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Remote Specialist Treatment Planning in Paediatric Dentistry: A Qualitative Evaluation and Refinement of a Web-Based Prototype

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Remote Specialist Treatment Planning in Paediatric Dentistry: A Qualitative Evaluation and Refinement of a Web-Based Prototype

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Abstract

Background: Access to specialist paediatric dental expertise is unevenly distributed, which may limit opportunities for specialist input into treatment planning for children requiring dental general anaesthesia (DGA). Digital approaches may provide a mechanism for remote specialist case review, however, the feasibility, usability, and acceptability of remote specialist treatment planning in paediatric dentistry remain uncertain. This study aimed to explore specialists' experiences of using a prototype web-based platform for remote treatment planning and to identify refinements required before further evaluation.

Methods: Specialists in paediatric dentistry used a prototype web-based platform to remotely review and treatment plan paediatric cases using radiographs, intra-oral photographs, and structured clinical information, and subsequently participated in a semi-structured focus group. Data were analysed using a pragmatic qualitative

approach. Findings were organised deductively according to four predefined domains; feasibility, usability, acceptability, and implementation, with more granular subthemes developed inductively within these domains.

Results: Three specialists in paediatric dentistry participated in the focus group. Remote specialist treatment planning was considered potentially feasible when sufficient, appropriately presented diagnostic information was available. Participants identified image quality and completeness, clarity of the digital workflow, technical reliability, and appropriate onboarding as important influences on confidence in using the platform. Participants expressed positive views regarding the potential value of remote specialist input, particularly where access to specialist expertise is limited. Future implementation was considered dependent on preserving professional judgement within a structured treatment-planning process and providing clear information regarding the use of clinical data.

Conclusion: Remote specialist treatment planning using a web-based platform was perceived as potentially feasible and valuable by the specialists participating in this study, but its successful implementation was considered dependent on the quality of diagnostic information, usability and reliability of the digital workflow, appropriate user preparation, and preservation of professional judgement. These findings informed refinement of the prototype and provide a basis for subsequent evaluation of the reliability and clinical utility of remote specialist treatment planning in paediatric dentistry.

Keywords

Telehealth, digital platforms, qualitative research, dentistry, general anaesthesia, paediatric, remote consultation

Background

Children referred for dental general anaesthetic (DGA) frequently present with extensive treatment needs, complex behavioural management considerations, and varying levels of prior dental care. Access to specialist paediatric dental expertise is limited and geographically variable across the UK. Workforce mapping has shown that 44% of UK postal areas have no registered specialist in paediatric dentistry, with specialist provision concentrated around dental hospital settings and substantial geographical variation in access to specialist services.[1, 2] This may be particularly relevant for children managed in primary care, where access to specialist input during treatment planning may be limited.

Variability in referral pathways, assessment and treatment planning may contribute to differences in clinical decision-making and repeat DGA. Reported repeat DGA rates vary considerably between UK services and according to follow-up duration, ranging from 0.63% over two years in a specialist-led service to approximately 11–13% in longer-term UK studies.[3-5] More recent UK data reported a repeat DGA rate of

1.21%, with comprehensive assessment and treatment planning identified as important considerations in reducing the need for subsequent DGA.[6] However, differences in definitions, follow-up periods and service models limit direct comparison between reported rates. Dental GA pathways can impose substantial burdens on children and families, including pain, sleep disturbance and missed school while awaiting treatment, while repeat procedures also have implications for healthcare resources and service capacity.[6, 7] The burden of dental extractions is also socially patterned, with children living in more deprived communities experiencing substantially higher rates of hospital tooth extraction than those in more affluent communities.[8] Access to high-quality assessment and specialist treatment-planning input is therefore relevant not only to service quality but also to equity of care. Current NHS England clinical standards provide a national framework for the assessment, referral and management of children requiring specialist dental care, including pathways involving sedation and general anaesthesia. [9]

Teledentistry, an extension of telemedicine involving the remote use of digital technologies to support dental consultations, diagnosis, and clinical decision-making, has expanded substantially in recent years. [10, 11] Although adoption accelerated during the COVID-19 pandemic, asynchronous “store-and-forward” approaches, whereby radiographs or intra-oral photographs are transmitted for subsequent review, are increasingly used to support remote dental assessment [12-16]. Evidence across both adult and paediatric populations suggests that image-based teledentistry can support remote diagnosis and screening across a range of dental conditions.[10, 11, 17-20] In paediatric populations specifically, remote assessment using clinical images has demonstrated good diagnostic performance for dental caries and enamel defects,

while studies in preschool children have demonstrated the feasibility and comparative effectiveness of teledentistry for caries screening.[17-19]

However, existing teledentistry research has focused predominantly on diagnostic tasks involving identification of disease presence or absence, rather than the more complex process of comprehensive treatment planning. In paediatric dentistry, treatment planning for children requiring DGA involves considerably broader clinical reasoning, including interpretation of radiographs, assessment of behavioural cooperation, consideration of alternative management strategies, sequencing of care, and evaluation of overall suitability for DGA. These decisions often rely on contextual clinical judgement and multidisciplinary input, making them more complex than isolated diagnostic assessments.

Despite increasing interest in digital healthcare delivery, there is limited evidence exploring the feasibility and acceptability of remote specialist treatment planning within paediatric dentistry. Little is known about whether paediatric dental specialists consider digital platforms using remotely supplied radiographs and intra-oral images to be clinically usable, acceptable, and practical within existing care pathways. Understanding these factors is important before wider implementation or formal evaluation. A platform may be technically functional but still prove difficult to integrate into clinical practice because of problems with usability, workflow, clinician confidence, or the way clinical decisions are made.

To address this gap, a prototype web-based platform was developed to support remote specialist paediatric dental treatment planning using uploaded radiographs, clinical photographs and structured clinical information. The intended use case was within services that had already received a referral for a child requiring dental treatment, such as Oral and Maxillofacial Surgery (OMFS) or Community Dental Services (CDS), where specialist paediatric dental expertise may not be locally available. The receiving service could submit the relevant clinical information for asynchronous review by a specialist in paediatric dentistry, who would provide treatment-planning advice for the receiving clinical team to implement within the existing care pathway. The prototype was therefore intended to complement, rather than replace, existing referral pathways and local clinical care. This study reports an early qualitative evaluation and refinement of the prototype prior to subsequent evaluation. Four domains were defined a priori to guide the evaluation: feasibility, usability, acceptability and implementation. The study aimed to explore specialists' experiences of the prototype within these domains and to identify additional considerations relevant to its refinement and future evaluation.

Methods

Aim

This study aimed to explore the feasibility, usability, acceptability, and implementation considerations of a prototype digital platform for remote specialist paediatric dental treatment planning.

Design

A qualitative design informed by a pragmatic approach was adopted to examine paediatric dental specialists' experiences of using a prototype web-based treatment-planning platform. Pragmatic qualitative approaches enable analytical methods to be tailored to applied research questions and allow deductive and inductive procedures to be combined where appropriate.[21] The present study focused on real-world feasibility, usability, acceptability and implementation considerations relevant to refinement of the prototype prior to subsequent evaluation. The study is reported in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ).[22]

Ethical approval was obtained from the University of Liverpool (reference 13068). All specialist participants provided written informed consent prior to participation. The clinical cases used within the prototype comprised anonymised patient radiographs, clinical photographs and clinical information collected as part of the wider MODERN study (IRAS 334702), for which the relevant research approvals and participant consent had been obtained. The study was positioned within the development phase of the Medical Research Council framework for developing and evaluating complex interventions, using early qualitative evaluation to identify uncertainties and inform iterative refinement of the prototype prior to subsequent evaluation. [23]

Prototype Platform

The prototype consisted of a secure web-based platform developed in-house within the University of Liverpool School of Dentistry to support asynchronous remote specialist paediatric dental treatment planning. The platform was hosted on the MODERN study website, with the domain registered through 123 Reg and protected using an SSL certificate. For each case, specialists were provided with structured

clinical information, clinical photographs and radiographs. Images could be enlarged and manipulated within the platform, and a structured template was provided to support systematic review and recording of the proposed treatment plan.

Each specialist reviewed five real patient cases selected from children attending the clinical service who were eligible, available and willing to participate in the wider MODERN study. Patient information presented within the platform was anonymised. Specialists accessed the platform remotely and recorded their proposed treatment plans directly within it. Case review took approximately seven minutes per case. The focus group was conducted approximately two weeks after specialists had completed their case reviews, allowing participants to reflect on their experience of using the prototype.

Characteristics of Participants

A convenience sample of specialists in paediatric dentistry was recruited from the available specialist population. Three specialists were approached directly by email and invited to participate; all three accepted. Participants were eligible if they were specialists in paediatric dentistry and were available and willing to participate in the study. No additional exclusion criteria were applied.

All participants were consultants in paediatric dentistry, with between three and ten years of experience since specialist registration. At the time of the study, all were working in hospital-based services, although each had previous experience of working across a range of paediatric dental care settings.

The researcher (SM) had established professional relationships with members of the specialist paediatric dental community from which participants were recruited. This

prior familiarity had the potential to influence participants' willingness to provide critical or negative feedback regarding the platform and to influence the researcher's interpretation of the data. These potential influences were considered throughout data collection and analysis as part of the reflexive process.

Researcher Characteristics

The focus group was facilitated by SM, a female dentist and academic with clinical experience in oral surgery and undergraduate dental education, who was undertaking doctoral research at the time of the study. SM had previous experience of qualitative research.

Study Conduct and Data Collection

The focus group was conducted in a private office within the dental hospital. All participants had previously interacted with the prototype platform and were therefore able to reflect on its usability, functionality, and potential application within paediatric dental practice.

The discussion was guided by a semi-structured topic guide developed in advance to explore participants' experiences of using the prototype, including the adequacy of clinical information for remote treatment planning, usability and technical functionality, perceived clinical value, and considerations relevant to future implementation. The topic guide is provided as Additional file 1.

The focus group was facilitated by SM, with no co-facilitator or other individuals present. The focus group was conducted in December 2023 and lasted approximately

60 minutes. The discussion was audio-recorded with participants' written informed consent, and SM made contemporaneous notes to capture key points and support subsequent analysis. No repeat focus groups were conducted. Given the focused feasibility and refinement objectives of the study, sample adequacy was considered according to the concept of information power rather than data saturation. The study had a narrow aim, participants comprised a highly specific and experienced specialist group with direct experience of using the prototype, and the focused discussion generated detailed data directly relevant to the study objectives. On this basis, the three-participant focus group was considered appropriate for this early-stage qualitative evaluation.[24]

Data Analysis

A pragmatic qualitative approach was used to identify findings directly relevant to platform refinement, feasibility, usability, acceptability, and future implementation.[21] Pragmatic qualitative analysis is an applied approach that prioritises the generation of findings that are relevant and actionable within real-world settings. Rather than adhering to a single prescribed analytical methodology, it allows established qualitative techniques to be combined and adapted according to the research question and intended application of the findings.[21]

Audio recordings were transcribed verbatim by SM. SM reviewed the transcripts repeatedly alongside the audio recordings to support familiarisation with the dataset prior to coding and analysis. Transcripts were not returned to participants for comment or correction, and participant checking of the findings was not undertaken.

Coding and initial analysis were undertaken by SM as the sole coder. An audit trail documenting coding decisions, subtheme development and analytical processes was maintained throughout to support transparency and consistency. Coding summaries, emerging interpretations and thematic groupings were subsequently discussed with a second researcher (SA), who provided critical review of the developing analysis but did not independently code the transcripts. These discussions were used to challenge interpretations and strengthen alignment between the data and resulting findings.

Analysis combined deductive and inductive approaches. Data were initially organised deductively according to four predefined domains: feasibility, usability, acceptability and implementation. For this study, feasibility referred to the practicality of using the prototype to support remote specialist treatment planning; usability to participants' experiences of interacting with and navigating the digital platform; acceptability to perceptions of the appropriateness and value of the approach to specialist clinical practice; and implementation to factors likely to influence integration of the approach within existing clinical services and workflows. These domains were defined a priori for the prototype evaluation and were informed by established concepts within implementation and digital health research.[25] [26] Within each domain, more granular subthemes were developed inductively from participants' accounts. These captured perceived barriers and facilitators, experiences of using the prototype, and recommendations for refinement and future implementation. Coding and analysis were undertaken manually without qualitative data-analysis software.

Reflexivity and Trustworthiness

Several strategies were employed to enhance the credibility and trustworthiness of the findings. SM maintained a reflexive journal throughout data collection and analysis to acknowledge prior professional relationships with participants and to monitor potential interpretive bias.

Results

Three specialists in paediatric dentistry participated in the focus group. All participants had previously used the prototype web-based platform to remotely review and treatment plan paediatric cases prior to the discussion.

There was broad convergence across participants regarding the potential value of remote specialist treatment planning and the importance of diagnostic information, platform usability and appropriate governance arrangements. Differences were primarily evident in individual preferences for how treatment-planning information should be structured and the degree of flexibility required to accommodate professional clinical judgement.

The four predefined domains and associated subthemes, together with illustrative participant quotations, are summarised in Table 1. Issues identified during the evaluation and the corresponding refinements made or planned for the prototype are presented in Table 2.

Feasibility

Information quality and diagnostic sufficiency

Participants considered remote specialist treatment planning feasible when sufficient, clinically appropriate diagnostic information was available. Confidence in remote decision-making was dependent on the quality and completeness of the information provided, particularly radiographs and intra-oral photographs. Participants identified the availability of appropriate radiographic views, including bitewing radiographs where clinically indicated, as important for assessing disease and formulating treatment plans. Missing or incomplete diagnostic information was perceived as potentially altering treatment decisions and reducing the reliability of remote assessment.

The presentation of diagnostic images was also considered important. Participants highlighted the need for images to be correctly oriented and for clinicians to be able to manipulate or reorient images within the platform. These findings indicated that the feasibility of remote treatment planning was dependent not only on obtaining sufficient clinical information, but also on presenting that information in a format that supported confident clinical interpretation.

Usability

Clarity of workflow and technical reliability

Participants considered clear instructions and a systematic workflow important for confident use of the platform. Structured data entry and treatment-planning processes were generally viewed positively; however, uncertainty regarding specific tasks, including which teeth required charting and how images could be manipulated, created avoidable confusion. Participants considered concise and explicit instructions important for ensuring that the platform was used as intended.

Technical reliability also influenced participants' perceptions of usability. Occasional loss of access to the platform disrupted the treatment-planning process and was considered a potential deterrent to future use. Participants therefore identified both clarity of the user interface and reliable platform performance as important areas for refinement.

Onboarding and familiarisation

Participants identified familiarity with the platform and its digital workflow as important influences on usability. Initial uncertainty regarding aspects of the interface, including image manipulation and recording of clinical information, indicated a need for clearer guidance before specialists undertook remote treatment planning. Participants considered an introductory practice case particularly valuable, allowing users to become familiar with the platform and treatment-planning process before reviewing study cases. Clear instructions and appropriate onboarding were therefore identified as important refinements to support confident and consistent use of the platform.

Acceptability

Perceived value and potential to improve access to specialist input

Participants expressed positive views regarding the concept of remote specialist treatment planning and its potential clinical and service value. The platform was perceived as a means of facilitating access to specialist input, particularly in geographically remote or underserved areas where opportunities for timely specialist advice may be limited. Participants drew on their own clinical experiences of receiving

requests for advice with limited supporting information and considered that a structured digital approach could enable more informed remote case review.

Remote treatment planning was viewed as having potential to complement existing clinical pathways by facilitating specialist involvement without requiring all initial case review to occur face-to-face. Participants also felt that the platform could provide specialists with more structured information when planning cases remotely.

Although clinical effectiveness was not evaluated in this study, participants considered the concept sufficiently valuable to warrant further development and evaluation.

Implementation

Clarity of patient information and use of clinical data

Participants identified several organisational and governance considerations that would need to be addressed before implementation within routine care. Clinical accountability was a particular concern, with discussion focusing on where

responsibility and clinical risk would sit when a treatment plan was provided remotely by a specialist but implemented by another clinician or service. Participants considered comparable models of remote specialist advice used elsewhere in healthcare and highlighted the need for clearly defined responsibilities between the specialist providing advice and the clinical team delivering care.

Related considerations included professional indemnity, allocation of specialist time and incorporation of remote treatment planning within consultant job plans, as well as integration with existing referral pathways and clinical information systems. Participants considered that these organisational requirements would need to be established alongside appropriate information-governance arrangements before wider implementation.

Participants also identified the need for clear information for patients and families regarding how clinical information would be used within remote specialist treatment planning. Although the clinical information used within this study was anonymised, future clinical implementation would require patients and families to understand the purpose of remote specialist review and how relevant clinical information and images would be shared between the treating service and specialist. Clear communication regarding the use of clinical information was therefore considered an important component of future implementation.

Balancing standardisation with professional judgement

Participants recognised potential benefits from structuring the information and treatment-planning process within the platform but emphasised the importance of retaining flexibility for individual clinical judgement. Increasing the number of predefined treatment options was perceived as potentially making the platform unnecessarily complex, while an overly restrictive approach risked failing to reflect how specialists make decisions in clinical practice.

Participants therefore favoured an approach that provided sufficient structure to support systematic case review while allowing specialists to formulate treatment plans according to their usual clinical practice. Maintaining this balance was considered important to the clinical relevance and future implementation of the platform.

Table 1. Predefined analytical domains, inductively developed subthemes and illustrative quotations

Predefined domain	Inductively developed subtheme	Illustrative quotation
Feasibility	Information quality and diagnostic sufficiency	"You really need to try [to] include cases of bitewings, because… that massively impacts what you do." **(P2)**
		"As long as the GDP could take an occlusion… and some photos, then you could probably treatment plan." **(P1)**
Usability	Clarity of workflow and technical reliability	"You also need to make it clear to people, they only need to chart the teeth present." **(P2)**
		"The website did kick you off… yeah, that would put people off doing it." **(P1)**
	Onboarding and familiarisation	"I didn't realise that you can move the images." **(P1)**
		"You also do need to flip your images, remember." **(P1)**
Acceptability	Perceived value and potential to improve access to specialist input	"I think it's going to be phenomenal. I think it's got so much potential as well." **(P3)**
		"If you have a system like that, it would massively help these remote areas." **(P3)**
Implementation	Clarity of patient information and use of clinical data	"Maybe just need to explain that… [with] a little bit more information to say briefly, this is what we do and why." **(P2)**
	Balancing standardisation with professional judgement	"Because the more options that you add in, the more complicated it then becomes." **(P2)**
		"Each individual should plan as they really would if they saw this patient chair-side tomorrow in their current place of work." **(P3)**

Table 2. Prototype refinements arising from the qualitative evaluation

Issue identified during evaluation	Refinement made	Status
Participants wanted an opportunity to familiarise themselves with the platform and workflow before reviewing study cases	A demonstration case was added to allow specialists to practise using the platform before undertaking treatment planning	Implemented
Charting all teeth created unnecessary complexity within the remote treatment-planning workflow	The dental chart was refined so that only teeth present in the mouth were displayed for charting and treatment planning	Implemented
Participants identified a need for clearer information before first accessing the platform	A clear welcome email linked to the study was developed, providing introductory information and guidance before participants accessed the platform	Implemented
Instructions and navigation required greater clarity	User instructions and onboarding information were revised to provide clearer guidance on navigating the platform and completing treatment plans	Implemented

Discussion

This study used qualitative evaluation to inform the refinement of a prototype web-based platform for remote specialist treatment planning in paediatric dentistry. The findings suggest that remote treatment planning was considered feasible when sufficient, appropriately presented clinical information was available, and that specialists perceived potential value in improving access to specialist input. However, having the necessary clinical information was only one part of this. Usability, appropriate onboarding, technical reliability, clear communication regarding the use of clinical data, and preservation of professional judgement within the digital workflow were also important considerations for future development and implementation.

Taken together, the findings suggest that the potential value of remote specialist treatment planning lies not in replacing face-to-face assessment, but in providing a structured mechanism through which specialist expertise could be incorporated earlier or more readily within existing care pathways. Further evaluation is required to determine whether this approach can deliver reliable treatment-planning decisions and meaningful benefits for patients and services.

A central finding was that the perceived feasibility of remote specialist treatment planning depended on the availability, quality and presentation of appropriate diagnostic information. This is consistent with the wider teledentistry literature, which suggests that remote assessment using clinical photographs can achieve diagnostic performance comparable to conventional clinical examination for dental caries, although diagnostic performance varies according to image acquisition and assessment methods.[17, 27]Systematic review evidence specifically in children and adolescents has similarly demonstrated that photographic assessment can provide comparable diagnostic accuracy for dental caries and enamel defects, although heterogeneity in image-capture methods and personnel limits the generalisability of findings. [17] More recent evidence has strengthened support for photographic assessment, with a systematic review and meta-analysis reporting clinically acceptable accuracy for caries detection using clinical photographs.[28]

The present findings nevertheless highlight an important distinction between remote diagnosis or screening and remote formulation of a comprehensive treatment plan. Participants considered appropriate radiographic information, particularly bitewing radiographs where clinically indicated, essential to confident treatment planning and identified incomplete diagnostic information as capable of altering clinical decisions. Remote specialist treatment planning may therefore require a more comprehensive and standardised diagnostic dataset than remote screening alone. Ensuring that appropriate radiographs, intra-oral photographs,

and relevant clinical information are available and presented consistently may be a prerequisite for reliable remote treatment-planning decisions. This provides an important focus for subsequent evaluation of the platform, in which agreement between remote and chairside specialist treatment plans will need to be established.

Usability and familiarity with the digital workflow were also important influences on participants' confidence in using the platform. Although the underlying concept of remote treatment planning was viewed positively, relatively minor usability issues, including unclear instructions, unfamiliar image-manipulation functions, and interruptions to platform access, were perceived as potential barriers to engagement. This is consistent with the wider digital-health literature, in which successful implementation is influenced not only by the clinical or technical capability of an intervention, but also by its fit with existing workflows, technical reliability, and the knowledge and confidence of intended users. Systematic review evidence has identified workflow disruption, changes in professional roles, and the requirement for new competencies as recurrent barriers to successful eHealth implementation.[29] More recent systematic review evidence similarly identifies inadequate training, low user confidence, disruption to clinical workflows, and limited organisational preparedness as important barriers to the adoption of digital interventions in healthcare. [30]

The perceived value of introductory guidance and a practice case in the present study therefore represents more than a preference for additional training; it suggests that familiarisation should form part of the intervention itself. This is

consistent with literature highlighting the value of iterative refinement with intended users during digital intervention development.[31] For remote specialist treatment planning, onboarding should therefore enable clinicians to become familiar with image manipulation, data entry, and the treatment-planning workflow before undertaking remote case review. Addressing these relatively modifiable usability factors during prototype development may reduce avoidable variation attributable to interaction with the platform rather than differences in clinical decision-making.

Participants perceived improved access to specialist expertise as an important potential benefit of remote treatment planning, particularly for children managed in areas where specialist paediatric dental input is less readily available. This perceived benefit is particularly relevant in the context of the geographical distribution of the UK paediatric dental workforce. As outlined in the Background, workforce mapping has demonstrated substantial geographical inequalities in access to dental specialists across the UK.[1, 2] More recent mapping of paediatric dental care pathways in England has shown that specialist provision remains unevenly distributed and that limited availability of specialists and consultants contributes to significant regional variation in the services and referral pathways available to children. [32]

Remote treatment planning could therefore allow specialist expertise to be accessed beyond the settings in which specialists are physically based. Importantly, this should not be interpreted as a substitute for appropriate face-to-face specialist care or as a solution to underlying workforce shortages. Rather, remote case review could potentially complement existing pathways by enabling

specialist input into treatment planning where geography or service configuration limits timely access. However, any equity benefit would depend on referring services having the capability to obtain and submit diagnostic information of sufficient quality, including appropriate radiographs and intra-oral photographs. Services with limited access to specialist expertise may also face constraints in the infrastructure, equipment or skills required to capture this information, potentially limiting access to remote specialist review. Implementation would therefore need to include appropriate support for participating services to avoid inadvertently widening existing inequalities in access to specialist care. Whether such an approach improves equity of access, referral quality, or subsequent patient care remains to be established through further evaluation.

A further consideration was the balance between standardisation and professional judgement. Participants valued structured case submission and treatment-planning processes but cautioned against overly prescriptive options that might not reflect the complexity of individual clinical decisions. This tension is particularly relevant to remote treatment planning, where standardisation may support completeness and systematic case review, while sufficient flexibility is required to accommodate individual patient circumstances and specialist clinical judgement. Future refinement should therefore aim to provide sufficient structure to support consistent remote assessment without constraining authentic clinical decision-making.

Future implementation would also require consideration of information governance, consent and clinical accountability. Participants highlighted the importance of ensuring that patients and families understand how clinical information and images would be used and shared for remote specialist review. Clear governance arrangements would also be required to define where clinical responsibility and risk sit when specialist treatment-planning advice is provided remotely but treatment is delivered by another clinician or service. Professional indemnity, specialist capacity and allocation of time within job plans, and integration with existing referral and clinical information systems were also identified as important considerations for implementation. These organisational and governance requirements will need to be addressed alongside further evaluation of the clinical effectiveness of the approach.

Strengths and Limitations

Involving specialist end users at this early stage identified practical problems with the prototype before subsequent evaluation, particularly around clinical information requirements, usability and workflow.

The use of a semi-structured focus group allowed participants to discuss and challenge different perspectives, while reflexive journalling, an audit trail, and discussion of emerging interpretations with a second researcher supported transparency in the analytical process.

Several limitations should be acknowledged. The study involved a single focus group with three specialists in paediatric dentistry and was intended to inform refinement of the prototype rather than provide findings that are transferable across the wider specialist workforce. Participants were recruited from a professionally familiar population and had pre-existing professional relationships with the facilitator. This may have influenced the discussion, including participants' willingness to express negative views or criticism of the platform or the wider concept of remote specialist treatment planning. Conversely, professional familiarity may have facilitated detailed discussion of practical and clinical issues. Reflexive approaches were used to acknowledge and consider these potential influences during analysis. The perspectives of clinicians and services responsible for capturing and submitting clinical information for remote specialist review, and of children and their families, were not explored.

Participants' experience of the prototype was limited to its use within the study context and may not reflect experiences arising from sustained use within routine clinical practice. The study evaluated specialists' experiences and perceptions and did not establish the accuracy, reliability, efficiency, or clinical effectiveness of remote treatment planning. Consequently, perceived feasibility and potential benefit should not be interpreted as evidence that remote treatment planning produces equivalent treatment decisions or improves patient or service outcomes.

Future Directions

The next stage of evaluation should examine whether remote specialist treatment planning using the refined platform produces decisions that are consistent with chairside specialist assessment. Quantitative assessment of treatment-plan agreement should be complemented by evaluation of usability, completion time, technical performance, and clinician experience. Further work with a broader specialist population will also be required to determine how the platform performs across different clinical and service contexts and whether the perceived benefits identified in this study translate into measurable improvements in access, efficiency, or patient care.

Conclusion

This qualitative evaluation identified factors relevant to the refinement and future evaluation of a prototype platform for remote specialist treatment planning in paediatric dentistry. Participants considered remote treatment planning potentially feasible and valuable when supported by sufficient diagnostic information, clear and reliable digital workflows, and appropriate user preparation. Participants also identified the importance of preserving professional judgement within a structured treatment-planning process and providing clear information regarding the use of clinical data.

These findings informed refinement of the prototype and provide a basis for subsequent evaluation of whether remote specialist treatment planning can produce reliable treatment decisions and contribute meaningfully to paediatric dental care pathways.

List of abbreviations

DGA — Dental general anaesthesia

Ethics approval and consent to participate

Ethical approval was obtained from the University of Liverpool (Approval Number: 13068). All participants provided written informed consent prior to participation.

The study was conducted in accordance with the principles of the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

The qualitative data generated during this study are not publicly available because of the potential for participant identification within the small specialist sample. Anonymised data extracts may be available from the corresponding author on reasonable request, subject to ethical and confidentiality considerations.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

SM: Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Project administration; Writing – original draft; Writing – review & editing.

JYD: Supervision; Writing – review & editing.

MM: Supervision; Writing – review & editing.

GB: Writing – review & editing.

SA: Supervision; Methodology; Writing – review & editing.

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Additional file 1

File format: DOCX

Title: Semi-structured focus group topic guide

Description: Topic guide used to explore specialists' experiences of the prototype web-based platform, including diagnostic information requirements, usability, perceived clinical value and considerations for future implementation.

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