

# Patients Referred for TIA May Still Have Persisting Neurological Deficits

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**ABSTRACT: Background:** The presence of residual neurological deficits after neurological symptoms is important information for making a diagnosis of Transient Ischemic Attack (TIA) versus stroke. The purpose of this study was to establish the reliability of the referring physician (non neurologist) to report focal neurological deficits in the context of an urgent referral for TIA. **Methods:** Prospectively recorded urgent physician-to-physician phone referrals for TIA through the Southern Alberta TIA hotline from March 2009 to July 2010 were reviewed. "Has the neurological deficit completely resolved?" was asked to the referring physician (family or emergency room physician) and recorded prospectively as a yes/no response. Patients were included if a neurological examination was performed by a neurologist on the same day as referral. The neurologist's assessment of whether the deficit had resolved was compared to that of the referring physician. **Results:** 78 patients were included in this study. 62 patients had resolved as per the referring physician's assessment. Of these 62 patients, 16 (25.8% 95%CI 16-38) had evidence of persisting neurological deficits on the neurologist's assessment. A wide variety of mild neurological deficits were identified. None of these deficits appeared to be explained by progression of symptoms. **Conclusion:** Physicians referring patients with TIA syndromes for emergent assessment do not reliably detect mild residual deficits in one-quarter of patients. We are questioning the validity of neurological deficit resolution as a triage rule. The findings suggest that studies of TIA likely include a proportion of minor stroke patients and this should be remembered when extrapolating the results to other populations.

**RÉSUMÉ: Déficiences neurologiques persistantes chez des patients référés pour une ICT. Contexte :** La présence de déficiences neurologiques résiduelles après la disparition des symptômes neurologiques est une information importante pour faire la distinction entre une ICT et un accident vasculaire cérébral. Le but de cet étude était de vérifier la fiabilité du médecin référant, qui n'était pas un neurologue, à identifier des déficiences neurologiques focales lors d'une demande de consultation urgente pour ICT. **Méthode :** Nous avons révisé de façon prospective les demandes de consultation urgentes effectuées au moyen de la ligne téléphonique d'urgence Southern Alberta TIA hotline par le médecin traitant au médecin spécialiste pour un patient présentant une ICT de mars 2009 à juillet 2010. La question suivante était posée au médecin traitant (médecin de famille ou médecin travaillant au service d'urgence) « Le déficit neurologique a-t-il complètement disparu? » et la réponse était notée systématiquement comme étant oui ou non. Les patients ont été inclus dans l'étude s'ils avaient subi un examen neurologique fait par un neurologue le jour même de la demande de consultation. L'évaluation du neurologue à savoir si le déficit était toujours présent ou s'était résorbé était comparée à celle du médecin traitant. **Résultats :** Soixante-dix-huit patients ont été inclus dans cette étude. Soixante-deux patients ne présentaient pas de déficit résiduel selon le médecin traitant. Seize de ces 62 patients (25,8% ; IC à 95% :16 à 38) avaient des signes de déficit neurologique persistant selon l'évaluation faite par le neurologue. Une grande variété de déficiences neurologiques légers ont été identifiés. La progression des symptômes ne semblait expliquer aucun de ces déficits. **Conclusion :** Les médecins qui dirigent des patients qui présentent un syndrome d'ICT vers un spécialiste pour une évaluation neurologique ne détectent pas de façon fiable la présence de déficiences résiduelles légers chez un quart de ces patients. Nous remettons en question la validité de la résolution des déficiences neurologiques comme règle de triage. Ces observations suggèrent que des études portant sur l'ICT incluent vraisemblablement une certaine proportion de patients qui présentent un accident vasculaire cérébral mineur, ce dont on devrait tenir compte quand on extrapole les résultats de ces études à d'autres populations.

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Transient Ischemic Attack (TIA) and strokes are events associated with dysfunction in a circumscribed area of the brain, caused by a reduction in blood flow to that area, with resultant clinical symptoms. A TIA is diagnosed when all symptoms and neurological findings have resolved and stroke when residual mild symptoms or neurological findings persist. This principle remains with either the classical definition<sup>1</sup> or the recently proposed new definition of TIA<sup>2</sup>.

The clinical status of the patient at the time of first assessment is critical for correct diagnosis (stroke or TIA), management decisions and appropriate classification of patients in research databases. A large body of literature determines very similar prognosis for TIA and for minor stroke presentations<sup>3-5</sup>. This may be in part because many minor stroke patients are

embedded in the TIA category because the data is coming from administrative coding or retrospective chart review from non-neurologist assessments where a full neurological examination may not have occurred. Previous work has shown that a

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**Table 1: Correlation between assessment of the ER physician and the neurologist**

	<b>Not resolved on Neurologist assessment</b>	<b>Resolved on Neurologist assessment</b>	<b>Totals</b>
<b>Not resolved on ER assessment</b>	6	10	16
<b>Resolved on ER assessment</b>	16	46	62
<b>Totals</b>	22	56	78

persistent mild deficit on the neurological examination when completed by a neurologist (versus being completely resolved) increases the risk of recurrent stroke in TIA and minor stroke patients<sup>6,7</sup>. Based on this data a triage algorithm in Alberta was created and one component designates persistent mild neurological symptoms as a reason for transfer to a tertiary centre. However this data only assessed the utility of the neurological examination by a neurologist and the reality is that many patients are examined by non-neurologists. There has been previous work assessing the lack of good reliability in the diagnosis of TIA,<sup>8-10</sup> however none have directly compared the examination of a non neurologist and a neurologist on the same day in this population.

We hypothesized that there would be discrepancies in the neurological examination carried out by a non-neurologist as compared to a neurologist, in terms of assessment of residual neurological deficits in a population of patients referred for assessment of TIA.

## METHODS

The Southern Alberta TIA Hotline is a service providing immediate expert advice to referring physicians encountering patients presenting with transient neurological symptoms. The system uses the RAAPID (Referral, Access, Advice, Placement, Information & Destination) nurse operator to link the referring physician with the on call stroke neurologist in Calgary. Full demographics and the answers to a systematic screening questionnaire were prospectively recorded by the operator for each patient. The question "Has the neurological deficit completely resolved?" was asked to the referring physicians and the answer recorded. Patients were only included in this study if a referring physician transferred them for assessment by a stroke neurologist at Foothills Medical Centre and they had a neurological examination completed by a neurologist on the same day as the referral. Types of patients usually transferred included patients with persistent deficits or a high risk TIA as defined by the provincial guidelines<sup>11</sup> (motor and speech symptoms lasting longer than five minutes or an ABCD2 score<sup>12</sup> of 4 or more). As well as the question regarding symptom resolution, the emergency physician consultation report was

reviewed to determine if neurological deficits were identified. If the emergency physician declared the patient resolved but a neurologic deficit was rated on his assessment report, the case was classified as not resolved as per emergency physician assessment. The hospital charts were retrospectively reviewed to document the presence of residual neurological deficits on the neurologist's examination. Only positive findings on examination were recorded. Any evidence of symptom progression from the emergency room (ER) assessment to the neurologist assessment in the history or from emergency medical services reports was also recorded. Results are displayed as simple proportions with confidence intervals as appropriate. Our local institutional ethics committee approved this study.

**Table 2: Deficits observed in the 16 patients classified as resolved by the ER physician, but not resolved by the neurologist. \*some patients have more than one deficit**

<b>Deficit</b>	<b>Count* (%)</b>
arm or leg drift	5 (31%)
facial droop	3 (19%)
visual deficit (field cut)	2 (13%)
sensory deficit	5 (31%)
mild aphasia	5 (31%)
mild dysarthria	1 (6%)
ataxia	3 (19%)
nystagmus	1 (6%)

## RESULTS

From March 20th 2009 to July 30th 2010, 78 patients were identified in the Southern Alberta TIA hotline database that met the entry criteria for our study. Mean age was 66 years old and 50% were male. Mean and median ABCD was 4. Seventy-seven percent had a history of motor or speech symptoms. Mean symptom duration was 120 minutes. Out of the 78 patients referred, 62 patients were declared as resolved by the ER physician and also had a normal neurologic examination described in the ER physician assessment. Of these 62 patients, 16 (25.80% 95%CI 16-38) had neurologic deficits on the neurologist's assessment (see Table 1). These cases represent 20.51% (95%CI 12-31%) of the whole sample of 78 patients referred. All 16 cases were assessed the same day in the emergency department by a neurologist. In no case was there a report of symptom progression between the initial assessment to the assessment by the neurologist. Neurologic deficits identified by the neurologist spanned most aspects of the neurological examination (see Table 2). All deficits were mild.

## DISCUSSION

This study highlights important issues in classification of TIA and minor stroke. In approximately 25% of cases we found discrepancies that resulted in the misclassification of TIA between the assessment by the non-neurologist referring physician and that of a neurologist.

Both TIA and minor stroke are clinically defined and thus proper diagnosis and classification is based on both the quality of the assessment and the knowledge of the diagnostic criteria. Discrepancies between neurologists and non-neurologists noted in this study are possibly related to both, although the diagnostic criteria for TIA are broadly known and unlikely to be misinterpreted. We explain the results by a higher sensitivity of stroke neurologists to identify mild residual deficits. This finding is not surprising as neurologists are expected to have more experience in the neurological examination and should be better at identifying subtle deficits.

These results have two important implications. Firstly, the presence of residual deficits is considered a potential marker for a higher risk of recurrent stroke<sup>6,7</sup>. Data out of Calgary supports the predictive value of the neurological examination by a neurologist<sup>6,7</sup>. Expert consulting physicians should be careful using this criterion without direct patient encounter. Secondly the presence of residual neurological deficits requires more urgent computed tomogram (CT) scanning to exclude hemorrhage prior to initiating antithrombotic treatment as reflected in best practice guidelines for Alberta<sup>11</sup>. Thirdly, many research studies<sup>13,14</sup> define TIA based on the judgment of symptom resolution made by non-neurologists whose opinions are recorded on hospital charts. We presume that Alberta non-neurologist physicians are similar to most other jurisdictions and that the results reported in most of these studies of TIA included minor strokes as well.

There are a number of limitations to our work. Firstly this is a small sample and these findings need to be replicated in larger patient populations. Additionally although we limited this study to patients examined on the same day as referral we do not have the exact time of the assessments to determine whether increasing time interval between the two assessments influences

the degree of discrepancy. It is also possible that despite same day assessment some of the discrepancies observed are explained by recurrence of symptoms or stroke progression that was not documented in the medical record. However, the occurrence of undocumented worsening is probably low. For the vast majority of transient ischemic syndromes the deficits are maximal at onset and therefore easiest to detect on initial exam; they then improve as time passes.

Physicians referring patients with TIA syndromes do not detect mild residual deficits in up to 25% of patients in our population. Experts should be cautious using referral assessment of the deficits as a triage rule. It is also likely that most studies of TIA include a proportion of minor stroke patients and this should be remembered when extrapolating the results of emergency room based TIA studies.

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