

## Eastern Health, Box Hill Hospital and Maroondah Hospital. Melbourne, Australia

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Eastern Health in Melbourne, Victoria Australia services a land area of approximately 2,816 km<sup>2</sup> (1749.78 miles) which is the largest geographical area of any metropolitan health service in Victoria.<sup>1</sup> There is 1 certified primary stroke center (PSC) within Eastern Health's catchment which is located at Box Hill Hospital. Box Hill provides transfer access to 3 comprehensive stroke center hospitals within an 18 km<sup>2</sup> (11.18 miles) radius. Box Hill Hospital was the 8<sup>th</sup> hospital in Australia to receive stroke unit certification, as a part of phase one of the Australian Stroke Coalition stroke unit certification project.<sup>2</sup> Eastern Health's second stroke unit is currently under construction and will be based at Maroondah Hospital which is more central to our catchment. Ongoing work to establish Maroondah as a certified PSC is underway.

Box Hill Hospital has approximately 750 stroke patient presentations per annum, and in 2023, 99 patients received intravenous thrombolysis and 40 were transferred out for thrombectomy. Thrombolysis rates were 37% for patients presenting within 4.5 hours of symptom onset, with a median door-to-needle (DNT) time of 41 minutes, and with 86% of cases being treated under 60 minutes of arrival; the fastest DNT for this same period was 16 minutes from arrival. Our performance was substantially better than the 2023 Australian National Benchmark for thrombolysis under 60 minutes, which was 66% for the country, and 30% within the state of Victoria.<sup>4</sup> Box Hill Hospital also achieved a median door-in-door-out time (DIDO) of 47 minutes with our fastest recorded time at 17 minutes; although a national benchmark for DIDO in Australia is lacking, the recent Australian National Stroke recommendations have set a DIDO target under 60 minutes for metropolitan hospitals.<sup>5</sup> Nationally, this ranks Box Hill as fast DIDO providers, and as Australia works toward improving reperfusion efficiency, Box Hill Hospital serves as an exemplary PSC. Our Box Hill stroke team was awarded platinum and gold status during every quarter of 2023 by the World Stroke Organisation (WSO) Angels and is often consulted on methods to improve DIDO times and other systems efficiencies.<sup>6</sup>



Photo 1: Eastern Health catchment area.



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Photo 2: Box Hill Hospital stroke team received WSO Angel Platinum and Gold Status awards for every quarter in 2023.

Box Hill's hyperacute stroke team consists of 5 fellowship trained stroke neurologists, 3 neurology advanced trainees, 1 fellow, 1 general medicine advanced trainee, 4 medical residents and 3 advanced practice acute stroke nurses. At least one member of the stroke team is onsite from 0800-2200 each day and the advanced trainee and neurologist are on-call from home for code strokes from 2200-0800.

Two decades of the Box Hill stroke team's thrombolysis experience was published by our former stroke fellow, Peter S.W. Park, MD in 2021, using data from the departmental database that has been maintained by successive acute stroke nurses.<sup>7</sup> The publication details key factors that resulted in significant improvement in DTN times over the years, the most clinically significant being a direct to CT protocol, organizational coordination, and maintaining presence of an acute stroke nurse to ensure efficiency and support patients receiving thrombolysis.<sup>7</sup>

As a stroke service, our team at Box Hill is dedicated to improving outcomes for each and every patient in our care, therefore we

have an ongoing quality improvement process that enables us to make change as soon as we see the need emerge. We have completed a body camera study<sup>8</sup> and DIDO study<sup>9</sup> to dissect different aspects of hyperacute stroke care that cause delays, finding that organizational patient flow and correct staffing levels have significantly improved our DTN and DIDO times over the years.



Photo 3: Acute Stroke Unit interprofessional team members. Eastern Health Box Hill and Maroondah, Melbourne, Victoria, Australia.

Fundamentally, it is the interprofessional relationships made between teams that allows for coordinated improvement across hospital departments that supports excellent hyperacute stroke care. This begins in the prehospital sector with ambulance services providing prenotification of an inbound acute stroke patient and early intravenous access, to unit secretaries coordinating registration, labels and identification bands, to emergency department staff for code stroke notification, triage, and compliance with the direct to CT protocol, to CT staff rapid scanning, and rapid response by members of the stroke team to assess, diagnose and treat. Recognition of our fellow colleagues regarding the role they play along the acute stroke continuum of



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care, and a commitment to ongoing collaboration, allows our team to make real time changes. We believe that empowering individual members of our team that are responsible for critical steps along the patient journey enables team member ownership and personal commitment to ensure the best possible outcome for patients.

The next challenge for our stroke team is determining if we can achieve similar results outside of our main Box Hill PSC, at Maroondah, a small satellite hospital where staff are not used to coordinating hyperacute stroke care. Lessons learned from years of

refining care at Box Hill, are now being implemented in this new setting by an advanced practice stroke clinical nurse consultant charged with coordinating organizational contributors that support excellent acute stroke care. Although it is still too early in the process to fully understand all cross-service factors that will need to be addressed to optimize hyperacute stroke care, our team looks forward to sharing the new lessons learned, approaches taken, and successes achieved so that we may share these with others on a stroke service improvement journey.

### Author Affiliations

Tanya Frost holds a master's of advanced practice degree and is a stroke nurse consultant at Eastern Health, Melbourne;<sup>1</sup> she serves on the Board of Directors of the Neurovascular Clinicians Certification Corporation, Co-Chairs Australia's Acute Stroke Nurses Education Network (ASNEN) and is a member of the Stroke Unit Certification Committee's National Stroke Targets Taskforce.

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