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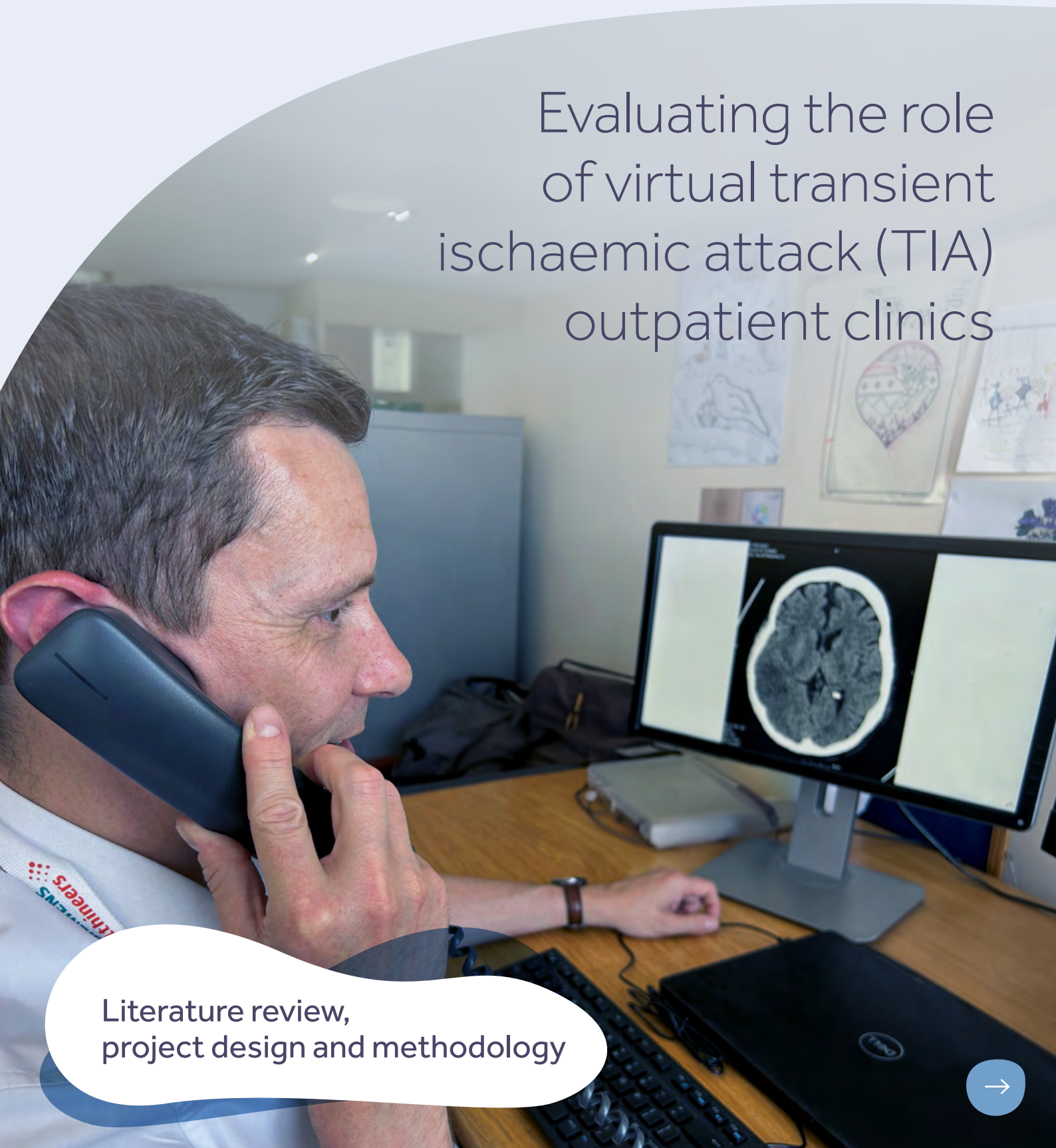
Evaluating the role of virtual transient ischaemic attack (TIA) outpatient clinics



Literature review, project design and methodology

Evaluating the role of virtual transient ischaemic attack (TIA) outpatient clinics

Contents

This document covers the literature review, project design and methodology. The results and recommendations can be found in our main evaluation report, available on our project website **https://bit.ly/HealthOxTIA**

From 1st October 2023 the AHSN Network was renamed the Health Innovation Network with Oxford AHSN now known as Health Innovation Oxford and Thames Valley

1 Rationale for project

1.1 Background information

The NHS Insights Prioritisation Programme (NIPP) was launched in 2021 by the NHS Accelerated Access Collaborative (ACC) and the National Institute for Health and Care Research (NIHR), to accelerate the evaluation of promising innovations, many introduced rapidly during the pandemic, to support post-pandemic ways of working. The programme had a particular focus on innovations which related to remote consultation, remote monitoring, changes to service delivery and health and social care workforce issues.

Local AHSNs and ARCs were invited to bid for funding to enable them to collaboratively work on an evaluation, which met the above criteria. The Oxford Academic Health Science Network and NIHR Applied Research Collaboration Oxford and Thames Valley (ARC OxTV) were successful in securing funding to evaluate the role of virtual transient ischaemic attack (TIA) outpatient clinics.

Stroke is a largely preventable disease. Prevalence, access, and outcome differ by socio-demographic group, with a strong link to socio-economic deprivation. There is concern that models of care that rely on digital capability and access (such as virtual TIA outpatient clinics) may exacerbate existing health inequalities for some groups.

For virtual TIA outpatient clinics [1] each stage of the clinical pathway (referral, initial triage and consultation) can be completed virtually, with hospital attendance limited to necessary investigations (commonly brain and/or carotid imaging, ECG, and blood tests. (See Appendix 1). The effectiveness, efficiency and patient and staff experience in a virtual clinic model are unclear. We evaluated each of these aspects and our findings and recommendations can be found on our project website.

2 Literature review

TIA clinics

Prior to the WHO declaring COVID-19 a pandemic on the 11th March 2020, an absence of literature on Medline and Google Scholar showed that telemedicine and virtual consultation were not widely used in day-to-day UK TIA and stroke care. Clinical guidance for managing TIA and strokes focussed on best practice for investigations and treatment, rather than the delivery of care. [2, 3]

Despite the well-developed literature base for telestroke, this is a distinct and separate area from the rapid implementation of virtual access in TIA clinics due to COVID-19. Telestroke, is now an established model of care [4] with well-developed evaluation metrics including time-to-consult and door-to-needle times [5], this was not the case for managing and evaluating remote access TIA clinics. Evidence in the literature for running TIA clinics virtually, or non-face-to-face, was not available at the time that the COVID-19 pandemic started. Guidance was produced by the Oxford AHSN and GIRFT in May 2020 on rapidly adapting stroke services to accommodate COVID-19 safety guidelines. [1] The report acknowledged that many hospitals would have to quickly change stroke management practice to minimise face-to-face contact. Following this report, we found three published papers since May 2020 which have evaluated the impact of COVID-19 on TIA clinics [6, 7, 8] and one paper which covered the 2020 updates for the Canadian Stroke Best Practice Recommendations, including a section on virtual care delivery. [9]

Yu et al [7] evaluated the effect of telemedicine on broad outcomes of TIA across Ontario, Canada in the period before the pandemic (1st of April 2015 -31st March 2020) and during (1st April 2020 – 31st March 2021). The use of telemedicine consultations increased significantly in this time period. 3.8% of consultations within 90 days of Emergency Department presentation were conducted via telemedicine pre COVID, whereas 83% of consultations were conducted via telemedicine during the COVID period. However, the number of physician consultations remained unchanged before and during COVID-19. There was no significant effect on investigations or medication renewals and crucially, clinical outcomes were also similar, including 90-day all-cause admission, stroke admission and death. [9] Similar findings were also reported by D'Anna et al [8], who assessed outcomes from the rapid outpatient TIA service of the Stroke Department in Charing Cross Hospital, London, UK. They compared two groups of patients pre-COVID-19 (23rd March – 30th June 2019) and during COVID-19 (23rd March – 30th June 2020). In the pre COVID period 180 patients were assessed with face-to-face consultation, whilst during the COVID period 136 patients were assessed, all via telemedicine consultations. There were no significant differences between the proportion of patients admitted to hospital for recurrent TIA/stroke, or cardiovascular cause, in the pre COVID period or during. A significantly lower proportion of patients were admitted to hospital for any nonvascular cause during COVID, which may be explained by patients' tending to avoid attending hospital during the pandemic. The authors also saw a significant decrease in mimic diagnoses in the rapid access TIA clinic during the pandemic which may also be explained by patients with milder symptoms avoiding hospital. [6]

Abdulaziz et al [8] conducted an electronic survey across Canadian stroke prevention clinics or TIA outpatient services which showed that there was a significant variation in how clinics were operating before the pandemic and the effect of COVID on these services during and after the pandemic. There were 33 clinics included in the final

analysis and significant differences existed between them in the management of services such as operational hours, when tests were completed (prior to arrival in the clinic or not), time for results and referrals of patients with an incorrect diagnosis of TIA. Importantly they showed a variation in the duration of wait times to see high-risk patients, with most high-risk patients not seen by the clinics within the two-day target. The authors found that COVID had a negative impact on the clinics with a drop in referrals, particularly from primary care, and an increase in wait times for appointments and test results. Similar to the findings of D'Anna et al [6], they also showed a decrease in the referral of mimic TIA referrals.

As with the two studies mentioned above, one of the biggest impacts of COVID was on the number of virtual consultations. Abdulaziz et al [8] reported that, before COVID-19, 13 out of 33 clinics were providing virtual care on a limited basis, but during the pandemic all but 4 were providing virtual care. Out of these 29 clinics, 20.7% provided virtual care to all patients, 41.4% provided virtual care for low to medium-risk patients and 31% provided virtual care for follow-ups and new consultations. 73% of the 33 clinics planned to continue providing virtual care following COVID-19. The 2020 update of the Canadian Stroke Best Practice Recommendations now includes a section on "Virtual Care for Secondary Stroke Prevention". This section suggests guidance for the delivery of virtual care, including having appropriate triage and testing processes and regulation around using the technology for managing TIAs. [9]

More generally, post-pandemic there has been a continued interest in the use of virtual clinics and telephone or video consultations to provide health care. Increasingly there is an argument that virtual or remote consulting is 'good for some patients but not for all.' [10] The Planning and Evaluating Remote Consultation Services (PERCS) framework identified by Greenhalgh et al [11], emphasises the complex nature of remote consultations where many interacting factors need to be considered to provide high quality remote consultations. Identifying what kinds of patient consultation work best remotely, the potential benefit to patients and their preferences for mode of consultation is paramount [14]. In addition, clinical consultations through telemedicine require a different way of communicating and clinicians need to have the required skills. [10]

The patient and clinician experience of telemedicine services in stroke/ TIA is not well defined in the literature. We could not find any published studies on the perspectives of the patient or clinician on the use of virtual TIA clinics compared to face-to-face and, even in the more established telestroke literature, published qualitative data is limited. One UK qualitative study looked at the clinician experience of integrating telemedicine consultations into a stroke specialist's usual practice. [13] This study compared the experiences of UK and Australian specialists. Specialists from both countries reported that involving key stakeholders early in the planning was essential to ensure success. They felt that there should be enough time allocated for stakeholders to understand and prepare for changes to individual roles and to the overall clinic management. Clinicians found that there was a loss of cues in telemedicine consultations, compared

to face-to-face, and felt that it took time to learn to trust remote staff skills. They considered that there was a specific training need for telemedicine consulting. None of these recommendations would have been possible to follow in the COVID-19 pandemic as the need to reduce face-to-face consultations was urgent.

Health Inequalities

Provision to address health inequalities and digital exclusion should be taken into account when designing TIA services. There is concern that models of care which rely on digital capability and access, such as virtual TIA clinics, may exacerbate existing health inequalities for some groups. The search focussed on issues of inequality facing people with TIA as defined by the Equality Act 2010 and other vulnerable groups.

Some groups are at higher risk of having a TIA including older people (>55+), transgender people undergoing reassignment on gender-affirming hormone therapy, Black and Asian people, people who are pregnant, the LGBTQ community. [26, 27, 28, 29] Women who present with acute transient or mild neurological symptoms are less likely than men to receive a diagnosis of a minor ischaemic cerebrovascular event (TIA). [30] Also, a TIA or stroke more negatively affects their quality of life compared to men. [31]

In addition, some groups experience inequalities in accessing healthcare, for example, people on low incomes and or living in deprived areas are less likely to have their stroke/TIA recognised by health professionals. Also, people with a local social economic status experience TIA and stroke at a younger age and with a more severe deficit, an increased prevalence of smoking is likely to be a major contribution. [32, 33]

Environmental sustainability

There is significant impetus to address the impacts of climate change on health and the contribution of health systems to climate change. [14, 15, 16] In 2020, NHS England became the world's first health service to commit to net zero. [17] Identifying a decarbonisation pathway for a complex system like the NHS is challenging. Significant carbon emissions arise from patient, visitor and staff travel, making up around 14% of the NHS's carbon footprint. Virtual consulting has been signalled as one way in which a reduction in patient and staff travel, and therefore emissions, can be achieved.

Conclusion

The results of this report and subsequent recommendations will be a very important addition to the limited literature and evidence around implementing telemedicine services in UK TIA clinics. This is particularly important if clinics are planning to continue to use telemedicine. Bagot et al [13] noted that UK specialists were particularly concerned about governance procedures, clinical pathways and required resources for implementing telemedicine consultations in stroke. This does not yet exist in UK stroke guidance and will need to be addressed in future clinical guidelines.

3 Project Design & Delivery

3.1 Project design, aims and objectives

All stages of the project were developed and completed by members of the Oxford AHSN, NIHR ARC OxTV and the University of Oxford working collaboratively, alongside working with clinical experts and two PPI members with lived experience of TIA. The primary intended users of the evaluation are healthcare professionals working within TIA services across the five integrated stroke delivery networks (ISDNs) in the South East, with a view to the findings and recommendations also being shared nationally. This report will also be of interest to those who commission TIA services, such as integrated care systems (ICSs).

The overall aim of the project was to generate rapid insights (within an 18 month timeframe) to guide service design, improvement and planning for TIA outpatient clinics.

Specifically, this included whether virtual clinics should continue, the benefits and disadvantages to patients and healthcare professionals of each of the three models (face-to-face, virtual and hybrid) and considerations in relation to resource use, costs and environmental sustainability of the different models.

The objectives were:

1) Describe what a good pathway looks like for face-to-face, virtual and hybrid TIA outpatient clinics and which patients are best suited for each model.
2) Determine the current availability of data on TIA services and work with partners to identify improvements to enhance quality monitoring of services.
3) Describe the views and experiences of patients and healthcare professionals for the different models of TIA outpatient clinic.

A scoping exercise was completed at the start of the project, which included running a theory of change workshop for healthcare professionals involved in providing TIA services across the South East region. This enabled us to test that the objectives for the project were of value to them and would support them to make service improvements. From this scoping work, three main workstreams were developed (pathway mapping study, care pathways and views study), with cross cutting workstreams of PPI, health inequalities, environmental sustainability and health economics.

An equalities and health inequalities impact assessment (EHIA) was completed to assess the potential impact of the differing models of TIA care being evaluated. This included assessing the potential for digital exclusion. The EHIA was supported by a review and summary of the existing TIA/stroke health inequalities literature. This information was considered by each workstream when developing their methodology.

We established early in the project there was very limited local or national data collected on TIA services for ongoing monitoring, therefore, we couldn't progress the care pathways workstream and related objective. At the time of the project, for the Sentinel Stroke National Audit Programme (SSNAP) audit services only needed to provide limited data on patients seen in TIA outpatient clinics, this is currently being reviewed and changes may be made to the dataset. These changes were being considered concurrent with the timeline for our project and not because of it. There is however the opportunity for the outcomes of this project to guide future data collection within SSNAP.

3.2 Project Governance

The governance structure for the project is outlined in figure 1. The NIPP Project group met every 2-3 weeks for the duration of the project and the NIPP Steering group every 2-3 months. Terms of reference were developed for both meetings and whilst there was some overlap in membership, this did not impact on the focus for the meetings or the decisions made. Operational decisions were made at the Project group, with strategic direction and oversight by the Steering group.

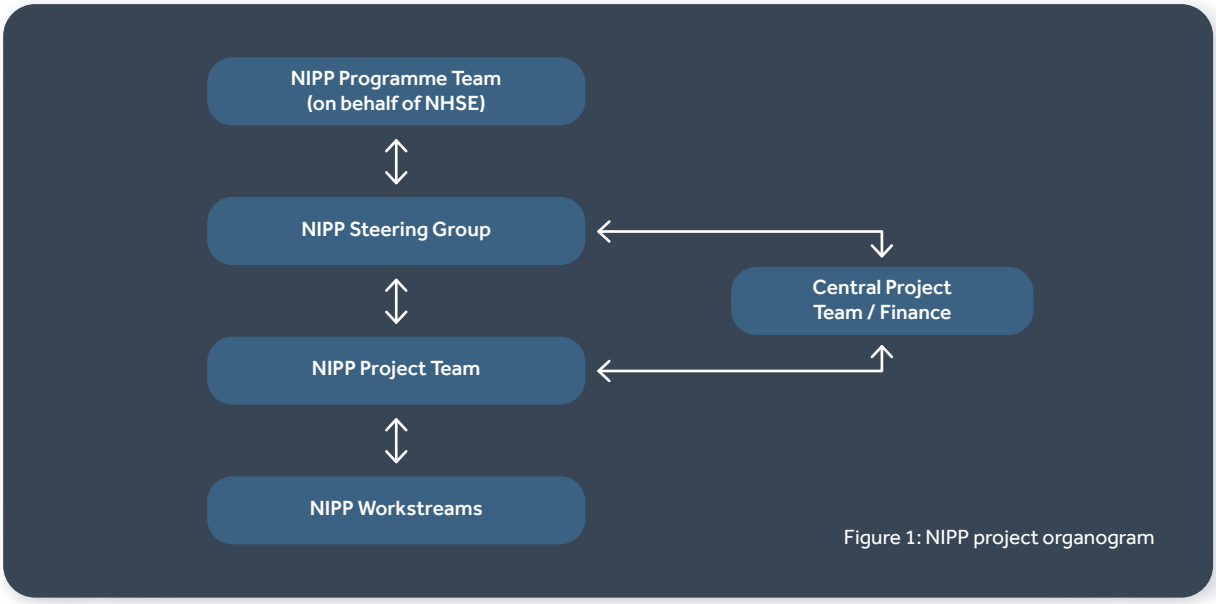


Figure 1: NIPP project organogram

3.3 Project team

The organisations that took part in the evaluation were:

- Oxford Academic Health Science Network
- NIHR Applied Research Collaboration Oxford and Thames Valley
- University of Oxford

For a list of evaluation team members see appendix 2.

4 Methodology

4.1 Patient and public involvement

Patient and public involvement was important to this evaluation as there is no published literature on patient experience of virtual TIA outpatient clinic appointments. Two public partners both with lived experience of TIA, were recruited through an open process, with the opportunity advertised on social media and shared through PPI networks across the Oxford AHSN and ARC OxTV.

The public partners were active members of the Project group and Steering group for all stages of the project, along with supporting work within the Views workstream, including development of the topic guides for the patient and healthcare professional interviews. They developed the public summary to ensure the project findings and recommendations were accessible to a broad audience, not just those delivering TIA services and contributed to the dissemination plan.

4.2 Pathway mapping workstream

Process (pathway) mapping is a qualitative tool to identify all the activities that occur in a process and produce a process map with an accompanying narrative. [18] The process map, a visual presentation, shows who is responsible for each activity or step and how these steps connect to reach a certain point. A successful process map should provide a shared understanding of how all the activities in a process fit together. Highlighting what works well now and what could be improved; to help avoid duplication, unhelpful variation, or unnecessary steps, improve understanding of the patient experience, and where further analysis is required. [19, 20]

The mapping study aimed to produce a post-Covid-19 pandemic process map for the patient pathway through each TIA outpatient clinic across the South East region (five Integrated Stroke Delivery Networks (ISDNs), which included 21 NHS Trusts, and 26 TIA clinics (2 on the boundary of the region)). Using the maps, the model of the TIA outpatient clinic was identified (face-to-face, virtual, hybrid), and a single map created to show what a typical pathway looked like for each of these models. Areas of commonality and individuality were identified. Finally, how the different pathways compared to current guidelines recommendations was examined.

Twenty-six TIA services were contacted to participate in the project, of which 14 participated in the project. TIA services were invited to attend a Microsoft Teams video meeting with research staff at a time of their convenience. Services were encouraged to include as many staff as feasible in these meetings and include staff with different roles within their clinic. The meetings were facilitated by two research staff, with notes and interactive whiteboard documenting the discussions.

The discussion led clinic staff through the patient pathway in their TIA clinic, exploring every event, task or decision, and how the flow proceeded from one of these to the next. Crucially, it was emphasised the discussion should reflect the current pathway in TIA clinics rather than how the pathway should look. The discussion was not judging how TIA clinics or clinic staff operated. Complicated steps and decisions were recounted back to the meeting by the researcher to ensure understanding of the discussion was clear.

After the meeting, the notes and transcript, were used to update the whiteboard to produce a draft process map for the clinic. [20] The draft map was shared back with the clinic for circulation and comment. Any queries and omissions were also highlighted. The maps were updated and reshared if required, with a final map provided to clinics.

Using the finished process maps, the TIA clinics were classified as face-to-face, virtual or hybrid models.

A table of characteristics for all the included TIA clinics was produced. The table was further broken down by model type. The variability between all clinics, between clinics using the same model, and the paucity of participating clinics meant that it was not possible to produce a single good practice map for each model. Findings from the maps were described in a narrative, including comparing the different clinics in general and specifically between clinic models. A comparison of clinic pathways to NICE guideline [2] recommendations for people with a suspected TIA was conducted.

4.3 Views workstream

Sampling and Recruitment

a) Patient interviews

NHS TIA services across the 5 ISDNs (and two hospitals on the boundary) were approached to be Participant Identification Centres (PICs) for the evaluation. Six Trusts agreed to be a PIC and were each asked to identify 4 patients/carers, aged 18 and above, attending their TIA clinic between February to May 2023 for the research team to approach for interview.

We used purposive patient sampling for the interviews paying special attention to identifying potential participants from different ethnic groups, geographical locations (inner city, urban, rural) and socio-economic characteristics.

Patients were given a patient information leaflet and invitation letter by the responsible clinician at their first consultation. Where the consultation was virtual these documents were sent by post, email or text link. Patients were asked to contact the research team if they wanted to take part in an interview.

b) Healthcare Professional Interviews

Healthcare professionals (consultant stroke physicians and neurologists, advanced clinical practitioners, specialist stroke nurses, and clinic coordinators/administrators) involved in delivering TIA care through virtual, face-to-face or hybrid models of care between February and May 2023 were invited via email from the Oxford AHSN, snowballing through existing contacts, and through South East region clinical stroke lead meetings to take part in an interview.

Two topic guides were developed: one for patients and one for healthcare professionals. These guides included open ended questions on how care is delivered, the benefits and disadvantages of virtual/face-to-face/hybrid models of care, resource allocation and environmental sustainability, patient and clinician views and preferences for different models of care and thoughts on the future of virtual clinics.

Data collection

Informed oral consent was audio recorded at the start of the interview. Participants were sent a copy of the consent form to read by post or email before the interview and a copy of the completed consent form afterwards.

In-depth interviews with patients and healthcare professionals were conducted by telephone or on Microsoft Teams between February and May 2023. Interviews lasted on average 30-45 minutes and followed a topic guide developed by the research team in collaboration with two PPI project team members with lived experiences of TIA. Interviews were audio-recorded and transcribed verbatim.

Data analysis

Interview data was analysed using a thematic analysis approach. Interview transcripts were de-identified and entered into NVivo qualitative data analysis software to support data management and retrieval in the analysis process. The team followed the approach described in Pope, Ziebland and Mays [21], moving from familiarisation and inductive coding to grouping and categorisation, using team 'data clinics' to explore coding consistency and to develop themes, and using charting and one sheet of paper (OSOP) visualisation and comparison methods [22] to identify themes. Qualitative research is not designed to allow statistical or predictive generalisability and thus external validity checks were not appropriate. However, the aim of the thematic analysis was to produce transferable findings. Obtaining ethical approval was time consuming and delayed, such that our sample was much smaller than intended and we did not reach data saturation. De-identified quotes taken from the interview transcripts are used for illustrative purposes.

4.4 Environmental sustainability workstream

To understand the environmental impact of virtual versus face-to-face consultations in the context of TIA services, we combined the following two sources of information/ data:

1. A systemic review of published literature [23] ,focusing on 23 articles and including assessment of the opportunities and challenges associated with the carbon impact of virtual consultations generally; and
2. Analysis of data from a series of qualitative interviews conducted with patients and healthcare professions who have experienced virtual and/ or face-to-face consultations, specifically in the context of the design and delivery of TIA services.

4.5 Use of resources workstream

A bespoke questionnaire was developed to record the activity within the TIA clinic, the type of professional who undertook the activity and an estimation of the activity duration (see Appendix 3). The data was collected from 12 of the 14 pathway maps, developed by the pathway mapping workstream, consisting of nine face-to-face clinics, two virtual and one hybrid. Two maps were not used as the patient journey could not be clearly defined. Hypothetical patient journeys from referral to the TIA clinic through to discharge/follow-up were developed from these maps.

We made the following assumptions during data collection:

- For referrals from the emergency department, we assumed investigations to be performed within the emergency department. So patients referred from the emergency department did not need further investigations in the TIA clinic.
- We assumed that patients only had the following types of imaging done (CT, CTA, MRI, and/or MRA).
- Since sites did not specify whether they had used time-of-flight or contrast-enhanced MRA, we assumed it to be the time-of-flight MRA.
- We excluded any further investigations that may be performed outside of the TIA clinic or follow up/ review of those results.
- To reduce missing data, if the time taken for an activity was missing for one site, we assumed the missing time to be the average time taken for the same activity that were non-missing at other sites.

We estimated the mean cost and mean duration of the models of care from the clinic perspective. First, the unit costs of clinical staff inputs were obtained primarily from Personal Social Services Research Unit's (PSSRU) Unit Costs of Health and Social Care 2021 compendium [24] and those of investigations were obtained from the latest NHS Reference Cost schedules [25] (Appendix 4). Next, the unit cost of each clinic resource input was then multiplied by the estimated time taken by a healthcare professional

to provide care or the duration of a clinical investigation before being summed up to obtain the total cost of care pathways for each model whilst assuming equal proportion of patients entering each pathway. The mean cost and mean duration were obtained by averaging the respective total cost and total duration values across the pathways in each model. Similarly, the mean number of investigations per model was also estimated from the average total number of investigations across the pathways in each model to account for the differences in terms of cost and time between the models of care.

Differences in the mean cost of clinic resources, duration of clinic pathways and number of investigations between virtual and face-to-face as well as between hybrid and face-to-face models were calculated and tested for statistically significant differences using independent-samples t-tests. A two-sided significance level of 0.05 was used throughout. Costs were expressed in 2020/2021 UK pounds sterling (£).

The results and recommendations can be found in our main evaluation report, available on our project website https://bit.ly/HealthOxTIA

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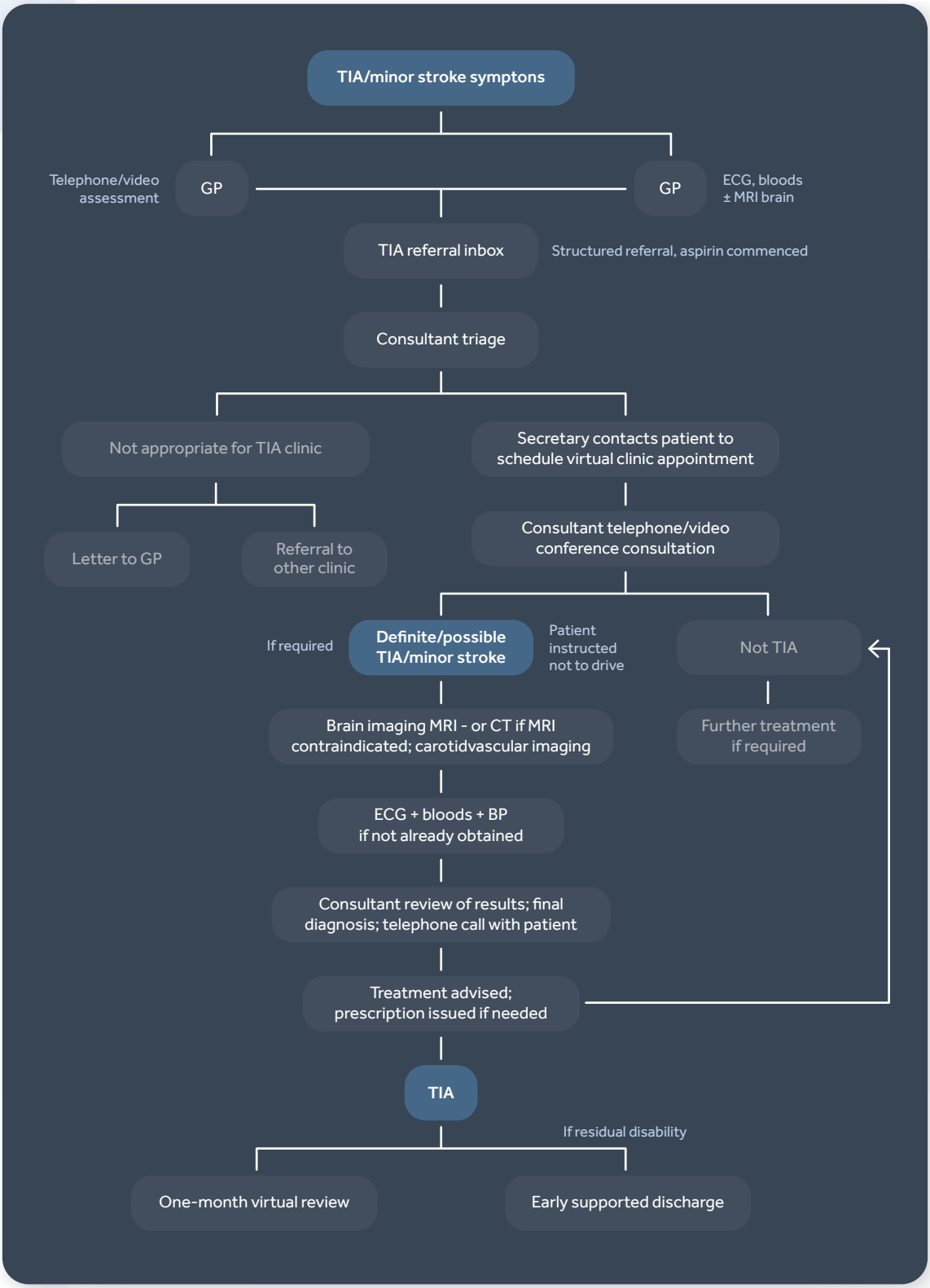
6 Appendices

Appendix 1: Suggested Virtual clinic pathway for managing TIA/ minor stroke in the COVID-19 pandemic [1, p27]



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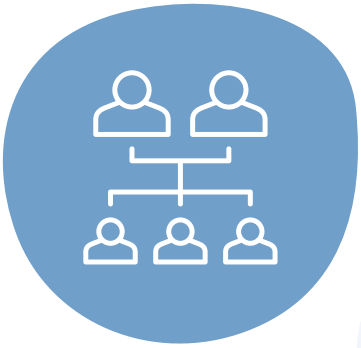

Appendix 3: Use of resources data points

Data point	Duration recorded	Cost recorded
Site	No	No
Source of referral - GP - Secondary Care Specialist - Emergency Department	Yes	Yes
- Triage Profession performing triage	Yes	Yes
What type of TIA clinic was booked. - Face-to-face - Virtual	No	No
Who scheduled TIA clinic appointment	Yes	Yes
Pre-clinic assessment - Who performed the assessment. - What activities take place during the assessment	Yes	Yes
Consultations - Up to three in a pathway - For each recorded who conduct's it and if in person or on the phone	Yes	Yes
Investigations conducted through the TIA clinic. - Imaging: CT, CTA, MRI or MRA (only one of them) - Carotid duplex - ECG - Blood pressure - Bloods (FRC, U&E, Lipid profile, TFT, LFT, glu/BM other) *if conducted in ED these have been represented on the data sheet but not as part of the pathway*	Yes	Yes
Outcomes of investigations - Yes TIA - Not a TIA	No	No
Post clinic administration. - Dictation of letters - Typing of letters - Checking of letters - Review of any outstanding results - Further communication with the patient - Sending out of letters	Yes	Yes
One month follow up. - If one would be booked - Who would book it	Yes	Yes

Appendix 4: Unit cost of clinic staff inputs and investigations, in 2020/21£

Resource	Unit	Unit cost	Source
Ambulance service	per contact	268	(NHS England, 2022)
Band 5 nurse	per hour	41	(Curtis et al., 2021)
Band 6 nurse	per hour	51	(Curtis et al., 2021)
Band 7 nurse	per hour	65	(Curtis et al., 2021)
Band 8a nurse	per hour	75	(Curtis et al., 2021)
Blood pressure test	per investigation	3.61	(NHS England, 2022)
Blood test	per investigation	4.75	(NHS England, 2022)
Carotid duplex	per investigation	111	(NHS England, 2022)
Clinic administrator	per hour	11.11	(NHS Employers, 2022)
CT	per investigation	136	(NHS England, 2022)
CTA	per investigation	153	(NHS England, 2022)
ECG	per investigation	149	(NHS England, 2022)
Emergency department	per hour	52	(Curtis et al., 2021)
General Practitioner	per hour	39	(Curtis et al., 2021)
Healthcare assistant	per hour	10.37	(NHS England, 2022)
Healthcare technician	per hour	11.11	(NHS England, 2022)
Medical consultant	per hour	123	(Curtis et al., 2021)
MRI	per investigation	246	(NHS England, 2022)
Radiographer	per hour	43	(Curtis et al., 2021)
Secondary care specialist	per hour	52	(Curtis et al., 2021)
Secretary	per hour	11.11	(NHS England, 2022)
Sonographer	per hour	66	(Curtis et al., 2021)
Specialist nurse	per hour	51	(Curtis et al., 2021)
Support worker	per hour	10.37	(NHS England, 2022)
Time-of-flight MRA*	per investigation	754.05	(Collins et al., 2007)

*Unit cost has been inflated to 2020/21 prices using the PSSRU Hospital & Community Health Services (HCHS) Index (Curtis et al., 2021). CT: computed tomography, CTA: computed tomography angiography, ECG: electrocardiogram, MRA: magnetic resonance angiography, MRI: magnetic resonance imaging.

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Literature review, project design and methodology

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