

TIA in the Emergency Department: Phased implementation of an electronic decision support tool for ED physicians in British Columbia to prevent recurrent stroke and reduce burden

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BACKGROUND

Stroke is a leading cause of disability in Canada with annual costs of \$3.6 billion. Transient ischemic attack (TIA) is a prodromal stroke and early intervention can prevent recurrence of debilitating secondary strokes. Early imaging assists clinicians in identifying high-risk patients and informs treatment decisions. In rural and remote areas, timely transport decisions depend on early and accurate stroke assessments.

Current Canadian Stroke Best Practice guidelines* suggest that patients who present to the ED within 48 hours of a suspected TIA receive urgent brain imaging and non-invasive vascular imaging (CTA or MRA) as soon as possible within 24 hours.

*Wein T, Lindsay MP, Côté R, Foley N, Berlingieri J, Bhogal S, et al. Canadian stroke best practice recommendations: secondary prevention of stroke, sixth edition practice guidelines, update 2017. *International Journal of Stroke*. 2018;13(4):420–443. doi:10.1177/1747493017743062.

THE TIA CLINICAL DECISION SUPPORT TOOL

- A logic enabled, fillable PDF
- Provides Clinical Decision Support for diagnosis and management
- Mapped to Canadian Stroke Best Practices (2017)
- If CTA is recommended, a requisition is pre-populated

TOOL EVALUATION AND VALIDATION

Previous tool validation) demonstrated its value in reducing unnecessary imaging and redirecting those resources to high-risk, ED stroke patients.* To evaluate the benefit of the tool to end-user providers we engaged in focus groups at Vancouver Island (Victoria, BC) and Interior (Kelowna, BC) Health Authorities. A trial of the PDF-fillable tool (Figure 2) was performed at the Kelowna General Hospital.

*Bibok MB, Votova K, Balshaw RF, Penn M, Lesperance ML, Harris DR, et al. Retrospective evaluation of a clinical decision support tool for effective computed tomography angiography utilization in urgent brain imaging of suspected TIA/minor stroke in the emergency department. *Canadian Journal of Emergency Medicine*. 2018;1–9. doi:10.1017/cem.2018.449.

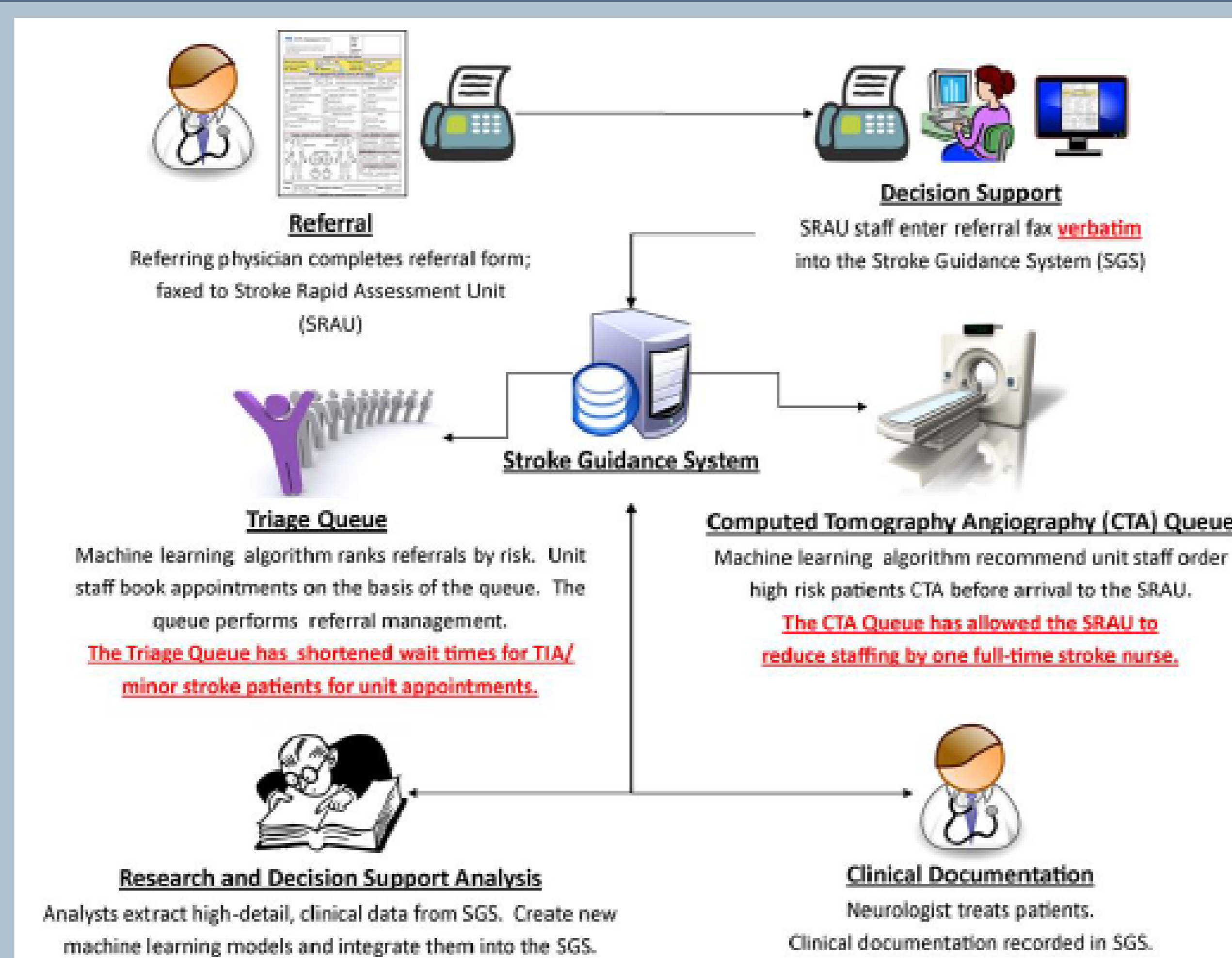
- Focused End User Group Testing with ED physicians.
- By medical students at triage in Victoria General Hospital.
- Implementation at Victoria General & Nanaimo Regional General Hospital.

Figure 1. Fillable PDF version of the TIA Clinical Decision Support Tool.

This tool captures the data elements (N=50) required by the algorithm and automatically generates TIA decisions and corresponding Canadian Heart and Stroke Foundation stroke best practice guidelines.

The form also serves as a referral form to the Stroke Rapid Assessment Unit, Vancouver Island, BC, Canada.

NEXT STEPS



Island Health is innovating foundational work to develop the API for mobile use and linkage with electronic health records, in addition to stakeholder engagement with the BC Emergency Medicine Network and Stroke Services BC. This will create a process to track TIA prevalence, outcomes and usage of the tool in real-time.

RESULTS

Feedback from physicians indicated that the tool was easy to use and they liked its use as a standardized form. A strong expression of interest to use the tool to inform transport decisions.

The Kelowna trial involved 50 ED patients suspected of TIA; physicians diagnosed 58% with TIA, only 31% of which received a CTA. Our tool accurately detected 97% of TIA patients, and would have recommended CTA in 83% of the cases.

The results show that CTA utilization in the Kelowna ED trial site did not align with guideline-based care as outlined in the Canadian Stroke Best Practice Guidelines. When CTA was ordered during the ED visit, the accuracy of CTA decisions (CTA TIA patients and withhold CTA from stroke-mimic patients) was 56%. The TIA Clinical Decision Support Tool would have successfully imaged an additional 15 true TIA patients in the ED, for the cost of performing an additional 5 CTAs on stroke-mimic patients.

Discriminant performance of ED physicians and our clinical decision support tool to appropriately allocate CTA to presenting TIA patients in the ED (N = 50)

Measure	ED Physicians	Clinical Decision Support Tool
Total # of CTAs Ordered	11	31
Sensitivity (True Positive Rate) (Total 29 TIA patients)	31.0% (rate: 9/29)	82.8% (rate: 24/29)
Specificity (True Negative Rate) (Total 21 stroke-mimic patients)	90.5% (rate: 19/21)	66.7% (rate: 14/21)
Accuracy	56%	76.0%
Area Under the ROC Curve	—	81.1%

VALUE TO HEALTHCARE

The TIA Clinical Decision Support Tool increases efficient use of emergent CTA for suspected TIA by increasing the therapeutic value of each CTA conducted. About 50% of recurrent strokes resulting from high-risk conditions occur within 24 hours of the initial event. CTA of high-risk TIA improves outcomes because patients receive time-sensitive treatment before being discharged from the ED. Timely intervention prevents recurrent stroke and disability. There is significant value in engaging the BC Emergency Medicine Network and Stroke Services BC to roll-out the TIA tool in PDF Fillable Form and in the soon to be developed API (for mobile) so that regardless of rural, remote or urban the same care recommendations are delivered.

