Full title

Implementation issues and barriers for assessing oral health for dependent patients after stroke: A qualitative study.

Abstract

Objectives:

To explore implementation issues and potential barriers for assessing oral health in dependent post-stroke patients.

Methods:

Semi-structured interviews were conducted with a purposively identified sample of healthcare service providers who work in two National Health Service (NHS) Trusts in the north of England. Interviews were conducted until data saturation was achieved (n = 30). Data were analysed using the constant comparative method.

Results:

Six themes were drawn out in this study, which described potential barriers to assessing oral health in post-stroke patients, aspects of oral health that need assessment, streamlining the oral health assessment, input methods for oral health assessment, characteristics of assessors, and how oral care should be planned.

Conclusions:

Assessment of oral health for post-stroke patients has been viewed as a complex task because of several identified barriers. Several suggestions have been proposed to overcome these barriers, aiming to enable more feasible and effective oral health assessments for post-stroke patients.

Clinical Significance

The findings from this study have the potential to contribute to developing oral health measurement instruments that might be more successfully implemented and guide oral care planning for dependent patients after stroke.

Keywords

Oral Health, Stroke, Implementation Science, Qualitative Research, Diagnostic Testing, Health Services

Introduction

Disability and subsequently dependency for personal care after stroke can occur due to physical causes, mental causes or both [1, 2]. One of the main physical-related causes of disability after stroke is the muscular paralysis that occur in the contralesional side of the body [1]. This can be compounded by sensory disturbances [3]. On the other hand, mental-related causes of disability after stroke could affect patients' memory, learning, and awareness, and thus their ability to independently undertake activities of daily living [2, 4].

Due to physical and mental impacts reducing a person's ability to self-care, dependent patients after stroke have been reported to experience deterioration in their oral health [5]. Oral health conditions that have been reported to worsen in patients after stroke include poor oral hygiene, gingivitis and severe dental infections [6].

One of the most frequently reported factors in the literature that explain the decline in oral health of the dependent patients, is the lack of adequate knowledge about oral health and care among medical personnel and caregivers [7]. This lack of knowledge issue is mainly manifested in the inability to easily detect oral health problems in the patients [8]. It was also manifested in feelings of not being able to undertake the right actions to resolve obvious oral health problems [8]. These manifestations may explain why both healthcare professionals and caregivers have explicitly expressed a need for an oral health measurement instrument that could be used to guide oral care planning for patients with dependency [8].

While several oral health measurement instruments have been developed to address this need in the last two decades [9, 10], they have never been widely adopted in daily clinical practice [8]. This may be because these instruments have not been developed while considering the factors that are important for their implementation success [11]. Thus, to develop an oral health measurement instrument that has the potential to be successfully and widely implemented,

factors important for implementation success should be identified and explored through a qualitative methods approach [12]. The aim of this study was to explore and understand service providers' experiences and views about implementation issues and potential barriers for assessing oral health in dependent post-stroke patients.

Materials and Methods

Design

This qualitative study employed the generic qualitative approach, often utilized when the research question does not align precisely with the constraints of established qualitative methodologies. This approach allows for deviations from the rigid rules and guidelines of the specific qualitative methodologies to better match the research purpose. In fact, the generic qualitative approach is increasingly practiced in the healthcare research field [13].

Theoretical Framework

This study has embraced the ontological position of subtle realism, which accepts that reality exists independently and externally of individuals, yet can only be understood through human minds and socially constructed meanings [14].

Epistemologically, the study has adopted the inductive reasoning approach to knowledge acquisition. However, it is important to note that employing "pure" inductive reasoning in data analysis was not entirely feasible. This is because the authors have previous acquired knowledge on this topic, which would inevitably influenced the data analysis process [15].

Interpretivism is the other epistemological stance adopted in this study, implying that individuals in the social world represent distinct and unique cases and are influenced by the process of being studied. Consequently, the researcher cannot be detached from the

phenomenon under investigation. Adopting this position enables researchers to be transparent and reflective about their assumptions, biases, and values. Thus, they can make deliberate effort to be as natural and non-judgmental in their approach as possible [15].

Study Setting and Recruitment

The sampling method used in this study was purposive (i.e. criterion-based) sampling utilising a maximum variation technique. The sampling strategy aimed to identify and recruit participants with distinctive features and characteristics based on previously defined criteria, to generate a sample that was capable of adequately reflecting the true depth and breadth of the phenomenon under investigation [16]. The participants were recruited from two National Health Service (NHS) Trusts in the north of England, who have at least three months' experience with patients after stroke and whose roles and duties are relevant to the patients' oral health and care.

Participants were recruited by working closely with gatekeepers in the two NHS Trusts. The potential participants were approached and provided with a brief verbal description about the study and its aims, as well as a written participant information sheet. If individuals were interested in participating, a mutually convenient time was arranged for interview, with written informed consent being received before undertaking the interview.

Data were collected and analysed concurrently, guided by the principles of theoretical sampling. The advantage of utilising this approach is that it can create an opportunity for identifying new avenues that could be investigated by recruiting new participants who are relevant to those dimensions [17]. Participants recruitment was completed within a seven-month period, when data saturation was achieved upon completion of the 30th interview.

Data saturation was defined as the point at which conducting additional interviews did not yield new concepts or ideas [17].

Inclusion and/or Exclusion Criteria

Several criteria were used to define the purposive sampling strategy: locations where the stroke services are provided, profession of healthcare provider, experience and gender (Table 1).

Data collection

One-to-one semi-structured interviews were used in this study for data collection. The interviews were conducted with the help of a topic guide employing open and non-leading questions, which were answered by all the participants. The topic guide was initially developed based on the literature. The content validity of the topic guide was further supported by feedback from the Stroke Patient and Carer Panel group, a collaboration between the National Institute for Health Research Clinical Research Network North East and North Cumbria and the City Hospitals Sunderland NHS Foundations Trust. This group consists of stroke survivors, their family carers and service providers. Throughout the study, the topic guide was continuously refined based on the new data that have been collected and analysed. The total number of questions in the last version of the topic guide was 30 questions. These questions covered four major topics: experience, role and duties of the participant, participant's perceptions regarding oral health in patients after stroke, participants' perceptions regarding oral health assessment in post-stroke patients, and participants' perceptions regarding three published oral health measurement instruments that have been previously used with patients after stroke (Supplementary Material 1). In addition to the predefined questions, unique and unanticipated dimensions revealed during the interviews were explored by diverging from the topic guide.

The interviews were conducted by the first author (FB) who underwent substantial training in interview skills and analysis and who had no personal or professional relationship with the interviewees. All the interviews were undertaken face-to-face on NHS premises.

All the interviews were digitally recorded using a Philips DPM7000 voice recorder. Each digital file was anonymised using a study number. The anonymised recordings were transcribed verbatim by a professional transcription company, and the generated transcripts were crosschecked for accuracy against the original recordings by the first author (FB).

Data from the study are available for sharing upon reasonable request to the corresponding author.

Data analysis

Data were analysed utilising the constant comparative method with the assistance of NVivo 12 ® software by the first author (FB). The first step in data analysis was familiarisation, which began by listening to the original professionally transcribed records verbatim while checking transcription accuracy. In this step, the interview transcripts were also read and reread, which was accompanied by recording initial ideas and comments about each interview.

The coding process was then undertaken following the method described by Corbin and Strauss [18]. The first step in the coding process was a line-by-line open coding, initially labelling, categorising and organising the qualitative data. The line-by-line coding was undertaken to allow the generation of adequate numbers of codes that could later be used to robustly establish the overriding themes [18]. Axial coding was the second step in the process. It explored the relationships between the codes that were established during the open coding step by utilising deductive and inductive reasoning. The last step was selective coding, which is more abstract than the previous steps. It was completed by identifying a central theme within

the study findings and exploring the relationships between this theme and other themes to eventually build a picture of reality.

Ethical Considerations

Ethical approval prior to conducting the study was obtained from the Faculty of Medical Sciences Ethics Committee at XXXXXXXX University, UK (FMS-EC 1609/6994/2018). Written informed consent was obtained from participants.

Rigor and reflexivity

The findings and interpretations in this study were independently cross-checked by the other authors (JD, RW, BA and GM) at different stages of data collection and analysis to minimise potential biases and enhance the rigour of the study. Further details of the methods used have been described elsewhere [19].

Results

Characteristics of participants

Thirty service providers were interviewed in this study with equal numbers from the Newcastle upon Tyne Hospitals NHS Foundation Trust and the Salford Royal NHS Foundation Trust. Nine participants were from a dental background, while the remaining 21 participants were from medical, nursing, and speech language therapy backgrounds. Detailed characteristics of the 30 participants are presented in Table 2 and can be cross-referenced to the references in parentheses following each quotation. The average duration of the interviews was 40 minutes and ranged from 25 to 67 minutes. Table 3 presents a summary of the main findings of this study.

Oral health assessment barriers

The participants in this study reported many barriers that can hinder the assessment of oral health for patients after stroke. Communication problems in post-stroke patients due to neurological or cognitive deficits was one of the barriers suggested to hinder the implementation and use of an oral health assessment. This was considered especially true in the assessment of orofacial pain due to the subjective nature of pain.

> *"It's hard to assess pain objectively because it's a very subjective thing about how someone feels about their mouth, so it can be hard to assess pain if someone's having difficulty communicating that after a stroke"*
>
> Participant with identification number 19 (P19)

Participants have also suggested that some post-stroke patients might refuse or be unable to cope with the oral health assessment.

> *"There are some people who have got quite marked oral sensitisation and won't let you look in their mouth. So, I'm guessing that, from the point of view of an elderly population, with potential for TMJ dysfunction there may be difficulties physically opening their mouth"* (P28)

To overcome these patient-related barriers, participants proposed suggestions about how the measurement instrument should look like and who should perform oral health assessments. These suggestions are presented and discussed in the next themes.

It was suggested that the stroke team members might not feel confident about their skills and knowledge to perform oral health assessments, which may prevent them from undertaking those assessments.

"But then I would say that being just a general ward doctor, I don't think I'd be very good at doing a proper dental assessment because I wouldn't know all the stuff that needs to be looked at" (P27)

Offering dental education and training for the stroke team members, therefore, were perceived to be important for the success of the implementation of oral health measurement instruments. Generally, participants thought that the initial training and education should focus on selected members of the stroke team who can be then responsible for educating and training other members. This was suggested due to the perceived difficulties in providing the training for the whole stroke team at once. The participants valued the theoretical and practical aspects of training and education by indicating the need for lectures and hands-on sessions.

"I think the difficulty that I have, especially in the nursing ways of working, is having the whole team available to be part of training. The way I always see training is that you would identify champions or people who are able and willing to take on an element of care and champion it so other people can ask of them… I think that you could provide specific sessions, you could provide PowerPoint sessions, practical sessions" (P29)

The perceived unfavourable attitude and low priority of stroke team members toward oral health and care is another factor that was thought to reduce their willingness to perform oral health assessments.

"I would like patients, as well as all the healthcare teams, to view mouth care and mouth health as very important. If everybody thinks it's more important, then it might become more normal for people to ask about it, to expect to be asked" (P2)

Thus, to have a successful implementation, participants believed that there is a need to raise awareness among the stroke team about the importance of oral health and its assessment for patients after stroke. This could be done by explaining the potential impact of the oral health assessment on the quality of oral care provided, as well as its positive impact on patients' oral health status, overall general health and quality of life. Raising awareness can also be supported by telling real patients' stories that demonstrate the significance of oral health and care for them after stroke.

""Why am I doing this [oral health assessment]?" But actually, with a good education system and a good training system, good patient stories of horrific mouths or somebody saying how much pain they were in, you know, whatever the experience is, then it relates that assessment to real life, and I think that would really support it being carried out" (P20)

Because the interviewees believe that stroke wards have limited staff, they thought that the stroke team may not have the time to incorporate an oral health measurement instrument into their practice. In addition, if the use of the measurement instrument requires specialised tools such as dental mirrors, this could be another potential barrier for the assessment because these dentally focused tools are not usually available outside dental settings.

"We don't have mouth mirrors, so we wouldn't be able to use that [oral health measurement instrument]" (P11)

In addition, if the implemented oral health assessment is not part of the Trust's policies and standard operating procedures or is not compatible with the working environment, this could be another potential barrier for successful implementation.

"It should be part… so, most assessments in care are now provided within, in protocols and standard approaches. So, it would be to ensure that it is part of a stroke unit's normal practice." (P4)

Oral health aspects to be assessed

Some participants recommended that any oral health problems occurring in post-stroke patients need to be assessed by the oral health measurement instrument. However, others suggested that it might not be beneficial to assess oral health problems that cannot be treated within the hospital setting. In addition, others reported that it is not necessary to assess the aspects of oral health already assessed by other instruments (e.g. the ability to swallow and speak). Furthermore, oral health problems that were not perceived as prevalent among post-stroke patients were not viewed as sufficiently necessary to be included in the oral health measurement instrument (e.g. orofacial pain).

"So, I think swallow I wouldn't be happy with adding for a stroke patient, because swallow is being assessed in quite a lot of depth … all of our patients have a swallow assessment as part of their admission." (P28)

Besides oral health problems, the participants also suggested to measure and record the risk factors that can cause oral health deterioration in post-stroke patients as part of the oral health measurement instrument. For example, they thought it necessary to record if a patient is experiencing neurological deficits that could lead to oral functional disturbances. In addition, they suggested that the measurement instrument needs to record if the patient is experiencing any general health condition or receiving any medical treatment or intervention that can impact their oral health status. Another risk factor proposed for assessment is the patients' ability to perform oral care independently. The recording of these risk factors was considered to be crucial because they can significantly change the nature of oral care provided.

"[The assessment should include] any oral health conditions, any medication that they're on that might lead to worsening dry mouth conditions that we need to be aware of, because some medications cause more dry mouth" (P19)

Lastly, many participants believed that the oral health measurement instrument needed to document the oral care provided to dependent patients after stroke. This was perceived to be important because it would allow for improvement in the overall quality of care.

"I would probably have a tick box type thing, things that you do twice a day. Some patients might have dentures … So, you tick the box every night, that the dentures have been taken out, they've been cleaned thoroughly and they've been sterilised." (P8)

<u>*Streamlining oral health assessment*</u>

There was an overwhelming agreement between the participants that the oral health measurement instrument needed to be as simple as possible because this could play a significant role in overcoming several barriers when assessing oral health in patients after stroke. The simplicity of the oral health measurement instrument was suggested to be achieved by designing it to be easily used and understood.

"I think it does need to be simple and clear for non-dental professionals. I think we need to mindful that" (P2)

Participants suggested the usability of the measurement instrument could be optimised by being as brief as possible. Thus, particular attention should be paid to the number of questions or items in the instrument, as well as the overall word count. In fact, some participants suggested that the entire instrument should be presented on a single sheet of paper.

"There's a lot to read through. When you work on a very busy ward like this, I think it could do with being simplified a bit" (P10)

Another suggestion to improve the usability of the instrument was to simplify the method of recording instrument scores. For example, some participants suggested using a tick-box format. Others recommended using pictures of the mouth to mark the problematic area of oral health.

"The easiest thing is to have a map of a mouth and then you mark on the map so that if you see something that you think is abnormal, you just mark it across on the picture… So, I think the simpler you make it, it makes it easier for people to use the tool" (P22)

Improving the comprehensibility of the oral health measurement instrument was the other aspect considered to be necessary regarding the instrument's simplicity. Many participants believed that the new instrument should match the knowledge level of the service providers who would undertake this type of assessment. It was also thought that providing instructions on how to undertake the assessment (i.e. in a written format or photographic images of the oral health conditions) would help in improving the comprehensibility of the instrument.

"Even if there were some images on the screen of the things you might be looking out for, to help nursing staff identify whether their patient's tongue or their mucosa is abnormal in any way" (P5)

Input methods in oral health assessment

It has been suggested that it could be easier to directly ask post-stroke patients about their oral health status especially if they do not experience any problem with their communication. However, for patients who experience difficulties verbally communicating their responses, participants suggested visual aids be used that can enhance communication. Nevertheless, these

communication aids have been criticised by some participants who thought that they are not always a valid communication mean to use with patients after stroke.

> *"Asking patients, so if the patient is in a position to talk again, that makes the job a lot easier … If the patient is in a position to understand what's happening or in a position to communicate, then they would tell us exactly."* (P23)

On the other hand, for patients who cannot communicate due to cognitive reasons, it was suggested that it would be necessary to adopt a more clinician-reported approach. This could be particularly problematic when assessing the orofacial pain in those patients due to the subjective nature of pain. The participants suggested several techniques to assess the pain in the orofacial area. One of the suggested techniques was to observe patients' behaviours during eating, drinking or the oral care process. Others suggested looking for signs of pain after intentionally initiate it through palpating areas that are suspected to be the potential sources of the orofacial pain.

> *"I know it sounds really bad, but sometimes if a patients has got a stroke and cannot communicate, it's hard to know exactly where the pain is, and obviously you can brush someone's teeth, and if they're wincing or anything, you can obviously put that down to them having pain"* (P30)

Characteristics of assessor

While the participants agreed that all the stroke team members should be able to perform the oral health assessment, they felt that completing the assessment need to be assigned to specific members from the stroke team to ensure that it would be done consistently. Participants considered several factors when choosing the preferred speciality of the service providers who should perform the assessment. One suggestion was that the assessment should be performed

by service providers with the minimum skills and knowledge necessary to successfully administer it.

"I think that would be probably maybe more easy for a medic that is more trained or is maybe orally aware … how they would assess that" (P21)

The participants also proposed that the assessment should be performed by service providers whose roles and duties are congruous with this type of assessment. Other participants believed that service providers who spent the most time and had the most frequent contact with the post-stroke patients were the best candidates to perform the assessment. This is because patients are familiar with those service providers and thus patients are more likely to accept being assessed by them.

"No, I think nurses should just be doing that, because physios go to the patients maybe for 10, 15 minutes in a day, doctors go to them probably around the same. It's the nursing team that see the patients more, have more dealings with the patients, probably know the patients better." (P18)

<u>*Oral care planning*</u>

The ability to produce a feasible oral care plan based on the assessment outcomes was considered to be crucial to successfully implement the oral health measurement instrument. Some participants believe that there is a need for rigid guidelines to help establish the appropriate care plan based on oral health assessment outcomes. This was suggested by the participants from the medical, nursing, speech language therapy fields to overcome the limitations in their dental knowledge as some had raised concerns about their inability to correctly interpret assessment scores.

"It's good just to get the scores and then generates ... But then what do you do with it? You know, that's the problem" (P13)

However, other participants believed in a more flexible approach when establishing the oral care plan by discussing the outcome of oral health assessment among a multi-disciplinary team, which can also involve patients and dental services providers to make decisions about the required actions. The rationale for this suggestion was to attempt to establish oral care plans that better suit each patient's needs.

> *"Or what we do is we design a care plan to fit round the patient's routine ... then we go and check in maybe about a month's time to see how they are getting on. We can maybe jiggle that care plan again to suit the patient"*
>
> (P12)

Discussion

This qualitative study explored implementation issues and potential barriers for assessing oral health in dependent patients after a stroke, as well as methods to overcome these barriers.

One of the major patient(s)-related barriers, identified in this study, to assess oral health in dependent patients after stroke is the potential limitation in the patients' communication ability. The participants, therefore, discussed the utilisation of different approach of measurement inputs to overcome this barrier. Even though participants acknowledge the existence of this barrier, some still advocated using a patient-reported approach when assessing the oral health to guide patient's care plan. This might be because of the several advantages that can be attained from adopting such an approach. First, this approach can help in empowering patients and facilitating provision of a more patient-centred care [20, 21]. In addition, it can be more useful than the clinician-reported approach when evaluating a medical intervention that aim to enhance the patient's quality of life such as treatments provided for end of life patients [20]. Furthermore, it has been suggested that patient-reported approach is more valid and reliable than other approaches when assessing symptoms that cannot be directly observed such as pain

[20, 21]. However, as this approach is highly dependent on patient's mental and psychological states, any deterioration in those may adversely affect the validity and reliability of this approach [21]. This may explain why other participants in this study have advocated using the clinician-reported approach to overcome the communication difficulties experienced by many post-stroke patients.

Two further important barriers, mentioned by participants, were the perceived unfavourable attitude and low priority of medical service providers toward oral health and care, and their limited knowledge in this arena. To overcome these barriers, participants appreciated the importance of dental education and training. The significance of education and training in the success of implementing any medical intervention is well recognised in the scientific literature and represent an essential domain within most implementation and behaviour change theories [11, 22]. In fact, in a study exploring facilitators and barriers for implementing screening tool among emergency nurses, knowledge was among the most important of factors [23]. Several studies have also shown that education improves service providers confidence and competence as well as the quality of care that is then provided [24, 25].

One of the main environment-related barriers, stated in this study, was the limited staff in stroke wards, which may result in stroke team not having the time to incorporate an oral health measurement instrument into their practice. To overcome this barrier, participants appreciated the significance of instruments' content in relation to improving its usability and feasibility. The suggested aspects of oral health to be measured in this study appears considerably different from the previously developed oral health measurement instruments for dependent adults including post-stroke patients [9, 10]. For example, participants in this study have pragmatically suggested limited the number of oral health problems to be measured as part of any measurement instrument. This limitation was mainly undertaken in order to utilise the NHS Trust recourses in the most effective way. In addition, they suggested to assess other aspects

that are not part of the oral health construct but were viewed to be significantly relevant to oral care planning such as assessing risk factors for oral health. These differences between the findings in this study and previously developed measurement instrument might be attributed to the consideration of medical service providers' inputs in this study, who have not been consulted during the development of many previous instruments [9, 10].

Lastly, the ability to establish a feasible oral care plan based on the measurement instrument's outcomes was considered to be crucial for successful implementation. Some participants preferred to adopt the prescriptive decision-making approach, which is the most common approach for decision-making in the nursing field. This approach usually utilises decision trees or algorithms that produce clinical decisions based on probability calculations of every decision outcome [26]. However, utilisation of this approach might be limited when it is not possible to establish a clinical guideline due to the lack of conclusive scientific evidence in support of specific interventions. In addition, this approach does not consider social and environmental factors, or factors beyond the biomedical algorithms [27]. In contrast, other participants adopted a more flexible and subjective approach, which is consistent with the descriptive decision-making approach. This approach depends on the clinician's knowledge, experience and intuition. While this approach can potentially maintain a more holistic view during the decision-making process, it can present a higher risk of different types of bias due to its subjective nature [27].

Strengths and Limitations of the Work

There were a few limitations in this study that may weaken its applicability and transferability. For example, as the findings of this study were based on the views of service providers who work within the NHS, the ability to transfer the findings to settings with different healthcare models is perhaps limited. In addition, this study did not recruit post-stroke patients, and thus information about them was based only on service provider perceptions, which may not

triangulate to those who were being cared for. Lastly, even though a purposive sampling technique was utilised in this study, it is not possible from an ethical perspective to adopt a "true" purposive approach. This is because it was the participant's decision to take part in the study, and thus it is possible that service providers with a greater interest in oral health were more inclined to accept to participate in the study.

Recommendations for further research

The findings from this study have the potential to aid in the development of valid and feasible oral health measurement instruments for post-stroke patients. This goal might be most effectively achieved through the utilization of the co-design method. The co-design method is an iterative process involving collaboration between relevant stakeholders and researchers. This collaboration aims to develop a novel oral health measurement instrument, informed by the findings of this study and other scientific evidence [10, 28, 29]. While this method demands considerable time, resources, and effort, it has the potential to maximize the acceptability and effectiveness of the oral health measurement instrument [30].

After the development of the new oral health measurement instrument, pilot testing is necessary to assess its content validity and feasibility. This assessment can be achieved by conducting a qualitative study using the cognitive interviews approach with end-users [31, 32]. The final stage in the development of an oral health measurement instrument is field testing. This stage involves a large-scale quantitative study to evaluate the instrument's measurement properties [33]. Finally, although the interpretability of the new measurement instrument will be primarily established during the co-design phase, analysing data collected during the field-testing phase could further refine the accuracy of the clinical interpretations assigned to the instrument's quantitative scores [33].

Implications for policy and practice

This study revealed the complexity involved in assessing oral health for post-stroke patients. This insight can help policymakers appreciate the intricate challenges associated with such assessments. Consequently, this may lead to increased allocation of resources and financial support for this type of assessments. Additionally, findings from this study could aid researchers in developing novel oral health measurement instruments that can be successfully implemented and guide oral care planning for dependent patients after a stroke.

Conclusions

In this qualitative study, implementing and using an oral health measurement instrument for post-stroke patients was viewed as a complex task because of several barriers. These barriers can be related to patients, service providers or the environment in which care is being delivered. Participants considered the unique features of the measurement instrument, characteristics of assessors and oral care planning to be important factors for overcoming these barriers and for achieving successful implementation and application of any instrument.

Tables

Table 1. Summary of the purposive sampling strategy. Table adapted from corresponding PhD thesis [34].

Criteria	Details
Location	1. Newcastle upon Tyne Hospitals NHS Foundation Trust 2. Salford Royal NHS Foundation Trust
Profession	1. Stroke team members a. Physician b. Speech and language therapist c. Nurse 2. Dental professionals a. Dentist b. Hygienist c. Dental therapist d. Dental nurse
Experience	1. Less than five years 2. Between five and 15 years 3. More than 15 years
Gender	1. Male 2. Female

Table 2. Characteristics of the study participants. Table adapted from corresponding PhD thesis [34]. (Pn = Participant identification number)

Identification number	Years of experience	Profession	Gender	Location
P1	5 - 15 years	Physician (Consultant)	Male	Newcastle
P2	< 5 years	Dentist (Speciality trainee)	Male	Newcastle
P3	5 - 15 years	Dentist (Senior officer)	Female	Newcastle
P4	> 15 years	Physician (Consultant)	Female	Newcastle
P5	5 - 15 years	Speech and language therapist	Female	Newcastle
P6	5 - 15 years	Nurse (Rehabilitation ward)	Female	Newcastle
P7	< 5 years	Nurse (Rehabilitation ward)	Female	Newcastle
P8	5 - 15 years	Dental hygienist	Female	Newcastle
P9	< 5 years	Nurse (Rehabilitation ward)	Female	Newcastle
P10	< 5 years	Nurse (Acute ward)	Female	Newcastle
P11	5 - 15 years	Nurse (Acute ward)	Female	Newcastle
P12	> 15 years	Dental therapist	Female	Newcastle
P13	5 - 15 years	Nurse (Acute ward)	Female	Newcastle
P14	< 5 years	Speech and language therapist	Female	Newcastle
P15	< 5 years	Dentist (Speciality trainee)	Female	Newcastle
P16	< 5 years	Nurse (Acute ward)	Female	Salford
P17	> 15 years	Nurse (Acute ward)	Female	Salford
P18	5 - 15 years	Nurse (Acute ward)	Female	Salford
P19	5 - 15 years	Speech and language therapist	Female	Salford
P20	< 5 years	Speech and language therapist	Female	Salford
P21	5 - 15 years	Speech and language therapist	Female	Salford
P22	> 15 years	Dentist (Specialist)	Female	Salford
P23	5 - 15 years	Dentist (Senior officer)	Male	Salford
P24	> 15 years	Dental nurse	Female	Salford
P25	> 15 years	Dental nurse	Female	Salford
P26	< 5 years	Nurse (Rehabilitation ward)	Female	Salford
P27	5 - 15 years	Physician (Speciality trainee)	Female	Salford
P28	5 - 15 years	Physician (Consultant)	Female	Salford
P29	5 - 15 years	Nurse (Rehabilitation ward)	Male	Salford
P30	5 - 15 years	Nurse (Rehabilitation ward)	Female	Salford

Table 3. Summary of the main findings.

Barriers for assessing oral health	Suggestions to overcome perceived barriers
1. Patient-related barriers:	
1.1. Communication problems.	• Utilising visual aids to enhance communication. • Adopting a more clinician-reported approach for assessment.
1.2. Refusal or inability to cope with assessment.	• Service providers most familiarity with the patients should perform the assessments.
2. Service provider-related barriers:	
2.1. Lack of skills and knowledge to perform oral health assessments.	• Offering dental education and training to stroke team members. • Improving the comprehensibility of the oral health measurement instrument to match the knowledge level of the service providers. • Providing instructions on how to undertake the assessment to improve the comprehensibility of the instrument.
2.2. Unfavourable attitude and low priority toward oral health and care.	• Raising awareness among the stroke team about the importance of oral health and its assessment
3. Environment-related barriers:	
3.1. Stroke wards have a limited number of staff.	• Developing oral health measurement instrument that is as brief as practically possible. • Simplifing the method of recording instrument scores.
3.2. Lack of specialised dental tools.	• Simplifying oral health measurement instrument
3.3. Oral Health assessment is not part of the Trust's policies and standard operating procedures.	• The task of oral health assessment has to be assigned to specific members of the stroke team. • Assessments should produce a feasible oral care plan.

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