High Risk TIA and the ASPIRE Project

Thomas Jeerakathil BSc, MD, MSc, FRCP(C)
Assistant Professor, University of Alberta
Shelagh Coutts MBChB, MD, FRCP(C)
Assistant Professor, University of Calgary
Telehealth June 23th, 2009

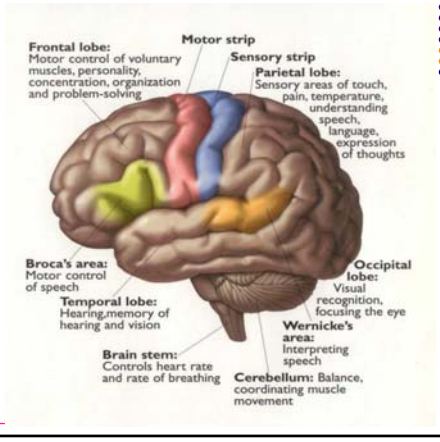
Objectives

- What is a TIA and what isn't? High risk?
- Review of algorithm to define high risk TIA and urgency of care based on risk level
- Feedback on progress of ASPIRE Project to date
- Patient scenarios encountered by ASPIRE
- Update on stroke risk after TIA (Dr Coutts)
- Neuroimaging and high risk tia/minor stroke (Dr Coutts)

Ruptured carotid artery plaque with thrombus

Diagnosing 'spells'

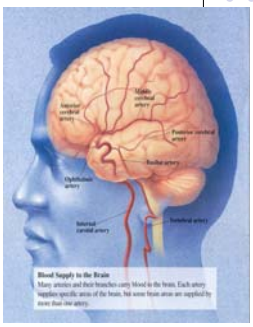
- Phenomenology: before, during, after the event
- Was the event witnessed? What did witnesses observe?
- What is the setting? (vascular risk factors, elderly, young without risk factors)



Page

Cerebral Circulation Review

- Brain gets arterial supply from carotid & vertebral arteries
- Internal carotid arteries & branches supply anterior 2/3 of cerebral hemispheres
- Vertebral & basilar arteries supply posterior & medial regions of hemispheres, brainstem, diencephalon, cerebellum & cervical spinal cord



Page

Top 6 symptoms likely to be a TIA-1

- All need to be sudden onset, lasting minutes to hours, resolved.
- 6. Vertigo only if present with brainstem symtoms
- 5. Hemibody numbness
- 4. Double vision, crossed numbness or weakness, slurred speech, ataxia of gait

Top 6 symptoms likely to be a TIA - 2

- 3. Speech disturbance for a defined period of time (definite dysarthria, muteness or marked word finding difficulty, paraphasic speech)
- 2. Monocular or hemifield visual loss (not blurring of entire visual field)
- 1. Hemibody weakness

Top 7 symptoms unlikely to be a TIA

- 7. Postural dizziness alone
- 6. Tingling of all 4 extremities
- 5. Syncopal events
- 4. Momentary word finding trouble that is not new
- 3. Positional and recurrent numbness of one limb
- 2. Scintillating or flashing visual disturbances

Symptoms unlikely to be a TIA - 2

- 1. Almost anything with hyperventilation or chest pain (but make sure it isn't cardiac!)

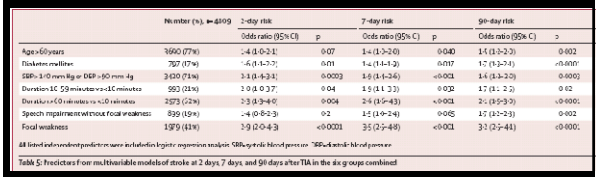
	Patients (%)	Strokes (%)	% risk (95% CI)
ABCD score			
≤1	2 (1%)	0	0
2	28 (15%)	0	0
3	32 (17%)	0	0
4	46 (24%)	1 (5%)	2·2 (0–6·4)
5	49 (26%)	8 (40%)	16·3 (6·0–26·7)
6	31 (16%)	11 (55%)	35·5 (18·6–52·3)
Total	188 (100%)	20 (100%)	10·5 (6·2–14·9)

Table 3: 7-day risk of stroke stratified according to ABCD score at first assessment in the OXVASC validation cohort of patients with probable or definite TIA

ABCD rule for stratifying risk after TIA – assign points

- Age > 60 = 1
- BP during event > 140 systolic or > 90 diastolic = 1
- Clinical features: unilateral weakness = 2; speech disturbance without weakness =1; other = 0
- Duration of symptoms (minutes): >= 60 = 2; 10-59 =1 ; < 10 = 0
- ***Rothwell, Lancet* 2005; 366: 29–36**

Validation and refinement of scores to predict very early stroke risk after transient ischaemic attack



	Number (%), n=4809	2-day risk		7-day risk		90-day risk	
		Odds ratio (95% CI)	p	Odds ratio (95% CI)	p	Odds ratio (95% CI)	p
Age >60 years	3690 (77%)	1·4 (1·0–2·1)	0·07	1·4 (1·1–2·0)	0·040	1·4 (1·1–2·2)	0·002
Diabetes mellitus	797 (17%)	1·4 (1·1–2·7)	0·01	1·4 (1·1–2·)	0·017	1·7 (1·3–2·4)	<0·0001
SBP>140 mm Hg or DBP >90 mm Hg	3420 (71%)	1·3 (1·0–2·3)	0·0002	1·6 (1·1–2·6)	<0·001	1·4 (1·1–2·0)	0·0001
Duration 10–59 minutes vs <10 minutes	950 (21%)	1·9 (1·0–3·7)	0·04	1·5 (1·1–2·)	0·032	1·7 (1· 2·)	0·02
Duration ≥60 minutes vs <10 minutes	2573 (52%)	2·3 (1·3–4·9)	0·004	2·4 (1·5–4·3)	<0·001	2·4 (1·5–3·9)	<0·0001
Speech impairment without focal weakness	839 (19%)	1·4 (0·8–2·3)	0·2	1·5 (1·0–2·4)	0·065	1·7 (1·1–2·5)	0·002
Focal weakness	1979 (41%)	3·9 (2·0–8·3)	<0·0001	3·5 (2·1–6·8)	<0·001	3·3 (2·1–6·1)	<0·0001

All listed independent predictors were included in logistic regression analysis. SBP=systolic blood pressure. DBP=diastolic blood pressure.

Table 5: Predictors from multivariable models of stroke at 2 days, 7 days, and 90 days after TIA in the six groups combined

ABCD 2 Score

Diabetes added and scores 1 extra point

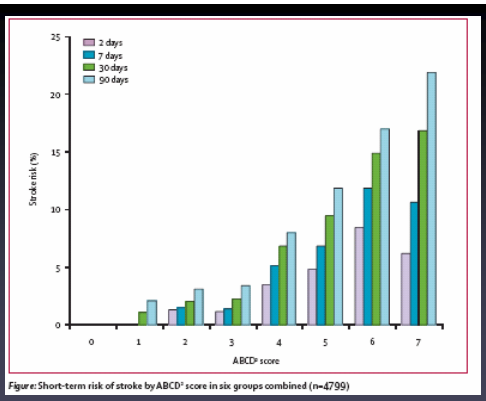


Figure: Short-term risk of stroke by ABCD² score in six groups combined (n=4799)

Predictive Value of the ABCD2 progostic score

Consensus:

- Either ABCD2 >=4 OR Speech or motor symptoms can identify high risk symptoms
- They have similar sensitivity and specificity to identify high risk stroke patients
- ASPIRE Consensus group choose these cutoffs for TIA Triaging within Alberta

APSS

MINOR STROKE/TIA STROKE RISK ASSESSMENT

HIGH RISK:
- Symptom onset within the last 48 hours with any one of the following:
  - ✓ Motor deficit lasting more than 5 minutes
  - ✓ Speech deficit lasting more than 5 minutes
  - ✓ ABCD² score > 4
- Atrial fibrillation with TIA

MEDIUM RISK:
- Symptom onset between 48 hrs and 7 days with any one of the following:
  - ✓ Motor deficit lasting more than 5 minutes
  - ✓ Speech deficit lasting more than 5 minutes
  - ✓ ABCD² score ≥ 4

LOW RISK:
- Symptom onset > 7 days
- Symptom onset < 7 days without the presence of high risk symptoms (speech deficit or motor deficit or ABCD² score > 4 or atrial fibrillation with TIA)

Note: isolated syncope or dizziness is rarely a TIA and may not require Stroke Prevention Clinic referral

ABCD² SCORING CHART

	Yes	No
Age: ≥ 60 yrs	1	0
BP: ≥ 140/90	1	0
Clinical Features:		
Unilateral weakness (with or without speech disturbance)	2	0
Speech deficit without weakness	1	0
Duration:		
≥ 10 min < 59 min	1	0
≥ 60 min	2	0
Diabetes	1	0
Score: ≥ 4 = High Risk		

INVESTIGATIONS

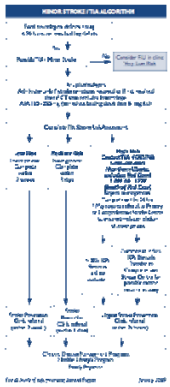
- CT scan of head
- Carotid investigations: carotid ultrasound or CT angiogram
- ECG: if atrial fibrillation strongly consider anticoagulation
- Echocardiogram: only if suspicion of cardiac cause
- Holter Monitor: if suspect atrial fibrillation
- CBC, electrolytes, creatinine, glucose, PTT, INR, fasting glucose and lipid profile

HIGH RISK: Contact TIA HOTLINE see over
Complete investigations within 24 hours
* *May require referral to Primary or Comprehensive Stroke Centre to ensure timely completion of investigations*
Stroke Prevention Clinic Referral (seen within 24 hours)

MEDIUM RISK: Complete investigations within 3 days
Stroke Prevention Clinic Referral (seen within 3 days)

LOW RISK: Complete investigations within 2 weeks
Stroke Prevention Clinic Referral (seen within 2 weeks)

Alberta Provincial Stroke Strategy (2009). Secondary Stroke Prevention, retrieved from, http://www.strokestrategy.ab.ca



High Risk
Contact TIA HOTLINE
1-888-282-4825
(Northern Alberta, including Red Deer)
1-800-661-1700
(South of Red Deer)
Urgent Investigations:
Complete within 24 hrs.
*** May require referral to Primary or Comprehensive Stroke Centre to ensure timely completion of investigations**

TIA Hotline 'go live' dates

- North including Red Deer (1-888-282-4825)
  - Went live March 16, 2009
- South excluding Red Deer (1-800-661-1700)
  - Went live March 16th, 2009
- 6-month phase in and implementation

TIA Hotline Utilization

- Approximately 40 calls province-wide since implementation March 16th
- Issues identified with tracking calls within the CCL system now addressed
  - Patients with persisting mild symptoms are diverted outside of the TIA Hotline and into the stroke algorithm; some of those symptoms then resolve completely after the TIA Hotline call;
  - With some differences, TIA and minor stroke probably need to be managed similarly

Patient Bill

- 58 year old from rural Alberta
- HT, smoker, 24 beers per week
- Acute onset sensory deficits left hemibody persisting since awakening (more than 6 hours)
- BP 136/84; ABCD2 = 2 for duration; except persisting symptoms so this may be a stroke;
- Kept overnight in rural centre and brain CT performed in primary stroke centre was normal

Patient Bill (cont.)

- By next AM persisting sensory symptoms (mild stroke); stable.
- Discharged in care of family with urgent carotid ultrasound arranged in tertiery care centre the day of discharge (no stenosis)
- Further workup as outpatient

Patient Sandy

- Very elderly female living in a lodge but otherwise independent;
- PMH 'TIA' 2 weeks prior (right facial weakness and speech trouble)
- Today right face arm and leg weakness total resolution by 8 hours; BP 168/68;
- Seen at rural community hospital;
- ABCD2 score = 6; also motor symptoms;
- Also consider preceding TIA = high risk

Patient Sandy (cont.)

- Call took place 1130 PM;
- Instructed to hold patient overnight;
- Brain CT performed next AM at nearest urban community hospital - no acute stroke or bleed; reviewed by telestroke neurologist;
- Urgent appointment arranged for AH Owen SPC; appointment cancelled by family physician;

Patient George

- 71 yo male with IDDM, HT, hyperlipidemia from a remote northern community
- Awoke with left sided weakness and numbness which then resolved to normal within 2 hours; BP initial 185/102;
- ACBD2 = 7 = highest possible score;
- Initial TIA Hotline call with nurse; ER physician from Primary Stroke Centre conferenced in;
- Transfer with CT, carotid imaging performed at primary stroke centre within 24 hours;

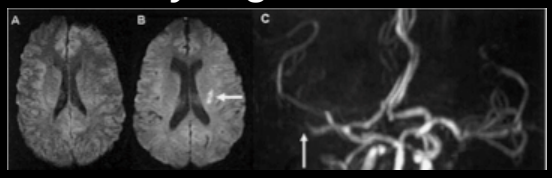
Patient Ben

- 81 year old male with CAD, stroke 1996;
- Admitted to rural emergency room with falls x 2 and left arm pain;
- ACS ruled out; no numbness, weakness, speech disturbance or other neuro symptoms at any time;
- Carotid ultrasound showed RICA 50% and LICA 70-80%; CT - no acute abnormalities;

Patient Ben (cont.)

- Imp - carotid stenosis is not related to his current presentation;
- Falls did not involve any focal neurological complaints;
- Search for another cause of his falls; urgent endarterectomy not required here - we can ‘stand down’ from an acute stroke prevention perspective;
- Statin suggested as already on antiplatelet;

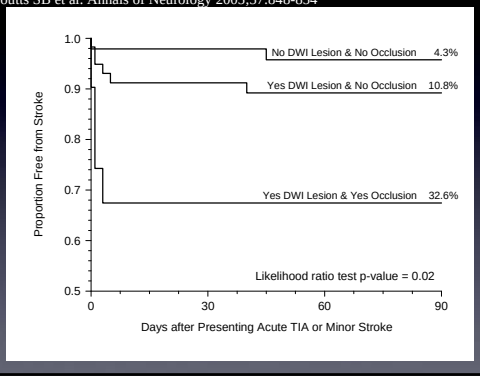
How else can we identify high risk TIA?



Coutts et al. Annals of Neurology 2005

Event free survival time for new stroke

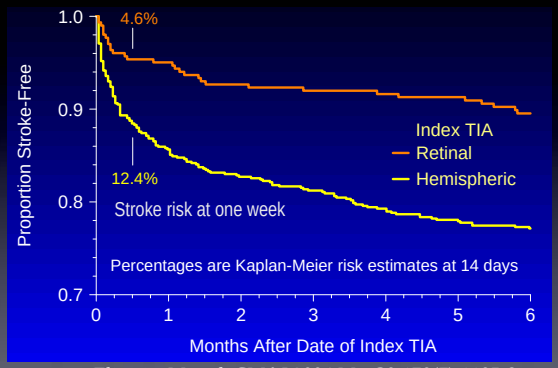
Coutts SB et al. Annals of Neurology 2005;57:848-854



NCCT ordered in most TIAs already

- CT identifies the mass lesions causing spells: subdural hematomas, intracerebral hemorrhage, tumour etc.
- TIA population: 67% CT performed
- 4% : 13/322 had evidence of infarct on CT
- Odds Ratio 4.06 (1.16-14.14) for risk of stroke if stroke on CT.

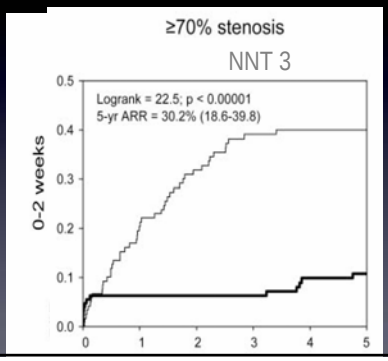
Stroke. 2003 Dec;34(12):2894-8.



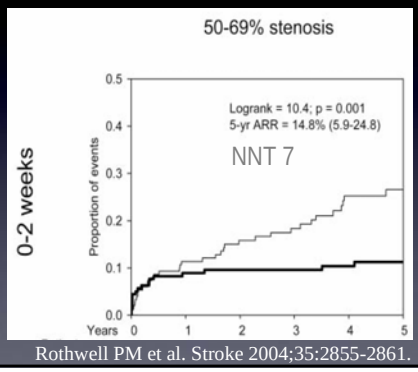
Eliasziw M et al. CMAJ 2004 Mar 30;170(7):1105-9.

Early Carotid Surgery Much Better >70%

Rothwell PM et al. Stroke 2004;35:2855-286



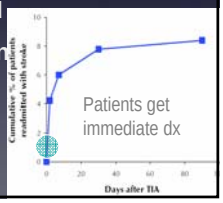
Early Carotid Surgery Better in 50-69% stenosis



Rothwell PM et al. Stroke 2004;35:2855-2861.

CT angiography ideal for ED diagnosis

- Patient already in ED
- Vascular imaging immediately follows NCCT
- Assesses intracranial and
- vertebro-basilar circulation
- Quick

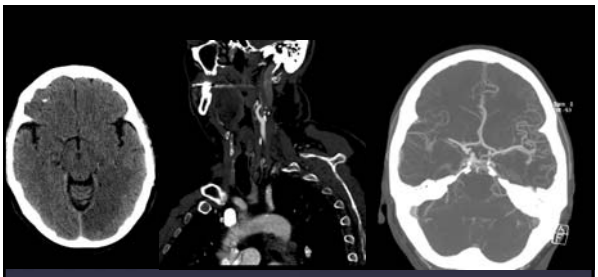


CTA data in prognosis of TIA/minor stroke

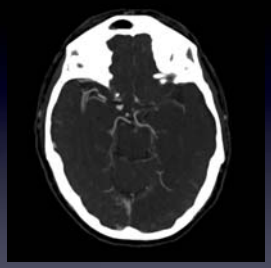
199 completely resolved patients:

- **Patients with normal CT/CTA: 2.4% disabled**
- **Patients with a symptom relevant abnormality on CT/CTA: 20% disabled.**
-
- **(RR 8.2, CI_{95}2.54-26.5)**

Coutts et al. In press International Journal of Stroke 2009

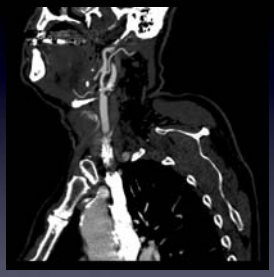


63 year old male. Transient right sided weakness and visual disturbance that resolved 4 hours ago. Transferred from a rural site.



- **Deteriorated 20 minutes after first CTA.**
- **Embolized to left supraclinoid carotid and MCA.**
- **Taken immediately for intra-arterial tPA.**

Case 2



- 68 year old man with 20 minutes of left sided weakness.
- Right ICA showed an ulcerated plaque with a non surgical <50% stenosis.

Imaging is key in the assessment of TIA and minor stroke

- **Whole brain CT: mostly to rule out mimics. Occasionally shows an acute stroke.**
- **Stroke is all about the blood vessels.**
- **The more we can see the better.**
- **The earlier we make the assessment the more likely we can intervene.**
- **TIA is a huge opportunity to prevent Stroke.**

How urgently should high risk TIA patients be assessed? Does it make a difference?

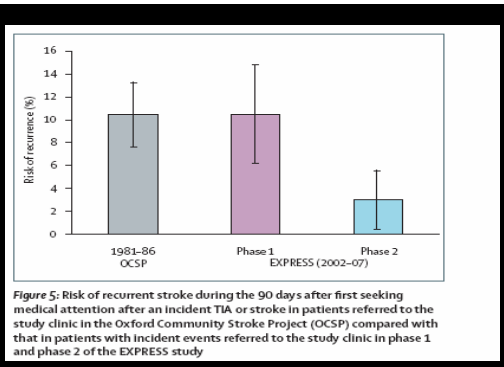


Figure 5: Risk of recurrent stroke during the 90 days after first seeking medical attention after an incident TIA or stroke in patients referred to the study clinic in the Oxford Community Stroke Project (OCSP) compared with that in patients with incident events referred to the study clinic in phase 1 and phase 2 of the EXPRESS study

Express Study

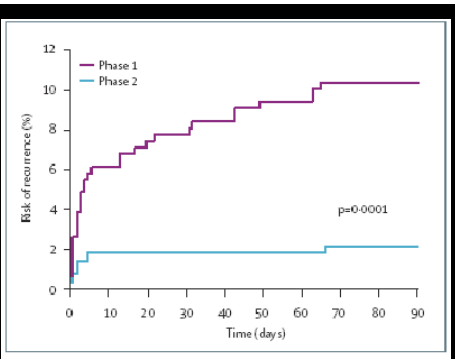
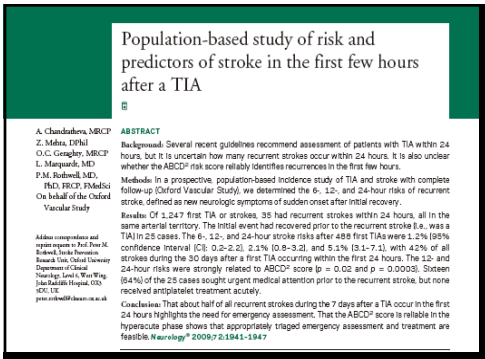


Figure 2: Risk of recurrent stroke after first seeking medical attention in all patients with TIA or stroke who were referred to the study clinic

Express Study



Population-based study of risk and predictors of stroke in the first few hours after a TIA

A. Chandratheva, MRCP
Z. Mehta, DPhil
O.C. Geraghty, MRCP
L. Marquardt, MD
P.M. Rothwell, MD, PhD, FRCP, FMedSci
On behalf of the Oxford Vascular Study

ABSTRACT

Background: Several recent guidelines recommend assessment of patients with TIA within 24 hours, but it is uncertain how many recurrent strokes occur within 24 hours. It is also unclear whether the ABCD² risk score reliably identifies recurrences in the first few hours.

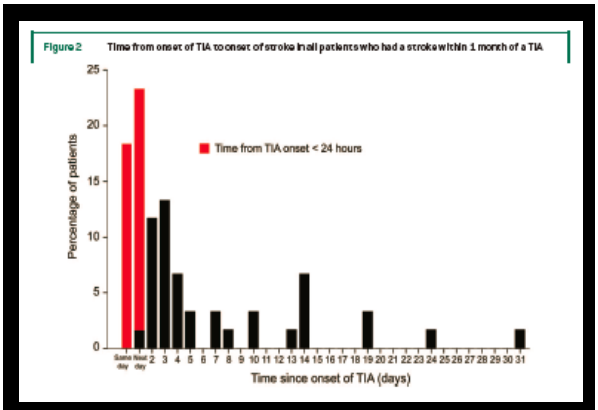
Methods: In a prospective, population-based incidence study of TIA and stroke with complete follow-up (Oxford Vascular Study), we determined the 6-, 12-, and 24-hour risks of recurrent stroke, defined as new neurologic symptoms of sudden onset after initial recovery.

Results: Of 1,247 first TIA or strokes, 35 had recurrent strokes within 24 hours, all in the same arterial territory. The initial event had recovered prior to the recurrent stroke (i.e., was a TIA) in 25 cases. The 6-, 12-, and 24-hour stroke risks after 488 first TIAs were 1.2% (95% confidence interval [CI]: 0.2–2.2), 2.1% (0.8–3.2), and 5.1% (3.1–7.1), with 42% of all strokes during the 30 days after a first TIA occurring within the first 24 hours. The 12- and 24-hour risks were strongly related to ABCD² score (p = 0.02 and p = 0.0003). Sixteen (64%) of the 25 cases sought urgent medical attention prior to the recurrent stroke, but none received antiplatelet treatment acutely.

Conclusion: That about half of all recurrent strokes during the 7 days after a TIA occur in the first 24 hours highlights the need for emergency assessment. That the ABCD² score is reliable in the hyperacute phase shows that appropriately triaged emergency assessment and treatment are feasible. *Neurology*® 2009;72:1941–1947

ABCD Study population (Oxfordshire Vascular Study). Examined stroke recurrence with more detailed time periods in the first 24 hours after TIA. Found that the stroke recurrence risks were: 1.2% at 6 hours; 2.1% at 12 hours; 5.1% at 24 hours.

***Neurology*® 2009;72:1941–1947**



***Neurology*® 2009;72:1941–1947**

ASPIRE Data

- The TIA Hotline and TIA Triaging Strategy overlap with APSS Educational Strategy as well as Pillar 1 - quality improvement
- Data will be tracked by TIA Hotlines (SARC in the south and the CCL/UCL in the north)
- Stroke Prevention Clinic referral forms will be faxed to a central number to track all TIAs that come to referral across the province

ASPIRE Outcomes

- Rate of recurrent stroke determined by presentations to emergency departments and admissions to hospital will be tracked using administrative data and telephone calls from study nurses to all patients at 7 days and 90 days
- Two years ‘pre’ compared to two years ‘post’ implementation
- Is the TIA Hotline/Triaging strategy effective? Is it worth the cost and effort?
- Ongoing feedback and refinement

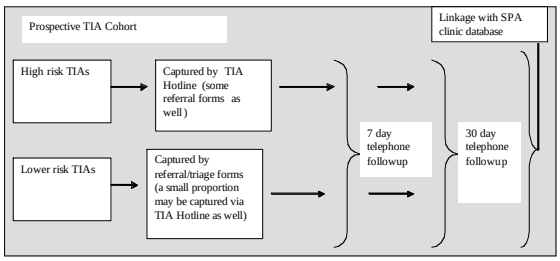


Figure 4: Figure showing how patients will enter into the prospective data collection arm of the study. These patients will all have 7 and 90 day telephone follow-up to assess for stroke recurrence. The prospective TIA cohort dataset will be used to validate the ABCD2 rule and 'speech or motor' symptoms as well as to determine the best set of predictors of stroke occurrence after TIA.

Progress for data collection component

- Ethics approval from U of C in place for data collection
- Ethics submissions pending to U of A and CREBA with U of C approval enclosed
- Operational Approval application will follow province-wide ethics approval
- We anticipate no problems with approval given stakeholder involvement so far

Moving forward

- When operational approval in place Stroke Prevention clinics will Clinics will be notified by letter
- SPCs to fax referral forms to central ASPIRE fax number located in Foothills Hospital in Calgary
- Study nurses will call patients at 7 days and 90 days post TIA to determine recurrent events and type of care received
- We anticipate this to occur within the next two months

THANK YOU!

HEART & STROKE FOUNDATION OF CANADA | FONDATION DES MALADIES DU CŒUR DU CANADA

Finding answers. For life.
À la conquête de solutions.

CIHR IRSC

April 1, 2009