varying motivations likely influence clinical management, including decisions around the need for endoscopic or surgical intervention. For instance, if ingestion is primarily

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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. Specifically, we aim to examine how different motivations impact rates of endoscopic and surgical interventions, in the hope of informing future clinical strategies and healthcare responses. The protocol adheres to PRISMA guidelines [38].

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 Appendix A-A and a full list of exclusion criteria is available in Appendix A-B.

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 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 B.

Selection Process

All identified articles were collated using Python (Pandas) [39]. 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 [39] and Scikit-learn for statistical analysis [40])

Data Collection Process

Data were extracted by a single reviewer (JGE) into an Excel [41] 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*

(*JB*) *Critical Appraisal Checklists for Case Reports and Case Series* [42]. Studies were first classified as either case reports or case series based on the level of granularity in the data. Each study was then evaluated using the corresponding JBI tool.

Case Reports: For case reports, the JBI Checklist for Case Reports was used. This tool assesses eight domains of reporting quality, including whether patient demographics were clearly described, a timeline of clinical history was provided, the presenting condition and diagnostic assessment were outlined, and whether the intervention, post-intervention condition, and any adverse events were reported. The final domain evaluates whether the case provides meaningful takeaway lessons.

In addition to manual JBI appraisal, a logic-based validation filter was applied to all case reports using *Python Pandas* [39]. This secondary filter assessed whether key variables — specifically, outcomes, object characteristics, and motivation — were completely unreported. For each domain, a binary flag was generated:

- *Outcome_Unknown* was marked 1 if all outcome-related fields were either missing or marked as unknown.
- *Object_Unknown* was marked 1 if all object-related fields (excluding *Object_Other_Long*) were missing or unknown.
- *Motivation_Unknown* was predefined in the dataset and indicated absence of motivational information.

If any of these flags were triggered, the corresponding JBI item most affected by the missing domain was marked as not reported (e.g., *Post Intervention Condition Described* or *History_Timeline* set to N). Finally, an *Overall_Appraisal* score of *Exclude* was assigned, indicating high risk of bias and exclusion from analysis. This ensured that only case reports with sufficient information to meaningfully contribute to the review question were retained.

Case Series: For case series, the JBI Checklist for Case Series was applied. The JBI Checklist for Case Series assesses 10 domains of methodological and reporting quality. These include whether the case series defined clear inclusion criteria, applied valid and consistent methods to identify the condition, and included participants consecutively and completely. The checklist also evaluates whether participant demographics and clinical information were clearly reported, whether outcomes or follow-up results were adequately described, and whether the study setting was detailed. Finally, it considers whether the statistical analysis used was appropriate for the data presented.

In addition to manual JBI appraisal, a logic-based exclusion filter was applied using *Python Pandas* [39]. This filter assessed whether key variables — specifically, motivation, object characteristics, and outcomes — were unreported for the entire study population. For each of these domains, a derived rate variable was calculated:

- *Outcome_Unknown_Rate* was marked as 1 if all outcome-related fields were missing or marked as unknown (i.e. the entire population had an unknown outcome).
- *Motivation_Unknown_Rate* indicated whether motivation was absent or only partially reported across cases within the study.
- *Object_Unknown_Rate* was derived if all object-related fields were missing or unknown.

If any of these indicators were flagged, the corresponding JBI checklist item (e.g., *Clear_Outcome_Followup_Reported*, *Clear_Demographic_Reported*, or *Clear_Clinical_Info_Reported*) was marked as N, and the study received an *Overall_Appraisal* of *Exclude*. This logic-based validation ensured that case series lacking essential variables could be systematically excluded from the final analysis, maintaining consistency with the review question and minimising risk of bias in the dataset.

This two-stage process — comprising manual critical appraisal followed by automated validation — ensured both transparency and reproducibility in the assessment of study quality.

IV. RESULTS

Study Selection

A total of 673 records were identified through initial database searches: PubMed (317), WoS (277), Embase (25), SCOPUS (24), PsycINFO (16), and Cochrane (14).

Following the removal of duplicate records—based on combinations of publication year, title, author, and DOI—313 duplicates were excluded. This left 360 unique database records for screening: PubMed (258), Web of Science (65), Cochrane (14), SCOPUS (12), Embase (9), PsycINFO (2). A Google Scholar search yielded 135 results. 3 duplicates were removed manually. Thus, 132 records proceeded to screening. Database records (360) and Google Scholar records (132) were then merged, yielding a total of 492 records.

Title and abstract review was then undertaken. JGE reviewed all 492 records. A random sample of 49 records was generated for independent screening MS. After title and abstract screening, Cohen's Kappa was calculated for inter-reviewer agreement between JGE and MS, yielding a value of 0.38, indicating fair agreement. Where JGE and MS disagreed, 16 records were reviewed by GC. 75 studies were excluded as they were studies not focusing on intentional self-ingestion (into the gastrointestinal tract) of foreign object via the oral cavity (mouth) or where unclear if ingested. 30 studies were excluded as they were non-human/animal studies. 27 studies were excluded as they were reviews, editorials, commentaries, and opinion pieces without original empirical data. 18 studies were excluded as they were studies focussing solely on accidental ingestion. 16 studies were excluded as they were studies focusing on ingestion or co-ingestion of substances (e.g. poisons, medications) rather than physical foreign objects. 9 studies were excluded as they were not available in english. 1 study was excluded as it studied ingestions undertaken in controlled environment as part of voluntary study. In total, 176 records were excluded, leaving 316 for full text review.

During full text review, JGE reviewed all 316 records. A random sample of 32 records was generated for independent review by MS. Inter-reviewer agreement was calculated using Cohen's Kappa, yielding a value of 0.45, indicating fair agreement. Where JGE and MS disagreed, 5 records were reviewed by GC. 94 records were excluded as they were ingestions not explicitly stated to be intentional and history not suggestive of deliberate ingestion (i.e. age \leq 8, no history of previous ingestions, no psychiatric comorbidities, not a prisoner/detainee/vulnerable group). 46 records were excluded as they were reviews, editorials, commentaries, and opinion pieces without original empirical data. 24 records

were excluded as they were full text not available in english. 19 records were excluded as they were studies not focusing on intentional self-ingestion (into the gastrointestinal tract) of foreign object via the oral cavity (mouth) or where unclear if ingested. 11 records were excluded as they were studies focussing solely on accidental ingestion. 9 records were excluded as they were ingestions where death resulted from other means (i.e. suicide) 7 records were excluded as they were studies focusing on ingestion or co-ingestion of substances (e.g. poisons, medications) rather than physical foreign objects. 6 records were excluded as they were duplicate publications or studies with overlapping data sets (the most comprehensive or recent study will be included). 6 records were excluded as they were does not meet inclusion criteria. 1 records were excluded as they were non-human/ animal studies. 1 records were excluded as they were studies before the advent of endoscopy (1906) In total, 224 records were excluded during full text review. 92 records were included and proceeded to bibliography search.

The bibliographies of the 92 included from full text review were searched by JGE manually. A list of included papers were collated using Python Pandas [39], ensuring each included item had its bibliography searched. Relevant bibliography items were identified; compared to the eligibility criteria; and collated in Zotero [43]. The bibliography search results were then exported from Zotero as a CSV and input into Pandas for analysis, manipulation and duplicate removal.

In total, 204 records were identified during bibliography searching. Using *Python Pandas*, bibliography search records were then programatically compared to title and abstract screen and full text review records. In this process, 12 duplicates were identified. 194 full text bibliography search records were reviewed by JGE. 121 bibliography search records were excluded, leaving 73 for inclusion.

Therefore, a total of 165 records were included in this study and proceeded to bias assessment. This process is illustrated in Figure 1.

Risk of Bias

Case Reports: 195 cases from 134 studies [26, 32, 33, 44–174] were evaluated using the JBI Checklist for Case Reports [42]. Motivation was not reported in 102 cases from 65 studies [26, 46, 49, 53, 57, 58, 65–67, 69, 71, 73, 74, 77, 78, 80–82, 84, 86, 89, 90, 93, 94, 96, 99–103, 106–108, 111, 113, 116, 118, 119, 122, 125, 126, 129, 130, 132–134, 137, 138, 140, 142, 143, 145, 147, 152, 156, 158–160, 163, 165–167, 170, 171, 173]. Given that this review specifically aims to explore how motivation influences clinical outcomes, the absence of this information was considered a critical limitation. As a result, these cases were classified as high risk of bias and excluded from the final analysis. Of the remaining cases (82), most clearly described intervention treatment (100%), post intervention condition (98%), and takeaway lessons (98%). Reporting was also strong for history timeline (94%), and patient demographic (93%). However, fewer studies reported diagnostic assessment (88%), harms (88%), and current condition (85%).

Case Series: Separately, 31 studies [20, 27, 175–203] were evaluated using the JBI Checklist for Case Series [42]. 1 study [27] did not report any of the outcomes of interest. 26 studies [20, 27, 176–178, 180–185, 188–199, 201–203] did not report motivation or reported partial reasons for motivation (i.e. for some of the included population, but not all). 7 studies [27,

175, 176, 184, 190, 198, 201] did not report object characteristics, or reported them partially. Therefore, 27 studies [20, 27, 175–178, 180–185, 188–199, 201–203] were considered high risk of bias and excluded from analysis. Exclusions were based on the absence of information essential to the review question — specifically, the reporting of motivation, object characteristics, and clinical outcomes. These variables were required to assess how motivation may influence treatment decisions and patient outcomes. As such, studies lacking this information were considered unable to meaningfully contribute to the synthesis and were excluded to preserve the integrity of the analysis. This left 2 case series [179, 186]. These two studies adequately fulfilled all JBI criteria and were deemed low risk of bias.

Study Characteristics

A total of 71 studies were included in the synthesis. Case reports made up 69 studies [32, 33, 44, 45, 48, 50–52, 54–57, 59–64, 68, 70, 72, 75, 76, 79, 83, 87, 88, 91–93, 95, 97, 98, 103–105, 108–110, 112, 114, 115, 117, 121, 123, 124, 127, 128, 131, 135, 136, 139, 141, 144, 148–151, 153–155, 157, 161, 162, 164, 168, 169, 172, 174], yielding 82 cases. Case Series made up 2 studies [179, 186], encompassing 38.0 ingestions.

Data Availability

The data and code used in this systematic review are available at http://github.com/jackgedge/iifo_systematic_review.

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PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources.

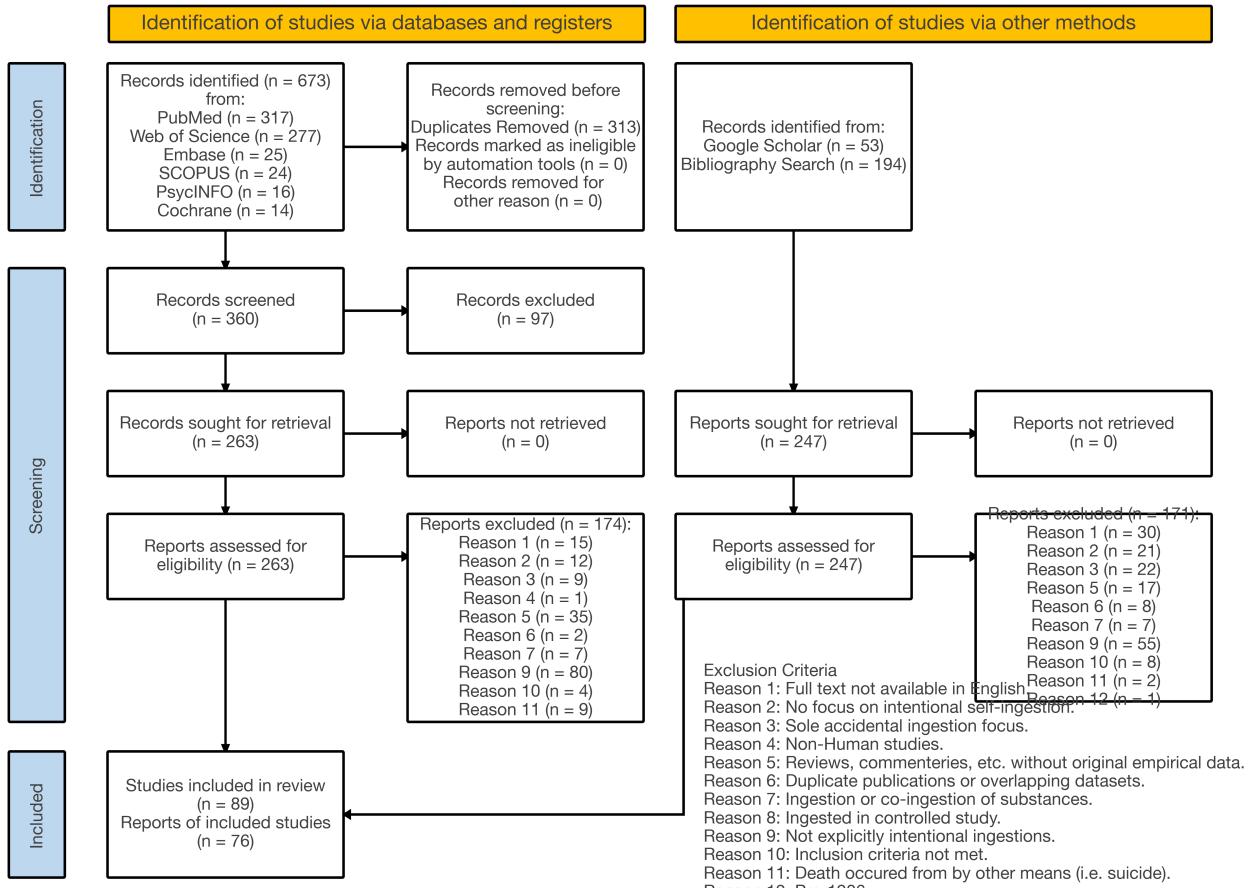


Fig. 1: PRISMA flow diagram summarising the study selection process.

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APPENDIX A
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) – Case series – Clinical trials – Case reports |
| Setting | |
| 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 B
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* egd esophagogastroduodenoscopy oesophagogastroduodenoscopy manag* | ALL() |
| Ingestion Behavior | | 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 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) [204]; 'N' if no diagnosis; 'UK' if data unavailable. |
| Is_Displaced_Person | Meets International Organisation for Migration definition of a displaced person [205]; '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. |