

# Care and outcomes of TIA and minor stroke in Ontario

Moira Kapral, MD MSC FRCPC and Ruth Hall, PhD  
Provincial Stroke Rounds, June 2015



## Mitigating Potential Bias

The Provincial Stroke Rounds Planning Committee mitigated bias by ensuring that there was no Industry involvement in the planning process or in the education content.

To comply with accreditation requirements of the College of Family Physicians of Canada and The Royal College of Physicians and Surgeons of Canada, speakers were provided with Declaration of Conflict of Interest forms, which were reviewed by the Ontario Regional Education Group (OREG) Host member on behalf of the Planning Committee and submitted to the NOSM CEPD Office.

The Ontario Regional Education Group (OREG) Host member on behalf of the Planning Committee reviewed the initial presentation supplied by the speaker to ensure that there was no evidence of bias.

## Conflict of Interest Declaration: Nothing to Disclose

**Presenters: Moira Kapral and Ruth Hall**

**Title of Presentation: The care and  
outcomes of TIA and minor stroke in  
Ontario**

**We have no financial or personal  
relationships to disclose**

## Objectives

1. To understand the factors that influence decisions to hospitalize patients with TIA and minor stroke
2. To review the optimal management strategies for TIA and minor stroke, and to determine how often these are provided to patients in Ontario

## Outline

- Overview of TIA/minor stroke
  - Definitions, risks, recommended care, current knowledge*
- Ontario's stroke secondary prevention clinics (SPCs)
- Presentation of OSN research project on TIA care
  - Methods, results, conclusions*
- Implications and future directions

## Case

- Saturday 11 p.m.
- 65-year-old woman in ED with left face/arm weakness.
- Symptoms resolved within 30 minutes.
- No other medical problems.
- BP 150/90. Remainder of physical examination normal.

## Questions

- Is this a TIA?
- What is her risk of subsequent stroke?
- What acute treatment is needed?
- Should she be admitted to hospital?

## Is this a TIA?

- Newer criteria for diagnosis of TIA (AHA 2009)
- Sudden onset of transient neurological symptoms  
(*< 24 hours and usually < 1 hour*)
- No evidence of infarction on imaging
- WHO still endorses traditional criteria of symptoms < 24 hours without reference to neuroimaging findings

## What is the risk of stroke after TIA?

- 10% risk of stroke within 90 days of TIA
- Half of these occur within 48 hours
- Efforts to identify patients at particularly high risk

### ABCD<sup>2</sup>

- **A** – Age 60 years or older (1 point)
- **B** – Blood pressure elevation on first assessment (1 point; systolic  $\geq$  140 or diastolic  $\geq$  90 mm Hg)
- **C** – Clinical features of TIA (unilateral weakness, 2 points; or speech impairment without weakness, 1 point);
- **D** – Duration of TIA ( $\geq$ 60 minutes, 2 points; 10–59 minutes, 1 point)

AHA GUIDELINES RECOMMEND HOSPITALIZATION IF ABCD<sup>2</sup> > 2

## Limitations of the ABCD<sup>2</sup> score

- 1 Interpretation:** This multicentre prospective study involving patients in emergency departments with transient ischemic attack found the ABCD2 score to be inaccurate, at any cut-point, as a predictor of imminent stroke. Furthermore, the ABCD2 score of more than 2 that is recommended by the American Heart Association is nonspecific.

*Perry et al CMAJ 2012*

## Emerging factors predicting high risk

- Risk driven by mechanism of stroke syndrome; not covered by ABCD2
  - High grade arterial stenosis*
- MR evidence of acute infarct (despite symptom resolution)

## TIA risk stratification – Canadian guidelines

- Highest risk – immediate ED evaluation recommended
  - Speech disturbance or unilateral weakness
  - Presentation within 48 hours of symptom onset
- Increased risk – evaluate w/in 24 hrs (2 wks if no motor sx)
  - Speech disturbance or unilateral weakness
  - Presentation between 48 hours and 2 weeks of symptom onset
- Lower risk – evaluate within 1 month
  - Atypical sensory symptoms
  - Presentation more than 2 weeks after symptom onset

*Canadian Best Practice Recommendations for Stroke Care, [www.strokebestpractices.ca](http://www.strokebestpractices.ca)  
Health Quality Ontario, Stroke QBP Clinical Handbook, [www.hqontario.ca](http://www.hqontario.ca)  
OSN Triage Algorithm, [www.ontariostrokenetwork.ca](http://www.ontariostrokenetwork.ca)*

## What tests are needed?

1. Brain imaging (CT/MRI)
2. Vascular imaging (Doppler ultrasound/CTA/MRA)
3. ECG to assess for atrial fibrillation
4. CBC, INR, PTT, creat, lytes, ALT, glucose, lipids, HbA1c
5. Holter monitor if cardioembolism suspected
6. Echocardiography “in cases where stroke mechanism has not been identified”

*Canadian Best Practice Recommendations for Stroke Care, [www.strokebestpractices.ca](http://www.strokebestpractices.ca)  
Health Quality Ontario, Stroke QBP Clinical Handbook, [www.hqontario.ca](http://www.hqontario.ca)  
OSN Triage Algorithm, [www.ontariostrokenetwork.ca](http://www.ontariostrokenetwork.ca)*

## What acute management is needed?

1. Antiplatelet therapy if no blood on brain imaging  
*ASA as soon as possible and within 48 hours*
2. Initiate oral anticoagulation if atrial fibrillation
3. If 50-99% ipsilateral carotid stenosis, refer for consideration of carotid endarterectomy
4. Other risk factor modification  
*Hypertension, lipids, smoking, diabetes*

Canadian Best Practice Recommendations for Stroke Care, [www.strokebestpractices.ca](http://www.strokebestpractices.ca)  
Health Quality Ontario, Stroke QBP Clinical Handbook, [www.hqontario.ca](http://www.hqontario.ca)  
OSN Triage Algorithm, [www.ontariostrokenetwork.ca](http://www.ontariostrokenetwork.ca)

## Is admission required?

### **Patients With Transient Ischemic Attack or Minor Stroke Should Be Admitted to Hospital**

**For**

Michael D. Hill, MD, MSc, FRCPC; David J. Gladstone, MD, FRCPC

### **Patients With Transient Ischemic Attack Do Not Need To Be Admitted to Hospital for Urgent Evaluation and Treatment**

**Against**

Richard I. Lindley, MBBS, MD, FRCP(Edin), FRACP



## Is admission required?

- Depends on ability of patient to return if recurrence
- Depends on availability of timely outpatient care  
*Need brain imaging and carotid imaging quickly*

- HQO Handbook:

*“The majority of patients with TIA and some patients with minor stroke do not require admission to hospital and should be referred to an urgent TIA/minor stroke unit/TIA clinic/stroke prevention clinic or comparable ambulatory care setting for rapid diagnostic and medical evaluation”*

*Canadian Best Practice Recommendations for Stroke Care, [www.strokebestpractices.ca](http://www.strokebestpractices.ca)  
Health Quality Ontario, Stroke QBP Clinical Handbook, [www.hqontario.ca](http://www.hqontario.ca)  
OSN Triage Algorithm, [www.ontariostrokenetwork.ca](http://www.ontariostrokenetwork.ca)*

## What do we know about TIA care in Ontario?

- SEQC evaluation reports: 3000 hospitalizations/year
- 75-80% discharged from the ED
- Gladstone et al, CMAJ, data from 2000
  - Low rates of recommended tests/treatments:
    - Brain imaging – 58%*
    - Carotid imaging – 44%*
    - Antithrombotic therapy – 63%*

## Strategies to improve TIA care

- Increasing recognition of high risk
- Development of best practice guidelines
- Implementation of stroke prevention clinics

## Background – Ontario’s Secondary Prevention Clinics

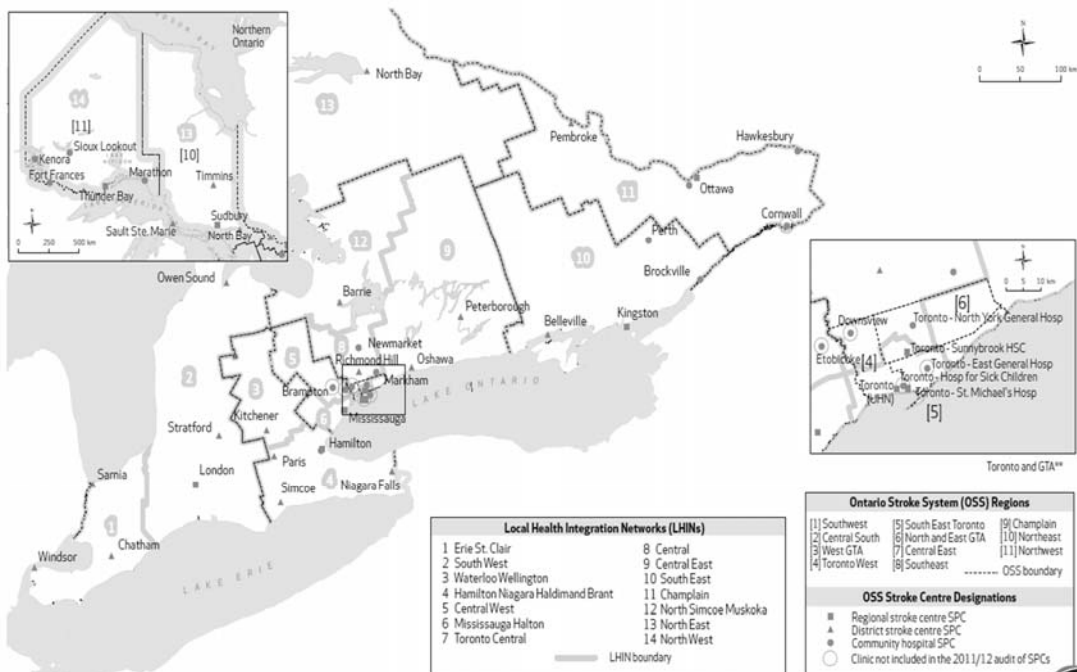
- 2001, 5 Stroke Secondary Prevention Clinics (SPC) as part of the Ontario Stroke System
  - 2005, 24 SPC
  - 2010, 43 SPC
  - 2014, 48 SPC
- Most operate 3-5 days/week and none are open on weekends
- Most located in specialized stroke centres

## Purpose of SPCs

1. to coordinate services for all high-risk patients
2. develop and implement referral and triage processes to facilitate transition of care from ED or GP offices to SPC
3. Establish processes to coordinate **timely** access for diagnostics, assessment and carotid revascularization.



## Map of Ontario's SPCs

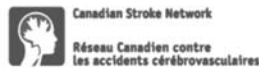
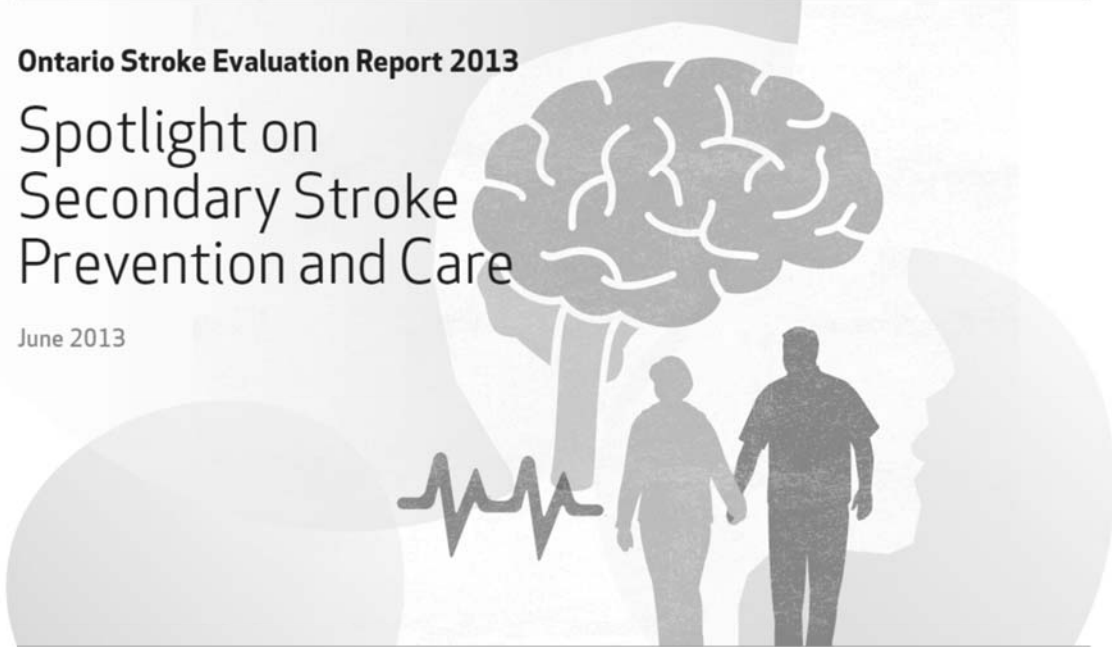


---

**Ontario Stroke Evaluation Report 2013**

# Spotlight on Secondary Stroke Prevention and Care

June 2013



## Findings from report

- 53% of SPC referrals are from ED physicians
- 27% of SPC referrals are from primary care offices
- 16.5% of SPC visits were for emergent or urgent cases



## Access

In 2011/12, ~30,000 ED visits for patients with suspected or confirmed TIA/stroke:

- 21.3% were assessed in an SPC
- < 20% patients deemed emergent or urgent were seen within recommended time (24 & 72hrs respectively)



## OSN research questions

- How are patients with TIA/minor stroke in Ontario managed currently?
  - How often hospitalized?*
  - What determines hospitalization?*
  - What is quality of care like in admitted/discharged patients?*
- What has been the impact of SPCs on TIA care?

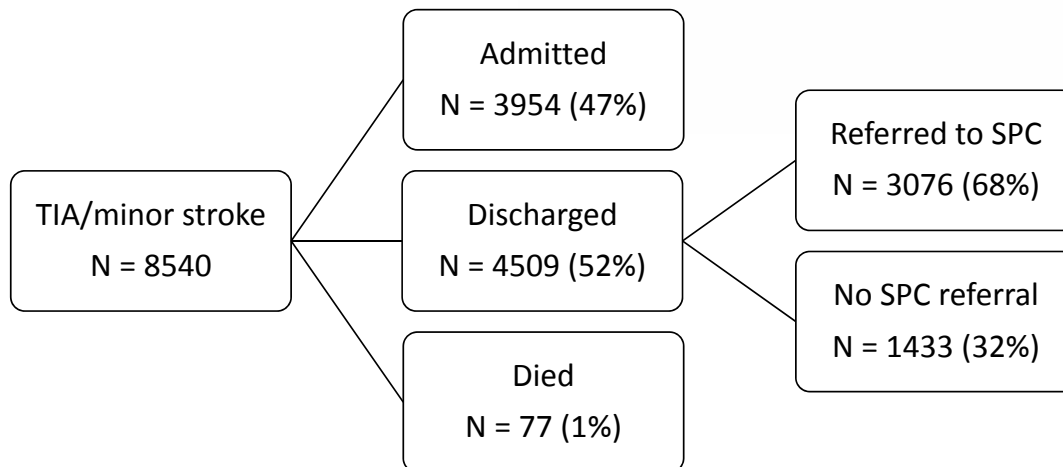
## Methods – data sources

- Data from Ontario Stroke Registry audits
- 2008/09 and 2010/11; N = 8540
- All ~ 150 acute care hospitals in province
- Patients with TIA/minor stroke seen in the ED
- Linked to administrative data to determine procedures/medications after discharge, as well as repeat ED visits, hospitalizations, deaths

## Analysis

- Determined % of patients hospitalized  
*Multivariable analyses to determine factors associated with hospitalization*
- Compared processes of care in patients admitted and discharged with and without SPC referral
- Compared risk of death/stroke in patients admitted and discharged with and without SPC referral  
*Hierarchical Cox PH models for hazard of death*  
*Similar models for stroke, with cumulative incidence functions to account for competing risk of death*  
*Secondary analyses with propensity methods*

## Results – Patterns of care

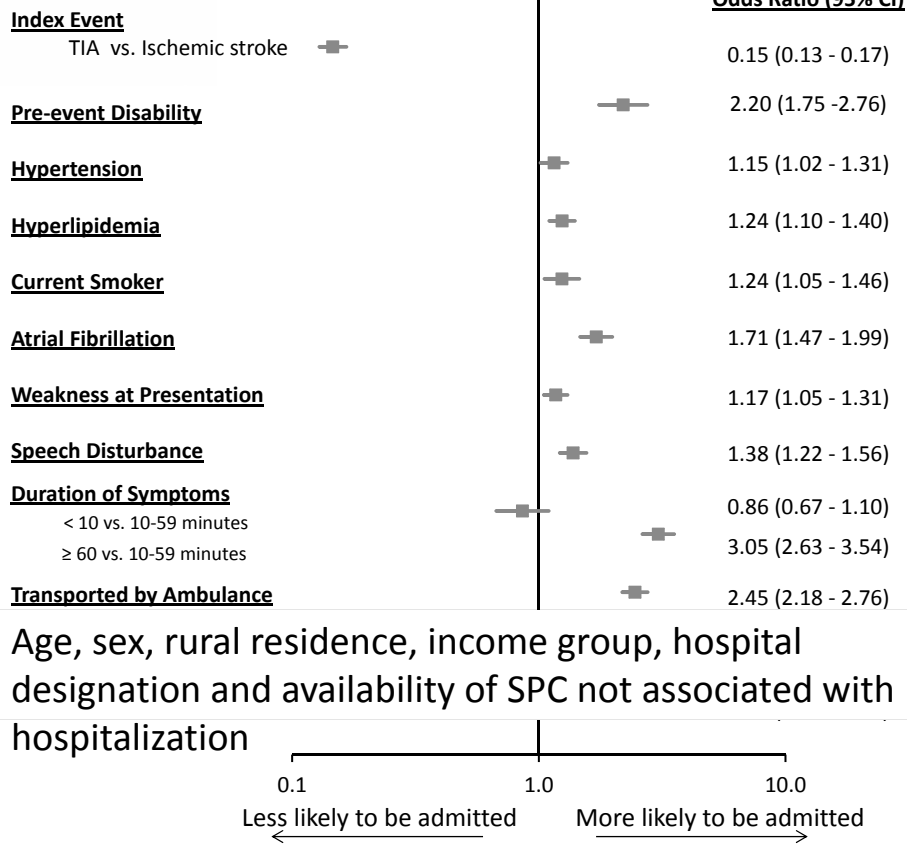


## Baseline characteristics

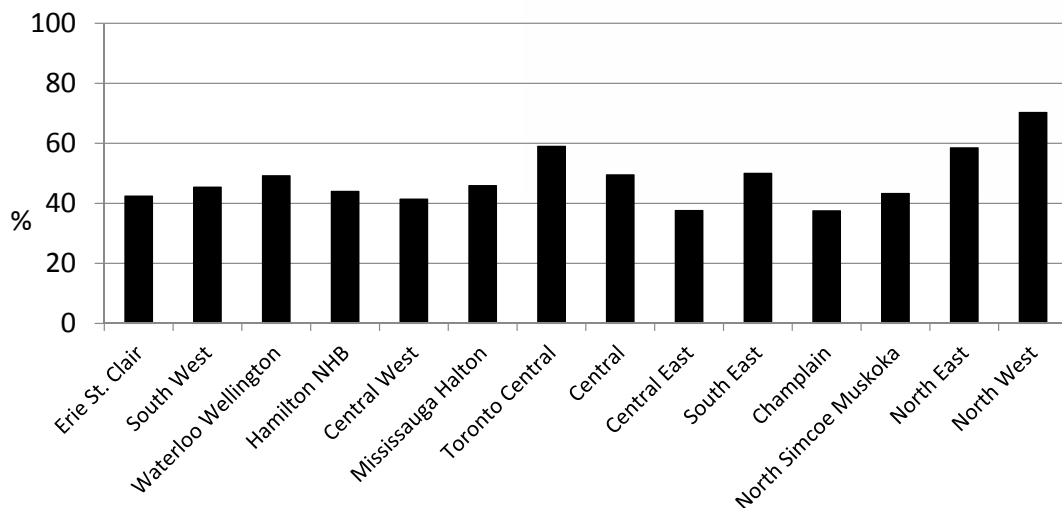
|                             | <b>Admitted<br/>N = 3954</b> | <b>Discharged<br/>SPC referral<br/>N = 3076</b> | <b>Discharged<br/>without SPC<br/>N = 1433</b> |   |
|-----------------------------|------------------------------|-------------------------------------------------|------------------------------------------------|---|
| Index event TIA (%)         | 42                           | 84                                              | 87                                             | * |
| Median age (y)              | 75                           | 72                                              | 76                                             | * |
| Female (%)                  | 48                           | 48                                              | 51                                             | * |
| Rural residence (%)         | 17                           | 12                                              | 29                                             | * |
| Disabled prior to event (%) | 10                           | 3                                               | 9                                              | * |
| Diabetes (%)                | 28                           | 22                                              | 23                                             | * |
| Hypertension (%)            | 71                           | 63                                              | 62                                             | * |
| Atrial fibrillation (%)     | 17                           | 10                                              | 12                                             | * |
| Weakness (%)                | 58                           | 48                                              | 49                                             | * |

\*P < .001

# Predictors of admission



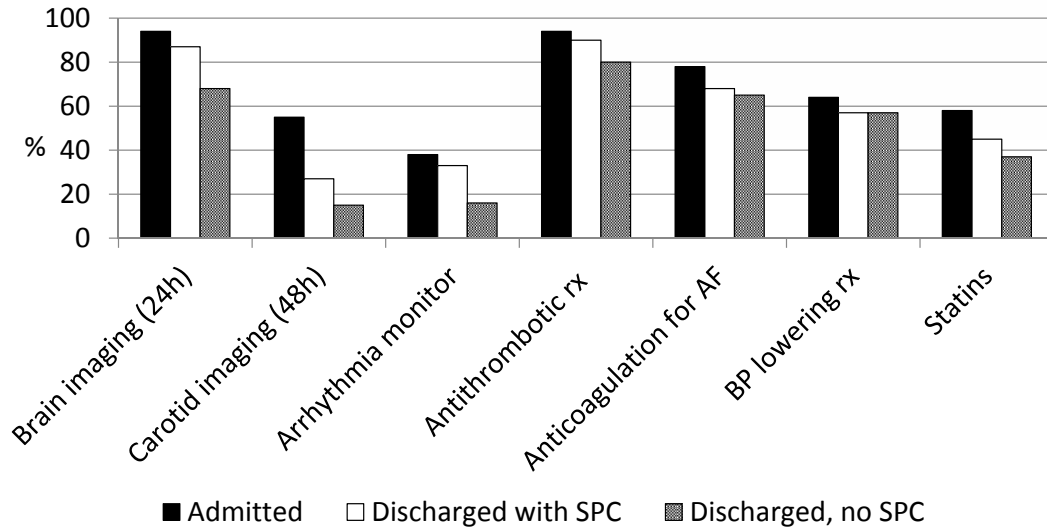
# Proportion admitted by region



- Range from 37.5% to 70.3%
- 88% of variation due to patient factors



## Results – processes of care



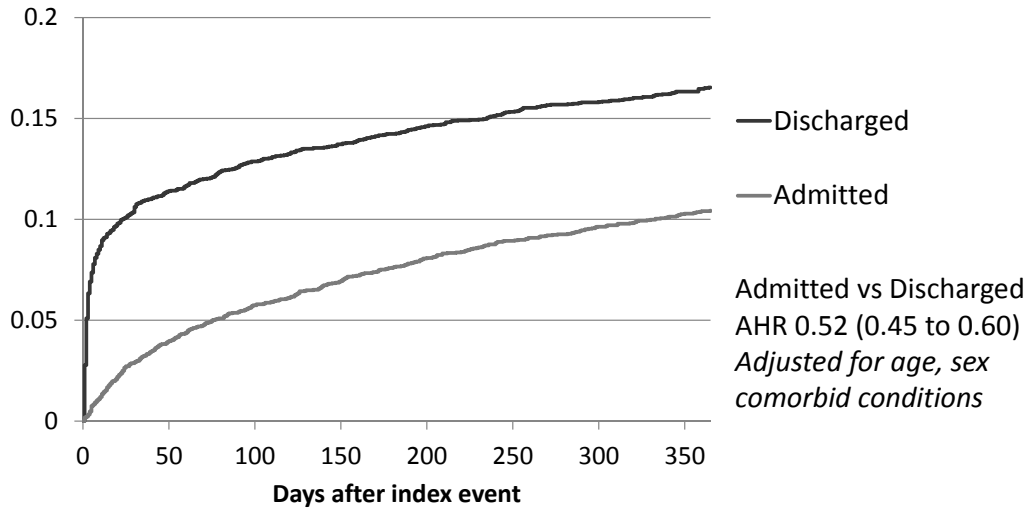
P < .001 for differences across groups

## Outcomes - unadjusted

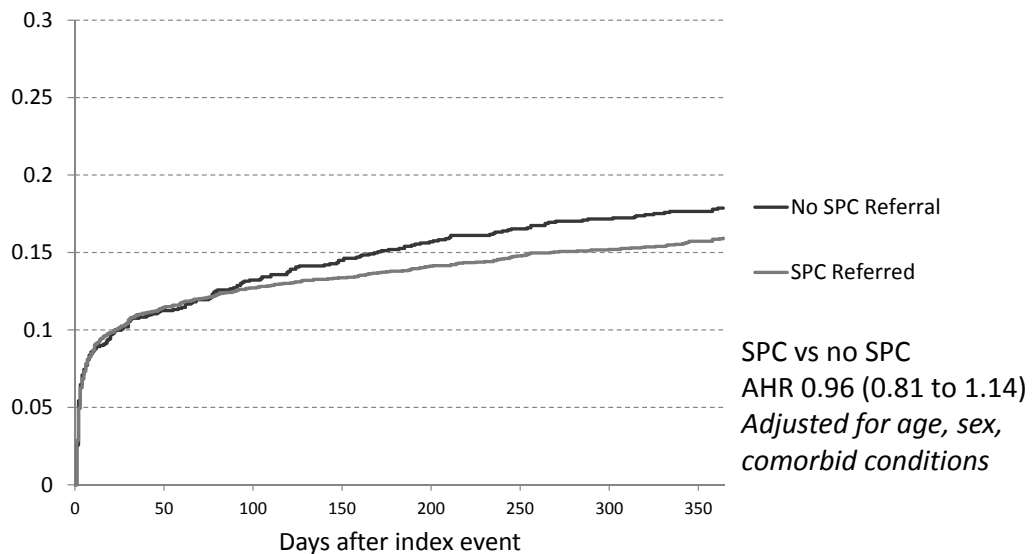
|                                 | Admitted | Discharged, SPC referral | Discharged, no SPC |   |
|---------------------------------|----------|--------------------------|--------------------|---|
|                                 | %        |                          |                    |   |
| ED visit for stroke within 7 d  | 0.9      | 8.2                      | 8.2                | * |
| ED visit for stroke within 30 d | 3.0      | 10.7                     | 10.6               | * |
| Death within 30 d               | 0.8      | 0.2                      | 1.2                | * |
| Death within 1 y                | 7.9      | 3.7                      | 9.9                | * |

\*P<.001

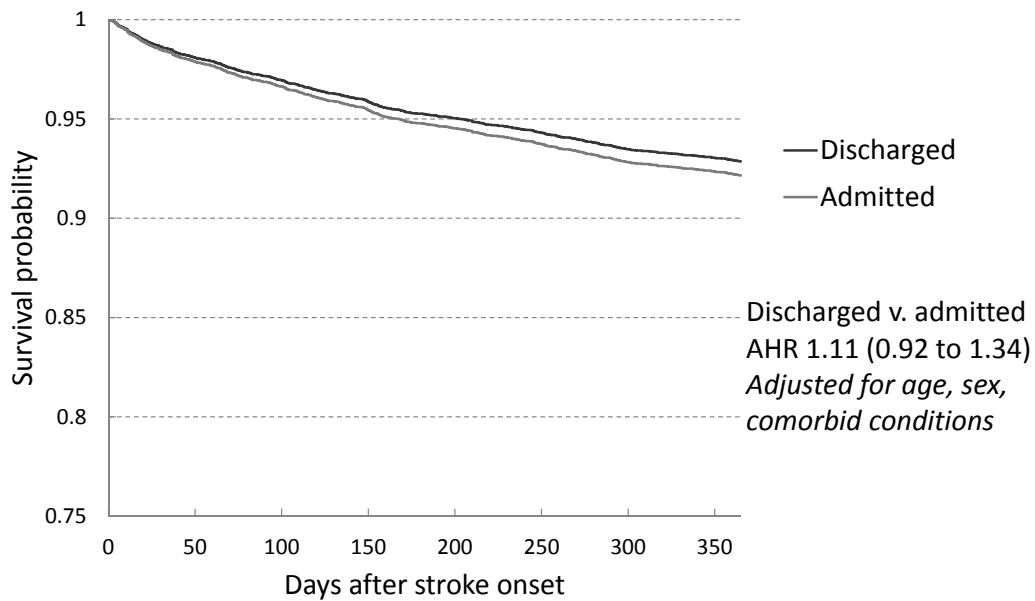
## Cumulative incidence of ED visits for stroke in admitted vs discharged patients



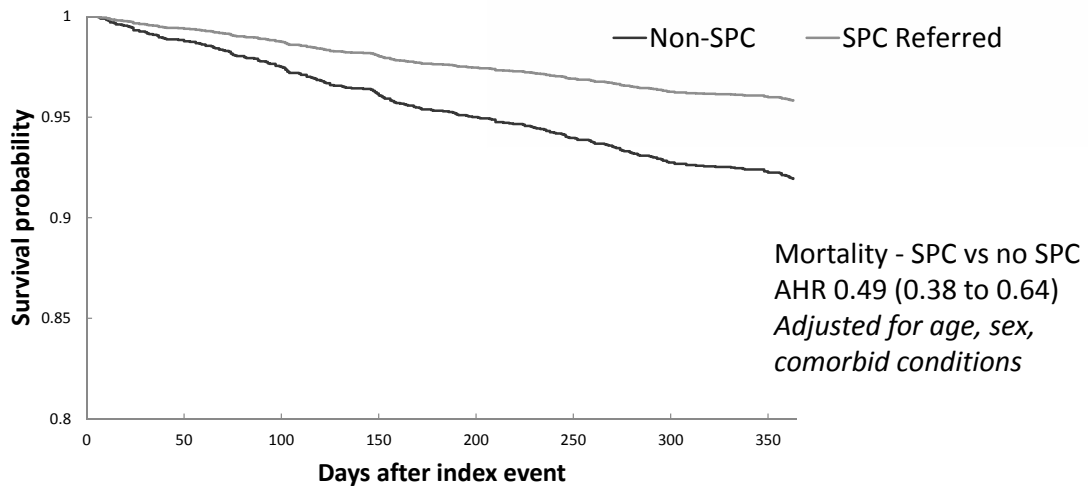
## Cumulative incidence of ED visits for stroke in discharged patients with and without SPC



## Adjusted survival in admitted vs discharged



## Adjusted survival in those referred and not referred to SPCs



## Summary of findings

- More than half of patients discharged from the ED  
*Patient factors explain most variation in admissions*
- 10% return to ED with stroke symptoms within 30 d
- Less likely to received recommended treatments
- Processes of care better with SPC referral
- Lower mortality in SPC cohort

## Limitations

- Lacked information on some factors that might have influenced admission decisions
- Unmeasured comorbid conditions may have contributed to some of the differences in outcomes

## Implications

- Additional guidance needed on when to admit or discharge patients with TIA/minor stroke
- Need to improve care of non-hospitalized patients
- SPCs are associated with improved care but currently may not have capacity to provide rapid care for all high risk patients
- Additional rapid outpatient assessment/treatment units may be needed

## Future initiatives

- Need for ongoing monitoring
  - May be challenging without ongoing registry data collection*
  - Administrative data valuable, but suboptimal coding of TIA and cannot identify minor stroke*
- Development of rapid assessment units
  - e.g. TAMS unit at Toronto Western Hospital*
- Development of guidelines/algorithms for TIA care
  - Stroke QBP Clinical Handbook*
  - OSN launch of triage algorithm*

# Thank you

Questions welcome



## TIA project study team:

Peter Austin, Leanne Casaubon, Jiming Fang,  
David Gladstone, Ruth Hall, Moira Kapral,  
Shudong Li, Frank Silver, Melissa Stamplecoski,  
Jack Tu

