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

Deliberate foreign body ingestion (DFBI) is defined as non-accidental ingestion of a true foreign body (non-nutritive items) for parasuicidal reasons [1].

In 1635, Daniel Schwaban performed a gastrotomy on a man who had swallowed a knife [2]. In 1738, Gorsauld is credited as the first surgeon to perform a cervical esophagotomy for the removal of a foreign body (FB) [3]. In 1906, José Goyanes extracted a coin impacted in the esophagus using a rigid esophagoscope [4]. 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 [5, 6].

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 [7]. The largest single ingested item reported measured 28 cm in length [8].

Psychiatric conditions most frequently associated with intentional ingestion of foreign objects (IIFO) include psychosis, malingering, pica, and personality disorders [9, 10]. The term "pica" originates from the Latin word for "magpie," reflecting the bird's tendency to collect unusual items [11], and has been reported globally [12].

Malingering can present in various forms, particularly in prison populations where manipulation to trigger medical transfer is a noted motivation [9, 10, 13]. In such cases, the optimal management often involves brief medical intervention with minimal reinforcement, followed by prompt return to custody [14]. In contrast, individuals with obsessive-compulsive disorder (OCD) may describe escalating anxiety prior to ingestion followed by a sense of relief afterward [9].

In cases involving borderline personality disorder, Gitlin et al. [10] 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 [9].

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 [15, 10]. 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 [16].

Motivations for IIFO can include relief from psychological symptoms, self-punishment, attempts to influence others, or command hallucinations [17]. Notably, ingestion alone should not be assumed to indicate suicidal intent [9].

Clinical outcomes are influenced by various factors, including patient age, comorbidities, object characteristics (size, shape, composition, anatomical location), and the time elapsed since ingestion [18]. In a seminal study of incarcerated individuals, Karp et al. [19] 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 [20].

A recent report from a UK acute NHS trust identified a rise in IIFO cases during the COVID-19 pandemic [21]. 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 [22].

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 [23]. Refugees and asylum seekers often endure extreme hardships, compelling them to seek asylum in foreign countries [24, 25]. 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 [26, 27, 28, 29].

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 [30, 31, 32].

Methods of suicide and self-harm among refugees differ based on available means, cultural factors, and motivating factors [33]. Common methods include cutting, self-battery, attempted hanging, self-poisoning by medication or chemicals, and ingestion of foreign objects [31].

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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 [34, 35, 36]. 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 [37]. Conversely, in psychiatric settings, ingestion may reflect mental illness or affective dysregulation [10, 17, 38, 39, 40].

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 [41].

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 availabe in Appendix **??** and a full list of exclusion criteria is available in 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 **??**.

Selection Process

All identified articles were collated using Python (Pandas) [42]. 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 [42] and Scikit-learn for statistical analysis [43])

Data Collection Process

Data were extracted by a single reviewer (JGE) into an Excel [44] 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 **??**.

The full dataset of extracted case-level and study-level data (including bias assesments), 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 [45]. 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 Pandas [42]. 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.

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. 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. 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 [42], ensuring each included item had its bibliography searched. Relevant bibliography items were identified; compared to the eligibility criteria; and collated in Zotero [46]. 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. Therefore, 194 full text bibliography search records were reviewed by JGE. 121 bibliography search records were excluded, leaving 73 for inclusion.

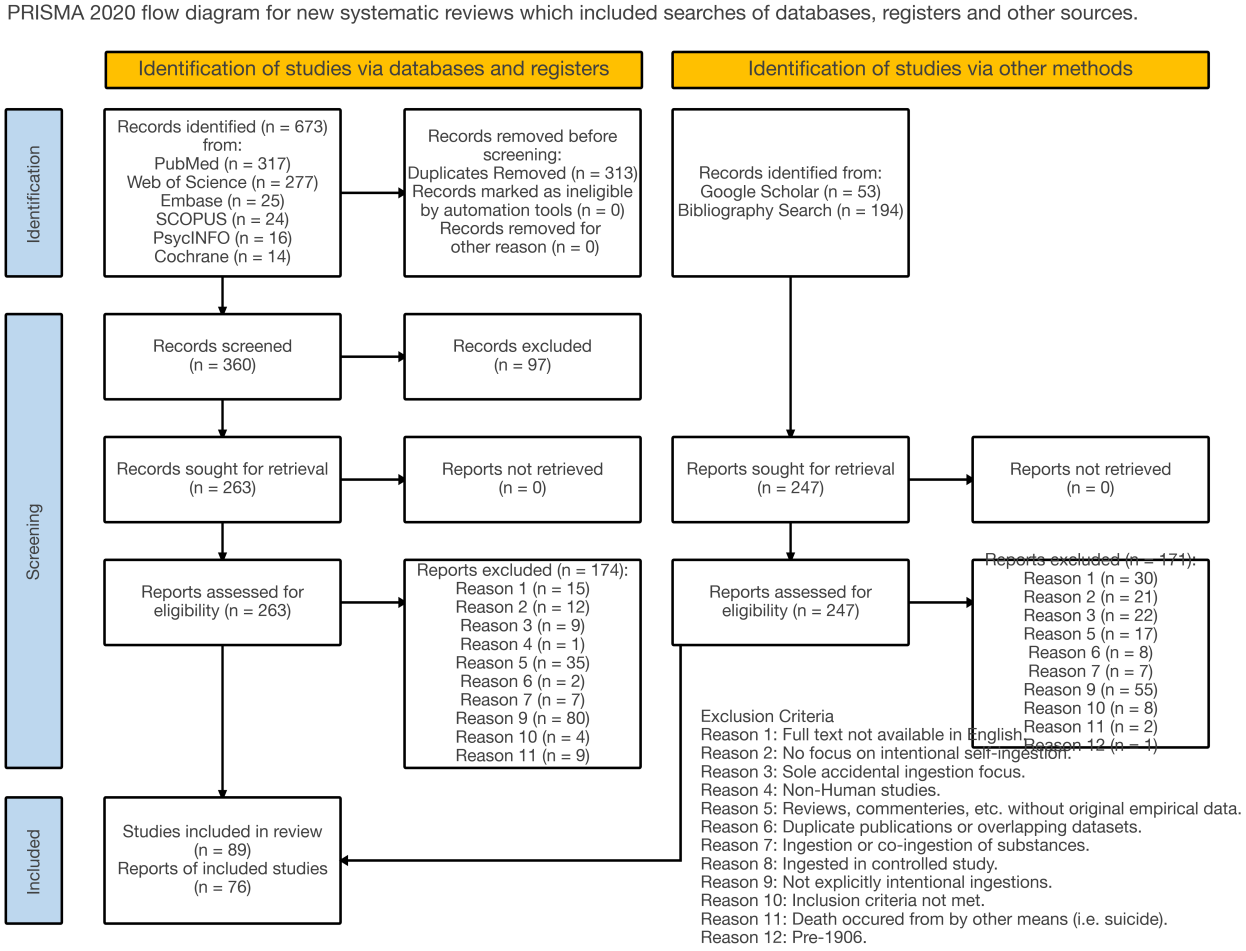

Fig. 1: PRISMA flow diagram summarising the study selection process.

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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 ($>$6 cm) – Short objects ($\leq$6 cm) Setting/location
Outcomes of interest	– Endoscopic intervention – Surgical intervention – Conservative management – Complication rates – Mortality rates
Setting	Any setting.
Study designs	– Observational studies (cohort, case-control, cross-sectional) – Case series – Clinical trials – Case reports

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

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 body”/exp
	”foreign bod*”	
Intentional Ingestion / Self-harm	”intent*”	”automutilation”/exp
	”deliberate*”	
	”purpose*”	
	”self-injur*”	
	”selfharm*”	
	”self-harm*”	
Ingestion Behavior	”ingest*”	”swallowing”/exp
	”swallow*”	
Interventions	”surg*”	”endoscopy”/exp
	”endoscop*”	”surgery”/exp
	”EGD”	”conservative treatment’/exp
	”OGD”	’drug therapy”/exp
	”Esophagogastroduodenoscopy”	
	”Oesophagogastroduodenoscopy”	
	”manag*”	

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*”	[mh foreign bodies]
	”foreign bod*”	
	(foreign NEXT obj*)	
	(foreign NEXT bod*)	
Intentional Ingestion / Self-harm	intent*	[mh self-injurious behavior]
	deliberate*	
	purpose*	
	(self NEXT injur*)	
	(self NEXT harm*)	
Ingestion Behavior	ingest*	–
	swallow*	
	surg*	
Interventions	endoscop*	[mh endoscopy]
	EGD	[mh surgical procedures, operative]
	Esophagogastroduodenoscopy	[mh conservative treatment]
	Oesophagogastroduodenoscopy	[mh drug therapy]
	manag*	

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

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*	ALL()
Intentional Ingestion / Self-harm	intent* deliberate* purpose* self PRE/0 injur* self PRE/0 harm*	ALL()
Ingestion Behavior	ingest* swallow*	ALL()
Interventions	endoscopy surgery 'conservative' 'treatment' 'drug' 'therapy' surg* endoscop* egd esophagogastroduodenoscopy oesophagogastroduodenoscopy manag*	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	–
Intentional Ingestion / Self-harm	intent* deliberate* purpose* self injur* self harm*	DE "Nonsuicidal Self-Injury"
Ingestion Behavior	ingest* swallow* endoscop*	DE "Ingestion"
Interventions	conservative treatment drug therapy surg* egd esophagogastroduodenoscopy oesophagogastroduodenoscopy manag*	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*”	–
Intentional Ingestion / Self-harm	”intent*” ”deliberate*” ”purpose*” ”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 where 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) [47]; 'N' if no diagnosis; 'UK' if data unavailable.
Is_Displaced_Person	Meets International Organisation for Migration definition of a displaced person [48]; '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_Unknown	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_Unknown	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_Unknown	Where no outcome identified; 'N' if outcome identified; 'UK' if Unknown.