2022

Triage Algorithm for Stroke Prevention Clinic Referrals

GUIDE FOR STROKE PREVENTION CLINICS IN ONTARIO

PROVINCIAL SECONDARY STROKE PREVENTION TASK GROUP

SEPTEMBER 2022

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Introduction to the Ontario Internal Triage Algorithm for Stroke Prevention Clinic Referrals

Background

Top priorities were identified in the Secondary Stroke Prevention Clinic Core Elements self-assessment completed by all stroke regions in 2018. Since the release of the self-assessment summary, an Ontario **Secondary Stroke Prevention Task Group** has been gathering and developing resources to address gaps and further support SPC efforts to implement the Ontario SPC Core Elements. The Ontario Secondary Prevention Task Group is comprised of Stroke Prevention Clinic (or equivalent) Clinicians, Stroke Prevention Coordinators, and other Stroke Prevention-related Best Practice Leaders. The group's main role is to collaborate on supporting the implementation of best practices as per *Ontario's Stroke Prevention Clinic (SPC) Core Elements*.

In September 2020, the provincial group reviewed the self-assessment again to look for unaddressed gaps and listed them in a new survey circulated to SPCs. The survey validated the group's **next top 2 priorities: 1) Develop a SPC virtual care toolkit and 2) update the Ontario Stroke Network SPC triage Algorithm (2015)**. The 2021-22 workplans for the 2 priorities were endorsed by the Regional and District Advisory Committee (RDAC).

SPC Triage Algorithm

The **overall goal of this work** was to evolve and promote adoption of the standardized Ontario SPC triage algorithm to enhance best practices, timely access, and efficiencies.

Building from the 2020 Canadian Stroke Best Practice secondary stroke prevention recommendations for triage which are intended for the "front" end referral source (e.g., from ED or primary care), this SPC Triage Algorithm is intended for internal SPC triage of referrals regardless of referral source. This triage algorithm is intended to help guide "how" SPCs can triage based on the clinical information received. This provincial SPC Triage algorithm serves as a **guide only** for SPC use for their own internal triage purposes.

This algorithm was adapted from the Northwestern Ontario Regional Stroke Network & Thunder Bay Regional Health Sciences Centre SPC Triage Algorithm. The updating of this algorithm was informed by an extensive literature review along with a review of current algorithms in use across Canada and the Canadian Stroke Best Practice Recommendations for Secondary Stroke prevention "triage" Evidence Table. The algorithm was tested by many SPCs across Ontario & reviewed by Stroke Prevention leaders and their feedback was incorporated into this updated version. The algorithm was endorsed by the stroke Regional District Advisory Council in May, 2022.

A detailed explanation of the components of the algorithm are also included in the Appendices.

It is recognized that many referrals don't exactly "fit" into one of the triage timeline levels, so often clinical judgment is needed.

We hope this triage algorithm will be helpful in supporting your triage practices. This algorithm **can be adapted or modified** to suit local SPC needs. We envision this algorithm as being helpful for those who are new to the SPC or are providing infrequent coverage.

Further feedback is welcome!

The Secondary Stroke Prevention Task Group

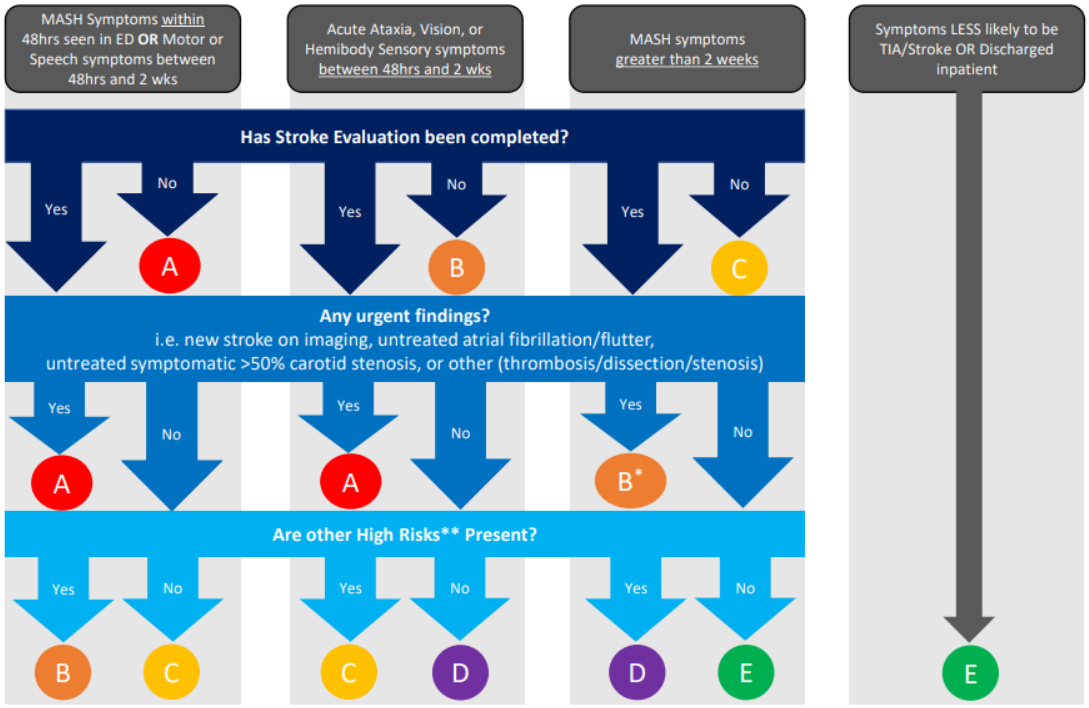
For more information, contact:

Tammy Tebbutt – tammy.tebbutt@grhosp.on.ca OR Colleen Murphy- Colleen.Murphy@kingstonhsc.ca

1st Page of the Ontario Triage Algorithm for Stroke Prevention Clinic Referrals

Ontario Triage Algorithm for Stroke Prevention Clinic Referrals

Patients with TIA or Non Disabling Stroke Symptoms



New Acute TIA / Stroke Symptoms → Within 48 hrs and no ED Visit → Advise to go to CT-capable ED Immediately

Stroke Symptoms - MASH

likely TIA or minor stroke (transient, fluctuating) & if persistent, increase triage scale or admit

MOTOR (Unilateral weakness: face or arm or leg)
ACUTE ATAXIA or VISION CHANGE (monocular or hemifield vision loss or diplopia)
SPEECH (dysarthric or dysphasia/aphasia)
HEMIBODY SENSORY (unilateral numbness: face/arm or arm/leg)

Stroke Evaluation

- Head Imaging
- Vascular Imaging
- Cardiac Monitoring (ECG or Holter or Loop)
- Antiplatelet or Anticoagulation started

Triage Scale

Time frame to be seen at SPC from date of referral sent

- A Within 24hrs (ED or SPC Fast Track) *(emergent)*
- B Within 1 Week (*urgent/high)*
- C Within 2 Weeks (*moderate)*
- D Within 1 Month (*low)*
- E Within 3 Months *(discharge inpatients / less likely to be TIA/stroke but still may need attention)*

Adapted from Northwestern Ontario Regional Stroke Network & Thunder Bay Regional Health Sciences Centre
Source: Canadian Stroke Best Practice Recommendations (2020; 2017) & References (See Appendix)
Updated by Ontario Secondary Stroke Prevention Task Group (May, 2022)

* If untreated atrial fibrillation/flutter-implement plan for anticoagulation ASAP
** See over for other high risks

Second Page (Flip Side) of the Ontario Triage Algorithm for Stroke Prevention Clinic Referrals

Other High Risksto Consider:**

Higher priority for those based on:

- Symptoms:
  - Longer duration of symptoms
  - MASH symptoms occurring > 2 weeks [with time the priority diminishes (e.g., 2 weeks vs > 3 months)]
  - Warrants OT/PT/SLP assessment
- Other Vascular conditions
- Previous TIA/stroke
- Pregnancy including post-partum
- Cancer
- Vascular risk factors
- Already on Antiplatelet/Anticoagulation therapy
- Blood pressure reading is high (e.g., initial triage diastolic blood pressure ≥ 110 mmHg as per Canadian TIA Score)
- Abnormal Blood work (e.g., Glucose ≥ 15 mmol/L & Platelet count ≥400 x 10^9/L as per Canadian TIA Score)
- High Canadian TIA Score ≥9
- Other considerations:
  - Lifestyle risks
  - Age (younger)
  - Ethnicity
  - Family history

Not likely to be a TIA:

- Transient symptoms lasting only seconds
- Seizure
- Isolated transient loss of consciousness or syncope
- Transient global amnesia
- Isolated non-vertiginous dizziness
- Vague generalized weakness without loss of power

OR

No other focal neurological findings

Defer back to referral source or primary care physician for follow up or as per internal processes

Appendix A

Description of Elements on the Triage Algorithm

Page 1

1. **New Acute Stroke/TIA Symptoms within 48 hours and NO ED visit-** Follow Canadian Stroke Best Practice Recommendations for Triage if patients have acute stroke symptoms within 48 hours. These patients should go immediately to the ED that has capability for stroke care. In Ontario, there are a few hospitals that offer a Rapid TIA type clinic where patients are seen immediately and have same day stroke evaluation completed (see 3. below for components of stroke evaluation). This part of the algorithm covers the majority of hospitals that do not have a Rapid TIA clinic; so the advice is patients go to an ED that has CT capacity.

2. **Stroke Symptoms-MASH symptoms (see below)**
   - This acronym is based on the symptoms that most likely could indicate an acute stroke or TIA event. These symptoms would be of sudden onset, and could be either transient or fluctuating or persistent in nature. For persistent stroke symptoms, the triage level is escalated and decisions are made about admission to hospital.
   - Motor (unilateral weakness) and Speech (dysphasia) disturbances are considered the highest risk category for acute stroke/TIA as these focal symptoms are most likely to be ischemic in origin.
   - MASH Stroke Symptoms acronym:
     - M – **M**otor symptoms such as unilateral weakness in either face **or** arm **or** leg
     - A – **A**cute Ataxia (lack of muscle control or coordination) or Acute Vision Change (monocular **or** hemifield vision loss **or** diplopia)
     - S – **S**peech (expressive **or** receptive *dysphasia* [difficulty in generating speech or comprehension] **or** *dysarthria* [slurred]*)
     - H – **H**emisensory (unilateral *numbness*: in two contiguous body parts (face/arm or arm/leg) **not** patchy burning or prickling paraesthesia

3. **Stroke Evaluation components**
   - *People experiencing signs of stroke require rapid assessment, diagnosis and determination of risk for prevention of recurrent stroke. Patients determined to have transient ischemic attack, or subacute, non-disabling ischemic stroke who are not candidates for hyperacute treatment with intravenous alteplase (tPA) or endovascular thrombectomy may then be prioritized for secondary prevention of stroke assessment and management. (CSBPR 2018)*
   - *Patients with acute stroke and TIA symptoms who present to an ambulatory setting (such as primary care) or a hospital/Emergency should undergo clinical evaluation by a healthcare professional with expertise in stroke care to determine risk for recurrent stroke and initiate appropriate investigations and management strategies.(CSBPR, Secondary Prevention, 2017)*
     - **Stroke Investigations** would include head imaging (CT or MRI), vascular imaging (carotid doppler/ultrasound or CT Angiography (CTA) head/neck), cardiac monitoring (ECG in ED; holter or Loop monitor may be ordered by ED or SPC when necessary)
     - **Prevention Medications** should be initiated for probable TIA/Stroke that would

include antithrombotic (antiplatelet(s) or anticoagulation) therapy as appropriate. Medications for chronic disease such as hypertension, dyslipidemia etc. that are imperative for secondary stroke prevention will need ongoing further assessment at future secondary stroke prevention clinic appointments.

- Based on Canadian Stroke Best Practice Recommendations:
  - Secondary Prevention (2017and 2020).
  - Acute Stroke Management (2018)

4. Triage Scale

A **Emergent**:
Patients to be seen **within 24 hours** of referral being sent to SPC. If unable to accommodate this, some options are:

- Redirect patients back to ED
- To be seen by stroke expert while in ED
- Some SPCs are set up to see patients directly from ED (Fast Track SPC)
  *If unable to be seen in SPC within 24 hours then suggest organizing missing evaluation components to be done in a timely manner (e.g., vascular imaging) prior to being seen

B **Urgent:**
Patients are to be seen in SPC **within 1 week** of referral being sent to SPC

C **Moderate Risk**:
Patients are to be seen in SPC **within 2 weeks** of referral being sent to SPC

D **Low Risk**:
Patients are to be seen in SPC **within 1 month** of referral being sent to SPC

E **Discharged Inpatients or less likely to have TIA** or stroke but still may need attention:
Patients are to be seen in SPC **within 3 months** of referral being sent to SPC

5. Urgent Findings

a) New Stroke based on Imaging: Infarct present on CT or MRI

b) Untreated Atrial Fibrillation/Flutter:

Non-valvular atrial fibrillation (AF) refers to atrial fibrillation in the absence of moderate to severe mitral stenosis or mechanical heart valve (CCS, 2020). It is an independent risk factor for stroke (annual incidence of approximately 4.1-4.5%) and combined stroke/systemic embolism (annual incidence of 50%). The Canadian Cardiovascular Society (CCS) algorithm (CHADS -65) is a helpful tool to guide antithrombotic therapy decision-making for patients with non-valvular AF or atrial flutter (CCS, 2020). A non-vitamin K antagonist direct oral anticoagulant (DOAC) is recommended in preference to warfarin for most patients with ischemic stroke or TIA (CSBPR, 2020 & CCS, 2020).
Untreated AF/flutter (new or previous) in a patient with a diagnosis of ischemic stroke/TIA means that the patient is <u>not</u> on any oral anticoagulant. Sub-therapeutic INR for patients taking warfarin means that the patient is “untreated”.
Assessment of adherence is an important feature of ensuring patients are fully treated with their oral anticoagulation (CSBPR, 2020).

c) Untreated Symptomatic Carotid Artery Stenosis (CAS)-ipsilateral

Carotid stenosis is termed symptomatic if associated with a symptomatic event: ipsilateral (occurring on same side) carotid-territory cerebral or retinal ischemic event (ischemic stroke, TIA, transient monocular blindness, or retinal artery occlusion) within the preceding 6 months (CSBPR, 2020). *Patients with a symptomatic event attributed to an ipsilateral 50 to 99 percent carotid artery stenosis should be evaluated without delay for potential carotid revascularization by a health professional with stroke expertise [Evidence B] (CSBPR, 2020). In men with 50 to 99 percent and women with 70 to 99 percent symptomatic carotid artery stenosis, carotid endarterectomy (CEA) is recommended and should be performed as soon as possible following the qualifying event [Evidence A]. In clinically stable patients (men and women), CEA should be performed as early as possible following a qualifying event [Evidence Level B] and ideally within 14 days [Evidence Level A]. In women with 50 to 69 percent symptomatic carotid stenosis, CEA may be considered in those at highest risk of stroke recurrence and upon consideration of other patient factors [Evidence Level B].*

Source: Canadian Stroke Best Practice Recommendations, Secondary Stroke Prevention, 2020

d) Other Urgent Findings: Refer to Canadian Stroke Best Practice Recommendations for Secondary Stroke Prevention

Page 2 (Flip Side of Algorithm)

6. Not Likely to be a TIA

- Transient symptoms lasting only seconds
- Seizure
- Isolated transient loss of consciousness or syncope
- Transient global amnesia or memory loss
- Isolated non-vertiginous dizziness
- Vague generalized weakness without loss of power

OR

No other focal neurological findings

The symptoms or conditions above are not likely to be a TIA. When this is the case, consider deferring the referral back to the referral source or to the primary care physician for follow up. It is recommended that a standard template letter be developed. Some clinics may follow organizational processes and may choose to see these patients.

7. Are Other High Risks** Present?

When MASH stroke symptoms and stroke evaluation results are similar, then other high risk features can be considered for further triage decision making:

- **Symptoms:**
  - Longer duration of symptoms. The longer the symptoms persist, the greater the risk (e.g., Symptoms persisting ≥10 minutes; someone with symptoms > 60 minutes would be considered a higher risk as they are more likely to have a stroke versus a TIA)
  - MASH symptoms greater than 2 weeks-the priority for earlier SPC visit diminishes over time (e.g., patient with symptoms at 3 weeks would have a higher priority than a patient with symptoms at 3 months)
  - Symptoms warrants Occupational Therapist/Physiotherapist and/or Speech Language Pathologist

assessment

- **Previous TIA/stroke** (e.g., higher priority if dual TIA earlier within 7 days)
- **Other Vascular conditions**
    - History of Carotid Disease
    - Hypertension
    - Cardiac conditions/events (e.g., prior MI, coronary artery disease, Patient Foramen Ovale (PFO), aortic arch atheroma, cardiac thrombus, left atrial atrophy, heart failure)
    - Peripheral Arterial Disease
    - Diabetes
    - Hyperlipidemia
    - Chronic Kidney Disease
- **Pregnancy or Postpartum,**
- **Cancer**
- **Vascular risk factors**
    - History of atrial fibrillation
    - Smoking/Vaping tobacco
    - Sleep Apnea
    - Abdominal obesity
    - Depression
    - Drug abuse
    - Alcohol abuse
    - Oral Contraceptives & Hormone Replacement Therapy
    - Environmental: Long-term exposure to air pollution especially particulate matter ≤2.5 μm in diameter
- Already **on Antiplatelet or Anticoagulation therapy** prior to event
- **Blood pressure reading is high** (e.g., initial triage diastolic BP ≥ 110 mmHg as per Canadian TIA Score)
- **Other abnormal findings on tests completed such as Blood work** results (e.g., Glucose ≥ 15 mmol/L or Platelet count ≥400 x 10^9/L as per Canadian TIA Score)
- **Canadian TIA Score** (High Risk Score is ≥9) (See Appendix B, #8)
- **Other considerations**:
    - Lifestyle risks (e.g., sedentary –inactive, poor diet, stress-psychosocial
    - Age (younger age)
    - Ethnicity
    - Family history

Appendix B

Who Does Triage/Admission Guide/Canadian TIA Score for ED

8. Who does Triage in SPC?

- A survey conducted in 2021 by the provincial Secondary Stroke Prevention Task Group revealed that triage is mainly completed by nursing teams (RN, CNS or NP) at the SPC. In some Stroke Prevention Clinics (SPCs), the nurse and physician work together in collaboration to triage the referrals. Some SPCs do not triage since all referrals are accommodated within a timely manner.
- There are times when the nursing team confers with the physician about triage. This collaboration may occur when there is uncertainty regarding reason for referral, interpretation of test results, missing clinical information, when referrals are similar, or other concern warranting a physician's perspective.
- The nursing team confers with the physician prior to the SPC declining or redirecting referrals.

9. Admission Guide

The following elements when present, may justify evaluation for potential admission to hospital:

- Acute brain infarct, or other acute findings (e.g., thrombosis, dissection) on CT or MRI or CTA or MRA
- Crescendo, fluctuating TIA, persisting signs especially speech impairment, gait disturbance, or weakness
- Recent prior TIA
- Symptomatic Carotid Stenosis
- Atrial Fibrillation already on anticoagulation
- Failed dysphagia screen
- End stage renal disease
- Pregnancy
- Other acute medical issues
- High Canadian TIA Score + Unable to arrange timely neurovascular imaging & secondary stroke prevention medication

Evaluation with the SPC MD or MRP should be considered if any of these elements above are noted.

10.Canadian TIA Score

Items	Points
Clinical findings:	
1) First transient ischaemic attack (in lifetime)	2
2) Symptoms ≥10 minutes	2
3) Past history of carotid stenosis	2
4) Already on antiplatelet therapy	3
5) History of gait disturbance	1
6) History of unilateral weakness	1
7) History of vertigo	−3
8) Initial triage diastolic blood pressure ≥110 mm Hg	3
9) Dysarthria or aphasia (history or examination)	1
Investigations in emergency department:	
1) Atrial fibrillation on electrocardiogram	2
2) Infarction (new or old) on computed tomography	1
3) Platelet count ≥400×10^9/L	2
4) Glucose ≥15 mmol/L	3
Total score (−3 to 23):	X

TABLE 4: Canadian TIA Score: interval likelihood ratios and risk of outcome within 7 days (n=7607)

	Outcome		Interval likelihood ratio (95%CI)	Observed risk (%)	Estimated risk (%)
	Yes	No			
Subsequent stroke/carotid revascularisation					
Low risk (−3 to 3)	6	1236	0.20 (0.09 to 0.44)	0.5	0.7
Medium risk (4 to 8)	124	5360	0.94 (0.85 to 1.04)	2.3	2.1
High risk (≥9)	52	829	2.56 (2.02 to 3.25)	5.9	6.3
Subsequent stroke					
Low risk (−3 to 3)	3	1239	0.17 (0.06 to 0.51)	0.2	0.5
Medium risk (4 to 8)	81	5403	1.04 (0.93 to 1.16)	1.5	1.3
High risk (≥9)	24	857	1.94 (1.36 to 2.78)	2.7	3.3

Sources: Perry et al., 2021 Prospective validation of Canadian TIA Score & comparison with ABCD2 & ABCD2i for subsequent stroke risk after TIA

Appendix C

Case Studies using the *Triage Algorithm for Stroke Prevention Clinics*

Case 1: Ann

- 60-year old Ann was walking her dog with a friend in a park near where she lives. She experienced sudden weakness in her left hand and was unable to hold the dog leash. A friend noted that Ann's speech was garbled. Ann rested on park bench for ~15 minutes while symptoms resolved completely.
- Next afternoon, Ann was seen by her family physician who then sent her to ED. In ED, symptoms remained resolved & physical exam including neuro assessment was normal.
- History: Inferior STEMI 18-months ago-received 2 stents in right coronary artery; remote smoker. Current medications: Clopidogrel, Bisoprolol.
- Investigations: Plain CT of head: Normal; CTA: < 50% LICA stenosis; ECG: Afib (rate 72-100 via monitor); blood work normal except slightly abnormal creatinine clearance at 50ml/min.
- Discharged home from ED in stable condition with query TIA diagnosis and new onset atrial fibrillation.
- ED Discharge Plan: Prescription given for Anticoagulant; Referred to local Stroke Prevention Clinic (SPC); Follow up with primary care provider.

SPC Referral Triage:

MASH symptoms within 48 hours and seen in ED: YES
Has Stroke Evaluation Been completed in ED: Yes
Any New Urgent Findings: No
Are Other High Risks Present: Yes-cardiac
Triage Scale: B

Case 2: Mohan

- 52-year old Mohan was walking with his spouse in late afternoon near the construction site where he works. Suddenly, he experienced vision loss in his right eye and felt dizzy. Mohan rested on the sidewalk bench for ~30 minutes while symptoms resolved completely.
- Was seen by his family physician 1 week later for a flu vaccination. Mohan told the physician about what had happened. The family physician performed a neuro assessment which was normal and his symptoms remained resolved. Bloodwork and an ECG was arranged to be done that day and he was referred for urgent ophthalmology consult. He was seen by the ophthalmologist the next day who arranged an urgent CT/CTA to be done that day and referral to the local SPC.
- History: Smoker and OSA. Current medications: Vitamin D, ASA (started by ophthalmology).
- Investigations: Plain CT of head: Normal; CTA: < 50% RICA stenosis; ECG: SR with frequent PAC's; blood work normal except Random Blood Glucose-8.0 mmol/L; Awaiting A1C results; BP -148/85.

SPC Referral Triage:

MASH symptoms within 48 hours and seen in ED or Motor/Speech symptoms between 48 hrs and 2 weeks: NO
Acute Ataxia, Vision or Hemibody Sensory symptoms between 48 hrs and 2 weeks: YES
Has Stroke Evaluation Been completed: Yes
Any New Urgent Findings: No
Are Other High Risks Present: Yes-smoker & works at construction site-long-term exposure to air pollution.
Triage Scale: C

Case Studies using the *Triage Algorithm for Stroke Prevention Clinics Continued*

Case 3: Ashley

- 74-year old Ashley, was drumming at her local drum social when she suddenly experienced weakness in her right hand - unable to coordinate use of her drum stick. Friends noted that Ashley's singing was garbled. Ashley rested on her chair for ~10 minutes while symptoms resolved completely.
- 3 weeks later, Ashley visited her local Community Centre where they were doing health screenings. A trained blood pressure community volunteer, took Ashley's blood pressure and noted it was high and suggested she go see her primary care provider. Next morning, Ashley was seen by her Indigenous nurse practitioner (NP) in local CHC. Ashley told the NP about her symptoms at the drum circle 3 weeks ago and that her BP was high yesterday. Her symptoms remained resolved & physical exam was normal. The primary care team arranged for investigations to be done.
- History: Hypertension and type 2 Diabetes; Current meds: Ramipril, Metformin, Liraglutide.
- Investigations: CT of head + CTA (head/neck): Normal; ECG: NSR; blood work: abnormal eGFR at 28 ml/min/1.73m^2 and glucose level at 15.0 mmol/L.
- Primary care provider to follow up on blood work. Started on ASA. Referred to Nephrology and local SPC.

SPC Referral Triage:

MASH symptoms within 48 hrs and seen in ED or Motor/Speech symptoms between 48 hrs and 2 weeks: NO
Acute Ataxia, Vision or Hemibody Sensory symptoms between 48 hrs and 2 weeks: NO
MASH symptoms greater than 2 weeks: YES
Has Stroke Evaluation Been completed: Yes
Any New Urgent Findings: No
Are Other High Risks Present: Yes- Hypertension, Diabetes, abnormal blood work, ethnicity
Triage Scale: D

Appendix D

Virtual Decision-Making Guide for in-person, video and telephone visits

TABLE 1. PRIORITIZATION LEVELS FOR IN-PERSON OR VIDEO VISIT

Determining Prioritization of Patients Who Are Appropriate for In-person Visit

PRIORITY LEVEL 1:

- New referrals where patients present with new onset high or moderate risk symptoms (MASH link)
- Referrals from any source (ED/community) and/or level A triage scale (hyperlink) still requiring further assessment or physical exam to guide diagnosis and treatment.
- New referrals where patients present with ongoing or worsening symptoms and those that have never had an in-person assessment.

PRIORITY LEVEL 2:

- New referrals with level B triage scale
- New referrals with complex risk factors that require ongoing management
- Abnormal test results that require urgent intervention
- Patients who require follow-up and there is a change in health status

PRIORITY LEVEL 3:

- New referrals from inpatient acute care with multiple co-morbidities
- Patients' preference, or patients with communication barriers (e.g. hearing/vision/cognitive impairment).
- Patients who require return to work or return to driving recommendations
- Patients who are emotionally distressed and cannot be adequately addressed via virtual care (psychosocial domains H&S)

Implementation strategies

- Use a standardized triage tool (i.e. Triage algorithm) to manage incoming referrals.
- Establish a process to manage backlog referrals during fluctuations in service delivery (e.g. as a result of a pandemic) to ensure patients are seen in a timely manner.
- Consider plans to triage patients to determine need for in-person visit, video conference or phone call.
- Consider previously used triage algorithm to determine priority access and in-person care
- Regular contact for those on the third priority level to identify risk or change in priority level based on health status.

NB: Prioritization levels are based on current best practice guidelines. It is recognized that there are exceptions where video is being used in place of in-person visits due to geographical proximity and unique circumstances.

Virtual Decision-Making Guide for in-person, video and telephone visits

Table 3: CLINICAL CONSIDERATIONS TO DETERMINE VIRTUAL MODE OF VISIT			
A VIDEO VISIT MAY BE MOST APPROPRIATE FOR:		**A PHONE VISIT MAY BE MOST APPROPRIATE FOR:**	
Stroke patient with a recent discharge from acute care		Follow-up from an in-person SSPC visit requiring minimal assessment (at 3 and 6 month check-ins)	
Symptoms resolved (triage level B, or C or D or E) but require intake history and remote assessment to decide on medical work-up and management		Symptoms resolved (triage level B, or C or D and E) intake history with no virtual access	
A stable, routine assessment including administering outcome measures/ assessment/screening tools that may be appropriate to administer remotely		Follow-up of those with no reported changes to their medical or cognitive status since previous in-person visit	
Sharing of test results that require medication management		Sharing of test results (unless there are complex issues and further interventions are required immediately)	
Intake/history assessment for patients with symptoms less likely to be TIA		Linking and referring to other services	
New concerns identified by a primary care practitioner and/or patient/ caregiver		High functioning patients who are able to self-manage	
Pre-driving assessments (perceptual, visual, sensory and physical skills)		Medication reconciliation and refills	
Educational virtual group sessions			

Literature Review Summary (September 2021)

Source	Summary of Key points of Article Related to Triage
More General TIA Articles with Triage/Stratification Noted	

Canadian Stroke Best Practice Recommendations (CSBPR), **2020**. Evidence Table: Triage and Initial Diagnostic Evaluation of TIA and Non-Disabling Stroke
+
CSBPR, **2018** Acute Stroke Management Evidence Tables OP Management of TIA & Non-Disabling Stroke
	Key guidelines included. Examples:
	• Melbourne Australia, 2017
	  ○ In pre-hospital settings, high risk indicators (e.g. crescendo TIA, current or suspected Atrial Fibrillation (AF), current use of anticoagulants, carotid stenosis or high ABCD2 score) can be used to ID patients for urgent specialist assessment
	• New Zealand, 2010
	  ○ HIGH risk is indicated by any of following: Active TIA, ABCD2 score ≥4, crescendo TIAs, AF or already on anticoagulation, should be managed as high risk regardless of ABCD2 score.
	  ○ LOW risk is indicated by any of the following: ABCD2 score ≥3, late presentation (>1 week)
	Predictors of Stroke Recurrence:
	• **Flach et al. 2020, UK, retrospective study**
	Independent predictors of recurrent stroke: Age ≥65 years, hypertension, AF & smoking.
	• **Bergström et al. 2017, Sweden, retrospective study**
	Predictors of recurrent ischemic stroke: age >75 years, prior ischemic stroke, prior MI, diabetes, AF without warfarin at discharge, & treatment with diuretics or β-blockers at discharge.
	• **Callaly et al. 2016, Ireland, prospective study**
	Hyperlipidemia and prior stroke were independent predictors of 2-year recurrence.
	• **Lioutas et al. 2021, USA, prospective Study**
	Hypertension was biggest independent predictor of subsequent stroke.
	• **Amarenco et al. 2016, 2018, France , prospective study**
	Independent predictors of stroke recurrence: Cerebral infarctions on brain imaging, ABCD2: 6-7, large artery atherosclerosis (1st 7 days); 5 year outcomes-Independent predictors of subsequent stroke: ipsilateral large-artery atherosclerosis. Cardioembolism, & ABCD2 score ≥ 4.
	• **Wardlaw et al. 2015, UK , Systematic review & meta-analysis**
	• **Perry et al. 2014, Canada, Observational**
	Items: first TIA, symptoms persisting for ≥10 min., History of carotid stenosis, on antiplatelet, History of gait disturbance, History of unilateral leg weakness, DBP, ≥110 mmHg, dysarthria or aphasia, ED investigations: AF on ECG, infarct on CT, elevated platelet count ≥400x109/L & BG ≥15 mmol/L. Total TIA scores range from -3 to 23.
	• **Coutts et al. 2012 Canada Prospective cohort study**
	+ve CT/CTA scan only predictive variable of recurrent stroke in multivariate model. CT & MRI were found to be equal in ability to predict recurrent stroke. Immediate CT/CTA imaging findings (within 24 hrs) were predictive of recurrent stroke at 90 days.
	• **Purroy et al. 2012, Spain, Prospective cohort study**
	Clinical predictors of stroke within 7 days: Prior TIA & large artery atherosclerosis.
	Predictors of stroke within 90 days: Prior TIA, large artery atherosclerosis, & motor weakness.
	• **Ferrari et al. 2010, Austria, Prospective study**
	Predictors of patient deterioration: Hypertension, Diabetes, Etiology (Cardioembolic stroke, Macroangiopathy), Acute infection, & Cardiac decompensation.
	Rapid Evaluation of TIA & Stroke
	• Components of Care for Outpatient Management of TIA and Non-Disabling Stroke/Models of Care
	• See Table for Tools for Assessing the Risk of Recurrent Stroke or TIA:
	  • **Rothwell et al., 2005-ABCD score**
	  • **Perry et al., 2011-ABCD-2 score**
	  ○ Multicentre prospective study involving patients in EDs with TIA found the ABCD2 score to be inaccurate, at any cut-point, as predictor of imminent stroke. Furthermore, ABCD2 score >2 that is recommended by American Heart Association is nonspecific.
	  • **Meng et al., 2011-ABCD^2-I**
	  ○ To prospectively validate predictive value of ABCD^2-I score & compare predictive accuracy of ABCD^2 score and ABCD^2-I score for 1-year risk of stroke in admitted patients with TIA as defined by WHO time-based criteria.

	○ ABCD^2-I score is useful tool for stratifying 1-year risk of stroke in TIA patients and improves discriminatory power of ABCD^2 score for prediction of stroke risk. • **Song et al., 2013-ABCD^3-I** ○ The ABCD^3-I score had higher predictive value than the ABCD^2 score for assessing risk of early stroke after TIA in Chinese population. • **Fitzek et al., 2011-Essen Stroke Risk Score** ○ Validated usefulness of the Essen Stroke Risk Score to predict stroke recurrence in hospital-based follow-up study. ○ Essen identifies groups of patients with TIA or Ischemic Stroke who are at significantly increased risk for recurrent stroke & CV event. Patients with high score require short-term follow-up & re-evaluation of secondary prevention strategies. • **Kernan et al., 2000-Stroke Prognosis Instrument SPI-II** ○ 1991 Stroke Prognosis Instrument (SPI-I) stratified patients with TIA or Ischemic stroke by prognosis for stroke or death in 2 years. ○ Validated & improved SPI-I with creating SPI-II. SPI-II added CHF & prior stroke to SPI-I. ○ Confirmed earlier findings that SPI-I identifies groups of patients with TIA or non-disabling ischemic stroke at increased risk for stroke or death.
HQO; 2013 TIA: Where Can patients Receive Optimal Care? Rapid Review	Aim: Investigate place of initial assessment & treatment of patients who present with symptoms of TIA has an impact on clinical outcomes (where should patients receive initial care?). • Organizations have developed rapid outpatient TIA assessment clinics. • Risk stratification using validated scoring systems should be used to identify patients at high or low risk of stroke. Patients then receive appropriate tests according to risk score. **Primary Care Referrals**: Summary review of 1 small study (Goldstein et al.)-clear distinction between TIA & minor stroke may be difficult if relying only on patient's signs & symptoms-may need more objective data. Significantly more patients with stroke than with TIA were admitted. Also stroke severity was not recorded-assumed patients evaluated in physician's offices had minor deficits while those with more severe deficits were more likely referred to hospital EDs. **ED Referrals**: • Summary of EXPRESS, SOS, & TWO ACES studies. • Summary of older guidelines. ○ BC, Canada-Consider emergent TIA for admission; initial investigations for TIA/stroke are same. Non emergent TIA may be referred to internist/neurologist or rapid stroke assessment unit. ○ CSBPRs ○ Australian Guidelines, National Stroke Foundation, 2010- ▪ High risk TIA (e.g., ABCD^2 ≥ 4 and/or any of following: AF, carotid territory symptoms, crescendo TIA: Brain imaging Urgent (within 24 hrs)/Carotid imaging-urgently in those patients with anterior circulation symptoms who are candidates for carotid revascularization. ▪ Low Risk TIA (e.g., ABCD^{2}score <4 without AF or carotid territory symptoms or patients presented more than 1 week after last symptoms: Brain imaging ASAP within 48 hours/Carotid imaging where indicated and ASAP. ○ Italy-For TIA, prompt hospital admission is recommended when symptoms are recurrent & last more than 1 hour, and when there is a possible embolic source. ○ UK-NICE-Suspected TIA should be assessed ASAP for risk of subsequent stroke using validated scoring system such as ABCD^2; suspected TIA and high risk of stroke (ABCD2 ≥4) should be assessed by specialist for appropriate investigations & treatment within 24 hours of onset of symptoms; crescendo TIA (2 or more TIAS in a week) should be treated as high risk. ○ Scotland-TIA/minor stroke who are high risk should undergo specialist assessment & begin treatment promptly. • Various prediction scores can help detect people at risk of stroke. • Highlights the ABCD^2 Algorithm & more recently combination of neuroimaging & vascular info resulted in improved prognostic accuracy of risk algorithm in patients with TIA: ABCD^3 & ABCD^{3-I}.

Lioutas et al., USA 2021 Incidence of TIA & Association with Long term Risk of Stroke	Aim: To determine population-based incidence of TIA & timing and long-term trends of stroke risk after TIA. • Early stroke risk stratification schemes are widely used, but less known regarding clinical & demographic factors that determine long-term risk of stroke after TIA. Large multicentre TIA registry study, risk of stroke & CV events continues to rise steadily in long term, suggesting patients with TIA remain high risk beyond early phase. • Study used longitudinal data from Framingham Heart Study. • Primary outcomes were 1) TIA in the incidence cohort & 2) stroke after TIA. For stroke after TIA, followed patients up to 10 years after TIA. • **Baseline characteristics of participants with TIA** reported in Table 1. Patients with TIA had significantly higher prevalence of hypertension, diabetes, atrial fibrillation, coronary artery disease, & smoking. • **Factors associated With Subsequent Stroke Within TIA Cases**- ○ Comparisons of baseline demographics and clinical characteristics between patients with TIA and subsequent stroke vs patients with TIA but without a stroke on 7 and 90 days are presented in eTables 3a and 3b. Stroke risk was mainly associated with hypertension for 7-day stroke. Statistically significant linear association between systolic & diastolic BP for both early & late risk of stroke. With regard to TIA features, only presence of language symptoms was significantly associated with early stroke risk after TIA. • Findings suggest TIA patients represent high-risk group in need of vigorous surveillance beyond early, high-risk period with special attention to hypertension monitoring & treatment. • In this population-based cohort study from 1948-2017, estimated crude TIA incidence was 1.19/1000 person-years, the risk of stroke was significantly greater after TIA compared with matched control participants who did not have TIA, & risk of stroke after TIA was significantly lower in the most recent group from 2000-2017 compared with earlier period from 1948-1985.
Mijalski, USA; 2015 TIA Management: Should TIA patients be admitted?	General Review Article of TIA management at Rhode Island Hospital-not all patients require admission. • **Compares different models of TIA management**: EXPRESS 2007; SOS-TIA 2007; Ottawa 2010, TWO ACES 2011 & Monash 2012. • **Reviews Risk Scores:** ABCD2-uses easily available data, adopted by many centres; integrates ABCD & California scores; correlated with low, moderate, & high risk of stroke at 2, 7, & 90 days: Low-risk group scores of 0 to 4, with stroke risk of 1%, 1.2%, & 9.8% at 2, 7, & 90 days, Moderate-risk group scores of 4 to 5 whom stroke risk was 4.1%, 5.9%, & 9.8% at 2, 7, & 90 days, High-risk group scores of 5 or greater with stroke risk of 8.1%, 11.7%, & 17.8% at 2, 7, & 90 days. • ABCD2 does not take into account imaging. One study found that patients with CT head with evidence of infarction had increased short term risk. • ABCD3-uses same as ABCD2 but + 2 points for "dual" TIA or earlier TIA within 7 days. • ABCD3-I used same scale as ABCD3 but + abnormal findings on imaging of internal carotid stenosis> 50% &/or restricted diffusion on DWI. • ABCD3 & ABCD3-I were superior to ABCD2 & may predict long term outcome in patients with TIA up to 3 years. • These scoring tools were not developed to determine need for hospitalization. • One study (Amarenco) indicated that "any setting where patients can be evaluated in efficient manner & triaged accordingly is best setting in or out of hospital." • Includes an **algorithm about admission of TIA to a stroke unit** including elements for admission and care plan for those admitted to an ED TIA observation unit (23 hour observation). • In Rhode Island hospital-**evaluated TIAs in dedicated TIA unit located in ED**. Admit ~ 20% of TIAs. Patients are **primarily admitted if** persistent neurological deficits, failed dysphagia screen, ≥two TIA events in last 7 days, AF, end stage renal disease, pregnancy, internal carotid artery stenosis ≥50% ipsilateral to suspected symptomatic hemisphere, AF on telemetry, & thrombus on echo.
Coutts; 2017 Diagnosis & Management of TIA	General Review Article published by American Academy of Neurology-**what is important is that patients get appropriate early assessment & treatment.** • TIA & stroke represent different ends of ischemic continuum but care management is similar. • Diagnosis of TIA depends on quality & quantity of info available-main criteria are clinical history or neuro exam consistent with focal neuro dysfunction & imaging of brain. Diagnosis largely is based on taking accurate history. Most importantly determine whether symptoms are focal or non-focal. Then clarify

	circumstances of the TIA-what was the patient doing at time of TIA? Have symptoms occurred before? Were the symptoms sudden or gradual? • Can be challenging to obtain reliable report of events from patients even for experts. • Presence of mimic is higher among those without motor & speech symptoms. Patients with motor or speech symptoms are higher risk too. Patients with other symptoms have more uncertain etiology. Posterior circulation ischemia can pose additional challenges as symptoms are more variable. • Although % of patients with true ischemia is lower in those without motor or speech symptoms, it is important not to miss patients with true TIA & minor stroke. • After basic investigations, brain imaging is key to rule out structural causes (e.g., tumor, bleed, subdural hematoma). • Problem with ABCD2 is patients in low risk category still have recurrent stroke. Majority of recurrent strokes are in moderate category. • Progressing beyond ABCD2-posterior cases can cause nonspecific symptoms for example. • Evidence of infarct on CT alone has been shown to be predictive of recurrent stroke. Patients at highest risk or recurrent events can be identified using CTA. ≥50% stenosis or occlusion in intra or extra cranial vessel of symptomatic patient puts them at high risk. • Most neurologist agree that patients who have negative DWI but have truly had TIAs clearly exist-they will treat patients with TIA with –ve DWI. • Assessing patients & completing urgent imaging is most easily done in ED. If no access to timely outpatient imaging, patients are often admitted to hospital. **TABLE 4-1** is helpful--has clinical and imaging features that increase the risk of recurrent stroke or symptom progression after TIA or minor stroke: ○ **Timing:** High risk-hours ago; Low Risk-weeks ago ○ **Age** (years): High risk->60; Low risk: <45 ○ **BP at presentation**: High risk >140/90; Low risk: <140/90 ○ **Diabetes:** High risk-Yes; Low risk- No ○ **Symptoms**: High risk-Speech, weakness; Low risk: dizziness, numbness ○ **Duration** (minutes): High risk>60; Low risk: <10 ○ **Frequency**: High risk: 1 or few; Low risk: Many ○ **Degree of clinical improvement**: High: vanishing severe deficit; Low risk: Improving mild deficit ○ **Intracranial stenosis**: High risk: severe; low risk: none ○ **Extracranial stenosis**: High risk- present; Low risk: absent ○ **Intracranial occlusion**: High risk: present; Low risk: absent ○ **DWI lesion**: High risk- multiple greater than single; Low risk- none ○ **Transcranial Doppler emboli detection** (microembolic signals/hour) High:>50; Low: none
Gomez et al. , 2017 , USA Recent Advances in Management of TIA	General Review-TIA is opportunity for stroke prevention much like unstable angina for MI. Background for Review 1) improved predictive models of stroke risks 2) Optimal algorithms for evaluation &3) effective treatment strategies. • Table 1 compares **different ABCD stroke risk scoring systems**. • **Stroke Risk Stratification-stroke subtype classification is best carried out by using TOAST**. Unfortunately likelihood of identifying stroke subtype in ED is ~ 60% making this impractical for use before patient is seen in SPC. • ABCD score was rapidly embraced and had been the platform for progressively more complex scoring systems. • Next wave of scoring systems improved predictability of stroke risk by including diagnostic info. • Similar approach to stroke risk stratification involved Alberta Stroke Prevention in TIAs and Mild Strokes (ASPIRE). ASPIRE though allocated over ¾ of pts to high risk category cancelling out benefit of triage. • Most recent initiative involves adding 2 variables to existing ABCDE+ a) etiology point for each stroke subtype) & b) DWI positivity (+ 3 pts) • It is **useful at the bedside to approach stroke risk considering 3 domains** that include the variables that comprise the scoring systems in **Figure 2: a) Risk Factors** (e.g., age, BP, diabetes, AF), **b) semiologic variables** (e.g., type of symptoms & signs and duration of deficit) and **c) Imaging Findings**-DWI lesions, ischemic mismatch, Carotid stenosis, Cardiac dysfunction). With this domain approach, possible to address

	components of all scoring systems without being bound by any one of them–sometimes need a more qualitative view. • PROMAPA from Italy recommended going beyond scoring systems. The limitations of using scoring systems is the various levels of stroke risk have been set arbitrarily (e.g., BP as defined as > 140) and 2) much of the info for scoring is not available or easily found. **TIA clinic Attributes** • Fast Track Access: Immediate appointments for TIA patients. Metrics-24 hours for high risk & 48 hrs for others • Specialist: Challenging to diagnose as many conditions mimic TIA • Rapid access to diagnostics • Multidisciplinary network-variety of consultants • Educational programs Most patients with TIA fall into either large artery atherothromboembolic or cardiogenic (i.e. TOAST). These are the 2 subtypes posing greatest risk. Therefore priorities of diagnostic evaluation involve exam of cerebral arterial system and cardiogenic sources of embolization. The choice depends on: clinical scenario, specific vascular pathology suspected, & imaging resources available.
Hosier et al., 2015. Transient ischemic attack: management in the emergency department and impact of an outpatient neurovascular clinic	Aim: • Evaluate TIA management in ED settings (Nova Scotia) to determine if following Canadian Stroke Best Practice Recommendations • Evaluate impact of being followed in a dedicated outpatient neurovascular clinic • 686 patients were seen in ED for TIA and evaluated at 90 days. • Triage tool not elaborated upon. • Results: ○ Majority of patients in study were treated with antithrombotics in the ED and had CT and ECG within 24 hours. ○ A dedicated neurovascular clinic follow up showed an association of reduced risk of subsequent stroke, MI or vascular death compared to a non-dedicated neurovascular clinic follow up.
Kamal et al., 2015 Rapid Assessment and Treatment of Transient Ischemic Attacks and Minor Stroke in Canadian Emergency Departments Time for a Paradigm Shift	• All suspected TIA/minor stroke patients have CT/CTA imaging of head/neck in ED…**if imaging abnormal**…. Then seen by stroke specialist on same day….. **if imaging normal…**. Refer to rapid access or SPC for further diagnosis and treatment (same day or next day if high risk features present). • AF needs to be treated promptly. • **Simple triage algorithm** with Yes/No approach-if definite or possible TIA/minor stroke → patient receive CT/CTA imaging of head and neck. If imaging is NOT normal → seen by stroke specialist for same day treatment. If imaging is normal → rapid access to the clinic or day unit for further diagnosis and treatment. • Focus was the use of CTA to determine same day fast tracking for endovascular procedure. • Algorithm appropriate for sites with CTA accessibility.
Lim et al., International Report on Adaptations of Rapid TIA Pathways	• Lists TIA **pathway links.** • Indicated that TIA clinics remained operational during pandemic. • Noted that with rapid care pathways with urgent evaluation of TIA in the outpatient or ED setting has been successful in preventing recurring strokes. The risk has reduced from 10.3% to 2.1% in some settings. • Interesting points about how many continued in-person and how many converted to video or telephone visits during COVID.

during COVID-19	• More CTA now being done at time of CT.
Maddula et al., 2018, New Zealand From in-patient to ambulatory care : intro of Rapid Access TIA Service	Aim: to share experience of establishing successful rapid access ambulatory service without additional resources. • While high risk TIAs have higher risk for stroke, **low-risk may have undiagnosed high risk conditions**. • **Set up daily weekday one-stop rapid access TIA clinics** where patients are assessed, investigated & treated. • Many patients at low risk were managed by GPs. • Over reliance on ABCD2 score-ABCD2 has low sensitivity & specificity when used by non-specialists in community & ED. • Shift away from ABCD2 to reliably discriminate between high and low risk TIAs. • High risk offered TIA clinic within 24-48 hours and low risk within 7 days. • **Streamlined referral process**-stroke physician was accessible by phone during working hours & received email alerts of inpatient referrals & electronic GP referrals, enabling prompt triage and early allocation of clinic slots. • Single room on stroke ward converted to a consult room. • Had fixed diagnostic appointments. • Purchased holter monitors. • Results-timely access without additional resources; redesigned service and included more use of electronic systems; & dropped existing clinic using a daily TIA service. • An area of concern was # of pts diagnosed with stroke-they would have had benefit from multidisciplinary team on a stroke unit if seen in clinic.
Graham et al., 2019, Scotland, Clinical dx of TIA or minor stroke & prognosis in pts with neuro symptoms: a rapid access clinic cohort	Aim: to determine effectiveness of bedside clinical diagnosis of minor stroke or TIA prior to imaging or other tests, for risk stratification in routine clinical practice in different groups presenting with TIA or minor neuro symptoms. • Risk prediction tools may aid stratification in patients with diagnosis of TIA but less useful in patients presenting with focal neuro symptoms due to a mixture of causes. • **There are patients presenting to TIA clinics who are at high risk of stroke or MI whether or not they were diagnosed with stroke or TIA**: older pts, and those with history of vascular disease. Therefore a strategy that might be effective in older patients or patients with history of stroke or MI who develop minor neuro symptoms, would be to use the presentation with symptoms to optimise preventative therapies whatever the clinical diagnosis. Patients presenting with minor or transient neuro symptoms who were not diagnosed with TIA or minor stroke had moderate risk of subsequent stroke or MI. • Delay from onset of symptoms to assessment in the clinic was 5 days, the delay from referral to clinic was ~ 3 days. 94% of patients were seen within 4 days of referral. • Main message was careful attention to control of vascular risk in patients is justified.
Hastrup et al. , 2021, Denmark Specialized Outpatient Clinic vs Stroke Unit for TIA and minor stroke	• In clinic, **specialized neurovascular team** performs complete diagnostic workup & treatment the same day patient is referred-assess those at high risk & eligible for admission. • **Outpatient clinic is integrated with the Stroke Unit open 7 days a week in daytime** (8-6) and staffed by physician, nurse and therapists as needed. Admitted at night to stroke unit as all TIA bypassed ED. • **Used a tool that included ABCD2 score + results of imaging of intra and extra cranial arteries together with other risk factors. Other elements like psychosocial issues were taken into account.** • Risk assessment tool was a **guiding tool only**-final decision to admit was made by specialized neurovascular senior physician. • To be classified as low risk, no acute ischemia on MRI or an ABCD2 score <3 & patients with stroke an NIHSS score< 5 + no symptomatic stenosis ≥50% of carotids, no symptomatic stenosis of intracranial vessels, no major cardioembolic risk factors, and no other complications for which an inpatient course was needed. • Triage appeared safe with low rate of recurrent vascular events within 7 days.
Evans et al., 2017, UK] Referral pathways	Aim: to identify features & effects of pathway for Emergency assessment & referral of patients with suspected TIA in order to avoid admission. • See large table 3 for **Referral and treatment pathways for patients** with suspected TIA from ED & Primary Care

for patients with TIA avoiding hospital admission : scoping review	• Ambulance services are exploring alternative care pathways for appropriate low-risk patients, to refer direct to relevant specialist services. Some ambulance services are setting up alternative pathways for presumed low-risk suspected TIA with protocols for direct referral to specialist services, avoiding the ED. • The Welsh Ambulance Service NHS Trust & PRIME Centre Wales are assessing feasibility of assessment & referral with low risk TIA by paramedics directly to TIA clinic rather than ED. • This scoping review is to inform development an ambulance paramedic referral for TIA. Common features of pathways included the following: • Suspected TIA diagnosis and risk assessment were made using a symptom-based algorithm or the ABCD2 score; • Low-risk patients with suspected TIA, suitable for the referral pathway, had an ABCD2 score <4 (where stated); • Patients could be referred to clinic without appointment, via a central contact point or electronic system which led to arrangements for attendance during the next 2 weeks; • Antiplatelet therapy, generally aspirin unless contraindicated, was prescribed before discharge; • Patients received comprehensive tests and further treatment at outpatient clinic (such as blood tests, brain scans, medication for hypertension and anticoagulation). Further details about the referral and treatment pathways are provided in table 3. Also contained sample referral pathway implementation processes for ED and primary care. See Table 4
Gupta et al., 2014, USA TIA : Predictability of future ischemic stroke or TIA events	Aim: to review current literature on **predictors of ischemic stroke after TIA**, to determine whether one scoring system is better than another. • Table 1 has Various post TIA stroke prediction scores (e.g., California score, ABCD scores including ABCD3-V) • TIA stroke risk is different for each individual based on his/her modifiable & non modifiable risk factors. • An **ideal score for stroke prediction after TIA** is one that is easily available, easy to calculate manually, cost effective, practical, includes up to 5 variables, has high predictive value, can accurately categorize patients into meaningful categories & is validated in various cohorts & settings. • Multiple studies have investigated prediction scores and their validation. Different scores may produce different results depending on the examiner's specialty (ER physician versus neurologist), patient setting (ER versus outpatient clinic), and duration of follow-up (7 days versus 90 days). So far, the ABCD2-I and ABCD3-I seem to be the best scoring systems because they have the maximum "area under the curve", include patient imaging and vasculature data, and have been externally validated. The ABCD3-V score further includes intracranial imaging data and its external validation is needed.
More Specific Risk Stratification Scores	
Perry et al., 2021 Prospective validation of Canadian TIA Score & comparison with ABCD2 & ABCD2i for subsequent stroke risk after TIA	Aim to validate previously derived Canadian TIA Score to stratify subsequent risk of stroke in new cohort of ED patients & compare to existing risk stratification scores. • Canadian TIA Score (2014) derived prospectively from ~ 4000 patients at 8 large Canadian hospital EDs. • Incorporates 13 predictive variables form history, physical exam, & testing routinely performed at time of presentation in ED. **See Table 1 for the Canadian TIA Score items.** • **See Table 4 for Canadian TIA Score: interval likelihood ratios and risk of outcomes within 7 days** (n=7607). • Grouped into 3 risk categories to prioritise investigations, admission and follow up in specialty clinics. • Enrolled adults with TIA or minor stroke as their final ED diagnosis at time of discharge or specialist consultation. • Attending ED physicians, neurologists, or supervised resident physicians completed all assessments. • With increasing use of prompt emergency carotid endarterectomy at study sites the primary outcome was altered to either subsequent stroke or carotid endarterectomy/carotid artery stenting within 7 days. • Very few patients were admitted to hospital from ED at time of TIA. • To improve generalizability of score, included both community & academic centres. • 3 risk groups: 1/6 to be low risk (< 1%) & 1/8 at high risk (> 5% risk). The remainder were at medium risk with subsequent 7 day risk of 2.3%. • Canadian TIA score performed significantly better than ABCD2. However, more patients were deemed to be high risk by Canadian TIA Score than both ABCD2 scores. • ABCD2i was better than ABCD2-identified many low risk but missed many patients who underwent early carotid revascularisation.

	• Although score is more complex and is not intended to be memorized, it requires only routinely available info from history, bedside assessment & tests results. **Can be readily used and applied in EDs** as it does not require advanced neuroimaging which is often unavailable. **It allows one to customise urgency of ,e.g., advanced neuroimaging, or decision re inpatient admission.** • Clinicians will probably use online calculator or smartphone app to calculate risk. • Definition of TIA continues to evolve and require absence of infarction on MRI. This is not practical in EDs. This is about working ED Diagnosis of TIA or minor stroke as target population. Abnormal MRI alone confers modest increase in subsequent risk of stroke only. • **Had surveyed ED physicians & neurologists to identify thresholds of stroke risk** –identified that < 1% risk was appropriate for outpatient investigations & > 5% risk might benefit from more comprehensive investigations and possible admission. • With this validation, clinicians may now use this tool to stratify pts as being low, medium, or high risk (with or without early carotid vascularization)
Perry et al., 2014 A Prospective Cohort Study of Patients With Transient Ischemic Attack to Identify High-Risk Clinical Characteristics	• Objective was to determine which clinical feature of patients with TIA presenting to ED were associated with impending stroke (</= 7 days) thereby developing a prediction model for impending stroke (Canadian TIA Score) • 3906 patients enrolled (2.2%) experienced a stroke within 7 days • TIA symptoms of language disturbance, duration of symptoms =/> 10 minutes, gait disturbance, Afib, infarction on CT, elevated platelets or glucose, unilateral weakness, history of carotid stenosis, and elevated diastolic BP are at higher risk of impending stroke. Vertigo was low risk. **Table 4. Canadian TIA Score** First TIA (in lifetime) 2 Symptoms ≥10 min 2 History of carotid stenosis 2 Already on antiplatelet therapy 3 History of gait disturbance 1 History of unilateral weakness 1 History of vertigo −3 Initial triage diastolic blood pressure ≥110 mm Hg 3 Dysarthria or aphasia (history or examination) 1 Investigations in emergency department Atrial fibrillation on ECG 2 Infarction (new or old) on CT 1 Platelet count ≥400×109/L 2 Glucose ≥15 mmol/L 3 Total score (−3 to 23) _____
Wasserman et. Al., 2010. Stratified, Urgent Care for Transient Ischemic Attack Results in Low Stroke Rates	• Outpatient TIA care in rapid-access stroke prevention clinic using ABCD2 score for triage can be used without requiring admission to hospital. Overall 90-day risk of stroke or subsequent TIA, MI or death was significantly lower than predicted risk for each stratified risk group. • Involved 2 EDs (tertiary care ED) in Ottawa and referring to outpatient Stroke Prevention Clinic. • 1093 patients met criteria for inclusion. • **Reduced stroke risk was attributed to system of care that combines ED care and clinic process.** • **Three stratified risk groups:** High – ABCD2 score =>6 Moderate ABCD2 =4-5 and Low ABCD2 <4 ◦ Utilized ABDC2 tool ◦ Imaging of head in ED and some labs ◦ FBG/lipids and carotid doppler, transthoracic echo and 24-hour holter were scheduled as outpatient and completed prior to SPC visit. ◦ Stratified high risk group saw neurologist in < 7days, moderate risk group in 7-14 days and low risk group > 14 days
Sanders et al., 2012, Australia	• **Monash TIA Triaging Treatment** (M3T) **adopts rapid management in ED followed by outpatient management prioritized by stroke mechanism. See Flow Diagram** of the Monash TIA Triaging Treatment pathway: ED assessment with tests to be done: CT, Carotid US, ECG, blood tests and phone referral to stroke team-commence antiplatelet or anticoagulation, Statin, ACEI; Outpatient triage-If No AF and ICA

Monash TIA Triaging Treatment Safely of TIA Mechanism Based OP Model of Care	stenosis <50% then review in TIA clinic. If AF-priority review in TIA clinic and if ICA ≥50% then CTA and priority review in TIA clinic. • M3T pathway first requires emergency physician evaluation of suspected TIA patients, with decisions undertaken in consultation with stroke team. Patients with persistent signs, recurrent/ crescendo TIA, or other acute medical issues are admitted to stroke unit. All other patients enter the non-admission arm of M3T**. Decision- making paradigm is driven by vascular mechanism**, without dependence on ABCD2 score or other risk- stratification tools. All patients receive urgent CT, ECG, & baseline blood tests in ED, with request forms marked "TIA Pathway" to expedite results. Radiology department facilitates same- day carotid ultrasound (anterior circulation symptoms) or next- day if patients present after usual working hours. After CT review, antiplatelet therapy is immediately commenced or modified. If AF is identified & no contraindications exist for anticoagulation, then anticoagulation is commenced & titrated as an outpatient in conjunction with patient's GP. When a patient enters the M3T pathway, ED physicians send standardized TIA referral to daily TIA clinic. The stroke registrar & nurse triage referrals on daily basis, with priority appointments for patients with ipsilateral internal carotid artery stenosis ≥50%, a conservative threshold chosen to avoid missing critical stenosis attributable to ultrasound misclassification. For patients with ≥50% ipsilateral internal carotid artery stenosis, confirmatory CTA or MRA is arranged within 24 hours. Immediate referral for surgical intervention occurs for patients with confirmed symptomatic stenosis ≥70%. Patients without symptomatic internal carotid artery stenosis or AF are allocated less urgent appointments (usually within 4–6 weeks) given that antiplatelet therapy is commenced in ED. Optimization of other vascular risk factors occurs during clinic visits. • Stroke rate at 90 days in M3T was low & similar to rates associated with non-admission-based TIA management in EXPRESS, SOS, and Ottawa studies. However in these studies there was no comparison to admitted patients. In TWO ACES 30% of pts were admitted. M3T is applied to unselected TIA patients avoiding admission in the majority. M3T protocol differs from other published pathways in several components. It does not require neurologist at first assessment like SOS & EXPRESS, **but does require ED physicians provide initial treatment based on structured pathway developed by stroke neurologist.** Clinic follow up urgency is based on vascular mechanism not ABCD2 scores. • Key component in any TIA model probably lies in mobilization of resources to expedite essential investigations & management based on vascular mechanism. **Includes helpful implementation tips.**
Mayer et al., 2018. ABCD3-I score and the risk of early or 3-month stroke recurrence in tissue- and time-based definitions of TIA and minor stroke	Aim: to determine prognostic value of ABCD3-I score and initial visit and 3 month follow-up to determine if it would be an effective tool in both groups (TIA and minor stroke patients), irrespective of definition. • Australian study –prospective 2010-2014, 5000 patients and 3 month follow-up involved 2400+ patients • Results found that the prognostic performance of the ABCD3-I score was similar in all definitions of TIA or minor stroke. • It supported the common trend to select TIA patients with a high risk for recurrent or progressive stroke very early after symptom onset based on risk score to initiate intensified treatment. • MRI not used extensively in this time period…. Therefore difficult to conclude evidence of stroke. ABCD3-I tool was not included in article (but items added below) ○ Age ≥60 years ○ BP systolic > 130 or Diastolic > 80 mm Hg ○ Speech impairment without weakness ○ Unilateral Weakness ○ Duration ≤59 minutes (1 point) ○ Duration ≥59 minuts (2 points) ○ Diabetes ○ Dual TIA (2nd TIA within 7 days) ○ Same sided >49% stenos of ICA ○ MRI showing hyperintensity on DWI ABCD3-I Score: 0-13 ○ Low Risk (0-3): Recurrence within 90 days 2-3% ○ Intermediate Risk (4-7): Recurrence within 90 days < 6 % ○ High Risk (8-13): Recurrence within 90 days > 18% • Focus of study was on changing definition of TIA from time based focus to tissue based focus.

Olivot et al, 2011, USA-Stanford TWO ACES	Aim to evaluate a novel **emergency department TIA Triage system.** • 224 pts included in study. • Approach to TIA triage was based on ABCD2 in combination with early cervical & intracranial imaging. • Patients with ABCD2 score of 0 to 3 were eligible to be discharged directly from ED to TIA clinic. Efforts were made to evaluate patient in the TIA clinic within 1 - 2 business days and to obtain an MRI and MRA (cervical and intracranial) before clinic visit (if there were MRI contraindications, then patients would undergo head CT with CTA or carotid ultrasound or both). For patients with an ABCD2 score of 4 to 5, protocol recommended obtaining cervical and intracranial vessel imaging (typically with CTA) in ED. If a symptomatic cervical or intracranial stenosis (>50% narrowing) were identified, then protocol recommended hospital admission. If vessel imaging did not reveal significant symptomatic lesion, then referral to TIA clinic was recommended. For patients with ABCD2 scores > 5, hospitalization was recommended. • 92% of patients seen within 24 hrs of symptom onset. 93% had vascular imaging & 61% had imaging in ED. 48% were diagnosed with Non TIA/Non Stroke. 157 pts were discharged to TIA clinic. The median times between ED & TIA clinic were 3 days & 4 days from symptom onset. • After adjustment for sex previous MI & AF were independently associated with hospitalization. • Results demonstrate that management of suspected TIA in patients using specialized outpatient clinic with triage from ED based on ABCD2 & vascular imaging avoided hospitalization for majority of patients. • ABCD2 score/vessel imaging-based triage system was designed to reserve hospital early stroke rate was only slightly higher for hospitalized patients compared with TIA clinic group, hospitalized patients were considerably more likely to have acute DWI lesion, symptomatic vessel stenosis, and final diagnosis of a cerebrovascular event. • Having both MRI & vascular imaging findings available before making decision to hospitalize TIA patients has potential to result in more accurate triage of patients at high risk for hospitalization, whereas patients at low risk can be more confidently discharged to complete their evaluation in outpatient setting.
Purroy et al., 2012, Spain Recurrent TIA & Early Risk of Stroke-PROMAPA study Puroy et al. , 2012 Spain Prediction of Early Stroke Recurrence in TIA from PROMAPA Study-Comparison of Prognostic Risk Scores	Aim to determine whether all patients with multiple TIAs have same high early risk of stroke. • Abstract ONLY • Multiple TIAs within 7 days are associated with greater subsequent risk of stroke than after single TIA. Nevertheless, found no independent predictor of stroke recurrence among these patients. Article 2 Aim: To compare the very early predictive accuracy of most relevant clinical scores (ABCD, ABCD2, ABCD3, California Risk , Essen Stroke Risk Score, & Stroke Prognosis Instrument II) • Abstract only • 1,255 TIA patients in Spanish stroke centres • Could confirm predictive value of ABCD3 score for stroke recurrence at 7 day follow up & 90 day follow up, which improved when vascular imaging info added & derived ABCD3V scores by assigning 2 points for ≥50% symptomatic stenosis on carotid or intracranial imaging. • When evaluating each component of all clinical scores, **prior TIA & left atrial atrophy were independent predictors of stroke recurrence at 7 and 90 day follow up**. • Clinical scores were not able to replace extensive emergent diagnostic evaluations such as vascular imaging, and they should take into account unstable patients with recent prior transient episodes.
Chang et al., 2019, New York, Safety & Feasibility of Rapid Outpatient Managment Strategy for TIA & Minor Stroke : Rapid Access	Aim to assess feasibility & safety of rapid outpatient stroke clinic for TIA & Minor Stroke **(RAVEN).** • **Protocol incorporated medical and social criteria.** • While bedside scoring systems, e.g., ABCD2 have been explored as potential risk stratification tools, they are limited without use of vascular imaging in identifying symptomatic large arterial stenosis. • RAVEN: identified TIA & minor stroke patients for whom ED discharged to RAVEN within 24 hrs would pose minimal adverse short term risk, while considering potential limitations in functional or social factors that would permit rapid outpatient evaluation. • Criteria for RAVEN eligibility-**start with screening for disabling deficit** including symptoms that warrant inpatient PT, OT assessment that then move to having NONE of the following: head CT imaging with no evidence of hemorrhage, no treatment with thrombolysis in ED, no fluctuating symptoms or recurrent symptoms within past month, ECG showing no new onset atrial fibrillation or cardiac ischemia, no

Vascular Evaluation-neurology (RAVEN)	evidence of BP persistently elevated over 180/110 mm Hg or no IV hypertensive agents administered in ED, no known large artery stenosis of > 50%, & ability to follow-up within 24 hours. For the initial implementation of RAVEN, due to available hospital and staffing resources, the RAVEN clinic operated on weekdays from Monday to Friday, with no clinic on weekends or holidays.
Weimer et al, 2009, Germany, France, USA Essen Stroke Risk Score Predicts Recurrent Cardiovascular Events	Aim: to **validate the Essen Stroke Risk Score** in large cohort of outpatients with previous TIA or Stroke from REACH Registry (15, 605 pts) • On 10 point scale, Essen risk score predicts 1 year risk of recurrent stroke & combined CV events. • **Table 1 includes the prevalence of vascular risk factors** included from the REACH registry. Risk factors: Age, Hypertension, Diabetes, Previous MI, Other cardiovascular disease (except MI and AF), Peripheral arterial disease, smoker, previous TIA or ischemic stroke in addition to qualifying event, • Essen Stroke Risk Score was shown to predict stroke and combined CV events reasonably well in both stable outpatients with cerebrovascular disease and inpatients with stroke
Fitzek et al, 2022 Essen Score Risk Score in 1 Year Follow up of Ischemic Stroke Pts	Aim: to validate the **usefulness of the Essen Stroke Risk** Score (ESRS) to predict stroke recurrence in a hospital-based follow-up study. • 730 consecutive patients admitted to a neurological stroke unit in Berlin with ischemic stroke or TIA. • The risk of a recurrent stroke was significantly higher in patients with an ESRS >2; risk of a vascular event defined as a fatal or nonfatal Ischemic stroke or MI, was significantly higher in patients with an ESRS >2. • ESRS identifies those with TIA or ischemic stroke who are at significantly increased risk for a recurrent stroke and CV event. Patients with a high ESRS require short-term follow-up and re-evaluation of secondary prevention strategies.
Kernan et al 2000, Hamilton & USA Stroke Prognosis Instrument II (SPI-II)	Aim to validate & improve SPI-I by creating SPI-II. • SPI-I: 3 risk groups [low (score 0-2), medium (score 3-6), high (score 7-11)] on basis of 5 clinical features: age >65 years (3 points); diabetes (3 points); severe hypertension (2 points); the distinction between stroke & TIA (2 points for stroke); and coronary artery disease (1 point). • Results confirmed earlier findings that SPI-I identifies groups of patients with TIA or non-disabling ischemic stroke at increased risk for stroke or death. • New candidate variables for II version were identified from several sources. CHF, diabetes, and prior stroke were each assigned 3 points; age >70 years and stroke (rather than TIA) for index event were each assigned 2 points; & severe hypertension & Coronary Artery Diseases were each assigned 1 point. • With the inclusion of prior stroke & CHF, SPI-II includes most conveniently obtained clinical variables that are well documented to influence risk for recurrent stroke or death among patients with symptomatic cerebrovascular disease. Follow up study- 2011 In addition, its poor performance in stratifying recurrent stroke in isolation as compared with the composite of recurrent stroke and death demonstrates that the score's performance is driven mostly by its ability to predict death, thus highlighting need for better clinical tools to predict stroke recurrence. Probability of recurrence as predicted by the SPI-II score would be 8.2% in the low-risk group and 10.9% in the high-risk group, assuming a 9.5% overall rate of recurrent stroke, which is the weighted average of the studies. This suggests that although SPI-II score is modestly effective in predicting composite of death or recurrent stroke, it does not provide useful information on stroke recurrence in isolation.
Lavallée et al. 2007 A transient ischaemic attack clinic with round-the-clock access (SOS-TIA):	Aim: to evaluate effect of rapid assessments of patients with TIA on clinical decision making, length of hospital stay, and subsequent stroke rates • Study took place in Paris, from Jan 2005-Dec 2005 • 643 patients • 53% were seen within 24 hours of symptom onset. • 65% had confirmed TIA or minor stroke, 13% had ? TIA. • Involved rapid access clinic with round-the-clock access for family doctors in Paris. • This clinic assessed patients who had a sudden retinal or cerebral focal symptoms judged to be due to ischaemia and had total recovery.

feasibility and effects	• Assessment at clinic included neurological, arterial and cardiac imaging…. Within 4 hours of admission to clinic. • 90 day recurrent stroke rate was 1.24% (ABCD2 predicted rate was 5.96%) • 74% of patients were sent home on same day • 5% required urgent carotid revascularization • 5% were treated for AF with oral anticoagulation • Conclusion: use of TIA clinics with 24 hour access and immediate initiation of preventative treatment might greatly reduce length of hospital stay and risk of stroke compared with expected risk. • Vascular neurologist was available to discuss symptoms with the nurse at clinic…. The vascular neurologist was responsible for the decision to exclude patients who were judged to have non-ischemic neurological transient symptoms (ie migraine). Nurse in charge of call centre 9-5
Rothwell et al., 2007 Oxford Effect of urgent TIA & minor stroke on early recurrent stroke (EXPRESS Study)	Aim: to determine effect of more rapid treatment after TIA & minor stroke in patients who are not admitted directly to hospital. • **EXPRESS**=Early use of Existing PREventive Strategies for Stroke • Introduced daily TIA & minor stroke clinic to which collaborating primary care physicians were asked to refer all patients with suspected TIA & minor stroke. At the start of the EXPRESS trial, this was appointment based and had inherent delays in receiving referrals. This phase involved any patient suspected of TIA or stroke but did not consider required immediate hospital admission to a daily TIA and minor stroke clinic. • The data indicated that urgent assessment & early initiation of combination of existing preventive treatments can reduce risk of early stroke by ~ 80%.
Wilson et al., 2014, UK Delay between symptom onset & clinc attendance following TIA & minor stroke : BEAT study	Aim: to quantify delay & map pathways taken by patients from symptom onset to specialist assessment. • Royal College of Physician guidelines suggests that TIA patients should be scored using the ABCD2. Those at high risk (score ≥4) should be assessed by specialist within 24 hours of symptom onset & those at lower risk within one week. • Time between symptom onset & clinic attendance differed according to health professional first consulted: the median following consultation with the patient's own GP was 97 hours, 48 hours if a paramedic was called, 44 hours if the patient attended ED and 70 hours if an out-of-hours GP was consulted. The greatest delays (median 220 hours) were seen in patients who first presented to an optometrist. Delays were also greater when a second HCP was consulted. • **Delays between initial consultation & specialist could be addressed by streamlining referral pathways**.
Chandratheva et al., 2009, Oxford UK Population-based study of risk & predictors of stroke in first few hours	Aim: to perform population-based study of risk of stroke during 24 hours after TIA, with stratification by ABCD2 & by whether patients sought medical attention prior to stroke. • Appropriateness of new 24-hour for high risk TIA recommendation depends on 1) what is risk of recurrent stroke within first few hours which might be prevented by even more urgent assessment; 2) what % of patients who have stroke during first 24 hours after TIA seek medical attention prior to recurrent stroke and 3) do existing risk scores reliably predict risk of recurrent stroke in hyperacute phase after TIA such that very high risk individuals might be triaged for emergency care? • 25 cases with recurrence within 24 hours accounted for 52% of 48 strokes during the 7 days and 42% of 59 strokes during 30 days after first TIA. Of the recurrences within 24 hours, 14 (56%) had an NIHSS ≥3 at initial assessment after the recurrent stroke, 12 (48%) were associated with a Rankin score ≥3 at 1month follow-up, & 3 were fatal. • The risk of stroke within 24 hours of a TIA was about 5%, with half of all recurrent strokes within 7 days occurring in the first 24 hours, and half of these very early recurrent strokes being disabling or fatal. • Majority of patients who had recurrent stroke within 24 hours of TIA did seek medical attention, usually from their family doctor, prior to their recurrence but they were not treated or sent to the EXPRESS clinic as an emergency.
NICE Guideline; 2019	Aim-how accurately scoring systems predict risk of stroke or TIA in first 7 days following TIA and whether these should be used to guide current practice. • **Table 2 has Risk Score items and definitions**: ABCD2, ABCD2-I, ABCD3 and ABCD3-I. • Since last version of NICE guideline, **provision of daily TIA clinics is much more common & is now accepted best practice in UK**. **Patients with suspected TIA should therefore be seen within 24 hours**

Prognostic Evidence Review	**regardless of risk as indicated by risk score.** The committee agreed that seeing some patients less urgently based on risk scores had potential for harm because risk scoring systems are not sufficiently good predictors of risk of stroke. • The committee noted that there was no disadvantage to patients who are at "low risk" being seen within 24 hours alongside patients at high risk. However, there will be organizational considerations for those services that do not currently have a 7 day TIA clinic provision. • The committee discussed individual predictors of stroke recurrence, such as carotid stenosis (as identified through imaging in the ABCD3-I risk tool) & AF. They believed that wider issues are useful to consider, such as evidence of recurrent TIA and presence of anticoagulation, and would expect clinicians to take this into account when assessing patients. • In conclusion, the committee therefore did not recommend use of risk scores, as their discriminative ability for future ischaemic stroke risk and their calibration were not good enough. It is recommended that all those who have had a suspected TIA are assessed in a specialist setting within 24 hours. • The committee discussed that there is variation in access to TIA clinics and that risk stratification is currently used to prioritise those with a high ABCD2 score for assessment. Whilst the committee considered that risk assessing patients using these tools has been used to help prioritise patients where the service is limited, they thought the scoring systems are not reliable and that it was much more important to set up a suitable 7-day service where one currently does not exist. • This recommendation should not increase the absolute numbers of people who need to receive expert assessment but it does mean that in some areas people may need to be assessed sooner than they currently are. • The committee noted that education about TIA diagnosis was important. The diagnosis is difficult because the symptoms have resolved at the point of assessment and history taking is crucial. This highlights the need for early specialist assessment. Also it is important to realise that having a TIA (or suspected TIA) is a worrying time for the patient and most people would prefer to be assessed ASAP.

References

Andrade, J. C., Aguilar, M., Atzema, C., Wyse, D. G., Macle, L., & Members of the Secondary Panel. (2020). The 2020 Canadian Cardiovascular Society/ Canadian Heart Rhythm Society Comprehensive Guidelines for the management of atrial fibrillation. *Canadian Journal of Cardiology*, *36* (12), 1847-1948. Retrieved from: https://www.onlinecjc.ca/article/S0828-282X(20)30991-0/fulltext

Boulanger, JM., Butcher, K., (Writing Group Chairs) on behalf of the Canadian Stroke Best Practice Recommendations Acute Stroke Management Best Practice Writing Group. 2018. Acute Stroke management Evidence Table: Outpatient management of transient ischemic attack and non-disabling stroke. Heart and Stroke Foundation, Canada. Retrieved from: https://heartstrokeprod.azureedge.net/-/media/1-stroke-best-practices/acute-stroke-management/2018_csbpr_asm_table-2_4april2018.ashx?rev=462d9b31556247ad883d1218c2096618

Casaubon, L; Kelloway, L, & Jasper, S as part of the Ontario Stroke Network 's Acute and Secondary Stroke Best Practice Committee. (2015). Ontario Stroke Network (OSN) Ambulatory Triage Algorithm for patients with suspected or confirmed Transient Ischemic Attack (TIA) or Stroke. December 2014. Ontario Stroke Network, Canada.

Chandratheva, A., Mehta, Z., Geraghty, O. C., Marquardt, L., Rothwell, P. M., on behalf of the Oxford Vascular Study. (2009). Population-based study of risk and predictors of stroke in the first few hours after a TIA. *Neurology, 72,* 1941-1947. doi : 10.1212/WNL.0b013e3181a8261d. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2690971/

Chang, B. P., Rostanski, S., Willey, J., Miller, E. C., Shapiro, S., Mehendale, R., et al. (2019). Safety and feasibility of a rapid outpatient management strategy for transient ischemic attack and minor stroke : The rapid access vascular evaluation-neurology (RAVEN). *Annals of Emergency Medicine, 74(*4), 562-571. doi: 10.1016/j.annemergmed.2019.05.025.Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6756973/

Coutts, S. (2017). Diagnosis and management of transient ischemic attack. *Continuum, 23* (1), 82-92. doi: 10.1212/CON.0000000000000424. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5898963/

Evans, B. A., Ali, K., Bulger, J., Ford, G. A., Jones, M., Moore, C., et al., on behalf of the TIER Trial Research Management Group. (2017). *British Medical Journal Open, 7*, 1-13. doi: 10.1136/bmjopen-2016-013443. Retrieved from: https://bmjopen.bmj.com/content/7/2/e013443

Fitzek, S., Leistritz, C., Witte, O. W., Heuschmann, P. U., & Fitzek, C. (2011). The Essen Stroke Risk Score in one-year follow-up acute ischemic stroke patients. *Cerebrovascular Diseases, 31*, 400-407. doi: 10.1159/000323226.

Gladstone, D., Lindsay, M., Douketis, J., Smith, E., Dowlatshahi, D., Wein, T., . . . Poppe, A. (2021). Canadian Stroke Best Practice Recommendations: Secondary Prevention of Stroke Update 2020. *Canadian Journal of Neurological Sciences / Journal Canadien Des Sciences Neurologiques*, 1-69. doi:10.1017/cjn.2021.127. Retrieved from: https://www.cambridge.org/core/journals/canadian-journal-of-neurological-sciences/article/canadian-stroke-best-practice-recommendations-secondary-prevention-of-stroke-update-2020/A73EB82EEB054DD001AD5A19627F0D83

Gladstone, D.J., & Poppe, A. Y. (Writing Group Chairs) on behalf of the Canadian Stroke Best Practice Recommendations Secondary Prevention of Stroke Writing Group in collaboration with the Canadian Stroke Consortium. 2021. Secondary Prevention of Stroke 7th Ed., 2020 evidence table: Triage and initial diagnostic evaluation of transient ischemic attack and non-disabling stroke. Heart and Stroke Foundation, Canada. Retrieved from: https://heartstrokeprod.azureedge.net/-/media/1-stroke-best-practices/secondary-prevention-of-

stroke/csbpr7secondarypreventionevidencetable1ainitialriskstratificationnondisablingstrokeandtiafinal10feb2.ashx?la=en&rev=3ef25ce24beb41a08fc8430ff1c41299

Gomez, C. R., Schneck, M. J., & Biller, J. (2017). Recent advances in the management of transient ischemic attacks. *F100Research, 6*, 1-16. doi: 10.12688/1000research.12358.1. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5658709/

Graham, C., Bailey, D., Hart, S., Hutchison, A., Sandercock, P., Doubal, F. (2019). Clinical diagnosis of TIA or minor stroke and prognosis in patients with neurological symptoms : A rapid access clinic cohort. *PLOS ONE, 14*(3). doi : 10.1317/journal.pone.0210452. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6424476/

Gupta, H. V., Farrell, A. M., & Mittal, M. K. (2014). Transient ischemic attacks : Predictability of future ischemic stroke or transient ischemic attack events. *Therapeutics and Clinical Risk Management, 10*, 27-35. doi: 10.2147/TCRM.S54810. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3891764/

Hastrup, S., Johnsen, S. P., Jensen, M., von Weitzel-Mudersbach, P., Simonsen, C. Z., Hjort, N., et al. Specialized outpatient clinic vs stroke unit for TIA and minor stroke : A cohort study. *Neurology, 96*(8), e1096-e1109. doi : 10.1212/WNL.0000000000011453. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8055342/

Hosier, G. W., Phillips, S. J., Doucette, S. P., Magee, K. D., & Gubitz, G. J. (2016). Transient ischemic attack: Management in the emergency department and impact of an outpatient neurovascular clinic. *Canadian Journal of Emergency Medicine, 18*(5), 331-33. doi: 10.1017/cem.2016.3. Retrieved from: https://www.cambridge.org/core/journals/canadian-journal-of-emergency-medicine/article/transient-ischemic-attack-management-in-the-emergency-department-and-impact-of-an-outpatient-neurovascular-clinic/0243F3355BD06CF4E802C534A80ECC04

Kamal, N., Hill, M. D., Backquiere, D. P. V., Boulanger, JM., Boyle, K., Buck, B., et al. (2015). Rapid assessment and treatment of transient ischemic attacks and minor stroke in Canadian emergency departments: Time for a paradigm shift. *Stroke, 46,* 2987-2990. doi: 10.1161/STROKEAHA.115.010454. Retrieved from*:* https://www.ahajournals.org/doi/10.1161/STROKEAHA.115.010454?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Kernan, W. N., Viscoli, C. M., Brass, L. M., Makuch, R. W., Philip, M. S., Roberts, R. S., et al. (2000). The stroke prognosis instrument II (SPI-II) : A clinical prediction instrument for patients with transient ischemia and nondisabling ischemic stroke. *Stroke, 31*, 456-462. doi: 10.1161/01.STR.3.2.456. Retrieved from: https://www.ahajournals.org/doi/full/10.1161/01.STR.31.2.456

Kiyohara, T., Kamouchi, M., Kumai, Y., Ninomiya, T., Hata, J., & Yoshimura, S., for the FSR investigators. (2014). ABCD3 and ABCD3-I Scores are superior to ABCD2 Score in the prediction of short- and long-term risks of stroke after transient ischemic attack. *Stroke, 45*, 418-425. doi : 101161/STROKEAHA.113.003077. Retrieved from: https://www.ahajournals.org/doi/pdf/10.1161/strokeaha.113.003077?download=true

Lavallée, P. C., Meseguer, E., Abboud, H., Cabrejo, L., Olivot, JM., Simon, O.,…Amarenco, P. (2002). A transient ischaemic attack clinic with round-the-clock access (SOS-TIA) : Feasibility and effects. *The Lancet Neurology*, 6, 953-960. doi : 10.1016/S1474-4422(07)70248-X

Lim, A., Singhal, S., Lavallée, P., Amarenco, P., Rothwell, P., Albers, G., et al. (2020). An international report on the adaptations of rapid transient ischaemic attack pathways during the COVID-19 pandemic. *Journal of Stroke and Cerebrovascular Diseases, 29*(11). doi: 10.1016/j.jstrokecerebrovasdis.2020.105228. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7434484/ rt on Adaptations of Rapid TIA Pathways during COVID-

19

Lioutas, VA., Ivan, C.A., Himali, J., Aparicio, H. J., Leveillle, T., Romero, J. R., Beiser, A. S., Seshadri, S. (2021). Incidence of transient ischemic attack and association with long-term risk of stroke. *The Journal of the American Medical Association, 325*(4), 373-381. doi: 10.10.1001/jama.2020.25071. Retrieved from: https://jamanetwork.com/journals/jama/fullarticle/2775447

Maddula, M., Adams, L., & Donnelly, J. (2018). From inpatient to ambulatory care : The introduction of a rapid access transient ischaemic attack service. *Healthcare, 6*(57), 551-7472. doi : 10.3390/healthcare6020057. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6023360/

Mayer, L., Ferrari, J., Krebs, S., Boehme, C., Toell, T., Matosevic, B.,…Knoflach, M. For the Austrian Stroke Unit Collaborators. (2018). ABCDS-I score and the risk of early or 3-month stroke recurrence in tissue-and time-based definitions of TIA and minor stroke. *Journal of Neurology, 265*, 530-534. doi : 10.1007/s00415-017-8720-8. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5834555/

Mijalski, C. & Silver, B. (2015). TIA management: Should TIA patients be admitted? Should TIA patients get combination antiplatelet therapy? *The Neurohospitalist, 5*(3), 151-160. doi: 10.1177/1941874415580598. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4530421/

National Institute for Health and Care Excellence (NICE) (2019). Stroke and transient ischaemic attack in over 16s: Diagnosis and initial management. Evidence [B]review for transient ischaemic attack (TIA) prediction rules. National Guideline Centre, NICE: UK. Retrieved from : https://www.nice.org.uk/guidance/ng128/evidence/b-transient-ischaemic-attack-tia-prediction-rules-pdf-6777399567

Olivot, JM., Wolford, C., Castle, J., Mlynash, M., Schwartz, N. E., Lansberg, M. G., Kemp, S., & Albers, G. W. (2011). TWO ACES : Transient ischemic attack work-up as outpatient assessment of clinical evaluation and safety. *Stroke, 42,* 1839-1843. doi : 10.1161/STROKEAHA.110.608380. Retrieved from: https://www.ahajournals.org/doi/10.1161/STROKEAHA.110.608380?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Perry, J. J., Sharma, M., Sivilotti, M. L. A., Sutherland, J., Worster, A., Émond, M., et al. (2014). A prospective cohort study of patients with transient ischemic attack to identify high-risk clinical characteristics. *Stroke, 45*, 92-100. doi: 10.1161/STROKEAHA.113.003085. Retrieved from: https://www.ahajournals.org/doi/10.1161/STROKEAHA.113.003085?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Perry, J. J., Sivilotti, M. L. A., Émond, M., Stiell, I. G., Stotts, G., Lee. J., et al. (2021). Prospective validation of Canadian TIA Score and comparison with ABCD2 and ABCD2i for subsequent stroke risk after transient ischaemic attack: Multicentre prospective cohort study. *The British Medical Journal, 372* (n49). doi : 10.1136/bmj.n49. Retrieved from : https://www.bmj.com/content/372/bmj.n49

Purroy, F., Caballero, P. E. J., Gorospe, A., Torres, M. J., Álvarez-Sabin, J., Santamarina, E., et al., on behalf of the Stroke Project of the Spanish Cerebrovascular Diseases Study Group. (2012). Recurrent transient ischaemic attack and early risk of stroke: Data from the PROMAPA study. *Journal of Neurology, Neurosurgery & Psychiatry, 84*, 596-603. doi :10.1136/jnnp-2012-304005.

Purroy, F., Caballero, P. E. J., Gorospe, A., Torres, M. J., Álvarez-Sabin, J., Santamarina, E., et al., on behalf of the Stroke Project of the Spanish Cerebrovascular Diseases Study Group. (2012). Prediction of early stroke recurrence in transient ischemic attack patients from the PROMAPA Study: A comparison of prognostic risk scores.

Cerebrovascular Diseases, 33, 182-189. doi: 10.1159/000334771.

Rothwell, P. M., Giles, M. F., Chandratheva, A., Marquardt, L., Geraghty, O., Redgrave, J. N. E., et al., on behalf of the Early use of Existing Preventive Strategies for Stroke (EXPRESS) study. (2007). Effect of urgent treatment of transient ischaemic attack and minor stroke on early recurrent stroke (EXPRESS study) : A prospective population-based sequential comparison. *The Lancet, 370*, 1432-1442. doi: 10.1016/S0140-6736(07)61448-2. Retrieved from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(07)61448-2/fulltext

Sanders, L. M., Srikanth, V. K., Jolley, D. J., Sundararajan, V., Psihogios, H., Wong, K., Ramsay, D. & Phan, T. G. (2012). Monash transient ischemic attack triaging treatment : Safety of a transient ischemic attack mechanism-based outpatient model of care. *Stroke, 43*, 2936-2941. doi: 10.1161/STROKEAHA.112.664060. Retrieved from: https://www.ahajournals.org/doi/full/10.1161/STROKEAHA.112.664060

Sehatzadeh, S. (2013). Transient ischemic attack: Where can patients receive optimal care? A rapid review. Health Quality Ontario: Toronto, Canada. Retrieved from: http://www.hqontario.ca/Portals/0/documents/evidence/rapid-reviews/transient-ischemic-attack-2013015-en.pdf

Wasserman, J., Perry, J., Dowlatshahi, D., Stotts. G., Stiell, I., Sutherland, J., Symington, C., & Sharma, M. (2010). Stratified, urgent care for transient ischemic attack results in low stroke rates. *Stroke, 41,* 2601-2605. doi: 10.1161/STROKEAHA.110.586842. Retrieved from: https://www.ahajournals.org/doi/10.1161/STROKEAHA.110.586842?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Weimar, C., Diener, HC., Alberts, M. J., Steg, P. G., Bhatt, D. L., Wilson, P. W. F., Mas, JL., & Röther, J., on behalf of the REACH Registry Investigators. (2009). The Essen Stroke Risk Score predicts recurrent cardiovascular events : A validation within the REduction of Atherothrombosis for Continued Health (REACH) Registry. *Stroke, 40,* 350-354. doi : 10.1161/STROKEAHA.108.521419. Retrieved from : https://www.ahajournals.org/doi/10.1161/strokeaha.108.521419

Wilson, A. D., Coleby, D., Taub, N. A., Weston, C., & Robinson, T. G. (2014). Delay between symptom onset and clinic attendance following TIA and minor stroke : The BEATS study. Age and Ageing, 43, 253-256. Doi : 10.1093/ageing/aft144. Retrieved from : https://academic.oup.com/ageing/article/43/2/253/10706