Adaptations of rapid transient ischaemic attack (TIA) pathways during the COVID-19 pandemic: An international survey

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Abstract:

Background: The aim of this study was to survey the changes that centres providing TIA pathway services have required to keep TIA services operational during the COVID-19 pandemic.

Methods: This was a pragmatic survey of existing rapid TIA pathways around the world. Authors of published studies from 2000-2020 that described a rapid TIA pathway were contacted. Pathway setting, pre- and post-COVID assessment method, pre- and post- COVID imaging strategy, personal protective equipment (PPE) use in the TIA clinic, region lockdown status, and pathway status (active versus inactive) were recorded.

Results: Twenty-eight centres were identified and invited to participate. Eighteen centres completed the survey (response rate 18/28 = 64.3%). The results cover eight countries and three continents. Sixteen pathways had TIA clinics (16/18 = 88.9%). Six clinics (6/16 = 37.5%) continue to provide in-person assessment while the majority (10/16 = 62.5%) have changed their patient assessment method to include mainly telephone or video-enabled visits. Five centres with clinics (5/16 = 31.3%) have adopted a different vascular imaging strategy.

Conclusion: The COVID pandemic situation has led TIA clinics around the world to move to telemedicine for outpatient clinic review and to modify investigation pathways.

Introduction:

The COVID-19 pandemic[1] has led to widespread disruption of society and has overwhelmed health care systems in some countries with a high level of infection. Many health services have been minimising 'non-urgent care', with impacts on secondary stroke prevention and urgent outpatient follow-up[2]. Urgent evaluation of TIA in the outpatient or ED setting has been successful in providing urgent care and preventing stroke occurrence[3, 4]. With urgent evaluation and medical treatment, the risk of recurrent stroke has been reduced from 10.3% to 2.1% in some settings[3]. The aim of this study is to provide a survey of existing rapid TIA pathways around the world and understand the necessary adjustments in practice required to optimally evaluate and manage TIAs during the pandemic.

Methods:

Only articles describing expedited evaluation and management pathways in Pubmed were included. The comprehensive search strategy and inclusion/exclusion criteria is included in Supplemental Methods.

Survey method

Identified authors were invited to complete a survey form. Results from non-responders were extracted from the published article and internet search. The study was approved by the Monash Health Human Research Ethics Committee.

Results:

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram of the literature review process is included in Figure 1. Table 1 summarises the responses from each centre. Supplemental Table 1 summarises non-responder results.

In-person TIA clinic assessment

Six centres in Paris, Oxford, Wellington, Adelaide, Sydney, and Leicester retained in-person assessments, but with modifications. One site (Rochester, MN) is reinstating the in-person evaluation in follow-up to the initial ED eval in late April with patient and staff masking, and extensive patient COVID-19 screening. The SOS-TIA France model allows patients with or without suspicion of COVID-19 to be evaluated in the TIA clinic, with the patient and the staff wearing a surgical mask and the medical staff wearing a gown and surgical hat. Patients at low risk of COVID-19 are assessed by medical staff wearing a surgical mask. Oxford are reviewing patients in-person if TIA is likely. In Wellington, patients who are deemed likely to have TIA after telephone screen are assessed in clinic provided that the swab for COVID-19 in the community is negative. In Adelaide patients are seen in clinic if there is symptomatic carotid artery stenosis or the diagnosis had been revised to stroke after a review of the MRI scans. Leicester is still seeing patients face-to-face, but is increasing their focus on triage and referral with occasional phone review. PPE use includes goggles, surgical mask, apron, and gloves for seeing inpatients, and goggles and surgical mask for outpatients with no symptoms.

Imaging protocol

The centres in Monash, Oxford, Ottawa, Glasgow and New York have largely replaced carotid ultrasonography with computed tomography angiogram (CTA). The centres at Rochester, New York, Paris, and Stanford also reported additional imaging variations. At Mayo Clinic in Rochester, for a short period in late March and April 2020, cardiac CT and transthoracic echocardiogram were used as short-term replacement for transesophageal echocardiography (TEE) to lessen use of personal protective equipment (PPE). The practice has since returned to use of TEE. The New York model additionally performs an MRI brain in the ED, as clinically indicated, if follow-up is considered unlikely. The SOS-TIA France model allowed patients to their TIA clinic. In case of suspected COVID infection the patients were screened with CT chest prior to MRI brain. The Stanford model admitted high risk TIA patients to facilitate MRI scanning; this change had occurred prior to the COVID-19 pandemic.

Discussion:

The key findings were: (1) change in assessment to telephone and/or video-enabled visits; (2) and change in type of vascular imaging investigations.

Telemedicine has been recommended for the assessment of a patient with TIA during the pandemic[5]. This is reflected in the change in pattern of practice seen in most centres. This may mean that patients miss out on other aspects of secondary prevention such as blood pressure measurement and lipid management[6], in-person risk factor and lifestyle advice, driving issues, other diagnostic tests and timely prescription of medicine[3]. Such evaluation can also be difficult with telephone consultation especially for hearing impaired or patients with cognitive impairment.

Five centres replaced carotid ultrasonography with CTA. These changes are not without precedents as eleven centres had already been performing CTA as a vascular imaging option pre-COVID. The changes in strategies may reflect the impracticality of bringing patients back on another day for carotid ultrasound.

Limitations

The response rate was low (64.3%). Our results may not reflect activity among other TIA clinics. Our reporting on the use of PPE as a binary variable is simplistic, as different health services have a range of PPE availability and utilization based on the procedure and setting. It remains uncertain how COVID has altered the patient demographics of patients referred for TIA clinic evaluation.

Conclusion:

This study has provided an initial description of the global impact of COVID-19 on these pathways. These results reflect the recognition of TIA as a medical emergency, and treatment remains an essential health service, even if performed through telehealth. It will be important to perform a patient-level analysis of pre- and post- COVID clinical outcomes.

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Disclosures:

None

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Figure legends

Figure 1: PRISMA diagram

Table 1: Survey of TIA Pathways

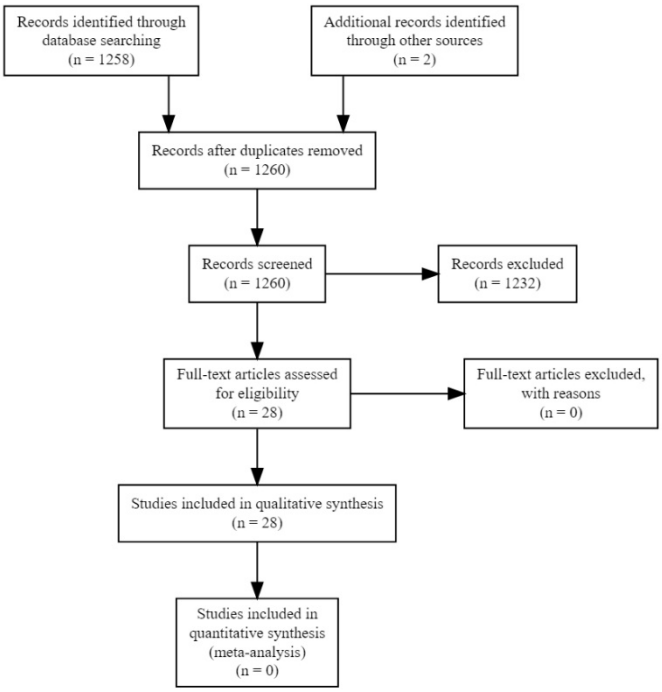
	City	Country	Setting	Pre-COVID-Assessment	Post-COVID-Assessment	Pre-COVID-Imaging	Post-COVID-Imaging	PPE	Region Lockdown status	Pathway-Status	Date
M3T	Melbourne	Australia	Hospital	In-person	Telephone	CT/US	CTA	NA	3	Active	8/4/2020
SOS-TIA	Paris	France	Hospital	In-person	In-person	MRI/US	MRI/US	Yes	3	Active	10/4/2020
Oxford Vascular Study	Oxford	UK	Hospital	In-person	Telephone + in-person if TIA likely	MRI/US	MRI/CTA	Yes	3	Active	30/3/2020
Ottawa	Ottawa	Canada	Hospital	In-person	Telephone	CT/US/CTA	CT/CTA	NA	4	Active	12/4/20
TWO-ACES	Stanford	USA	Hospital	In-person	Video	MRI/US	MRI/US	NA	3	Active	17/4/2020
Rochester	Rochester	USA	ED	In-person ED, then in-person outpatient clinic	In-person ED, then video outpatient clinic	CT/US/TEE for cardiac imaging	CT/US/cardiac CT/TTE for cardiac imaging	NA (yes later)	3	Active	25/4/2020
Wellington	Wellington	New Zealand	GP-Hospital	In-person	Telephone screen + in-person if TIA likely and swab negative	CT/US	CT/US	No	4	Active	16/4/2020
Edinburgh	Edinburgh	Scotland	Hospital	In-person	WhatsApp/Facetime/	CT/MR/US	CT/MR/US	NA	3	Active	11/4/2020

Edinburgh	Edinburgh	Scotland	Hospital	In-person	WhatsApp/Facetime/ Telephone	CT/MR/US	CT/MR/US	NA	3	Active	11/4/2020
Tauranga	Tauranga	New Zealand	Hospital	In-person	Telephone	CT/MR/US	CT/MR/US	NA	4	Active	12/4/2020
Adelaide	Adelaide	Australia	Hospital	In-person	Telephone ± in-person	CT/CTA/D2-7 MR	CT/CTA/D2-7 MR	No	3	Active	08/4/2020
RNSH	Sydney	Australia	Hospital	In-person	Telephone ± in-person	CT/CTA/US/MRI	CT/CTA/US/MRI	No	3	Active	20/4/2020
Glasgow	Glasgow	Scotland	Hospital	In-person	Telephone	CT/CTA/US	CT/CTA	NA	3	Active	18/4/2020
BEATS	Leicester	UK	Hospital	In-person	In-person	MRI/CT/US	MRI/CT/US	Yes	3	Active	22/4/2020
RAVEN	New York	USA	Hospital	In-person	Video visit (telehealth); Telephone if patient has no enabled device	CT/US	CTA (MRI in ED if follow-up considered unlikely)	NA	4	Active	24/4/2020
Bologna	Bologna	Italy	Hospital	In-person	In-person ED, then telephone for follow-up	CT/US/CTA	CT/US/CTA in ED (no COVID area)	NA	3	Active	24/4/2020
Foothills Medical Centre	Calgary	Canada	Hospital	In-person	Telephone	CTA	CTA	NA	3	Active	6/5/2020
Grand	Grand	USA	ED	In-person	Does not have a TIA clinic	US/CTA/MRA	US/CTA/MRA	NA	4	Active	11/4/2020

Boston	Boston	USA	ED	In-person	Does not have a TIA clinic	MRA/CTA±TTE	MRA/CTA±TTE	NA	4	Active	23/4/2020

M3T=Monash TIA Triaging Treatment, CT=computed tomography, CTA=computed tomography angiography, US=carotid ultrasonography, NA=not applicable, MRI=magnetic resonance imaging, MRA=magnetic resonance angiography, D2-7=days 2 to 7, RNSH=Royal North Shore Hospital, RAVEN=Rapid Access Vascular Evaluation – Neurology, TTE=transthoracic echocardiography, TEE=transesophageal echocardiography

Figures:


Records identified through database searching (n = 1258)
Additional records identified through other sources (n = 2)
Records after duplicates removed (n = 1260)
Records screened (n = 1260)
Records excluded (n = 1232)
Full-text articles assessed for eligibility (n = 28)
Full-text articles excluded, with reasons (n = 0)
Studies included in qualitative synthesis (n = 28)
Studies included in quantitative synthesis (meta-analysis) (n = 0)