



Adapting stroke services during the COVID-19 pandemic: an implementation guide

Professor Gary A Ford, Dr David Hargroves, Dr Deb Lowe, Dr George Harston, Dr Guy Rooney, Hannah Oatley, Jemma Lough

May 2020

Foreword

Stroke services in the UK have never been challenged by a pandemic. But we need not panic, because we are no strangers to change. We are fortunate to have become accustomed to evolution and revolution in the delivery of stroke care over recent decades. Hyperacute stroke pathways, rapid-access outpatient clinics and acute stroke units are embedded in everyday clinical practice in many parts of the UK, in order to deliver the many interventions that high-quality evidence has told us we should use to improve the care of people with stroke.

There has been variation in the availability and implementation of many of these interventions between nations and regions of the UK. The needs of populations and the availability of staff and other resources have, in part, determined why services are delivered differently between regions. Several of these different service models are supported by evidence and extensive experience. These are opportunities for us to reuse what others have learned when we need to change our delivery of care for people with TIA and stroke as a consequence of the changes that the pandemic has inflicted upon us at short notice.

Help is now at hand for anyone who needs to adopt or adapt acute TIA or stroke services during the peak and recovery phases of the COVID-19 pandemic. This distinguished team from the Oxford Academic Health Science Network and Getting It Right First Time are to be congratulated for burning the midnight oil at their homes and hospitals during the lockdown phase of the pandemic to distil sensible and practical recommendations for (1) telemedicine for remote decision making about thrombolysis/thrombectomy, (2) care at hospitals without acute stroke units in England, and (3) virtual clinics for TIA and minor stroke.

When changing rapidly, we face competing pressures. On the one hand, we must be fleet of foot to avoid neglecting the care of people with stroke during the pandemic. On the other hand, we must be cautious to consider the capacity of our services to support new ways of working, anticipate any unintended consequences of these changes, and avoid rushing headlong into a long-term commitment to technologies that are still under development and evaluation (such as the use of artificial intelligence for interpreting brain imaging).

The silver lining of this coronavirus cloud is that we may well find benefits and efficiencies in adopting or adapting the proposed service models, which may endure after the pandemic subsides. In particular, you have an opportunity to implement efficient virtual approaches to hyperacute stroke care pathways and rapid access outpatient clinics that can still involve face-to-face contact to keep the person with stroke at the centre of the service. The widespread use of smartphones and videoconferencing hardware at home enables these virtual approaches, while also minimising carbon emissions and inconvenience from travel.

Social distancing need not mean professional isolation. Telephone, messaging services, email, webpages, and social media allow us to disseminate what Gary Ford, Deb Lowe, David Hargroves and their colleagues have started. You can also build upon these recommendations by sharing your experiences of stroke service adoption or adaptation during COVID-19 via the case study form on the web pages that the British Association of Stroke Physicians (BASP) has provided for this implementation guide: https://basp.ac.uk/adapting-stroke-services-during-the-covid-19-pandemic-an-implementation-guide/. Your feedback will inform revision of the guide.

BASP is committed to advancing stroke medicine whether or not we are in the midst of a crisis. BASP wants to be a strong professional association for physicians delivering stroke care in the UK. You can review what else we have been doing during the COVID-19 pandemic on our website: <u>www.basp.ac.uk</u>. But we can only advance stroke medicine with your support, so please join us via <u>https://basp.ac.uk/registration-page/</u>.

Stay safe. Keep well. Advance stroke medicine.

Rustam Al-Shahi Salman

President of the British Association of Stroke Physicians Professor of Clinical Neurology (University of Edinburgh) and Honorary Consultant Neurologist (NHS Lothian)

Contents

Foreword
Contents
Development team
Introduction
Implementing telemedicine to support specialist decision making in stroke care during the COVID-19 pandemic
Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic: guidance for clinical networks and acute trusts in England
Developing virtual clinics for managing TIA and minor stroke during the COVID-19 pandemic
Appendices

Development team

Authors

Professor Gary A Ford, Chief Executive, Oxford Academic Health Science Network; Consultant Stroke Physician, Oxford University Hospitals NHS Foundation Trust; Professor of Stroke Medicine, Oxford University

Dr David Hargroves, Consultant Physician and Clinical Lead for Stroke Medicine, East Kent Hospitals University NHS Foundation Trust; National Clinical Lead for Stroke Programme for GIRFT, NHSE/I

Dr Deb Lowe, Consultant Stroke Physician and Geriatrician, Wirral University Teaching Hospital NHS Foundation Trust; National Clinical Director for Stroke Medicine, NHSE&I, Joint National Clinical Lead for Stroke Programme for GIRFT, NHSE&I

Dr George Harston, Consultant Physician, Acute General Medicine, Geratology and Stroke Medicine, Oxford University Hospital NHS Foundation Trust

Dr Guy Rooney, Medical Director, Oxford Academic Health Science Network

Hannah Oatley, Clinical Innovation Adoption Manager, Oxford Academic Health Science Network

Jemma Lough, Independent Medical Writer

Reviewers

Professor Rustam Al-Shahi Salman, BASP President

Dr Michael McCormick, BASP ordinary member for Northern Ireland

Dr Indira Natarajan, BASP ordinary member for England

Introduction

The COVID-19 pandemic presents major challenges to healthcare systems around the world. The initial focus has rightly been on reducing spread of the infection and managing people who develop complications of coronavirus infection. These necessary actions have had profound effects on other clinical services. We are now recognising that significant avoidable death and disability may occur in the longer term due to the impact of these changes on other clinical pathways such as cancer and cardiovascular disease. The impact of the pandemic on stroke and TIA services in the UK and abroad has been substantial. Reduced numbers of stroke admissions, large declines in TIA referral numbers, outbreaks of COVID-19 infection in acute stroke units and the inability to sustain stroke services in some hospitals due to staff sickness have all been reported.

Rapid changes are needed in some hospital and regional services if people with stroke are to continue to receive sustainable high-quality stroke care. Coordinating innovations within and between the evolving integrated stroke delivery networks (ISDNs) may facilitate a sustainable cohesive response. There is an immediate need to minimise face-to-face interactions between patients and healthcare professionals where alternative models of care can be implemented – such as remote decision support for thrombolysis. Existing models of care to make such changes already exist, and digital technologies such as artificial intelligence interpretation of brain imaging add further support to the wider spread and adoption of such models of care. In other areas of care, such as assessment and management of patients with TIA, many services are implementing new pathways of virtual assessment.

At such times, sharing experience across our community is key to the rapid spread of best practice. We must capture the learnings from these new models of care, including understanding the patient and carer experience. We need to grasp the opportunity to maintain beneficial changes in our clinical pathways as we return to more normal working during the recovery and restoration period of the pandemic. We hope this guide provides some help and reassurance to colleagues who are reshaping their stroke services across the UK.

We anticipate that the recommendations in this implementation guide will evolve over time as experience of developing and running virtual TIA clinics and acute stroke services broadens, so we encourage stroke teams to share their own experiences via the form for sharing best practice on our resource hub (https://basp.ac.uk/adapting-stroke-services-during-the-covid-19-pandemic-an-implementation-guide/case-study-form/). As important as the sharing of successful innovations you have made during this pandemic is the knowledge of some changes that have inevitably not been such a success and may be discontinued as soon as feasible; please acknowledge and share these with us as well.

Gary Ford, Deb Lowe, David Hargroves

Implementing telemedicine to support specialist decision making in stroke care during the COVID-19 pandemic

May 2020

Scope

This document is aimed at stroke services that provide hyperacute care (thrombolysis and decision making for thrombectomy) and that do not currently utilise telemedicine 24/7 for all elements of the pathway. It aims to provide pragmatic guidance to support rapid implementation of remote decision making during the COVID-19 pandemic.

NHS England guidance on the COVID-19 pandemic recognises that most stroke physicians have dual or triple accreditation in medicine and/or geriatrics and that services may need to consider releasing specialist clinicians to support the general emergency medical take and inpatient bed base. This, together with high levels of staff absence anticipated due to COVID-19 infection, means that the number of stroke physicians available on any one site is likely to be significantly lower than usual.

Following an initial 'peak' of COVID-19 patient presentations, there is likely to be a significant prevalence of COVID-19 remaining within populations until effective treatment or a vaccine is widely available. A restoration and recovery phase must pre-empt this, minimising cross-infection while optimising stroke-specific expertise. The use of separate/virtual teams to minimise 'footfall' to potential and confirmed COVID-19 patients with stroke while maintaining standards is crucial.

This pressure on specialist expertise and the need to minimise unnecessary face-to-face contacts will require stroke units to work differently, with an increase in the use of telemedicine.

Adapting stroke services during the COVID-19 pandemic: an implementation guide

Contents

Introduction	9
Options for configuring a system of virtual assessment	9
Telestroke network	9
Remote decision making within an individual trust	9
Preparing to implement virtual assessment	10
Governance	10
Pre-hospital phase alerts	10
Videoconferencing within the ED	10
Image sharing and artificial intelligence	11
Training	11
Confidentiality and consent	П
Example pathway	

Introduction

Telemedicine is a broad term, encompassing the use of formal videoconferencing, as well as image sharing supported by remote review and decision making via telephone.

The majority of stroke services providing hyperacute care in England use telemedicine out of hours to enable remote specialist decision making for thrombolysis and mechanical thrombectomy. However, a significant number still rely on face-to-face assessment for review, decision making and the delivery of thrombolysis both in and out of hours. Stroke units that do not currently utilise telemedicine should strongly consider putting a system of virtual assessment in place. Additionally, those using telemedicine out of hours to enable the should consider moving to 24/7 use of telemedicine. This could be at an individual trust level or at a network level.

The option for virtual assessment by a stroke physician should also be considered in the pre-hospital phase. This will help ensure that stroke mimics and those who would not benefit from admission are less likely to be inappropriately or unnecessarily transferred to hospital for further assessment.

This document aims to provide guidance for trusts seeking to rapidly establish a system of virtual assessment, drawing on the experiences of stroke services that have been working with these systems for many years.

Options for configuring a system of virtual assessment

Telestroke network

Telestroke networks involve decision making across a network of stroke physicians from different trusts. This typically includes videoconferencing connectivity and image sharing between specialists and the emergency department (ED). These networks have the advantage of involving a large number of individuals and so being resilient to staff absence. Telemedicine can also be used to support decision making for mechanical thrombectomy or referrals to neurosurgery for intracerebral haemorrhage (ICH).

There are challenges to implementing a telestroke network quickly. Clearly defined protocols are essential, alongside associated training. Despite these challenges, for those networks with good relationships across trusts and infrastructure to support such a service, a telestroke network may provide a resilient model to cover pressures on the availability of stroke physician expertise in individual trusts during the COVID-19 period and beyond.

Remote decision making within an individual trust

Setting up a system of remote decision making within an individual trust may be simpler to implement than across a network of multiple trusts. Transition to remote specialist decision making would reduce patient and clinician exposure and may potentially provide a mechanism for staff who are in self-isolation (but are physically well) to contribute to clinical care.

Implementation will require rapid access to high-quality images and communication between stroke physicians and front-door clinicians who are suitably experienced to take an accurate history and perform a neurological examination (e.g. a medical registrar or ED physician).

Advantages of this approach include familiarity of clinicians with existing pathways, understanding of colleagues' abilities and being covered by existing trust governance frameworks. This approach may also be used to support non-specialists covering an acute stroke unit in the context of staff shortages or relocation of the stroke unit to a different hospital site.

Preparing to implement virtual assessment

Governance

For trusts who do not have formal videoconferencing software in place, a pragmatic approach would be to use a telephone system alongside informal videoconferencing solutions such as FaceTime or WhatsApp. NHSX guidance for the COVID-19 period states that it is acceptable for clinicians to use these tools for video conferencing (www.nhsx.nhs.uk/key-information-and-tools/information-governance-guidance/health-care-professionals).

Ideally a local or network agreement will be in place to acknowledge that decisions about treatment may be made by a consultant working in another trust. Additionally, the General Medical Council acknowledged in recent guidance (www.gmc-uk.org/news/news-archive/supporting-doctors-in-the-event-of-a-covid I9-epidemic-in-the-uk) that while doctors have a duty to recognise and work within their competence, in 'these exceptional circumstances, doctors at every level may be required to work at the limits of their comfort zone and in some cases beyond'.

Pre-hospital phase alerts

- Consider enhanced pre-hospital communication with stroke consultants to reduce unnecessary conveyance to hospitals for patients with a stroke mimic or TIA.
- Ensure stroke consultants are immediately available to give an opinion the ambulance paramedics are not able to spend time making multiple attempts at contact or waiting a long time for calls to be answered.
- Ease of use of the system is critically important if it is to be implemented quickly.
- FaceTime between the stroke consultant and the ambulance service (on iPad) has been tried with success in some sites.
- Key points to note from sites that have implemented videoconferencing for ambulance pre-alert include:
 - The paramedic should provide the patient/family/carer with an explanation of how the information will be used and should gain and document consent.
 - The stroke physician should conduct the call in a private environment to preserve patient confidentiality, privacy and dignity.
 - The paramedic should document the remote clinician's name.
 - The paramedic should document clinical information and decision making resulting from the video call.
 - The stroke physician should separately record the consultation and the advice given to the paramedic.

Videoconferencing within the ED

- Decide on the remote assessment facilities that will be used.
- Video conferencing may be helpful in assessing some patients. Many trusts with existing virtual assessment systems or networks use videoconferencing units. These can be mobile or fixed and enable the remote stroke consultant to visualise the patient as well as the scan images.
- The practicalities of procuring formal videoconferencing facilities during the COVID-19 pandemic may make this unfeasible. In the absence of formal videoconferencing facilities, a pragmatic approach would be to use a telephone system alongside informal videoconferencing solutions such as FaceTime or WhatsApp.
- Ensure that all stroke physicians who will be participating in the telemedicine rota have adequate internet connectivity to participate in videoconferencing (if using) and to view the images.
- Agree the system for contacting the stroke consultant on-call.
- Telephone or messaging contact is recommended in the first instance to alert the stroke consultant of a potential acute stroke admission. They will then be prepared to review the patient and CT images when available.

- It is recommended that clinicians use work mobile telephones rather than personal telephones wherever possible.
- Agree the criteria and timescales for contacting the stroke consultant on call.
- Timing is critically important when thrombolysis or thrombectomy are treatment options. However, **all** stroke patients will benefit from an early virtual review by a stroke consultant.
- Ensure the trust switchboard and the ED have the stroke consultant rota.
- Decide how the decisions made by the stroke consultant on-call will be recorded in the patient's record.
- Agree the back-up system to be used if there is a failure in image transfer or videoconferencing software.

Image sharing and artificial intelligence

- To allow the stroke consultant to make treatment decisions, there needs to be a rapid transfer of imaging of sufficient quality.
- Ensure that there is the facility to share images with the stroke consultant working remotely and test this to ensure that speed of image transfer and quality/clarity of image are acceptable.
- Ensure that staff who will be sharing the images are trained in how to use the software.
- Systems that share images and use artificial intelligence to support decision making could also be used. These have the advantage of offering rapid image interpretation to support early referral for thrombolysis or mechanical thrombectomy, even with non-contrast CT.

Training

- If implementing a virtual assessment system will result in an enhanced role for another member of the healthcare team for example, reliance on nursing staff to carry out the National Institutes for Health Stroke Scale (NIHSS) ensure that they receive training and support to enable them to do this.
- Training for NIHSS can be accessed at <u>www.nihstrokescale.org/</u>.

Confidentiality and consent

- As with any consultation or examination, it is important to consider where and how the teleconference takes place so that confidentiality can be ensured.
- If practical, the patient or family should be informed that telemedicine is going to be used and their agreement sought.
- If the remote stroke physician is not employed by the trust where the patient is located, this should also be made clear.

Adapting stroke services during the COVID-19 pandemic: an implementation guide

Example pathway



Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic: guidance for clinical networks and acute trusts in England

Scope

This document is aimed at clinical networks and trusts with hospitals (with emergency departments) that do not have acutely admitting stroke services. It provides pragmatic guidance on how to provide safe and effective protocol-driven care, including thrombolysis, to patients presenting with acute stroke during the COVID-19 pandemic and should be used as a contingency measure only.

Contents

Introduction	16
Suggested actions for strategic clinical networks/future structures	16
Suggested actions for acute trusts with hospitals that do not currently admit patients with acute stroke	16
Preparation phase	16
Suggested pathway for acute trusts/hospitals that do not currently admit acute stroke patients	18
Ongoing care	18
Suggested pathway for care of acute stroke patients in hospitals that do not usually deliver hyperacute structure unit care	roke 19

Introduction

NHS England guidance for the management of stroke patients during the COVID-19 pandemic (www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/C033-Specialty-guide_-Stroke-andcoronavirus-v1-24March_.pdf) acknowledges that the stroke inpatient bed base will need to be reduced to accommodate a potential influx of non-stroke patients. The anticipated pressures on ambulance services and inpatient beds mean it is inevitable that **patients with acute stroke will need to be transported and admitted to hospitals that do not usually accept acute stroke admissions and therefore are not experienced in delivering thrombolysis**. It is also becoming evident that patients with COVID-19 are at higher risk of stroke and also are presenting with atypical neurological symptoms not initially recognised as stroke (https://jamanetwork.com/journals/jamaneurology/fullarticle/2764549; https://ssrn.com/abstract=3550025)

During the COVID-19 pandemic, **all** hospitals need to be equipped to provide basic stroke care and be linked into regional stroke specialist clinical networks for specialist decision making for thrombolysis. Hospitals that do not usually accept acute stroke admissions will need support from remote stroke physicians and clearly defined protocols of care to enable them to deliver thrombolysis within a safe framework.

This implementation guide aims to provide pragmatic and practical advice to enable the delivery of safe, protocol-driven stroke care, supported by remote specialist decision making.

Suggested actions for strategic clinical networks/future structures

In this document, strategic clinical networks (SCNs) and integrated stroke delivery networks (ISDNs) will be referred to as 'stroke networks'. Ideally telemedicine networks for remote decision making should cover multiple hospitals over one or more stroke networks. This will enable stroke specialists to support neighbouring hospitals in times of workforce shortage.

Each stroke network should identify acute trusts with hospitals that have an emergency department with CT scanning facilities but **do not currently admit acute stroke patients.** Stroke network leads should contact these trusts to explain that they may receive acute stroke admissions during the COVID-19 crisis and to direct them to this guidance.

Stroke network leads should develop arrangements that enable specialist decision making to be available at all times across their network, anticipating that the COVID-19 pandemic may make individual hospital specialist rotas, at times, unsustainable. Any cross-hospital arrangements should be clearly communicated to all hospital switchboards, emergency departments (EDs) and stroke units.

Stroke network leads should prepare communications to ambulance trusts for deployment at the appropriate time. Networks may choose to take a stepwise, phased approach based on ambulance service pressures, workforce difficulties and geographical pressures related to variations in COVID-19 presentations.

All patients with suspected acute stroke benefit from receiving an early specialist stroke opinion. Networks should consider how they can offer 24/7 access to specialist stroke opinion and stroke multidisciplinary team support.

Suggested actions for acute trusts with hospitals that do not currently admit patients with acute stroke

Preparation phase

Governance

The General Medical Council acknowledged in recent guidance (<u>www.gmc-uk.org/news/news-</u> <u>archive/supporting-doctors-in-the-event-of-a-covid19-epidemic-in-the-uk</u>) that while doctors have a duty to recognise and work within their competence, in 'these exceptional circumstances, doctors at every level may be required to work at the limits of their comfort zone and in some cases beyond'. This guidance aims to provides a **safe and protocol-driven** framework for delivering acute stroke care in hospitals that do not routinely provide this care. Doctors working within such hospitals will be able to access immediate telephone advice from a consultant stroke physician. The consultant stroke physician will agree an overall medical care plan for all patients who present with acute stroke and will make any necessary decisions about thrombolysis and referral for thrombectomy in patients who would benefit from these therapies.

It is recognised that remote decision support is usually associated with a higher treatment rate of stroke mimics. However, the bleeding risk in stroke mimics is low, and this concern should not prevent the implementation of a remote decision-making service.

Ambulance trusts

- Agree a system of pre-alert with the local ambulance trust. The pre-alert pathway adopted by South East Coast Ambulance service is included in Appendix 1 of Implementing telemedicine to support specialist decision making in stroke care during the COVID-19 pandemic, as an example.
- When paramedics make the decision to bring a suspected stroke patient to the ED, the ED should be alerted so that they can prepare to receive the patient.

Training

- Identify a lead clinician to oversee the implementation of the action points below.
- Ensure that staff working in the ED are familiar with the Recognition of Stroke in the Emergency Department (ROSIER) tool. This tool, and a series of brief training videos, can be accessed in Appendix 3.
- Provide resources and support to medical staff in the ED to carry out the National Institutes for Health Stroke Scale (NIHSS). A link to the tool can be found in **Appendix 4**.
- Ensure there are staff capable of carrying out swallow screening on, or reaching into, wards receiving acute stroke patients.
- The European Stroke Organisation Angels Initiative has a number of training resources to support hospitals that have not previously delivered stroke care. Links to the various resources can be found in Appendix 5.

Thrombolysis

- Ensure there is a stock of alteplase and administration guidance in the ED.
- Ensure that ED/acute medical staff are aware of the checklist for alteplase administration (Appendix 6).
- Consider creating a 'thrombolysis box' in the ED, which contains everything required to assess patients' suitability for and administration of alteplase.
- Ensure that nursing and medical staff in the ED and on the wards are aware of the possible complications
 post-thrombolysis and the actions that should be taken should these complications occur (Appendix 7).
- Ensure that nursing and medical staff in the ED and on the wards that are likely to receive acute stroke patients are aware of the monitoring requirements for patients post-thrombolysis (Appendix 8).

Remote assessment

- Agree with the stroke network which remote assessment facilities will be used.
- Videoconferencing may be helpful in assessing some patients.
- In the absence of formal videoconferencing facilities, a pragmatic approach would be to use a telephone system alongside an informal videoconferencing solution such as FaceTime or WhatsApp. NHSX guidance for the COVID-19 period states that it is acceptable for clinicians to use these tools for videoconferencing (www.nhsx.nhs.uk/key-information-and-tools/information-governance-guidance/health-care-professionals).
- Agree the system for rapidly contacting the remote stroke consultant on call so that they are prepared to review the patient and CT images when available.
- Agree the criteria and timescales for contacting the remote stroke consultant on call. For example:

- Alert by telephone when a patient with suspected stroke who would be eligible for thrombolysis is referred for CT (before CT is performed)
- Telephone call or videoconference to discuss treatment plan (including thrombolysis) once imaging is available for viewing across network
- Discuss patients in whom thrombolysis is not indicated following initial assessment at the front door.

Timing is critically important when thrombolysis or mechanical thrombectomy are treatment options. However, **all** stroke patients will benefit from an early virtual review by a stroke physician and agreement of a management plan.

- Ensure the trust switchboard and the ED have the remote stroke physician rota.
- Decide how decisions made by the remote stroke physician will be recorded in the patient record.

Image sharing and artificial intelligence

- Rapid transfer of brain imaging of sufficient quality is required to enable the remote stroke physician to make treatment decisions.
- Ensure that there is the facility to share images with the remote stroke physician and test this to ensure that speed of image transfer and quality/clarity of image are acceptable.
- Ensure that staff who will be sharing the images are trained in how to use the software.
- Systems that share images and use artificial intelligence to support decision making could also be used. These have the advantage of offering rapid image interpretation to support early referral for thrombolysis or thrombectomy, even with non-contrast CT.

Suggested pathway for acute trusts/hospitals that do not currently admit acute stroke patients

The aim of this pathway (page 19) is rapid recognition of stroke at the front door, followed by rapid assessment:

- Patients who are potentially eligible for thrombolysis should have an urgent CT brain performed as soon as possible and within 30 minutes of arrival at the hospital to differentiate between haemorrhagic and ischaemic stroke.
- The remote stroke physician should be informed by telephone in advance of the CT being performed so they are prepared to review the scan and the patient.
- The scan should be remotely reviewed by the remote stroke physician, who will advise on a treatment plan, including whether thrombolysis should be carried out and whether CT angiography (CTA) is required to determine suitability for thrombectomy.
- The stroke consultant will take responsibility for the decision to administer thrombolysis or not.
- Guidelines for carrying out thrombolysis with alteplase can be found in Appendix 10.
- The thrombolysis checklist can be found in Appendix 6.
- Guidance on informing patients on the risks and benefits of thrombolysis with alteplase can be found in **Appendix 9**.
- Key points for the management of patients with haemorrhagic stroke can be found in Appendix 11.

Ongoing care

• All patients with a diagnosis of stroke should have a swallow screen performed as soon as possible and within 4 hours of admission.

Suggested pathway for care of acute stroke patients in hospitals that do not usually deliver hyperacute stroke unit care



*Note that after reviewing the CT, the stroke consultant may request a CTA to determine if mechanical thrombectomy is indicated

Developing virtual clinics for managing TIA and minor stroke during the COVID-19 pandemic

May 2020

Scope

This document is aimed at clinicians working in stroke/TIA services who would normally assess and manage patients with suspected TIA or minor stroke in the TIA clinic. The COVID-19 pandemic requires services to be adapted to minimise face-to-face contact between healthcare professionals and patients when other means to deliver care can be put in place. The document provides pragmatic guidance and recommendations on how to deliver safe and effective care for patients with symptoms that indicate TIA or minor stroke during the COVID-19 pandemic.

This is an evolving guide. We welcome examples of solutions to deliver high-quality virtual TIA services to people with suspected TIA, which can be added to the resource hub associated with this document (<u>https://basp.ac.uk/adapting-stroke-services-during-the-covid-19-pandemic-an-implementation-guide/</u>).

Adapting stroke services during the COVID-19 pandemic: an implementation guide

Contents

Introduction	23
Referral	23
Triage	23
Virtual consultation for patients with high suspicion of TIA or minor stroke	23
Format	23
Preparation	24
History	24
Patients identified as having definite TIA/minor stroke	24
Investigations	24
Prescribing	25
Follow up	25
Virtual clinic for managing TIA/minor stroke in the COVID-19 pandemic	27

Introduction

This implementation guide is designed to support adaptation of stroke services in the UK to meet the challenges of the COVID-19 pandemic. It offers rapid guidance on adapting to manage TIA and minor stroke (defined as patients with minimal functional disability from their stroke who can be managed in their own homes, with or without community therapy support) in the COVID-19 environment; however, many of the changes included may be sustainable after the COVID-19 pandemic ends. This guide focuses on TIA and minor stroke; patients with suspected acute major stroke should be managed in line with the new COVID-19 acute stroke guidance (www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/04/C0033-_Specialty-guide_-Stroke-and-coronavirus-V1-update_16-April-003.pdf).

The recommendations offered in this guide are based on experiences of clinicians who are already running virtual TIA clinics. Detailed case studies of these examples are provided in **Appendix 12**.

Referral

Reports from around the UK suggest that fewer patients with suspected TIA are being referred via their GP and from emergency departments (EDs) while the COVID-19 pandemic is ongoing. This may reflect changes in behaviour of those experiencing TIA symptoms or change in referral practices from primary and secondary care. The importance of referring patients with suspected TIA symptoms for immediate assessment to prevent fatal or disabling stroke should be emphasised to colleagues and in public health messages to the local community.

Referral systems should be easy to access; use preconfigured template referral forms. Referrals should ideally be accessed and triaged without the need for a secretary to forward to a clinician (see Case study 3 in **Appendix 12**).

Triage

• Patients with suspected TIA or minor stroke should be virtually triaged by a senior clinician to minimise face-to-face their contact with clinicians and other people.

Virtual consultation for patients with high suspicion of TIA or minor stroke

Format

- Advice on how to undertake remote consultations is available (<u>www.bmj.com/content/368/bmj.m1182</u>).
- Virtual consultations can be managed over the telephone for patients without access to smart technologies, but video may be preferable, as audio calls miss non-verbal cues and the ability to visualise a persistent neurological deficit in the case of patients with minor stroke:
 - To protect personal contact details of healthcare professionals, outgoing telephone numbers from personal phones should be blocked, with calls made via a laptop or departmental phone dedicated to virtual consults for stroke patients.
 - Video-based systems could be considered, such as Attend Anywhere (<u>www.attendanywhere.com/</u>), CareRx (<u>www.carerx.com/carerx</u>) and AccuRx (<u>www.accurx.com</u>).
- Virtual consultations can be run by stroke consultants or specialist stroke nurses with experience of assessing patients with TIA:
 - Using specialist nurses can ensure more efficient use of consultant time, but additional safety nets
 may need to be in place, particularly during the COVID-19 pandemic, when decisions may demand
 more challenging risk-benefit analysis and GPs are less able to provide in-person screening, safety
 nets and follow-up support.

• Audit of TIA clinics is recommended following service reconfiguration. This should include capturing views of patients and carers.

Preparation

- Administrative staff may be able to support the virtual consultation (see Case study 1 in Appendix 12).
- Patients should be notified about the 1-hour window during which they will receive their call and what will be required of them:
 - Patients should make sure they are able to answer the call during this period and be sat down where they will not be disturbed for a 20-minute consultation.
 - Patients should have a list of their drugs, information on previous medical history, and weight/height to hand.
 - If possible, a witness to the event should also be available to provide a collateral history, particularly if the patient does not have a good recollection of the event.
- Clinicians should review existing records, including any recent blood tests and brain imaging before the call, as this will improve the efficiency of the call and minimise the amount of information exchange required.
 - The call should be made from a quiet, private location where the clinician will not be disturbed.

History

- Include details of what access to medications the patient has, including home supplies of aspirin, ability to obtain aspirin and access to pharmacy services locally.
- Non-verbal cues that might normally alert the clinician to anxieties or concerns can be easily overlooked. Care should be taken to specifically identify these by direct questioning.
- In some circumstances it may be necessary for the clinician to examine the patient in person, and facility must be available when this need arises.

Patients identified as having definite TIA/minor stroke

Investigations

- Where possible, patients seen in the ED should have investigations in the ED to reduce the need to reattend secondary care.
- The ED should have a clear protocol to ensure optimal collection of appropriate routine tests recommended in NICE guidance such as lipid profile and ECG.
- Local solutions, e.g. community testing hubs or 'investigation pods' that offer phlebotomy, one-lead ECG (e.g, Kardia Mobile, MyDiagnostic), 12-lead ECG and BP measurement, should be considered; this would benefit a wider group of patients, not just those experiencing TIA/minor stroke.

Blood pressure

- Clinicians should ask patients whether they have a BP monitor or access to one.
 - If not, arrangements need to be made to obtain a BP reading in primary or secondary care.
 - Solutions to obtain pulse and BP remotely could be considered, e.g. MyDiagnostick (<u>www.mydiagnostic.com</u>) or Omron BP monitor (<u>www.omron-healthcare.co.uk</u>), which also records pulse.
- Clear communication of the agreed BP monitoring strategy with the GP is essential to ensure continuity of secondary prevention.

ECG

- If an ECG has not already been performed (e.g. at ED attendance), local arrangements will need to be made to obtain a 12-lead or one-lead ECG reading.
- For suitable patients, consideration might be given to home monitoring for atrial fibrillation (AF) using a mobile one-lead device such as Kardia Mobile or MyDiagnostic.
 - 12-lead ECG would need to be arranged if the screening device detects potential AF.
- Other options such as app-based AF detection, e.g. <u>https://cardiosignal.com/en/</u>, could also be considered.

Imaging

- For patients who require imaging, this should be scheduled in advance of attendance to minimise time spent in the imaging department.
- To reduce COVID-19 transmission risk, patients should not be asked to attend early.
- Patients could be asked to wait in the hospital car park until called in by text or telephone call.
- Accompanying people should be advised not to accompany the patient to the imaging department unless their direct support is required.
- When brain imaging is required:
 - MRI rather than CT should be performed first line to reduce need for multiple attendances unless contraindicated
 - Vascular imaging need only be undertaken in those patients who would be suitable for carotid revascularisation (not major disability etc) and should be acquired in the same modality as crosssectional imaging whenever possible e.g. paired MRI and MR angiography (MRA). CT and CT angiography (CTA) should only be used if MRI is contraindicated.
- For some patients with a clear clinical diagnosis of TIA and previous brain imaging, it may not be essential to obtain brain imaging. The risks and benefits of attending hospital in the context of COVID-19 need to be carefully considered.

Prescribing

- The benefits of quick administration of secondary prevention medication once antiplatelet therapy is administered are modest and should be weighed against the risk of patients or their carers acquiring COVID-19 from interactions with healthcare providers. For example, while it might be reasonable for a patient to visit a pharmacy or shop to self-administer aspirin, it may be prudent to start lipid-lowering therapy on a next repeat prescription.
- Until national prescribing systems are in place to allow secondary care to send scripts directly to community pharmacies, local arrangements will need to be made to ensure medications can be provided in a prompt and reliable manner.
- If the patient is already attending the hospital for investigations, prompt review of results and decisionmaking in real-time might allow quick provision of medication during a single attendance using the hospital pharmacy.
- New national guidance on managing oral anticoagulation therapy during the COVID-19 pandemic should be followed (<u>www.rpharms.com/development/coronavirus-cpd-resources#warfarindoac</u>).

Follow up

- The clinic letter, sent to the GP and copied to the patient, should describe whether a video, audio or faceto-face appointment has occurred.
- Any specific considerations regarding the circumstances of constrained healthcare provision should be explicitly described (e.g. delays to carotid imaging or surgery, risk assessment decisions around brain imaging and hospital attendances, mechanism of follow up, mechanism of prescriptions issued and need for continuing provision of medication).
- Follow up at I month may be undertaken with virtual review.

Adapting stroke services during the COVID-19 pandemic: an implementation guide

• Consideration should be given to the need for early supported discharge team (ESDT) involvement for patients with disability relating to minor stroke. Review by the ESDT in the community may be required for the purposes of assessment when physical neurological assessment has not been possible in audio or video TIA clinic.



Virtual clinic for managing TIA/minor stroke in the COVID-19 pandemic

Adapting stroke services during the COVID-19 pandemic: an implementation guide

Appendices

Implementing telemedicine to support specialist decision making in stroke care during the COVID-19 pandemic

Appendix I: Case studies

Case study I: South East Coast Ambulance Service and East Kent Hospitals University Foundation Trust

Dr David Hargroves, Consultant Physician and Clinical Lead for Stroke Medicine at EKHUFT

In November 2018, a telemedicine pilot was set up between South East Coast Ambulance and East Kent Hospitals University Foundation Trust to test the feasibility of direct calls between clinicians in order to triage patients who are FAST+ before arrival at hospital.

The pilot sought to explore the feasibility of earlier, ambulance-based triage for FAST+ patients to reduce the number of stroke mimics being conveyed past their local EDs unnecessarily. It also sought to test whether earlier triage by a stroke consultant could potentially speed up 'door-to-needle' times once patients were at hospital by enabling better preparation.

A secure link was set up on FaceTime (via iPad) between South East Coast Ambulance Service NHS Foundation Trust staff based in Thanet and East Kent Hospitals University NHS Foundation Trust consultants in two hospitals. The pilot ran for 5 hours each evening over a 2-week period.

This pilot went through a thorough governance process within South East Coast Ambulance Service NHS Foundation and East Kent Hospitals University NHS Foundation Trust regarding confidentiality and patient safety. There was staff engagement at both sites and communication in person and via email. There was also engagement with a stroke survivor group in Thanet for their views.

The pilot demonstrated that telemedicine can substantially reduce door-to-scanner time by preparing the thrombolysis team before the arrival of the patient. However longer connection times and some poor-quality images were issues that needed to be addressed prior to adoption.

During the COVID-19 pandemic, rapid adoption of FaceTime to 24/7 stroke consultants in hours and neurology registrars out of hours for all equivocal primary stroke patients/minor stroke/TIA patients has been implemented. Analysis of outcomes/experience has been submitted through a National Institute for Health Research (NIHR) COVID-19 grant extension; the following pathway is currently in operation.

Case study 2: Virtual wards rounds in stroke care at Western Sussex Hospitals NHS Foundation Trust

Dr Rajan Patel, Consultant Stroke Physician, Wester Sussex Hospitals NHS Foundation Trust

With the recent coronavirus outbreak there have been innovative new ways of working using IT in the hospital setting to protect not only our patients but also our staff. Worthing Hospital is a district general hospital with an acute stroke unit providing 24/7 thrombolysis, acute stroke care, ongoing stroke rehabilitation and daily TIA clinics. This work is covered by 3 WTE consultants, and to ensure that we minimised the risk of coronavirus infection to our patients and staff, we decided to adopt virtual ward rounds, utilising and building on our experience with telemedicine, which is already currently being used for hyperacute stroke calls. Fortunately, our IT systems within the trust allow patient observations, blood results, patient notes, imaging and prescription charts all to be viewed electronically. By using FaceTime on a ward iPad, the junior doctors who are physically present with the patients and donned in PPE, would be able to connect to the stroke consultants' iPad for a virtual ward round review. The stroke consultant would have sight of all of the patient information outlined above, allowing them to make decisions akin to them being physically present on a ward round, despite them being in a remote location. The consultant would also be able to make an entry in the medical notes by scribing on a history sheet, which could later be filed in the patients' medical notes.

The small hurdle that we needed to overcome was that the initial medical clerking would not be scanned into the electronic system until discharge (with the rest of the admission notes). Therefore, any new patient to the stroke unit would have their admission notes scanned by the ward clerk, so that they were electronically visible by the stroke consultant on the ward round.

The above process has enabled us to provide effective stroke consultant input to stroke patients with or without coronavirus. It also means that the juniors only have to focus their attention on patient interaction rather than using multiple computer systems while donned in PPE. We have also found that patients do not seem phased by having to speak to a consultant on an iPad screen rather than in person.

This system also allows the stroke consultants to provide rapid reviews in other areas such as the ED, not only for acute stroke calls but also to prevent unnecessary admission to hospital for a stroke review or inappropriate referral to the TIA clinic.

In the scenario where a stroke consultant has to self-isolate but is still well enough to work, the above system could still be implemented from the stroke consultants' home premises, allowing some resilience to be built into the stroke service at that site. It also opens up the possibility of cross-site or organisation working if appropriate IT systems are in place.

All in all the system works well and has multiple benefits, especially with the current coronavirus outbreak. Whether it will replace traditional face-to-face doctor-patient assessment in the future altogether remains to be seen.

Case study 3: NHS Lanarkshire

Professor Mark Barber, Consultant Geriatrician, NHS Lanarkshire

(https://journals.sagepub.com/doi/10.1177/0036933013507868)

Prior to the development of the NHS Lanarkshire telestroke network, acute patients presenting to their local Lanarkshire hospital were assessed and then referred to Glasgow for thrombolysis. While an excellent service was provided on arrival, this incorporated large transport delays in the thrombolysis process for those treated and unnecessary transfers if patients were then considered ineligible.

A 'mesh' network was developed; this allowed six consultants from three separate sites to join a single rota covering all three hospitals. During normal working hours, the on-call consultant would provide face-to-face assessments on their own site and telemedicine-based assessments to the other two sites. Out of hours, the assessments would generally be performed using telestroke equipment in the consultant's own home. Nursing staff were trained in neurological examination (NIHSS) to assist in remote neurological assessment as there was not consistent experienced junior doctor cover.

The three stroke units were linked using standard videoconferencing equipment on integrated services digital network lines. Although siting the units in the EDs was considered, it was felt that placing the technology within the stroke area would ensure that the equipment was closely monitored so it would consistently function. The stroke units checked the equipment by dialling into one of the other stroke units on a daily basis.

Because of the importance of a written record of the decision-making process in the patient's clinical record, a system was developed using the Stroke Audit In Lanarkshire (SAIL) software to allow stroke specialists to record the clinical findings electronically from home – or a distant hospital – and have this record immediately printed off in the stroke unit and filed in the patient's case record. The clinical record included important times with regard to the stroke journey and initiated the audit process for the assessed patient.

Case study 4: East of England

Lynda Sibson, Telemedicine Manager, East of England Stroke Telemedicine Stakeholder Partnership

The out-of-hours East of England regional stroke telemedicine service was introduced in 2010 to address the inequitable access to stroke thrombolysis across the region. The East of England is a largely rural area covering 7,500 square miles with a population of 5.6 million. With an estimated 6,000 patients per annum presenting with a stroke, providing timely access to stroke thrombolysis across this wide and largely rural population was a challenge.

From November 2010, a videoconferencing telemedicine software solution, *Visionable*, currently hosted in a secure Amazon cloud, allowed the stroke consultants to rapidly link with the referring hospital, providing realtime, rapid access to stroke expertise when and where it was required. Prior to telemedicine, many stroke patients were transferred between hospitals to access thrombolysis, only to be outside the timeframe for treatment on arrival at the treating hospital.

The stroke telemedicine consultants are also able to securely access the patient's CT scan via the image exchange portal (IEP) system. The IEP allows each hospital to transmit the patient's CT scans through to our dedicated 'blue-light' institution. The CT scanners at the referring hospital are linked with the IEP system, enabling automatic routing of the relevant CT scans out of hours. The stroke telemedicine consultants are then able to access the internet-based web browser and review the patient's CT scan via a three-factor authentication process. If the patient's CT scan is not available via IEP, the *Visionable* software has a desktop-sharing feature, enabling the local stroke team to access their local PACS on the stroke telemedicine cart and share this view with the stroke telemedicine consultant.

Each hospital has two telemedicine carts; one based in the ED and one based on the hyperacute stroke unit (HASU). Each cart is a mobile, wireless-enabled trolley, housing a hospital-specific PC that runs the telemedicine software and is easily moved to the end of the patient's bed, as needed. The on-call stroke telemedicine consultant is based at home, with a standard laptop, using the *Visionable* software, enabling them to clearly see and hear the patient, their relatives and the local clinical team in a 'virtual' consulting room.

Case study 5: Royal Berkshire NHS Foundation Trust

Dr Kiruba Nagaratnam, Consultant Stroke Physician and Geriatrician, Royal Berkshire NHS Foundation Trust

The Royal Berkshire NHS Foundation Trust have worked with Brainomix to develop a novel working practice to support remote decision working during the COVID-19 pandemic. A full report of this initiative can be found on the Oxford AHSN website (<u>www.oxfordahsn.org/our-work/covid-19/covid-19-case-studies/ai-technology-speeds-up-stroke-care-and-reduces-costs/</u>). The pathway is shown on page 32.



Implementing telemedicine to support specialist decision making in stroke care during the COVID-19 pandemic

Appendix 2: Suggested data capture sheet – telemedicine thrombolysis for acute ischaemic stroke

Patient name:

Patient identifier or DOB:

Telestroke consultant:

Referring hospital:

Name of referrer:

Date of call:

Time of call (24-hour clock):

Time of onset/last well:

History:

Past medical history:

Current medication:

Examination: NIHSS:

BP: BM:

Date of CT scan:

Time of scan (24-hour clock):

CT interpretation

Diagnosis:

Contraindications:

Recent intracranial bleeding:

Other relevant factors taken account of (delete if not present):

Known low platelets

Adapting stroke services during the COVID-19 pandemic: an implementation guide

Prior ICH Ischaemic stroke within 3 months Recent surgery Recent major trauma Recent bleeding at non compressible site Pregnant /recent delivery Suspected subarachnoid haemorrhage (SAH) Seizure at onset SBP >185 DBP >110

Time of recommendation (24-hour clock):

Treatment recommendation (delete a or b, and edit if appropriate)

- a. Thrombolysis recommended
 - Discuss risks and benefits of treatment, including risk of fatal intracranial haemorrhage. In this case, potential benefits outweigh risks
 - Dose 0.9 mg/kg alteplase, 10% as bolus rest over one hour (max dose 90 mg)
 - Avoid antiplatelets and anticoagulants for 24 hours then review after repeat imaging
 - Integrated stroke unit (ISU), HASU if not available discuss HDU vs AMU
 - CT scan at approximately 24 hours
 - Swallow assessment within 4 hours
 - Assess need for intermittent pneumatic compression (IPC)
- b. Thrombolysis NOT recommended because:
 - Swallow assessment within 4 hours
 - Aspirin 300 mg stat if no contraindication, then 300 mg daily (oral/NG/rectal)
 - Stroke unit care asap
 - Assess need for IPC

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 3: Recognition of Stroke in the Emergency Room (ROSIER)¹

(www.thelancet.com/journals/laneur/article/PIIS1474-4422(05)70201-5/fulltext)

Date/time of symptom onset								
GCS E=	M=	V=	BP		*(Glucose	e	
* If blood gluce	ose < 3.5	5 mmol/l	treat urgently ar	d reassess o	nce bloc	d glucos	se normal	
Has there been loss of consciousness or syncope? Y(-1) \square N(0) \square								
Has there	been s	eizure a	activity?		Y(-1)	?	N(0)	?
Is there a NEW ACUTE onset or on awakening from sleep								
Asy	mmetri	c facial	weakness	_	Y(1)	?	N(0)	?
Asy	mmetri	c arm w	eakness		Y(1)	?	N(0)	?
Asy	mmetri	c leg we	eakness		Y(1)	?	N(0)	?
Spe	ech dis	sturband	e		Y(1)	?	N(0)	?
Visual field defect Y(1) 2 N(0) 2								
	** Total Score (-2 to +5)							

Admit to Acute Stroke Unit / Refer to stroke team if total score > 0 (score between 1 and 5)

Brief training videos can be accessed here (flash player required)

www.strokeadvancingmodules.org/labyrinth/mnode_client.asp?id=29852

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 4: National Institutes of Health Stroke Scale



NIH_Stroke_Scale_5 08C.pdf

la	Level of consciousness (LOC):	
	0 = Alert; keenly responsive	
	I = Not alert, but arousable by minor stimulation to obey, answer or respond	
	2 = Not alert, requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements (not stereotyped)	
	3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, areflexic	
lb	LOC questions:	
	0 = Answers both questions correctly I = Answers one question correctly 2 = Answers neither question correctly	
lc	LOC commands:	
	0 = Performs both tasks correctly I = Performs one task correctly 2 = Performs neither task correctly	
2	Best gaze:	
	0 = Normal	
	I = Partial gaze palsy. This score is given when gaze is abnormal in one or both eyes, but where forced deviation or total gaze paresis are not present	
	2 = Forced deviation, or total gaze paresis not overcome by the oculocephalic manoeuvre	
3	Visual:	
	0 = No visual loss I = Partial hemianopia 2 = Complete hemianopia 3 = Bilateral hemianopia (blind including cortical blindness)	
4	Facial palsy:	
	0 = Normal symmetrical movement	
	I = Minor paralysis (flattened nasolabial fold, asymmetry of smiling)	
	2 = Partial paralysis (total or near total paralysis of lower face	
	3 = Complete paralysis of one or both sides (absence of facial movement in the upper and lower face)	

5	Motor arm:	5a Left			
	0 = No drift, limb holds 90 (or 45) degrees for full 10 seconds				
	I = Drift, limb holds 90 (or 45) degrees, but drifts down before full 10 seconds, does not				
	hit bed or other support	5b Right			
	2 = Some effort against gravity, limb cannot get to or maintain (if cued) 90 (or 45) degrees, drifts down to bed, but has some effort against gravity				
	3 = No effort against gravity, limb falls				
	4 = No movement				
	A = Amputation, joint fusion, explain:				
6	Motor leg:	6a Left			
	0 = No drift, leg holds 30 degrees position for full 5 seconds				
	I = Drift, leg falls by the end of the 5-second period but does not hit bed				
	2 = Some effort against gravity, leg falls to bed by 5 seconds, but has some effort against gravity				
	3 = No effort against gravity, leg falls to bed immediately				
	4 = No movement				
	A = Amputation, joint fusion, explain:				
7	Limb ataxia:				
	0 = Absent If present, is ataxia: (circle each limb YES or NO)				
	I = Present in one limb Right arm: YES NO Left arm: YES NO				
	2 = Present in two limbs Right leg: YES NO Left leg: YES NO				
	Amputation, joint fusion, explain:				
8	Sensory:				
	0 = Normal, no sensory loss				
	I = Mild-to-moderate sensory loss, patient feels pinprick is less sharp or is dull on the affected side, or there is a loss of superficial pain with pinprick but patient is aware he/she is being touched				
	2 = Severe-to-total sensory loss, patient is not aware of being touched in the face, arm, and leg				

Adapting stroke services during the COVID-19 pandemic: an implementation guide

9	Best language:	
	0 = No aphasia, normal	
	I = Mild-to-moderate aphasia, some obvious loss of fluency or facility of comprehension, without significant limitation on ideas expressed or form of expression. Reduction of speech and/or comprehension; however, makes conversation about provided material difficult or impossible	
	2 = Severe aphasia, all communication is through fragmentary expression, great need for inference, questioning and guessing by the listener. Range of information that can be exchanged is limited, listener carries burden of communication	
	3 = Mute, global aphasia, no usable speech or auditory comprehension	
10	Dysarthria:	
	0 = Normal	
	I = Mild-to-moderate, patient slurs at least some words and, at worst, can be understood with some difficulty	
	2 = Severe, patient's speech is so slurred as to be unintelligible in the absence of or out of proportion to any dysphasia, or is mute/anarthric	
	A = Intubated or other physical barrier, explain	
11	Extinction and inattention (formerly Neglect):	
	0 = No abnormality	
	I = Visual, tactile, auditory, spatial or personal inattention or extinction to bilateral simultaneous stimulation in one of the sensory modalities	
	2 = Profound hemi-inattention or hemi-inattention to more than one modality, does not recognise own hand or orients to only one side of space	
	Total	

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 5: Angels Initiative resources

You will need to register with the Angels Initiative to access the following resources:

- Slides and training videos for staff working in the ED and on the wards www.angels-initiative.com/angels-academy
- Hyperacute video simulations in a hospital www.angelsinitiative.com/academy/hyperacute/workshop-guidance
- Post-acute, Fever, Sugar, Swallow (FeSS) checklists and Acute Screening of Swallow in Stroke/TIA (ASSIST) training for dysphagia screening <u>www.angels-initiative.com/academy/post-acute/checklist</u>

Suggested protocol for ED nurse

(Adapted from ANGELS Initiative)

Work in parallel with medical staff to save time.

Objective: Confirm diagnosis of stroke and perform initial physical examination to provide the treating physician with the relevant information in less than 10 minutes.

Stroke screening - FAST

	Normal	Abnormal
Facial droop	Both sides of face move equally	One side of face does not move at all
Arm drift Both arms move equally or not at all One-arm drifts compared t		One-arm drifts compared to the other
Speech	Patient uses correct words with no slurring	Slurred or inappropriate words or mute

If the patient has **any** features in the abnormal column, or if you receive ambulance pre-notification of suspected FAST positive patient, **activate the stroke pathway**.

Stroke pathway

- ED doctor to contact networked stroke physician on-call
- Inform radiology to prepare CT scanner for stroke patient
- Inform laboratory of stroke patient incoming
- Immediate transfer to CT scanner
- Establish IV access (preferably two medium-large bore cannulas with saline lock) and start crystalloid infusion

Collect the following information within 5 minutes

- Blood sugar by finger prick (advise doctor if blood glucose <50 mg/dl or >180 mg/dl)
- Point-of-care INR (advise doctor if patient is taking anticoagulant)
- Determine patient weight (use stroke bed to determine weight, alternatively ask family or estimate)
- Time from symptom onset (advise doctor if >4.5 hours)
- Patient's age (advise doctors if patient is <18 or >80 years of age)

Monitor the following parameters

- Start on O₂ (2–4 l/min nasal cannula to keep O₂ saturation >94%)
- Connect to continuous cardiac monitoring
- Temperature

- Heart rate
- Respiratory rate

Draw blood for the following

- Complete blood and platelet count
- Partial thrombin time (PTT)
- Serum electrolytes
- Blood glucose
- CRP or sedimentation rate
- Hepatic and renal chemical analysis

Keep the following points in mind

- Incline head of bed at 30°
- If indicated, insert urinary catheter before starting alteplase (do not delay the initiation of alteplase for this)
- Apply pressure dressing on any failed vein puncture sites
- Avoid NG tubes, if possible, for 24 hours
- Keep nil by mouth until swallow screen has been done; if dysphagia is present, keep nil by mouth

Suggested protocol for ED physician (prior to thrombolysis decision being made)

(Adapted from ANGELS Initiative)

Objective: Confirm diagnosis of stroke and perform initial physical evaluation in less than 10 minutes

- Ascertain time of symptom onset (when was the patient last seen well?)
 - <4 hours ago
 - >4 hours ago
 - Unknown
- Take history
- Assess NIHSS score
- Assess modified Rankin score
- Assess for absolute contraindications for alteplase
- Review laboratory results
- Contact stroke consultant

Modified Rankin score

0 = No symptoms

- I = Able to carry out all usual duties and activities
- 2 = Unable to carry out all previous activities but able to look after own affairs without assistance
- 3 = Requires some help but able to walk without assistance
- 4 = Unable to walk without assistance and unable to attend to own bodily need without assistance
- 5 = Bedridden, incontinent and requiring constant nursing care and attention

(6 = Dead)

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 6: Thrombolysis checklist – factors associated with a higher risk of complication and/or bleeding

This checklist needs to be completed in full. Any tick in the YES column represents key information that needs to be highlighted to the remote stroke physician. This may not necessarily be a contraindication to thrombolysis.

	Yes	Νο
Factors associated with higher risk of bleeding		
Significant bleeding disorder at present or within the past 6 months		
Known haemorrhagic diathesis		
Patients receiving effective oral anticoagulant treatment, e.g. warfarin sodium (INR >1.7)		
Manifest or recent severe or dangerous bleeding		
Known history of or suspected intracranial haemorrhage		
Suspected subarachnoid haemorrhage or condition after subarachnoid haemorrhage from aneurysm		
Prior stroke within the I[ast 3 months		
Any history of central nervous system damage (i.e. neoplasm, aneurysm, intracranial or spinal surgery)		
Recent (less than 10 days) traumatic external heart massage, obstetrical delivery, recent puncture of a non-compressible blood-vessel (e.g. subclavian or jugular vein puncture)		
Severe uncontrolled arterial hypertension		
Bacterial endocarditis, pericarditis		
Acute pancreatitis		
Documented ulcerative gastrointestinal disease during the last 3 months, oesophageal varices, arterial aneurysm, arterial/venous malformations		
Neoplasm with increased bleeding risk		
Severe liver disease, including hepatic failure, cirrhosis, portal hypertension (oesophageal varices) and active hepatitis		
Major surgery or significant trauma in past 3 months		
Evidence of ICH on the CT scan		
Symptoms suggestive of subarachnoid haemorrhage, even if CT scan is normal		

Administration of an anticoagulant medication within the previous 48 hours	
Platelet count <100,000/mm ³	
SBP >185 mmHg or DBP >110 mmHg, or aggressive management (intravenous pharmacotherapy) necessary to reduce BP to these limits	
Considerations based on time	
 Symptoms of ischaemic attack beginning: more than 4.5 hours prior to infusion start, or if unknown onset, last known well more than 4.5 hours ago 	
Considerations based on stroke severity	
Non-disabling neurological deficit or symptoms improved before start of infusion	
Severe stroke as assessed clinically (e.g. NIHSS >25) and/or by appropriate imaging techniques	
Additional considerations	
Seizure at onset of stroke	
Any history of prior stroke and concomitant diabetes	
Blood glucose <50 mg/dl or >400 mg/dl (<2.8 mM or > 22.2 mM)	

Alteplase dosage and administration

Use the dosing table below (www.medicines.org.uk/emc/product/898/smpc) to determine the total dose.

The recommended total dose is 0.9 mg alteplase/kg body weight (maximum of 90 mg) starting with 10% of the total dose as an initial intravenous bolus, immediately followed by the remainder of the total dose infused intravenously over 60 minutes.

Dosing table for acute ischaemic stroke

By using the recommended standard concentration of I mg/ml, the volume (ml) to be administered is equal to the recommended dosing value (mg)

Weight (kg)	Total dose (mg)	Bolus dose (mg)	Infusion dose* (mg)
40	36.0	3.6	32.4
42	37.8	3.8	34.0
44	39.6	4.0	35.6
46	41.4	4.1	37.3
48	43.2	4.3	38.9
50	45.0	4.5	40.5
52	46.8	4.7	42.1
54	48.6	4.9	43.7
56	50.4	5.0	45.4
58	52.2	5.2	47.0
60	54.0	5.4	48.6
62	55.8	5.6	50.2
64	57.6	5.8	51.8
66	59.4	5.9	53.5
68	61.2	6.I	55.1
70	63.0	6.3	56.7
72	64.8	6.5	58.3
74	66.6	6.7	59.9
76	68.4	6.8	61.6
78	70.2	7.0	63.2
80	72.0	7.2	64.8
82	73.8	7.4	66.4
84	75.6	7.6	68.0
86	77.4	7.7	69.7
88	79.2	7.9	71.3
90	81.0	8.1	72.9
92	82.8	8.3	74.5
94	84.6	8.5	76.I
96	86.4	8.6	77.8
98	88.2	8.8	79.4
100+	90.0	9.0	81.0

*Given in a concentration of 1 mg/ml over 60 minutes as a constant rate infusion.

- Use as few vials of alteplase as possible to draw up dose.
- Reconstitute vial using the supplied preservative-free water for injection. Do not shake the vial to expedite this process.
- The concentration of the reconstituted alteplase is I mg/ml.
- Bolus dose:
 - The bolus dose is 10% of total calculated alteplase dose.
 - Use a 10-ml syringe to draw up the prescribed bolus dose directly from alteplase vial. Dosing and volume should be checked by two qualified members of staff (medical or nursing).
 - Administer the bolus dose by direct IV push over I–2 minutes.
 - Document the timing of bolus dose administration.
- Infusion dose:
 - The infusion dose is the remaining 90% of total calculated alteplase dose.
 - It should be drawn up in one or two 50-ml Luer-Lok syringes, dependent on the dose to be administered. These should be labelled according to standard policy.
 - The syringe(s) should be connected in turn to infusion tubing primed with alteplase and placed in an IV syringe pump.
 - Prior to attaching the infusion tubing to the patient, ensure the following:
 - The cannula to be used for the infusion is patent.
 - The BP cuff is attached to the other arm.
 - The pump infusion rate (ml/hr) should be set at the infusion dose over 1 hour given that the concentration of the reconstituted alteplase is 1 mg/ml.
 - Document the timing of commencement of the infusion.

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 7: Complications following thrombolysis

Haemorrhage within 48 hours of alteplase administration

- If haemorrhage is suspected, either intracranial or extracranial, the first action should be to stop the infusion of alteplase, if it is still running, and/or antithrombotic treatment while definitive investigations take place.
- There may be a role for fibrinolysis inhibition and/or fibrinogen replacement following discussion with haematology.

Intracranial haemorrhage

- Suspect if:
 - increased neurological deficit/deteriorating LOC
 - new or increasing headache
 - acute hypertension (two successive BP readings >185/110 mmHg)
 - nausea and vomiting
- Actions:
 - Stop alteplase infusion
 - Contact stroke consultant
 - Arrange immediate CT brain scan
 - Take bloods for:
 - full blood count
 - coagulation screen
 - fibrinogen, fibrin degradation products (FDPs)
 - Ensure Group and Save in place
 - If diagnosis confirmed:
 - administer fresh frozen plasma (FFP) 12 ml/kg
 - administer IV tranexamic acid I g tds
 - discuss with haematology and potentially with neurosurgery

Extracranial haemorrhage

- Superficial bleeding (Venflon sites, venepuncture sites)
 - If the patient is haemodynamically stable, continue intravenous infusion of alteplase.
 - Apply direct pressure dressing and/or ice packs, if required
- Major bleeding
 - Suspect if:
 - hypotension
 - new local symptoms or signs (BP, abdominal or back pain)
 - Actions:
 - Stop alteplase infusion
 - Contact acute stroke consultant
 - Take bloods for:
 - full blood count
 - coagulation screen
 - fibrinogen
 - Ensure Group and Save in place
 - Ensure patent IV access

- Resuscitate with IV fluids/blood, as appropriate
- Investigate and inform specialist colleagues dependent on suspected source of haemorrhage
- Administer FFP 12 ml/kg
- Administer IV tranexamic acid I g tds
- Discuss with haematology
- Haematology guidance for either intracranial or extracranial haemorrhage may include:
 - administration of cryoprecipitate or fibrinogen concentrate if there is depletion of fibrinogen
 - further therapy, which may be guided by results of coagulation tests.

Anaphylaxis

- Suspect if:
 - rash/urticaria
 - bronchospasm
 - angio-oedema
 - hypotension/shock
- Actions:
 - Stop alteplase infusion
 - Ensure airway secure and give 100% oxygen, unless contraindicated
 - Contact acute stroke consultant
 - Consider giving immediately the following:
 - Chlorpheniramine 10 mg IV
 - Hydrocortisone 200 mg IV
 - Epinephrine 500 micrograms IM (0.5 ml of 1:1000)
 - Rapid bolus infusion of normal saline
 - Salbutamol 2.5–5 mg nebulised
 - Ensure regular observations
 - If fails to respond to initial treatment, contact ICU as an emergency
 - In addition, consider use of CI esterase inhibitor if cause felt to be true angio-oedema

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 8: Nursing observations required post-thrombolysis

Arrival on the ward

- All stroke patients should be 'nil by mouth' for the first 24 hours or until the next acute stroke consultant review.
- NG tube and urinary catheter placement should be avoided wherever possible for the first 24 hours following thrombolysis. Every effort should be made to toilet the patient prior to consideration of a urinary catheter.
- All thrombolysed patients require an intensive schedule of monitoring, as outlined below, and should be attached to continuous monitoring.

On arrival on the ward

- BP
- Heart rate
- Respiration rate
- Oxygen saturation
- Temperature
- Neurological observations (Glasgow Coma Scale score, pupils, limb movement)
- Check all puncture sites for bleeding
- Check tongue for swelling

First 2 hours after thrombolysis

- Every 15 minutes:
 - BP
 - Heart rate
 - Respiration rate
 - Oxygen saturation
 - Check all puncture sites for bleeding
 - Check tongue for swelling
- Each hour:
 - Temperature
 - Neurological observations (Glasgow Coma Scale score, pupils, limb movement)

Next 6 hours

- Every 30 minutes:
 - BP
 - Heart rate
 - Respiration rate
 - Oxygen saturation
 - Check all puncture sites for bleeding
- Each hour:
 - Temperature
 - Neurological observations (Glasgow Coma Scale score, pupils, limb movement)

Adapting stroke services during the COVID-19 pandemic: an implementation guide

Next 16 hours

- Each hour:
 - BP
 - Heart rate
 - Respiration rate
 - Oxygen saturation
 - Check all puncture sites for bleeding
 - Temperature
 - Neurological observations (Glasgow Coma Scale score, pupils, limb movement)

Thereafter (i.e. between 24 and 72 hours after admission)

• Follow the FeSS protocol (<u>https://www.sciencedirect.com/science/article/pii/S0140673611614852</u>) for the next 48 hours, then routine observations thereafter, unless additional observations indicated.

Special notes

- All BP, pulse and oxygen saturation measurements should be taken from the unaffected arm, unless contraindicated.
- Manual BP measurement must occur to confirm BP > 185/110 mmHg or if the patient is hypotensive.

Actions

- Within the first 24 hours on the acute stroke unit, report immediately to doctor if:
 - SBP >185 mmHg
 - DBP >110 mmHg
 - Heart rate >100 beats per minute
 - Heart rhythm changes
 - Rate or nature of respiration changes
 - Neurological state deteriorates
 - Bleeding occurs
 - Temperature rise of I°C from baseline.

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 9: Benefits and risks of thrombolysis

(Taken from East of England SOP)

- Thrombolysed patients are 32% more likely to have little or no deficit at 3 months
- For every 100 patients treated:
 - 32 better, 3 worse, 65 unchanged
- IV alteplase 10 times more likely to help than harm
- Risk of bleeding 3–6%; I–2% will suffer significant ICH/gastrointestinal bleed, which in severe cases may lead to worsening symptoms or death
- The earlier the treatment within 4.5-hour window, the better the outcome
- Rare risk of hypotension and/or angioedema

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 10: Summary guide to thrombolysis

(Adapted from Oxford University Hospitals NHS FT guidance)

Scope

This document provides a **summary guide** covering the practicalities for the initial assessment of patients with acute stroke arriving at the ED.

A support document, the 'thrombolysis checklist', is available in Appendix 6 and should be kept in the ED. This should be used in real-time to help support screening for contraindications to thrombolysis, informing the consent processes and dosing alteplase.

Acute stroke care is supported remotely by a specialist stroke consultant, with 24/7 availability.

This document is designed to provide a structured approach to initial assessment. Using such a structured approach will support remote decision making by stroke consultants. It will also support fast times to treatment. Stroke is a time-critical emergency and thrombolysis should be administered as soon as possible and ideally within 30 minutes of arrival to eligible patients.

Pre-alerts and stroke calls

Paramedic teams should pre-alert the ED for all suspected stroke patients arriving at the ED. The radiography team should also be notified.

As soon as the ED team has secured the details, these should be relayed to the networked stroke consultant without personal details. This is typically via call to mobile phone or messenger service (WhatsApp, etc).

It is good practice for the ED team to contact the stroke consultant at the beginning of each shift to ensure each has the other's contact details to facilitate communication in the event of a stroke call.

Assessment on arrival

A focussed assessment should be carried out. A thrombolysis checklist (see **Appendix 6**) should be kept in the ED.

The patient should normally be assessed in the resuscitation bay of the ED.

Key factors to determine:

- Is this likely to be a stroke? Abrupt onset, focal neurological deficit, absence of severe haemodynamic or metabolic disruption.
- Are there any features to suggest an alternative diagnosis? This would include seizure, LOC, worsening symptoms of previous stroke, known brain tumour or metastases, recurrent stereotyped symptoms, strong suggestion of functional presentation.
- When was the patient last known to be well? If the patient woke with symptoms or the time is unknown, when were they last known to be well? *Call a witness if needed*.
- What is the severity of the stroke? This does not need to be a full NIHSS breakdown unless you are competent to acquire this quickly for example, it is sufficient to say dense left-sided weakness affecting face, arm and leg with dysarthria.
- What is the premorbid functional status? Summary is sufficient, e.g. level of dependency, walking ability and aids, cognitive status.
- What is the blood pressure and capillary glucose? The glucose can be from the paramedic assessment.
- Are there any additional considerations relating to thrombolysis? Important information includes current anticoagulation, previous haemorrhage, recent stroke, recent operations, pregnancy. Note there

are few absolute contraindications and these should usually be discussed with the stroke consultant directly.

After the initial assessment, please briefly update the stroke consultant and organise urgent imaging.

Investigations

After the targeted initial assessment, the **key investigation is the CT scan of the brain**. Unless there is a clear contraindication, this should include CTA of the head and neck. Recent renal function is **not** required before CTA. Venous access is required.

- These should **not** need to be discussed with the duty radiologists, and the radiographer should agree to do these routinely.
- Check the CT radiographer can accommodate the scan and which scanner is to be used. This should happen at the next available opportunity.
- Escort the patient to the CT scanner as soon as possible and help the radiographer move the patient onto the scanner table.
- Once imaging is acquired, make the stroke consultant aware and await instruction regarding thrombolysis.
- Imaging should not be delayed for an ECG or changing clothes, unless awaiting the scanner.
- Physiological monitoring should be used to transfer the patient to the CT scanner, unless clearly not needed.

Thrombolysis

A record of the discussion around decision making, including risks and benefits of thrombolysis with the patient or their advocate, should be recorded where the patient is able to engage in this discussion. A summary of the salient points is included in the thrombolysis checklist (Appendix 6).

For a comprehensive guide to thrombolysis contraindications, see the thrombolysis checklist (Appendix 6).

If a decision to deliver thrombolysis is made, **it may be necessary to first lower the BP if either SBP is over 185 mmHg or DBP over 110 mmHg**. First-line BP medication is 10–20 mg IV labetalol, escalating under guidance of the stroke consultant. Second-line agent is IV glyceryl trinitrate (GTN) infusion. Discuss with the stroke consultant for details.

Thrombolysis for stroke uses *alteplase*. This should be kept in the drug cupboard in the ED.

Dosing is by reported or estimated weight (0.9 mg/kg), and a look-up table is available in the thrombolysis checklist (Appendix 6). A weighting pat slide is a time-efficient way of obtaining body weight to calculate alteplase dose.

A bolus is given (10% of total dose) as a push IV injection, followed by the remaining dose over 1 hour.

The bolus dose can be mixed from a 10-mg set of vials for reconstitution. The diluent and powder are provided in the pack. These are to be mixed using a standard syringe and drawing up needle. Mixing should be done by rolling the mixed vial until the powder has dissolved. The timing of the bolus delivery should be documented in the notes and the drug chart.

ED nurses can set up the infusion. Patients should remain in ED until the infusion is complete. After this time, patients can be moved to a monitored bay on a ward.

Thrombolysis should be stopped if there is concern over intracranial bleeding (worsening neurological deficit, reduced conscious level, worsening headache, acute severe hypertension, nausea and vomiting) and the patient rescanned. Contact the stroke consultant and administer FFP and tranexamic acid. Thrombolysis should also be stopped in the presence of extracranial bleeding or anaphylaxis (hypotension or angioedema with lip/tongue swelling).

The **coagulopathy associated with thrombolysis can last up to 24 hours**, meaning BP control targets and haemorrhagic management remain the same for the first 24 hours.

Post-acute management

A few tips:

- Formally document the NIHSS in the clerking (online training is available at <u>www.nihstrokescale.org/</u>).
- Patients should be admitted within 4 hours to the stroke unit directly from ED.
- Venous thromboembolism (VTE) prophylaxis is normally managed using intermittent pneumatic compression devices. Do not give dalteparin unless advised by the stroke consultant.
- Patients are nil by mouth and kept hydrated with saline.
- Prescribe IV paracetamol as required.
- If thrombolysis is given, do not give concurrent aspirin or clopidogrel acutely.
- The stroke consultant will advise about thrombectomy options.

If in doubt about any aspect of the management, please contact the stroke consultant directly.

Delivering safe stroke care at hospitals without acute stroke units during the COVID-19 pandemic

Appendix 11: Key points for the management of haemorrhagic stroke

ICH will be confirmed by the CT scan, and patients should be discussed with the remote stroke physician, who will advise on management and any onward referral to neurosurgery.

Key points for the management of ICH (<u>www.nice.org.uk/guidance/ng128/chapter/Recommendations</u>) include:

- I. Reversal of anticoagulation treatment
 - 1.2 Return clotting levels to normal as soon as possible in people with a primary ICH who were receiving warfarin before their stroke (and have elevated INR). Do this by reversing the effects of the warfarin using a combination of prothrombin complex concentrate and intravenous vitamin K.
- 2. BP control
 - 2.2 Offer rapid BP lowering to people with acute ICH who do not have any of the exclusions in 2.4 below and who:
 - present within 6 hours of symptom onset
 - and
 - have SBP between 150 and 220 mmHg.

Aim for SBP target of 130–140 mmHg within 1 hour of starting treatment and maintain this blood pressure for at least 7 days.

- 2.3 Consider rapid BP lowering for people with acute ICH who do not have any of the exclusions listed in 2.4 below and who:
 - present beyond 6 hours of symptom onset

or

have SBP >220 mmHg.

Aim for SBP target of 130–140 mmHg within 1 hour of starting treatment and maintain this blood pressure for at least 7 days.

2.4 Do not offer BP lowering to people who:

- have an underlying structural cause (for example, tumour, arteriovenous malformation or aneurysm)
- have a score on the Glasgow Coma Scale <6
- are going to have early neurosurgery to evacuate the haematoma
- have a massive haematoma with poor expected prognosis.
- 3. Referral for neurosurgery
 - 3.1 The remote stroke physician will advise on the need for neurosurgery referral.

Developing virtual clinics for managing TIA and minor stroke during the COVID-19 pandemic

Appendix 12: Case study examples

Case study I: Wirral University Teaching Hospital NHS Foundation Trust

Dr Deb Lowe, Consultant Stroke Physician and Geriatrician, Wirral University Teaching Hospital NHS Foundation Trust; National Clinical Director for Stroke Medicine, NHSE&I

Wirral University Teaching Hospital has been delivering tele-triage for all TIA/minor stroke referral for almost 10 years. Referrals are received via e-mail on a standard proforma from GPs and the ED. The initial telephone assessment is completed by an experienced stroke nurse specialist, with same-day discussion with the 'hot-week' stroke consultant, a subsequent next day 'one-stop' TIA clinic. Since the COVID-19 pandemic, tele-triage has continued, but face-to-face clinics have been replaced by telephone consultations, or on occasion by video calls, initially using WhatsApp or FaceTime. Consultations are supported by a thorough stroke specialist nurse history to ensure efficient use of consultant time, using a structured approach with a checklist. The consultation generates a clinic letter in the same way a face-to-face consultation would. The electronic health record is also used to record all virtual telephone conversations.

During the call, the clinician takes history following the usual clinic format. Patients are asked to do a pulse check to determine whether it feels irregular, if the clinician feels the patient is able to do this. As about half of patients, mostly elderly, are unable to identify their own pulse, remote solutions for obtaining BP and pulse are being investigated.

Four main groups of patients are identified at this stage:

- Definite TIA or minor stroke from initial history
- Not TIA from initial history but needs rapid assessment and management via TIA clinic, e.g. suspected space-occupying lesion
- Likely other diagnoses best assessed by another clinic; these patients are referred on to another clinic, although this option may become less available in the current crisis and investigations may be undertaken
- Not TIA/other diagnosis that does not need consultation; no appointment is required, so reassurance is given.

For patients with definite TIA/minor stroke, investigations are arranged, including blood tests, rhythm strip/ECG and brain imaging, MRI being the first line of investigation for TIA. To minimise waiting times at hospital for brain imaging, tests should be booked in ahead

Clinical AF is treated immediately, with at least a rhythm strip required before blood-thinning drugs are prescribed. DOACs should be prescribed rather than warfarin unless absolutely contraindicated (e.g. end-stage renal failure or creatinine clearance [CrCl] <20 ml/min). With respect to COVID-19, new guidance on prescribing of DOACs is followed and existing use of NSAIDs is reviewed.

Patients are followed up at 1 month with a further telephone consultation to ensure they have had all the necessary investigations, they are taking the necessary secondary prevention, and they understand their risk factors and diagnosis. All patients, if they consent, are referred for follow up to the Stroke Association commissioned service for community support Those with minor stroke (e.g. speech problems or ongoing limb weakness but still functionally able to manage at home) are referred to the stroke specific ESDT from clinic, to be seen within 48 hours.

Case study 2: East Kent Hospitals University Foundation Trust

Dr David Hargroves, Consultant Physician and Clinical Lead for Stroke Medicine at EKHUFT

Dr Hargroves has been running virtual clinics from the start of the COVID-19 crisis, triaging about 60 people within the first month. This has allowed patients to be filtered out at each stage of the process, with referrals requiring a face-to-face consultation reduced by 30–40%.

All virtual triage is currently led by a consultant, with calls made from a quiet location that will not be disturbed. Virtual consultations are most successful when they follow the usual template for normal outpatient clinic; they do tend to take longer than a normal consultation, but this improves with time as the consultant becomes more familiar with the new format.

Both patient and clinician prepare before the call. The patient is prewarned about the timing of the call and asked to be sat down and ready for a 20-minute consultation, with a list of medicines and information about relevant previous medical history to hand. The consultant reviews existing records, including blood tests and brain scans, to get a picture of the patient before the call and identify what information needs to be obtained during the call.

A history is taken as usual, including the reason for referral and the drug history, which provides useful information about their current medical history to set the context for the call. Patients are asked about any concerns and what they think is happening so that immediate concerns can be discussed and reassurance given. The consultant concludes the call by sharing their impression about the patient's condition, giving the differential diagnosis, explaining the treatment plan and investigation timeline, and discussing any issues arising from the diagnosis, including driving, flying and tablets.

Until community settings for testing and remote solutions for monitoring are in place, patients who require investigations, including BP, ECG (rhythm strip) and brain imaging, are asked to attend the hospital. Only about 30% of patients identified as having definite TIA through this virtual triage approach will require further investigation in the COVID-19 environment compared with about 70% who would have been investigated further in routine practice. Practical considerations to minimise risks are taken, including patients being asked to sit in scanners to minimise contact with the equipment. Patients are reassured that they will be seen as quickly as possible. Imaging for every patient with TIA/stroke is routinely reviewed by a multidisciplinary team to check against history, and this is continuing for virtual triage.

DOACs are prescribed unless contraindicated, with dosing based on patient-reported weight when a formal measurement is not available. Scripts are emailed to the nearest pharmacy.

A clinic letter is sent as usual and copied to the patient. This highlights that a full in-person examination was not possible. Patients are asked to contact the clinic secretary or GP referrer if symptoms have not improved in 1 month.

Case study 3: Oxford University Hospital referral system

Dr George Harston, Consultant Physician, Acute General Medicine, Geratology and Stroke Medicine, Oxford University Hospital; **Professor Gary Ford**, Consultant Stroke Physician, Oxford University Hospitals NHS Foundation Trust

The TIA and minor stroke referral pathway at Oxford University Hospitals NHSFT was reconfigured in 2019 when the TIA service switched to one delivered by the duty stroke consultant every day rather than via discrete outpatient clinics. The system has been further reconfigured to meet the challenges of the COVID-19 pandemic to minimise the amount of direct patient contact with the healthcare system.

To optimise the standard of triage, the TIA service referrals are reviewed directly by the duty stroke consultant throughout each day (at least twice per day) to ensure a prompt triage and clinic review service. The review process is supported in real-time by a dedicated TIA and stroke secretary. No referrals are made by telephone, unless the patient is already in the hospital and there is an opportunity to avoid a future visit to hospital from direct review by a member of the stroke team.

- Referrals from both the ED and GPs are completed using a referral proforma PDF sent to a dedicated nhs.net email address. Access to this TIA inbox is available to all of the stroke consultants and the TIA secretary.
- The referral proforma contains a structured template, check boxes to prompt appropriate referral, and information about alternative referral pathways for non-specialists. It also contains prompts to administer aspirin and give driving advice.
- The TIA inbox is reviewed by the duty stroke consultant at regular intervals throughout the working day to triage referrals for review or arrange alternative clinic arrangements. This permits opportunistic triaging around unpredictable acute care commitments.
- The TIA secretary also screens the TIA inbox to create virtual hospital encounters for each referral at the earliest opportunity. This ensures that a telephone review can be documented in the electronic health record at the time of triage and investigations requested against the correct patient encounter.
- Once an outcome for the referral is decided, the original referral email is forwarded to the same TIA inbox with 'Triaged:' prefixed in the email subject line and with instructions for the TIA secretary in the email body.
- A redirect rule has been created so the 'Triaged:' prefix ensures this forwarded email is automatically sent straight to a subfolder for actions and archive by the TIA secretary.
- The duty consultant can then delete the original referral email from the TIA inbox once all consultant actions are taken, ensuring it is clear to the next duty consultant which referrals have been reviewed and actioned.



© 2020

t: +44 (0) 1865 784944 e: info@oxfordahsn.org t: @OxfordAHSN Magdalen Centre North Oxford Science Park Oxford OX4 4GA, UK

www.OxfordAHSN.org