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Repeat dental general anaesthesia in children and the role of treatment planning: A Scoping Review

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Research

Keywords:

Posted Date: November 1st, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11266305/v1

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Additional Declarations: There is no duality of interest

Abstract

Aims

To map evidence relating to repeat dental general anaesthesia (DGA) in children, describe reported repeat DGA rates and identify potentially associated factors, including treatment-planning arrangements.

Methods

A scoping review was conducted following Arksey and O'Malley and JBI guidance and reported according to PRISMA-ScR. Five bibliographic databases were searched, supplemented by grey literature, reference-list searching, database alerts to April 2026 and stakeholder consultation. English-language sources reporting repeat DGA in children were eligible.

Results

Seventy-five sources were included (72 published; three unpublished). Reported repeat DGA rates ranged from < 1% to 76%. Median rates were 4.9% with paediatric specialist-led treatment planning and 10.1% with non-paediatric-specialist-led planning. However, study period was a potential confounder; among sources published from 2010 onwards, corresponding medians were 4.9% and 3.2%. Radiographic assessment was more frequently reported with specialist-led planning (36% versus 19%).

Conclusions

Repeat DGA rates varied considerably. Although specialist-led treatment planning was associated with lower rates overall, this association was attenuated when study period was considered and should not imply causality. The findings highlight the potential importance of comprehensive assessment, appropriate diagnostic investigation and access to specialist expertise, and support further prospective multicentre research.

Key points

1. Maps the evidence on repeat dental general anaesthesia in children and identifies substantial variation in reported rates, definitions, follow-up and service arrangements.
2. Specialist-led treatment planning was associated with lower repeat DGA rates overall, but this association was attenuated after accounting for study period.
3. Highlights the need for standardised reporting and prospective research evaluating comprehensive assessment, diagnostic investigation and access to specialist expertise within contemporary paediatric DGA pathways.

Introduction

Dental caries, although largely preventable, remains the leading reason for hospital admission among children aged 6–10 years in the United Kingdom.(1, 2) The most recent Oral Health Survey of 5-year-old schoolchildren in England found that 22.4% had experience of obvious dentinal decay, with children in the most deprived areas more than twice as likely to experience decay as those in the least deprived areas. (3–5)

Children living in more socioeconomically deprived circumstances are also more likely to require hospital-based management of dental caries under DGA.(6, 7) Tooth extraction due to dental caries in children and young people living in the most deprived communities is nearly 3.5 times that of those in the most affluent communities.(2) The UK's four chief medical officers have described tooth decay as an entrenched inequality requiring action. (8) Dental problems also affect education, with 6% of children aged under 16 reported to have missed nursery or school because of problems with their teeth, mouth or gums. (9)

Hospital treatment for dental caries continues to place a substantial burden on children and healthcare services. In the financial year ending 2025, 33,976 tooth extractions due to dental decay were undertaken in children and young people aged 0–19 years in England, at an estimated cost of £51.2 million to the NHS. (10) Tooth decay also remains a leading cause of hospital admission in children. (3, 9)

Dental treatment under general anaesthesia (DGA) enables comprehensive dental treatment to be undertaken during a single hospital episode. A repeat DGA requires a further hospital admission and exposes the child and family to an additional healthcare procedure, while placing further demands on healthcare services. Avoiding repeat DGA is therefore an important consideration when assessing and treatment planning children requiring DGA. (11–13)

Previous literature has identified characteristics associated with repeat DGA. Children with dental caries affecting maxillary incisors and those not brought to subsequent clinical assessments are more likely to require repeat DGA. (14) Children with medical co-morbidities have also been reported to be four times more likely to require repeat DGA than healthy controls. (15)

National reviews have highlighted variation in paediatric dental service provision, referral pathways and access to specialist expertise across England. (6, 16)

The 2026 NHS England Clinical Standard for Oral Health and Dental Care for Children and Young People defines specialist-led paediatric dental care as that in which assessment, treatment planning and overall clinical responsibility rest with a specialist or consultant in paediatric dentistry. (17) The standard specifies that DGA should be delivered in a hospital setting as part of a specialist-led service, while GIRFT recommendations similarly emphasise specialist-led paediatric dental networks. (18) However, specialist paediatric dental expertise is not evenly distributed across the United Kingdom, and access may vary according to geographical location and local service configuration.(6, 16–19)

To avoid repeat DGA, guidance advises that the comprehensive assessment of children undergoing a DGA for extraction of teeth should be completed by a specialist in paediatric dentistry. (20, 21) Specialist assessment may facilitate comprehensive treatment planning and identification of teeth at risk of future disease. However, it remains unclear whether variation in access to specialist-led assessment contributes independently to the variation in repeat DGA rates reported within the literature. This uncertainty provided the rationale for examining treatment-planning arrangements alongside other factors potentially associated with repeat DGA.

A scoping review methodology was therefore considered appropriate to map the breadth and characteristics of the available evidence, identify factors potentially associated with repeat DGA, and highlight gaps in the existing literature.

Review question and objectives

The review question and eligibility criteria were informed by the JBI Population, Concept and Context (PCC) framework. The Population comprised children under 18 years undergoing DGA; the Concept was repeat DGA and associated factors, including treatment-planning arrangements; and the Context included DGA delivered in any healthcare setting or country.

The primary aim of this scoping review was to map and summarise the available evidence relating to repeat dental general anaesthesia (DGA) in children. Secondary aims were to identify factors associated with repeat DGA, including treatment planning arrangements, use of radiographic assessment, healthcare setting and patient characteristics, and to explore gaps in the existing evidence base. (22)

Methods

Protocol and registration

This scoping review was conducted in accordance with the methodological framework described by Arksey and O'Malley and subsequent JBI guidance for scoping reviews, and is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). A completed PRISMA-ScR checklist is provided as Supplementary Appendix 3. The review protocol was prospectively registered with the Open Science Framework in April 2022 (DOI: 10.17605/OSF.IO/GKJCP). (23, 24) There were no deviations from the registered protocol.

Eligibility criteria

Studies were eligible for inclusion if they reported a repeat dental general anaesthetic (DGA) rate in children under 18 years of age. A standardised definition of repeat DGA was not imposed, and the definition reported by individual studies was accepted. All research designs were eligible for inclusion, including randomised controlled trials, cohort studies, case-control studies, cross-sectional studies and quality improvement activities. No temporal limit was applied to the search. The search was restricted to studies published in English due to resource limitations.

Repeat DGA was defined according to the definition used within each included source. Treatment-planning arrangements were categorised as paediatric specialist-led, non-paediatric-specialist-led (including general dental practitioners and other dental specialties), mixed, or not stated, according to the professional group responsible for treatment planning.

Information sources

The search strategy followed the three step recommendations of the JBI Scoping Review Methodology Group. (25) A comprehensive search strategy using free-text keywords was developed by the research team in consultation with an experienced academic librarian and adapted for each database. The initial searches were conducted on 20 April 2022 and included MEDLINE via Ovid, PubMed, Scopus, Web of Science Core Collection and Dentistry and Oral Sciences Source (EBSCOhost). Grey literature sources included OpenGrey and EThOS. Automated database alerts were established following the initial searches and maintained until April 2026 to identify newly published records meeting the search criteria. Reference lists of included sources were also hand searched. Full search strategies are provided in Supplementary Appendix 1.

An optional sixth stage, that of a consultation exercise, is advocated by Arksey and O'Malley.(24) It is proposed that the consultation stage improves the academic rigour and is an essential component in a scoping review. (26) Permission to include and report the unpublished data was obtained from the respective contributors.

The consultation stage aimed to identify relevant literature not captured by the database searches, provide further insights into the findings of the scoping review and help prioritise future research. Consultation involved group and individual discussions with purposively selected stakeholders. Members of the British Society of Paediatric Dentistry (BSPD) were contacted and invited to provide relevant unpublished work relating to repeat DGA. Three unpublished sources identified through this process met the inclusion criteria and were included in the review.

Selection of sources of evidence and data charting process

Records were managed in EndNote and duplicates removed before screening. Two reviewers (SMK and LG) independently screened titles and abstracts and assessed potentially eligible full-text reports. Disagreements were resolved through discussion and, where required, consultation with a third reviewer (SA).

A standardised data extraction form was developed and piloted on ten included sources. Data were independently charted by SMK and LG and included study characteristics, country, repeat DGA rate, radiographic assessment, patient medical status, treatment provider, treatment planner and, where reported, follow-up information. Where sources reported repeat DGA rates for multiple cohorts, these were recorded separately.(27, 28)

In accordance with JBI guidance for the analysis and presentation of results in scoping reviews, findings were synthesised descriptively. (29) Categorical data were summarised using frequencies and percentages, and reported repeat DGA rates were summarised using **unweighted medians** and interquartile ranges (IQRs). Descriptive comparisons were undertaken according to treatment-planning arrangement, geographical setting, treatment approach and study period. The source was the primary unit of analysis; where a source reported multiple distinct cohort rates, each rate was retained separately for descriptive analysis.(30)

Results

The study selection and screening process, reported in accordance with PRISMA-ScR, is shown in Fig. 1. (27) A total of 10,174 records were identified through database and grey literature searches. Following removal of duplicates, 2,867 records underwent title and abstract screening, of which 151 proceeded to full-text review. Seventy-two published studies met the inclusion criteria. An additional three unpublished sources were identified through stakeholder consultation with members of the British Society of Paediatric Dentistry (BSPD), resulting in 75 sources included in the review.

Figure 1. PRISMA-ScR flow diagram showing identification, screening and inclusion of sources.

Characteristics of included sources

A total of 75 sources were included in the review, comprising 72 published studies and three unpublished sources identified through stakeholder consultation. Study characteristics and key findings are summarised in Table 1, with individual source characteristics presented in Supplementary Appendix 2. The included evidence spanned 1972 to 2026. Thirty-eight sources (51%) were from the United Kingdom and 37 (49%) were from other countries, of which the United States was the most frequently represented (n = 9, 12%).

Table 1
Characteristics of Included Sources (n = 75)

Characteristic	Number of sources (%)
Country	
United Kingdom	38 (51%)
International	37 (49%)
Treatment planning	
Specialist in paediatric dentistry	36 (48%)
Non-paediatric-specialist-led	16 (21%)
Mixed provider	2 (3%)
Not stated	21 (28%)
Treatment provider	
Paediatric specialist	25 (33%)
Non-paediatric specialist	10 (13%)
Mixed provider	1 (1%)
Not stated	39 (52%)
Medical status of participants	
Healthy patients only	17 (23%)
Medically compromised/special healthcare needs only	10 (13%)
Mixed populations	42 (56%)
Not stated	6 (8%)
Radiographic assessment	
Radiographs reported	20 (27%)
Radiographs not reported/not stated	55 (73%)
Treatment approach	
Comprehensive care	56 (75%)
Extraction Only	16 (21%)
Not stated	3 (4%)

Variation in repeat DGA

Across sources published between 1972 and 2026, reported repeat DGA rates ranged from less than 1% to 76%. Repeat DGA rates were broadly similar according to geographical setting. The median reported repeat DGA rate among UK sources was 7.2% (IQR 2.5–14.0%), compared with 10.2% (IQR 4.9–13.8%) among international sources.

The included evidence comprised a range of study designs, although retrospective designs predominated. These included retrospective studies, case-note and record reviews, clinical audits and service evaluations, alongside a smaller number of prospective, cohort, observational and questionnaire-based studies.

Follow-up and ascertainment of repeat DGA varied considerably across the included evidence. Where reported, follow-up periods ranged from several months to more than 10 years, although a number of sources assessed repeat DGA over approximately two years. (31–34) Other sources reported previous DGA at presentation rather than prospectively identifying a subsequent DGA, and several did not specify a defined follow-up period.(35)

Results of individual sources of evidence

Of the 75 included sources, treatment planning was undertaken by a specialist in paediatric dentistry in 36 (48%), by a non-paediatric specialist in 16 (21%), and by a mixed provider group in two (3%); the treatment planner was not stated in 21 sources (28%). Where this information was not explicitly reported, the primary author was contacted where contact details could be located.

Treatment planning and diagnostic assessment

Most sources included mixed patient populations (42/75, 56%), while the treatment provider was not stated in 39/75 sources (52%), reflecting incomplete reporting of these characteristics across the evidence base.

Studies in which treatment planning was undertaken by specialists in paediatric dentistry generally reported lower repeat DGA rates than those involving non-paediatric specialist treatment planning. Among 36 sources involving specialist-led treatment planning, the median reported repeat DGA rate was 4.9% (IQR 1.8–11.2%). Among 16 sources involving non-paediatric specialist treatment planning, the median reported repeat DGA rate was 10.1% (IQR 3.3–25.4%).

Several sources reporting very low repeat DGA rates involved specialist-led paediatric dental services. Sources reporting repeat DGA rates below 2% were predominantly those in which treatment planning was undertaken by specialists in paediatric dentistry.

Several studies evaluated interventions intended to improve assessment and treatment planning prior to DGA. In a UK study evaluating the introduction of pre-operative assessment by a specialist in paediatric dentistry, the treatment plan was changed in 85% of exodontia lists, with the authors reporting that a repeat DGA was avoided in 12% of cases. (36) A further evaluation of a specialist-led service

incorporating comprehensive assessment and treatment planning reported a repeat DGA rate of 0.8%. (32)

Reporting of radiographic assessment was inconsistent across the included sources. Information on radiographic assessment was reported in 13 of 36 sources (36%) involving specialist-led treatment planning, compared with 3 of 16 sources (19%) involving non-paediatric specialist-led treatment planning. (37, 38)

There were important differences in the period in which studies involving specialist and non-paediatric-specialist-led treatment planning were conducted (Fig. 2). Among studies published up to and including 2009, the median reported repeat DGA rate was 6.3% (IQR 2.5–11.9%) across 13 specialist-led sources, compared with 25.0% (IQR 20.9–31.0%) across nine non-paediatric-specialist-led sources. In studies published from 2010 onwards, the corresponding median rates were 4.9% (IQR 1.6–10.9%) across 23 specialist-led sources and 3.2% (IQR 1.6–4.9%) across seven non-paediatric-specialist-led sources. The distribution of source-level repeat DGA rates by treatment planner and decade of publication is shown in Fig. 2. These findings indicate that study period is an important potential confounding factor when interpreting differences according to treatment planner.

Figure 2. Distribution of reported repeat dental general anaesthesia (DGA) rates according to treatment planner and decade of publication. Each point represents a reported cohort rate.

Treatment approach

Treatment approaches varied across the included sources. Fifty-six sources (75%) reported comprehensive dental care under general anaesthesia, while 16 (21%) involved extraction-only care; the treatment approach was not stated in three sources (4%). Among sources reporting comprehensive care, the median repeat DGA rate was 6.8% (IQR 2.8–12.5%), compared with 9.8% (IQR 6.0–23.5%) among extraction-only sources.

Several studies explored the relationship between treatment provided at the initial DGA and subsequent repeat DGA, including comprehensive restorative and extraction-based approaches. (32–36, 82)

Discussion

This scoping review mapped the available evidence relating to repeat dental general anaesthesia (DGA) in children. Reported rates varied considerably, from less than 1% to 76%, within a predominantly retrospective and heterogeneous evidence base. Key areas included treatment planning, service configuration, diagnostic assessment and treatment approach, alongside inconsistency in the definition and reporting of repeat DGA.

Treatment planning and diagnostic assessment

Across the evidence as a whole, sources involving paediatric specialist-led treatment planning generally reported lower repeat DGA rates than those involving non-paediatric-specialist-led planning. However, stratification by study period substantially reduced this difference, with similar median rates among sources published from 2010 onwards. The overall association may therefore reflect changes in clinical practice and service delivery over time. Nevertheless, several of the lowest rates were reported within specialist-led paediatric dental services. Specialist involvement may facilitate comprehensive diagnosis, assessment of restorability and prognosis, and definitive treatment planning; however, its independent effect on repeat DGA cannot be determined from the available evidence.

Radiographic assessment may also be relevant to treatment planning. Sources involving specialist-led planning more frequently reported radiographic assessment than those involving non-paediatric-specialist-led planning (36% versus 19%). Bitewing radiographs are an important adjunct to clinical examination, particularly for detecting proximal caries. (37)

Although their independent effect on repeat DGA could not be determined, where clinically indicated and feasible, recent diagnostic radiographs alongside comprehensive clinical assessment and charting may support DGA treatment planning.(38)

Variation in repeat DGA and service configuration

Variation in reported repeat DGA rates is likely to be multifactorial, reflecting differences in patient populations, disease severity, follow-up, treatment approach and healthcare setting. Several sources included children with special healthcare needs or medical co-morbidities, whose treatment needs may differ from otherwise healthy children. Longer follow-up also provides greater opportunity to identify subsequent DGA. This heterogeneity highlights the need for standardised definitions and reporting, including duration of follow-up and the denominator used to calculate repeat DGA rates.

Repeat DGA rates did not differ substantially geographically, with median rates of 7.2% among UK sources and 10.2% internationally. However, geographical setting may obscure differences in service configuration and access to specialist expertise. Within the UK, 44% of postal areas have been reported to have no specialist in paediatric dentistry.(6)

Given the disproportionate burden of dental caries and DGA among socioeconomically disadvantaged children, equitable access to specialist expertise remains important in the organisation of paediatric DGA services. (39)

Reporting and future research

Reporting was inconsistent and incomplete, with information on treatment planning, treatment provider, radiographic assessment and patient characteristics frequently absent. More than one-quarter of sources (21/75, 28%) did not report who undertook treatment planning, limiting comparison between sources. Future research would benefit from a core outcome and reporting set incorporating patient

demographics and medical status, indication for DGA, treatment planner and provider, treatment undertaken, radiographic assessment, definition of repeat DGA and duration of follow-up.

Strengths and limitations

Several limitations should be considered. As a scoping review, the aim was to map and summarise the available evidence rather than undertake formal methodological quality or risk-of-bias assessment. The evidence was predominantly retrospective and heterogeneous in study design, patient populations, healthcare settings, follow-up and reporting. Potential confounders, including age, disease severity, socioeconomic circumstances, medical co-morbidity and special healthcare needs, were inconsistently reported and could not be adequately accounted for. Only English-language sources were included, which may also have excluded relevant evidence.

Study period was an important potential confounder in the exploratory treatment-planning comparison, with non-paediatric-specialist-led planning more frequently represented in earlier studies. Stratification by study period reduced the apparent difference between treatment-planning groups. In addition, where sources reported multiple distinct cohorts, each rate was retained separately for descriptive analysis, meaning some sources contributed more than one estimate. The findings should therefore be interpreted as a descriptive mapping of associations within the available literature rather than evidence of causal relationships.

Previous review evidence has examined variation in the use and outcomes of DGA in children. Broomhead et al. (2020) identified substantial variation in the use of DGA and highlighted differences in service provision and clinical practice. (40) Sabbahi (2022) reviewed 46 studies evaluating outcomes including repeat DGA, follow-up attendance, subsequent treatment need, caries development and treatment success, with repeat DGA rates ranging from 0% to 31.8%.(41) The present review extends this work by focusing specifically on repeat DGA and mapping factors relating to treatment planning, diagnostic assessment and service configuration.

Future prospective studies should use consistent definitions and reporting standards to identify factors independently associated with repeat DGA and evaluate these within contemporary models of paediatric dental care. Since completion of this review, NHS England has published an updated Clinical Standard for Oral Health and Dental Care for Children and Young People (2026), which reinforces several findings identified within the available evidence. (17) The standard defines specialist-led services as those in which assessment, treatment planning and overall clinical responsibility are undertaken by a specialist or consultant in paediatric dentistry. It recommends that DGA is delivered within a specialist-led hospital service, with comprehensive treatment planning intended to maximise the benefit of a single general anaesthetic episode and minimise repeat treatment. These recommendations align with this review's findings relating to comprehensive assessment, treatment planning and access to specialist expertise.

Conclusions

This scoping review identified substantial variation in reported repeat DGA rates and important gaps in the available evidence. Treatment planning, diagnostic assessment and service configuration may be relevant to repeat DGA; however, associations with specialist-led planning were attenuated when study period was considered and should not be interpreted as causal. Standardised definitions and reporting are needed to improve comparability. Prospective multicentre research should examine factors independently associated with repeat DGA and evaluate contemporary models of care.

Declarations

Acknowledgements

The authors would like to thank the British Society of Paediatric Dentistry (BSPD) and its members for their support with the consultation stage of this review and for assisting in the identification of relevant unpublished work.

Author contributions

Sarah McKernon: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft, Writing – review & editing, Project administration.
Laura Gartshore: Methodology, Investigation, Writing – review & editing.
Janine Yazdi-Doughty: Methodology, Supervision, Writing – review & editing.
Manu Mathur: Methodology, Supervision, Writing – review & editing.
Girvan Burnside: Methodology, Formal analysis, Writing – review & editing.
Sondos Albadri: Conceptualization, Methodology, Supervision, Writing – review & editing.

Competing interests

The authors declare no competing interests.

Data availability

Data and material are available from the authors upon request to the corresponding author.

Funding

This work was supported by a 2024 Faculty of Dental Surgery Research Fellowship from the Royal College of Surgeons of England and the Roger Manley Francis Fellowship. The funders had no role in the design or conduct of the study, data collection, analysis or interpretation of the data, preparation of the manuscript, or decision to submit the manuscript for publication.

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Figures

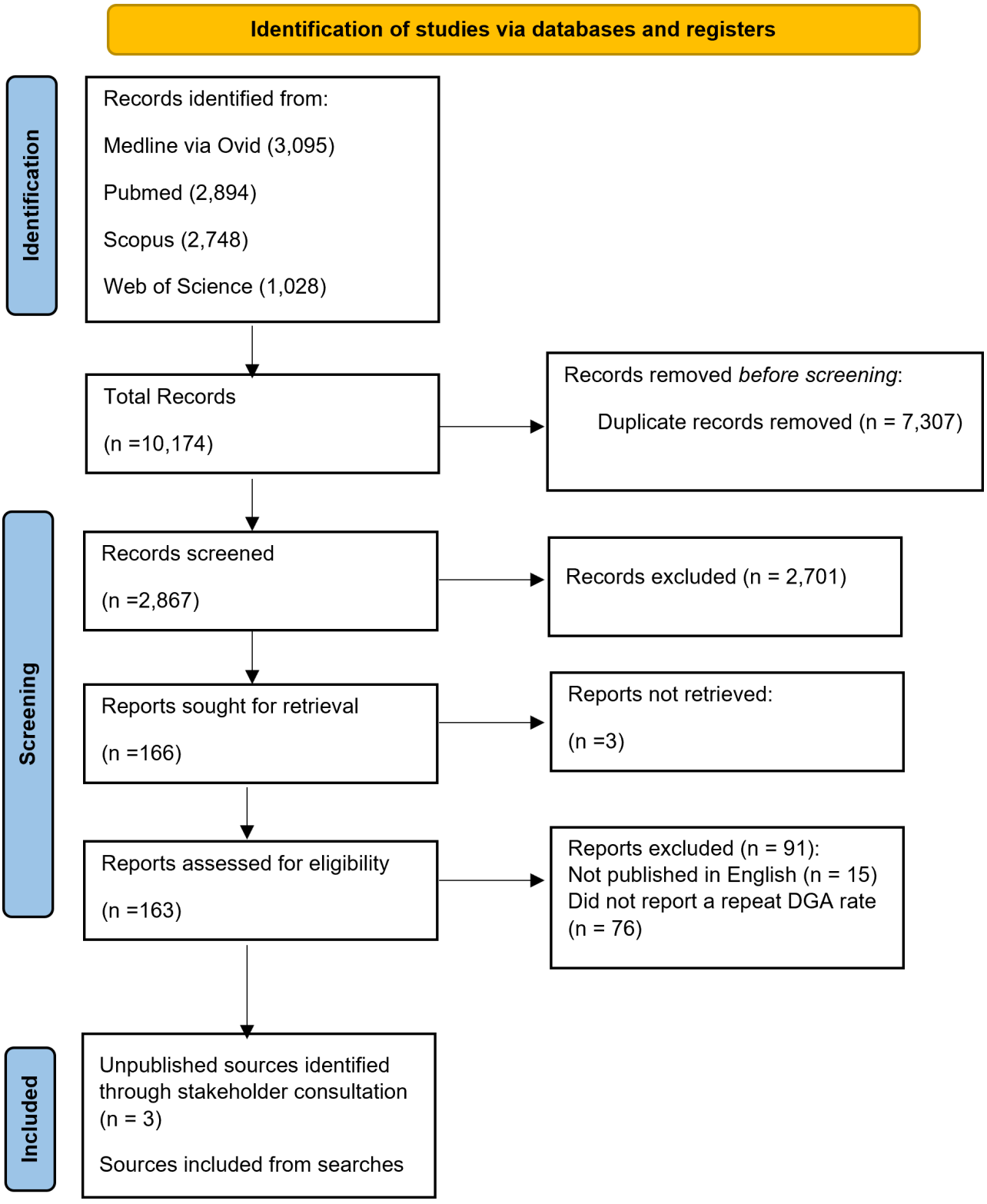


Figure 1

(27) A total of 10,174 records were identified through database and grey literature searches. Following removal of duplicates, 2,867 records underwent title and abstract screening, of which 151 proceeded to full-text review. Seventy-two published studies met the inclusion criteria. An additional three unpublished sources were identified through stakeholder consultation with members of the British Society of Paediatric Dentistry (BSPD), resulting in 75 sources included in the review.

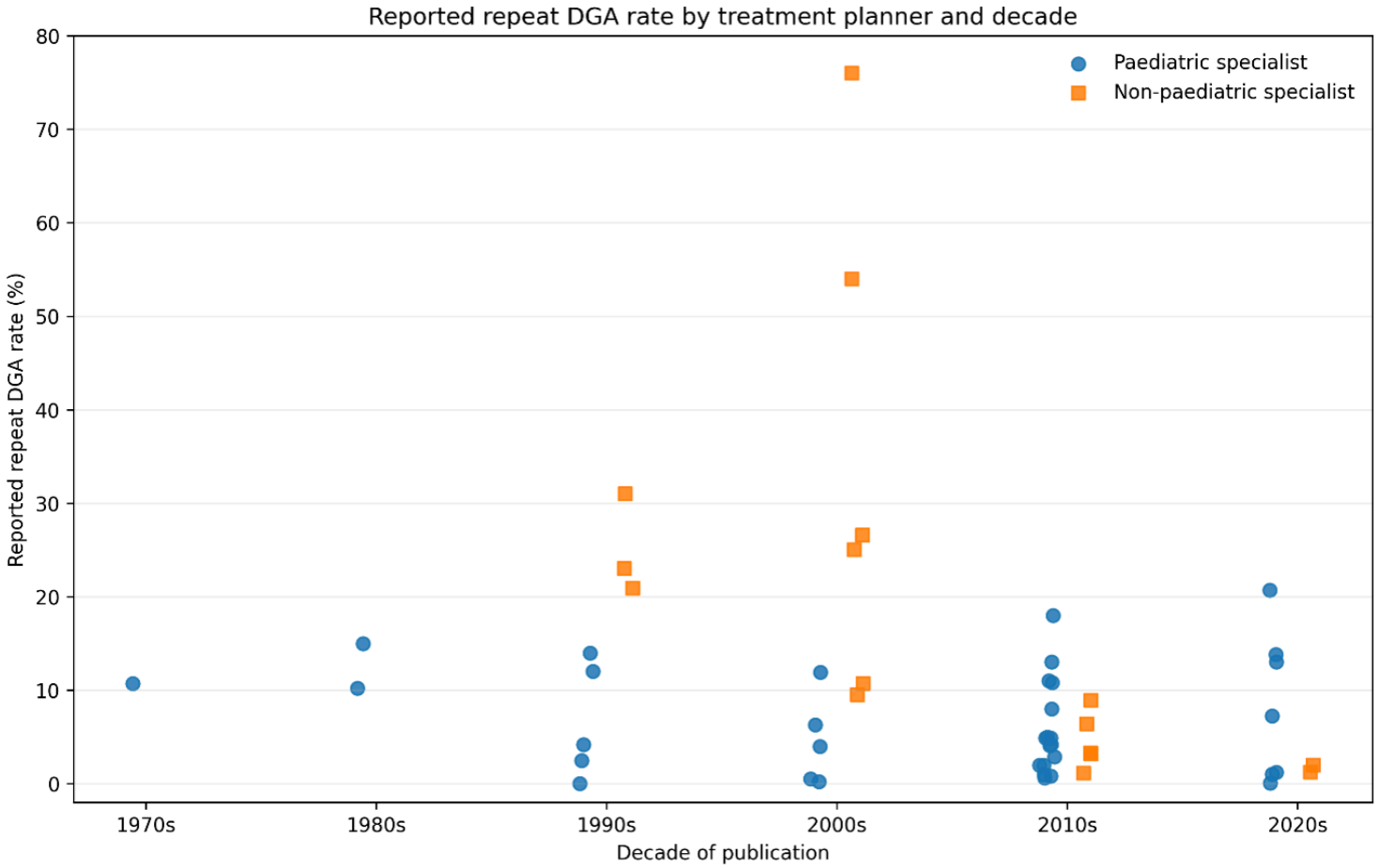


Figure 2

Distribution of reported repeat dental general anaesthesia (DGA) rates according to treatment planner and decade of publication. Each point represents a reported cohort rate.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryInformationRepeatDGAScopingReview.pdf