Evaluation

For the **Provincial Stroke Rounds Planning Committee**:

- To plan future programs
- For quality assurance and improvement

For **You**: Reflecting on what you've learned and how you plan to apply it can help you enact change as you return to your professional duties

For **Speakers**: The responses help understand participant learning needs, teaching outcomes and opportunities for improvement.

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Please take 2 minutes to fill out the evaluation form,
either online or in the room.
Thank you!

Mitigating Potential Bias
(Provincial Stroke Rounds Committee)

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

An Innovative Model of Care for High Performing Hyperacute Stroke Teams

Provincial Stroke Rounds

March 2, 2022

Beth Linkewich, MPA, OT Reg. (Ont)
Director, Regional Stroke Centre, Neurovascular Unit, Centre for Neurovascular Intervention, and North & East GTA Stroke Network
Adjunct Lecturer, Occupational Science and Occupational Therapy, University of Toronto
Practice Based Researcher, Sunnybrook Research Institute

Catherine Convery, MHA, BHSc, CPHQ
Performance Improvement Specialist, Quality & Patient Safety
Practice Based Researcher, Sunnybrook Research Institute

Dr. Houman Khosravani, MD, PhD, FRCPC
Medical Director, Inpatient Stroke Unit, Vascular Neurology, Sunnybrook Health Sciences, Neurointensivist and Internist
Assistant Professor, Division of Neurology, University of Toronto

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when it matters MOST

Disclosure of Affiliations, Financial Support, & Mitigating Bias

Speaker Name: Beth Linkewich

- **Affiliations:**
  - *I have no relationships with for-profit organizations*
  - *Employee of Sunnybrook Health Sciences Centre*
- **Financial Support:**
  - *This session/program has not received financial or in-kind support.*

Speaker Name: Catherine Convery

- **Affiliations:**
  - *I have no relationships with for-profit organizations*
  - *Employee of Sunnybrook Health Sciences Centre*
- **Financial Support:**
  - *This session/program has not received financial or in-kind support.*

Speaker Name: Houman Khosravani

- **Affiliations:**
  - I have no relationships with for-profit organizations
  - Division of Neurology, Department of Medicine, University of Toronto
- **Financial Support:**
  - This session/program has not received financial or in-kind support.

Objectives

- Upon completion, participants will be able to:
  - Appreciate the importance of high-performing teams in providing rapid, coordinated care in hyperacute stroke assessment and management
  - Describe the development of an innovative model of hyperacute stroke care, specifically the role of specialized Code Stroke Nursing.
  - Identify the impact of this new role and model of care on process and outcomes

Stroke QI Team

- **Catherine Convery, Performance Improvement Specialist**
- **Dr. Houman Khosravani, Medical Director, Inpatient Stroke Unit**
- **Sandy Lyeo, Acute Stroke Coordinator**
- **Lowyl Notario, Clinical Educator, Emergency Department**
- **Beth Linkewich, Director, Regional Stroke Centre and North & East GTA Stroke Network**
- Will Thomas-Boaz, Advanced Practice Nurse, Emergency Department
- Nelisha Bhaloo, Advanced Practice Nurse, B4NVU
- Mike Minoo, Manager Charge Technologist, CT/Interventional Radiology
- Dr. Rick Swartz, Medical Director, Neurovascular Unit and North & East GTA Stroke Network

And many others!

Hyperacute Stroke at Sunnybrook

Regional Stroke Centre Volumes

In 2020/21:

- ~1000 Code Stroke activations
- 88 tPA cases
- 208 EVT cases
- 928 patients admitted with stroke

Infrastructure for Quality Improvement

- Governance
  - Monthly Hyperacute QI Committee
    - Report up to Stroke Program Advisory
- Cohesion
  - Flat hierarchy, open discussion, and debriefing on cases
- Training and Simulation
  - Monthly orientation to rotating trainees
    - Support by allied health teams
  - Code Stroke RNs are all trained with interprofessional team
  - Code simulations with ED partners
    - Feedback and debriefing

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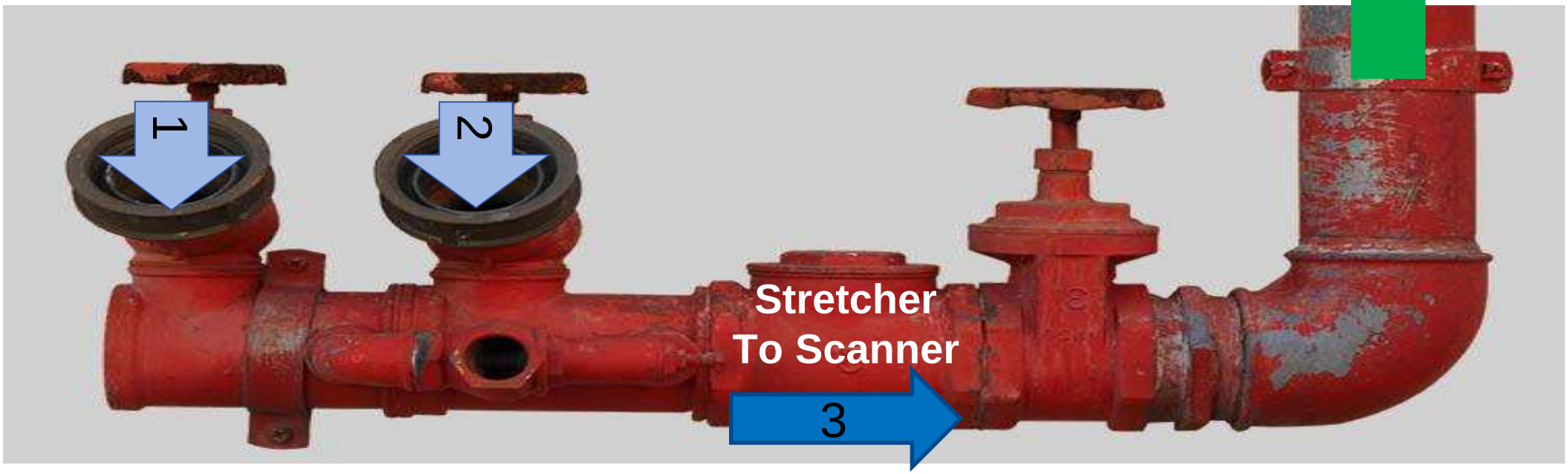
Sunnybrook Simplified Code Stroke Process

Registration and Order Entry

RN and MD Assessments

CT
- Availability of scanner, Techs
- Scanning
- Advanced imaging

MD Decision Making for tPA and EVT



Team cohesion

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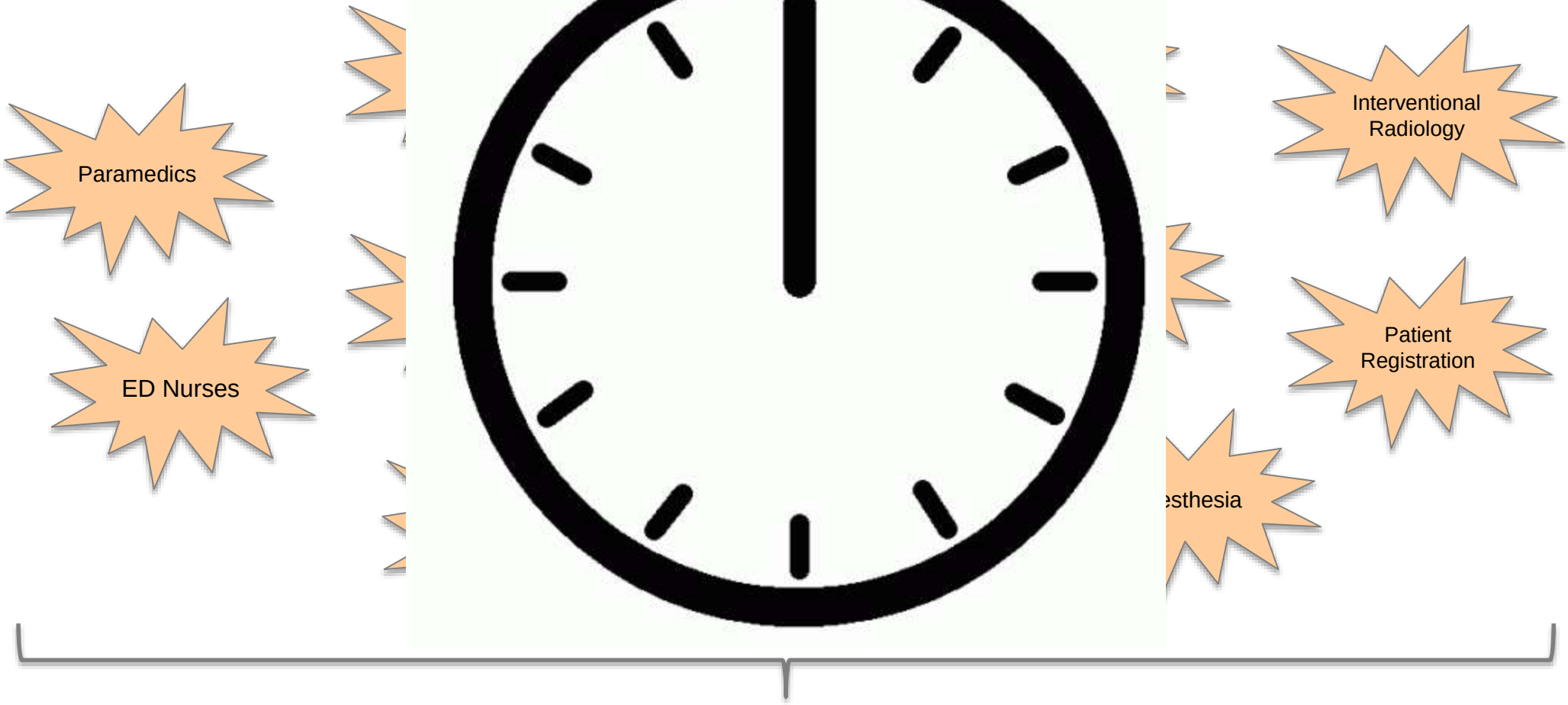
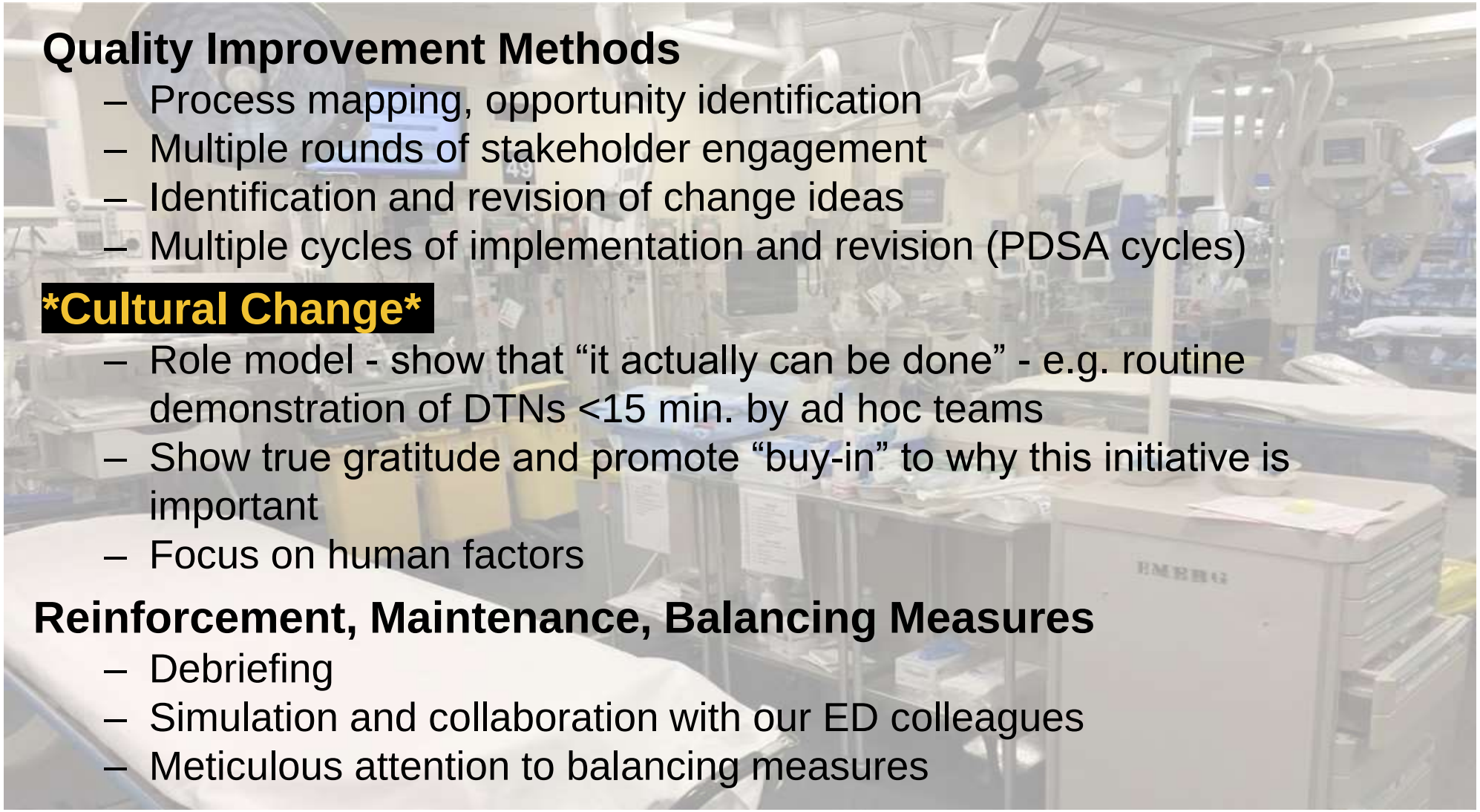
Ad Hoc Teams

Hyperacute assessment and
united by a common purpos
rom many disciplines to be



What It Takes



Quality Improvement Methods

- Process mapping, opportunity identification
- Multiple rounds of stakeholder engagement
- Identification and revision of change ideas
- Multiple cycles of implementation and revision (PDSA cycles)

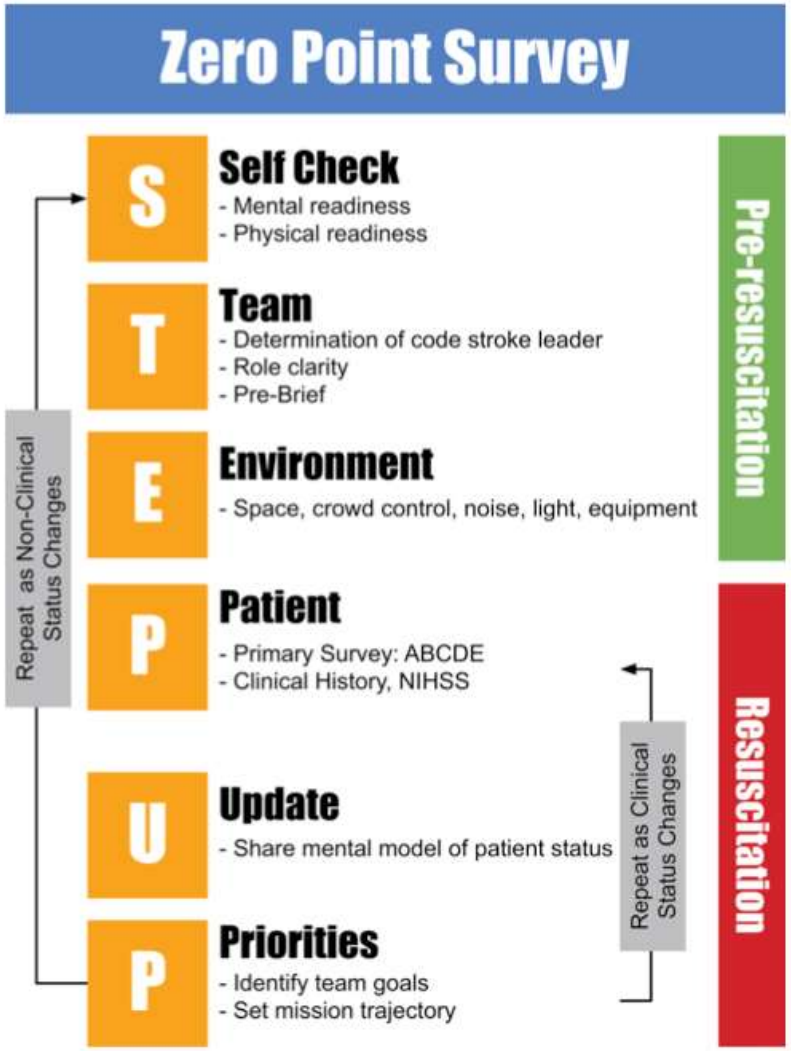
Cultural Change

- Role model - show that “it actually can be done” - e.g. routine demonstration of DTNs <15 min. by ad hoc teams
- Show true gratitude and promote “buy-in” to why this initiative is important
- Focus on human factors

Reinforcement, Maintenance, Balancing Measures

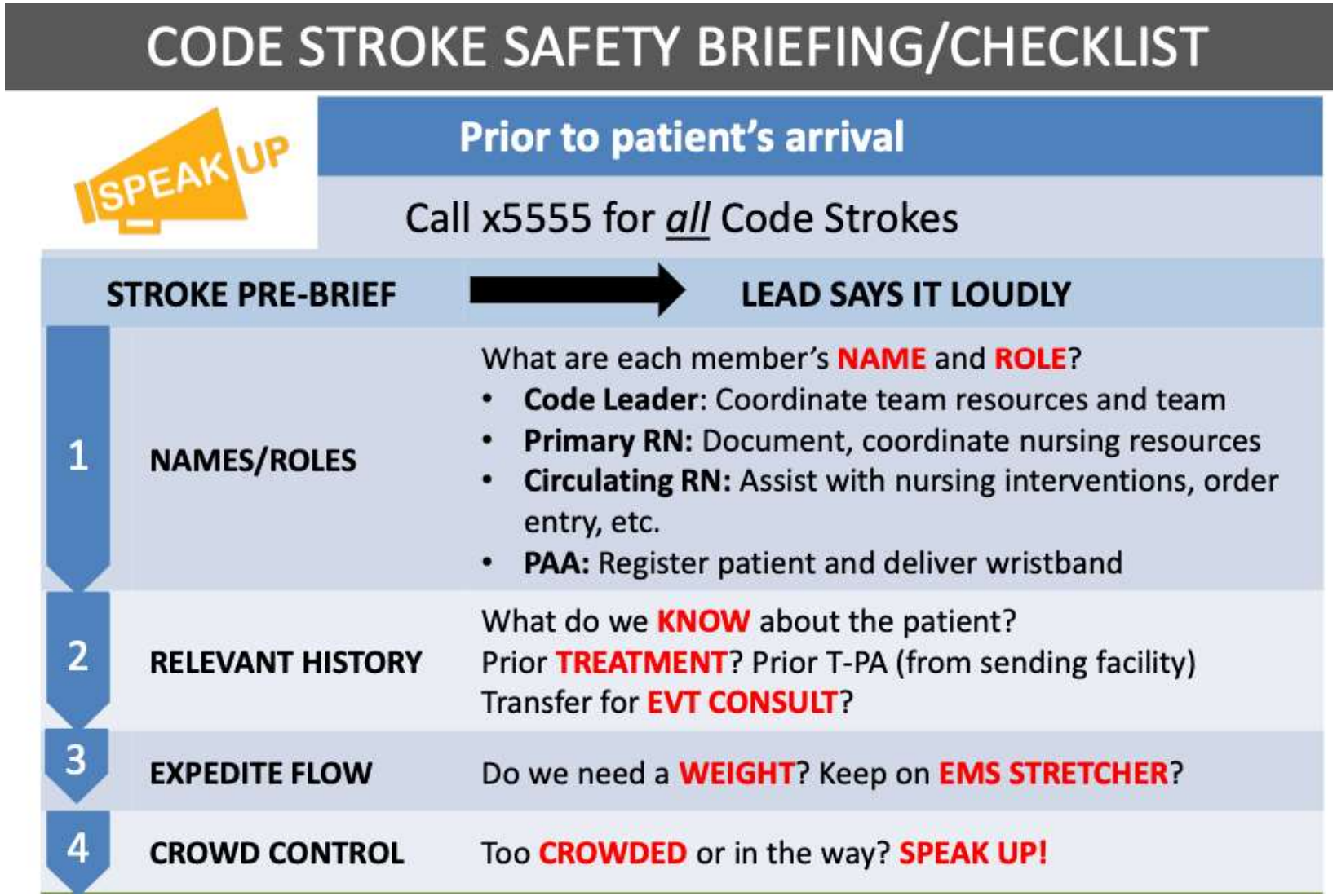
- Debriefing
- Simulation and collaboration with our ED colleagues
- Meticulous attention to balancing measures

Ad Hoc Teams and Crisis Resource Management



Lessons learned in hyperacute stroke care are now being developed into a curriculum for broader application “WIT” working in teams.

Change Idea: Team Pre-Brief



CODE STROKE SAFETY BRIEFING/CHECKLIST

SPEAK UP

Prior to patient's arrival

Call x5555 for *all* Code Strokes

STROKE PRE-BRIEF		→ LEAD SAYS IT LOUDLY
1	NAMES/ROLES	What are each member's **NAME** and **ROLE**? • **Code Leader**: Coordinate team resources and team • **Primary RN:** Document, coordinate nursing resources • **Circulating RN:** Assist with nursing interventions, order entry, etc. • **PAA:** Register patient and deliver wristband
2	RELEVANT HISTORY	What do we **KNOW** about the patient? Prior **TREATMENT**? Prior T-PA (from sending facility) Transfer for **EVT CONSULT**?
3	EXPEDITE FLOW	Do we need a **WEIGHT**? Keep on **EMS STRETCHER**?
4	CROWD CONTROL	Too **CROWDED** or in the way? **SPEAK UP!**

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Change Idea: Pre-CT Checklist

Prior to departure from assessment room		
1	**STROKE TIME OUT** →	**LEAD SAYS IT LOUDLY**
2	**AIRWAY**	Are we satisfied with the **AIRWAY**?
3	**IV ACCESS**	Do we have **IV ACCESS**?
4	**LABS**	Has **BLOODWORK** been **ORDERED** and **SENT**?
5	**CT**	Has **CT** been ordered with **CLINICAL HISTORY** Is **CT READY**? Which CT?
6	**IDENTIFICATION**	Are **ID STICKERS, ARMBAND** and **BELONGINGS** with patient?
7	**BELONGINGS**	**JEWELLERY, DENTURES** **removed & labelled**
	MEDICATIONS & EQUIPMENT	Do we need to bring **MEDICATIONS** (antiemetic, antihypertensive, thrombolytic) and **EQUIPMENT** (syringes, suction, IV pump)

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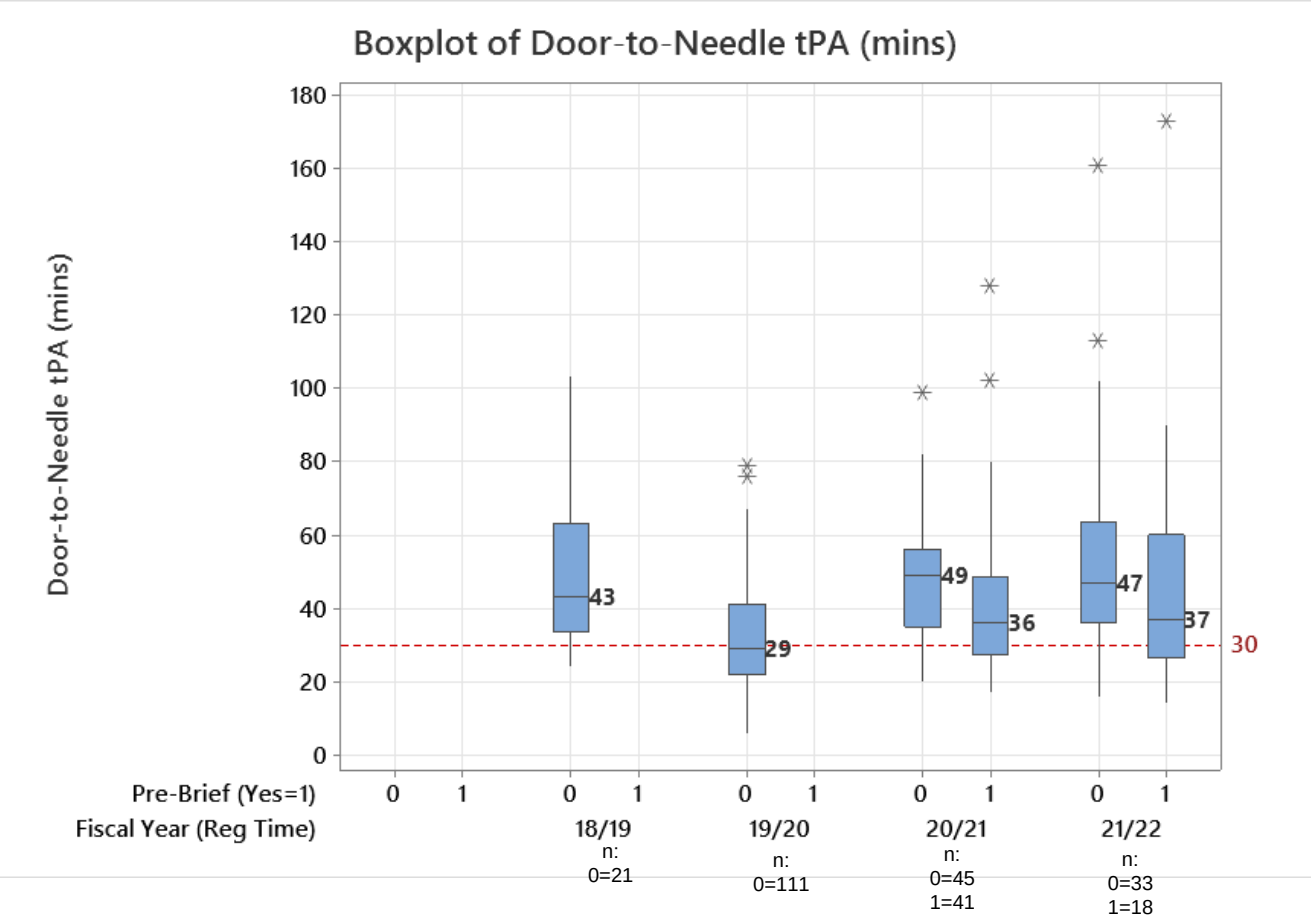
Impact of Pre-Brief on DTN Time



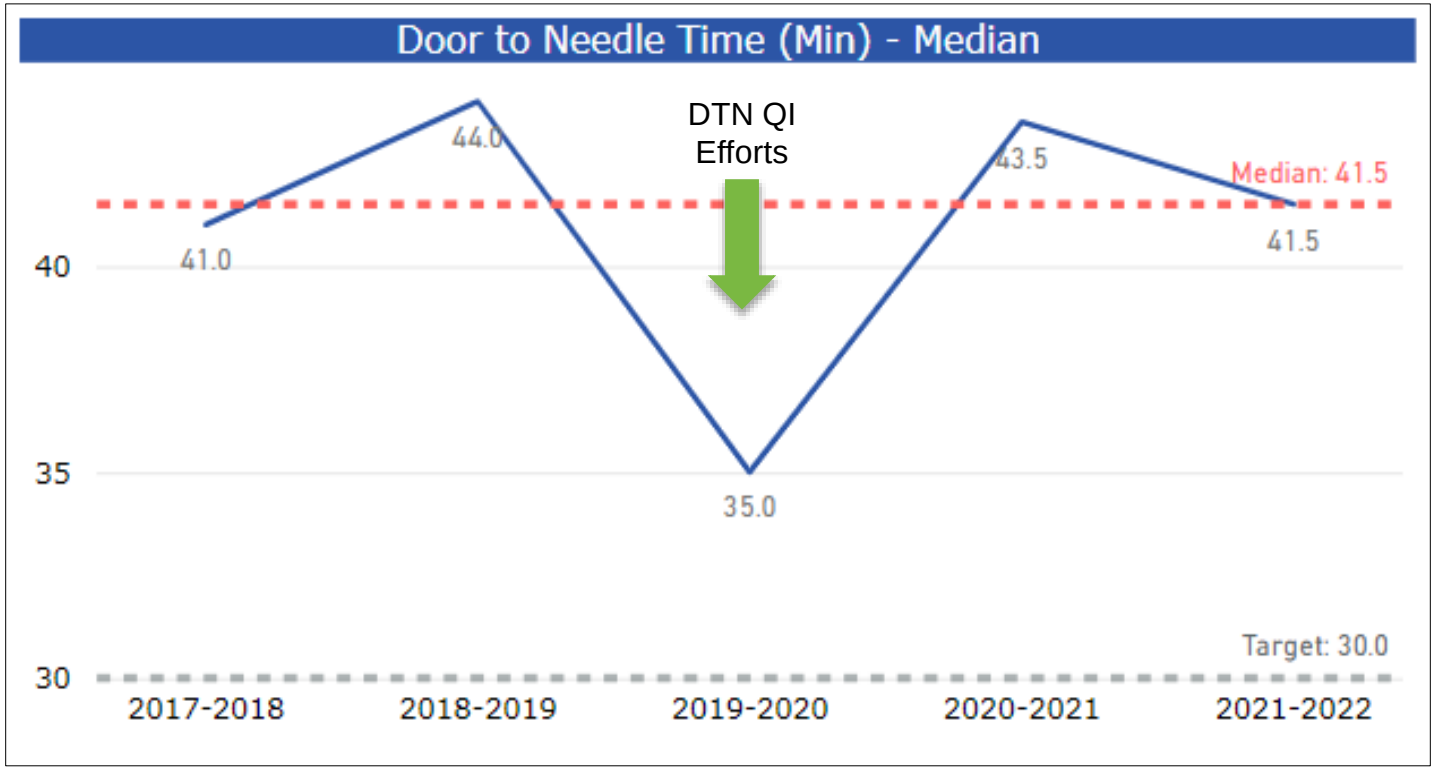
Data source: manual data collection. Analysis by C. Convery.

Legend:
1 = pre-brief completed
0 = pre-brief not completed or unknown

- Pre-brief implemented in 19/20, but utilization data not included in extract
  - Know from previous data that utilization was approximately 50% in first months of implementation
- **Lower median DTN observed when pre-brief occurred**
  - 13 minutes faster in 20/21 (p=0.017)
  - 10 minutes faster in 21/22 (p=0.098)
- Difference is not statistically significant in 21/22, but may be *clinically* significant
- Pre-brief continuing to have impact in 20/21 and 21/22

DTN QI Results

- Reduction in median Door to Needle (DTN) time for tPA during period of focused QI intervention (FY 2019-20)
- Challenges with sustaining these results during the COVID-19 pandemic



Data source: CIHI DAD

Acute Stroke Coordinator (ASC) Role

- Foundational to our Code Stroke process and our DTN QI efforts
- Role created in 2017 based on analysis of roles and responsibilities
- Acts as a ‘Quarterback’ within the Code Stroke Team to enhance efficiency of care processes through coordination and communication with teams
- Supports reporting requirements through data collection, data dissemination, and monitoring of data quality
- Enhances quality of care through leadership and engagement of teams in quality improvement
- Regulated health professional

Identifying Other Opportunities

- Door to Needle quality improvement work provided a strong foundation of collaborative teamwork
- EVT as a standard of care and expansion in Ontario necessitated further refinement of our Model of Care for Hyperacute Stroke
- Identified need to understand the roles involved, and whether they matched our stroke volumes and the needs for quality stroke care

Identified Gaps in EVT Process

- Gaps in the EVT process were identified through current state analysis: process mapping, stakeholder engagement, observations, data analysis, simulation
- Identified resource gaps, and the need to better define the model of care for EVT

Current State Gaps in Code Stroke Process						
Timely access to treatment (Angio suite set-up)	Timely access to treatment (Prep of patient)	Timely access to medical management and patient monitoring	Ability to manage two simultaneous Angio cases	Post-procedure management when access to bed is delayed	Continuity of care peri-procedurally	Impact on other services (e.g. OR)

Model of Care During EVT Procedure: Peers

- Environmental scan of 7 peer hospitals across Canada that provide EVT
- Looked at different models of care at other organizations, and what might work at Sunnybrook to support identified gaps

Roles		A	B	C	D	E	F	G	Sunnybrook
Patient **Monitoring**	Code Stroke Nurse	✓	✓	✓	✓	*In progress*	✓		
	Anaesthesia Assistant (AA)		✓		✓			✓	✓
Medical **Decision-Making**	Anesthesia Physician	Attend unstable cases	✓	Attend unstable cases	Attend unstable cases	✓	✓	✓	✓
	Neurology Physician	✓		✓	✓	✓	✓		
Angio Team (After Hours)	Angio Nurse (On-call)	✓	✓	✓	✓	✓	✓	✓	✓
	Angio Tech (On-call)	✓	✓	✓	✓	✓	✓	✓	✓

Solutions Considered

- Different solutions were identified and evaluated based on the potential for resolving the identified gaps at Sunnybrook
- Creating a Code Stroke Nurse role, available on-site 24/7, resolved the greatest number of gaps

	Current State Gaps						
	Timely access to treatment (Angio suite set-up)	Timely access to treatment (Prep of patient)	Timely access to medical management and patient monitoring	Ability to manage two simultaneous Angio cases	Post-procedure management when access to bed is delayed	Continuity of care peri-procedurally	Impact on other services (e.g. OR)
1) Add additional Rapid Response Nurse		*Only if available*	*Only if available*		*Only if available*		
2) Add Angio Tech on-site	✓						
3) Increase Anesthesia coverage model		✓	✓		✓		✓
4) Change AA to on-Site		✓	✓				
5) Add Code Stroke RN On-Site 24/7		✓	✓		✓	✓	✓

Code Stroke Nurse (CSRN) Role

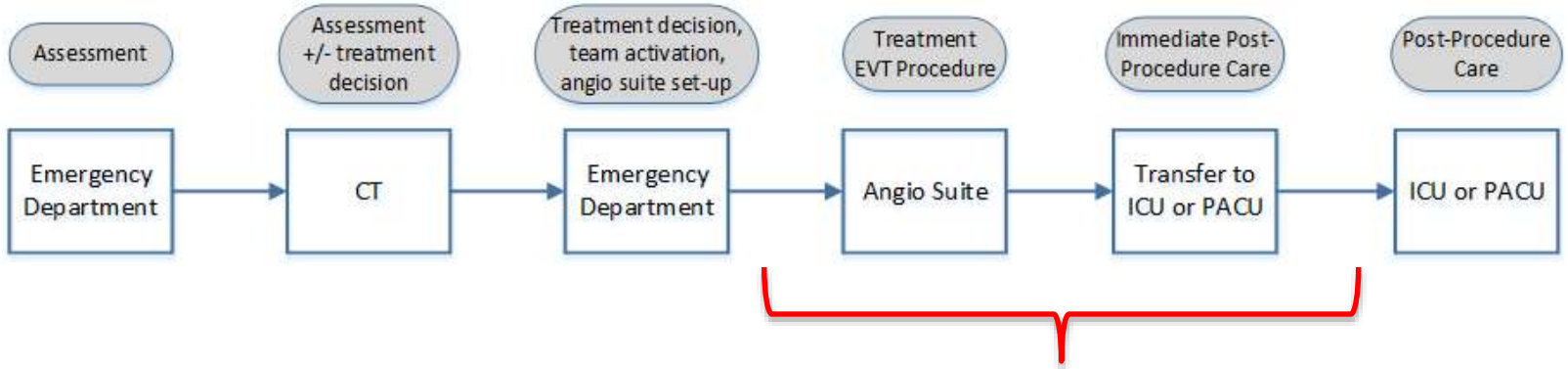
- Development of the Code Stroke Nurse (CSRN) role included:
  - Internal and external environmental scans for similar roles
  - Engagement with teams involved in stroke care at Sunnybrook
  - Evaluation of scope of existing roles
  - Determination of how gaps in best practices could be resolved with the CSRN role
- Critical care training, with primary responsibility for patient monitoring
- Onboarding for the role includes orientation with Stroke Team, Acute Stroke Coordinators, Neurovascular Unit, Anesthesia, and Angio Team, with the goal of having exposure to a significant number of EVT cases to support clinical competency
- Integrated with the Neurovascular Unit to facilitate continuity of care

Code Stroke Nurse: Considerations for Implementation

	Key Considerations / Risks	Strategies
Medical Decision-Making (MD)	• Need to define role responsible for medical decision-making during EVT procedure and during transfer to ICU/PACU	• Code Stroke Model of Care • Team huddle pre-EVT
Availability	• Availability may be impacted due to other stroke cases. Identify strategies for prioritization.	• Code Stroke Model of Care – Clinical Prioritization Algorithm • Stroke Thrombectomy Pages
Scope of Role	• Refine scope of responsibilities for all roles involved in hyperacute stroke • Determine if/what Medical Directives, order sets are required • Determine what additional training is required	• Code Stroke Model of Care – Roles and Responsibilities • EVT Order Sets
Implementation	• Determine structure for reporting, training, and ongoing education • Unit alignment – Neurovascular Unit (NVU)	• CSRN Job Description, Model of Care – Clinical Prioritization Algorithm, Roles and Responsibilities • Integration with Neurovascular Unit • Bed placement algorithm for post-EVT patients

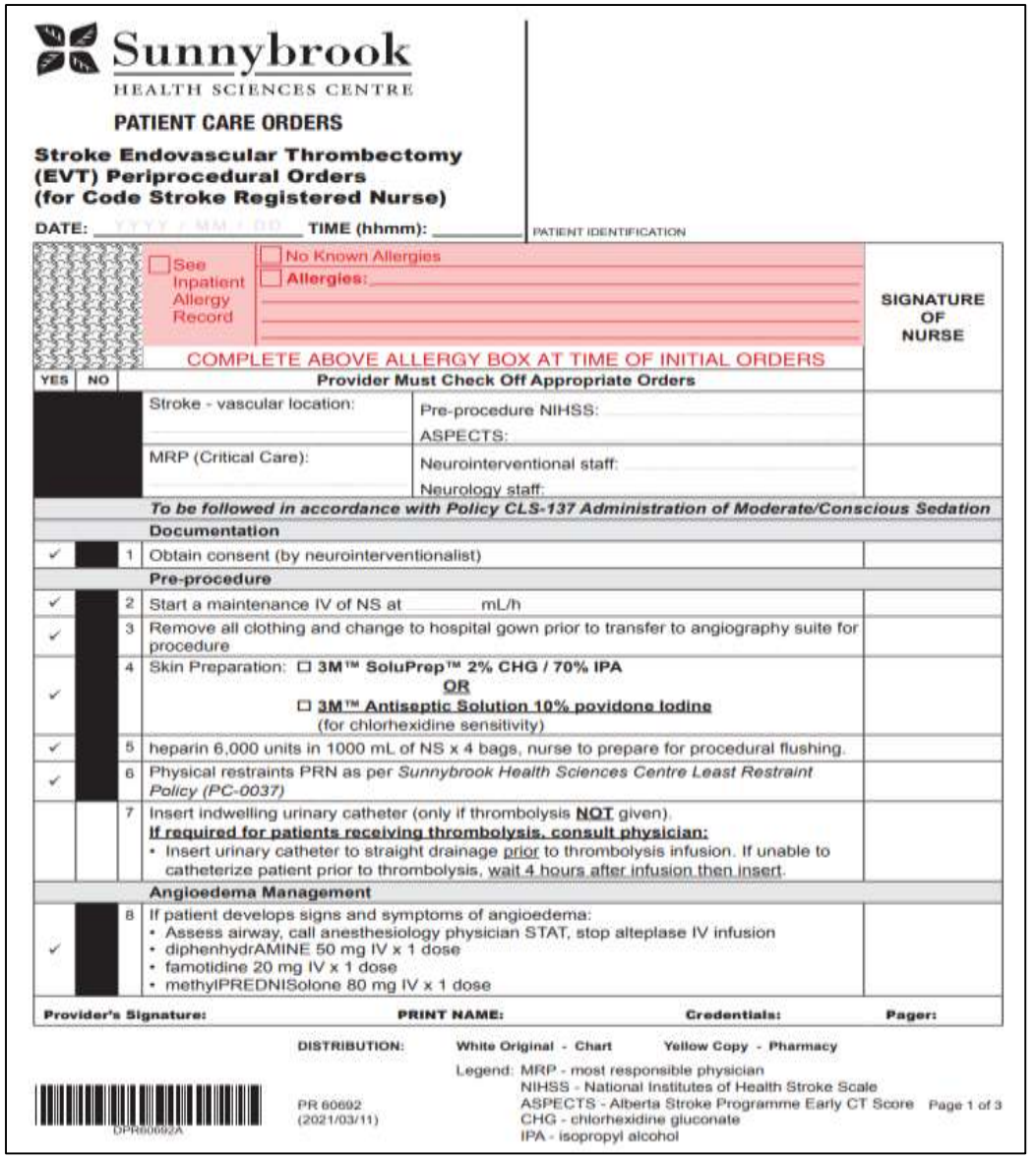
Implementation of New Model of Care

- Code stroke model of care defines roles and responsibilities for medical decision making and patient monitoring throughout the code stroke and EVT process
- For EVT, this model is supported by a team huddle and the EVT Order Set
- Clinical team huddle includes team introductions and information sharing
  - Determine: stability of the patient, need for Anesthesia involvement, and approach to sedation



Tools to support model of care for EVT:
- Team Huddle
- EVT Order Set

EVT Order Set



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PATIENT CARE ORDERS

Stroke Endovascular Thrombectomy (EVT) Periprocedural Orders (for Code Stroke Registered Nurse)

DATE: YYYY / MM / DD TIME (hhmm): _____ PATIENT IDENTIFICATION

☐ See Inpatient Allergy Record ☐ No Known Allergies ☐ Allergies: _____ SIGNATURE OF NURSE

COMPLETE ABOVE ALLERGY BOX AT TIME OF INITIAL ORDERS

YES	NO		Provider Must Check Off Appropriate Orders	
			Stroke - vascular location: _____ Pre-procedure NIHSS: _____ ASPECTS: _____	
			MRP (Critical Care): _____ Neurointerventional staff: _____ Neurology staff: _____	
			To be followed in accordance with Policy CLS-137 Administration of Moderate/Conscious Sedation	
			Documentation	
✓		1	Obtain consent (by neurointerventionalist)	
			Pre-procedure	
✓		2	Start a maintenance IV of NS at _____ mL/h	
✓		3	Remove all clothing and change to hospital gown prior to transfer to angiography suite for procedure	
✓		4	Skin Preparation: ☐ **3M™ SoluPrep™ 2% CHG / 70% IPA** **OR** ☐ **3M™ Antiseptic Solution 10% povidone Iodine** (for chlorhexidine sensitivity)	
✓		5	heparin 6,000 units in 1000 mL of NS x 4 bags, nurse to prepare for procedural flushing.	
✓		6	Physical restraints PRN as per *Sunnybrook Health Sciences Centre Least Restraint Policy (PC-0037)*	
		7	Insert indwelling urinary catheter (only if thrombolysis **NOT** given). **If required for patients receiving thrombolysis, consult physician:** • Insert urinary catheter to straight drainage prior to thrombolysis infusion. If unable to catheterize patient prior to thrombolysis, wait 4 hours after infusion then insert.	
			Angioedema Management	
✓		8	If patient develops signs and symptoms of angioedema: • Assess airway, call anesthesiology physician STAT, stop alteplase IV infusion • diphenhydrAMINE 50 mg IV x 1 dose • famotidine 20 mg IV x 1 dose • methylPREDNISolone 80 mg IV x 1 dose	

Provider's Signature: **PRINT NAME:** **Credentials:** **Pager:**

DISTRIBUTION: **White Original - Chart** **Yellow Copy - Pharmacy**

Legend: MRP - most responsible physician
NIHSS - National Institutes of Health Stroke Scale
ASPECTS - Alberta Stroke Programme Early CT Score
CHG - chlorhexidine gluconate
IPA - isopropyl alcohol

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Simulation Scenario Template

Section I: Scenario Demographics

Scenario Title:	Anaphylaxis in Code Stroke
Date of Development:	10/08/2021
Target Learning Group:	☐RNs ☐ Staff and resident MDs ☐PAs

Section II: Scenario Developers

Scenario Developer(s):	Nicole Kester-Greene, Miranda Lamb, Houman Khosravani
Affiliations/Institution(s):	Sunnybrook Health Sciences Centre

Section III: Curriculum Integration

Learning Goals & Objectives	
Educational Goal:	To improve interprofessional team communication and operation during critical events involving joint care with the Stroke team in the ED
CRM Objectives:	To demonstrate maintenance, re-evaluation, and sharing of shared mental model during management of a Code Stroke To demonstrate maintenance of situational awareness during management of a Code Stroke
Medical Objectives:	To demonstrate management of a difficult airway during a Code Stroke To demonstrate management of anaphylaxis during a Code stroke

Case Summary: Brief Summary of Case Progression and Major Events

67F presents with right sided hemiplegia and aphasia after she was found on the floor of her bedroom approximately 30 minutes ago. Last seen normal 2 hours prior. In CT scan becomes tachypneic, and relatively hypotensive (for a stroke patient). In ED lip/facial swelling noted. SpO2 91% RA PMH: HTN, DM, Dyslipidemia Meds: Bisoprolol, Metformin, Crestor NKDA

-Pt arrives, has brief neurologic assessment, IV, labs.

-Ensure vitals done prior to CT

-Goes to CT

-CT looks good for TPA, no hemorrhage, good ASPECTS; CT is paused after PLAIN CT to give TPA

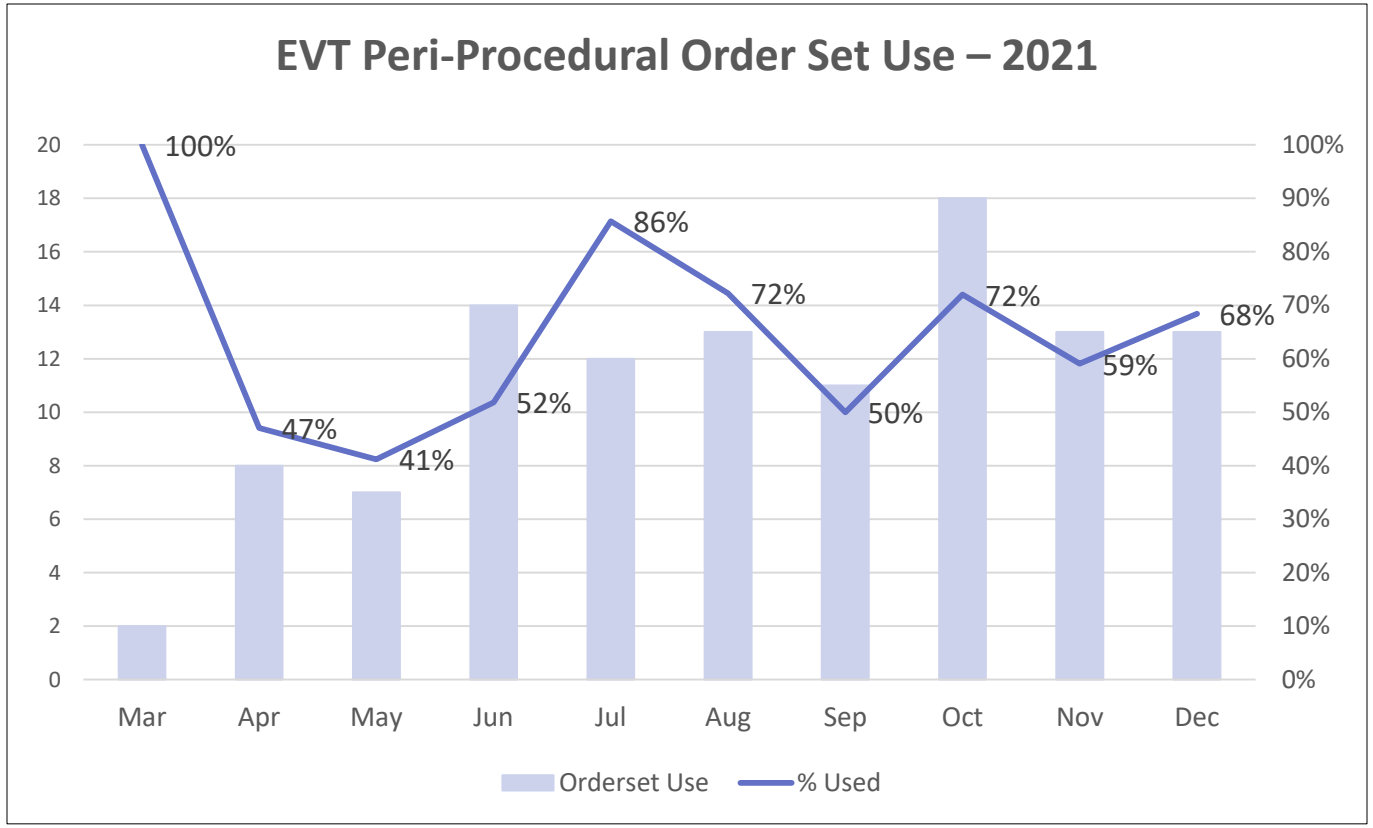
-TPA is given

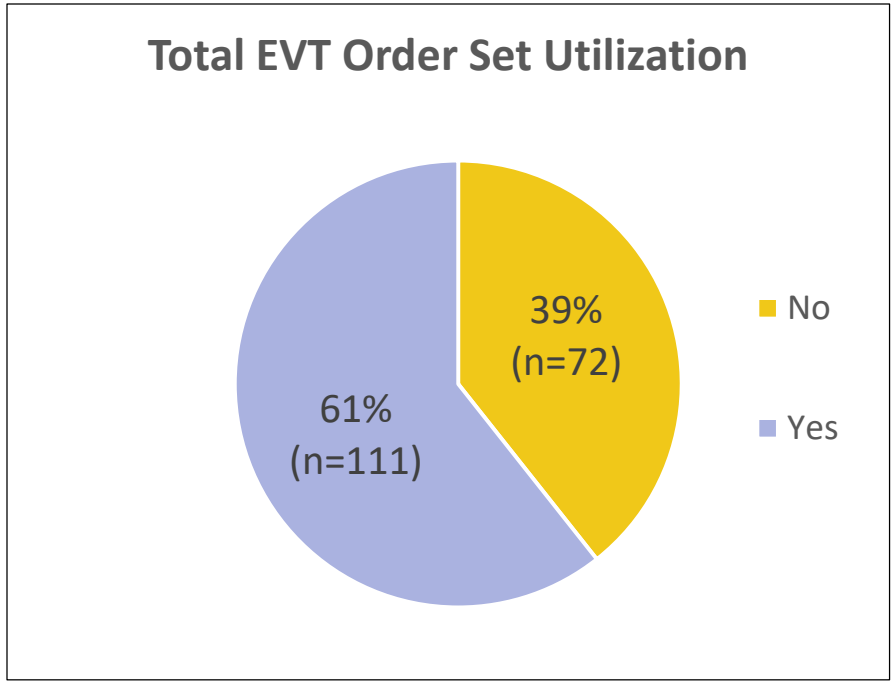
-CTA resumes with the patient decompensating requiring emergent ED consultation and airway management; group needs to consider DDx for deterioration in the CT scanner.

References

MOVING THE MARK…

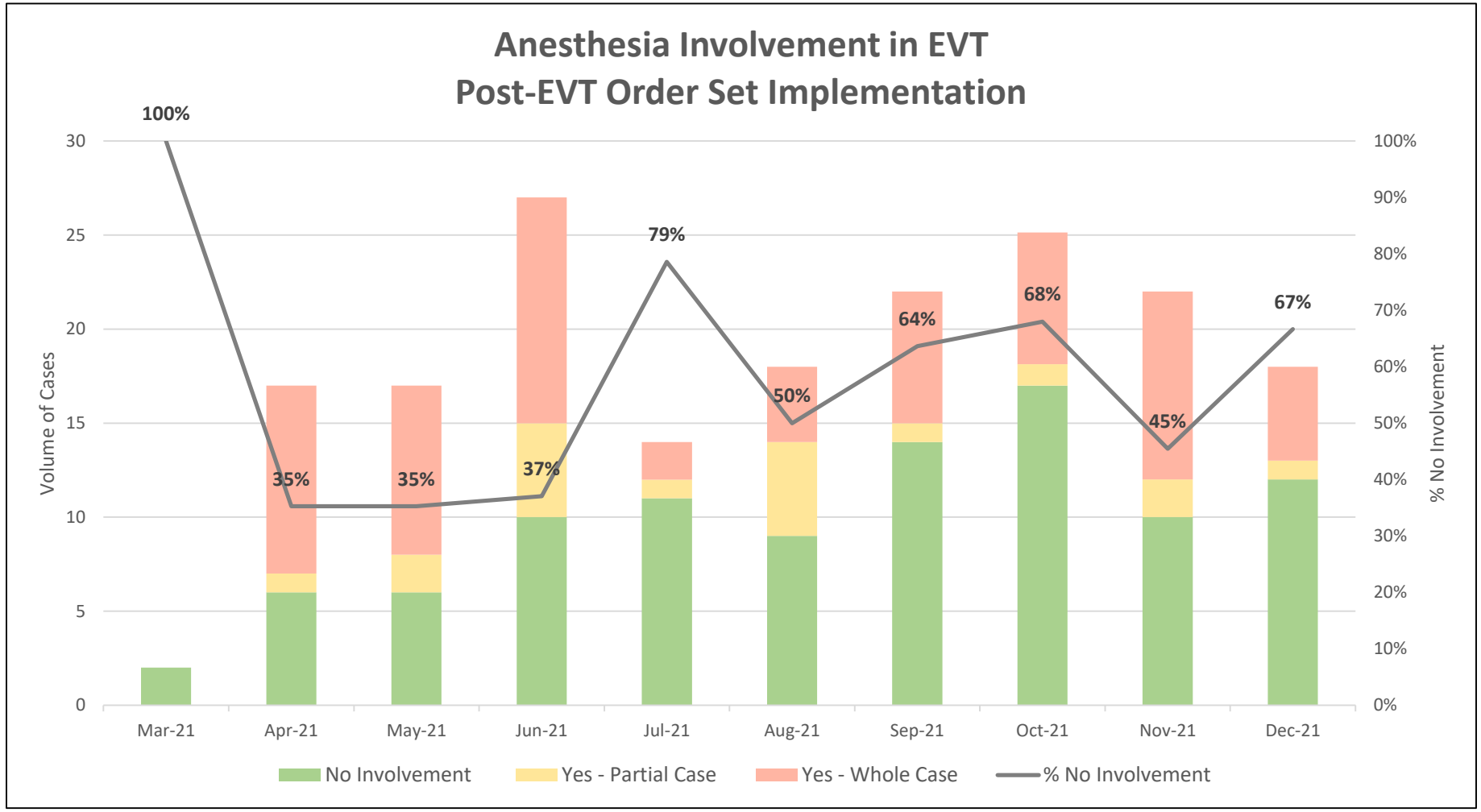
Results – Resource Utilization





Data source: manual data collection

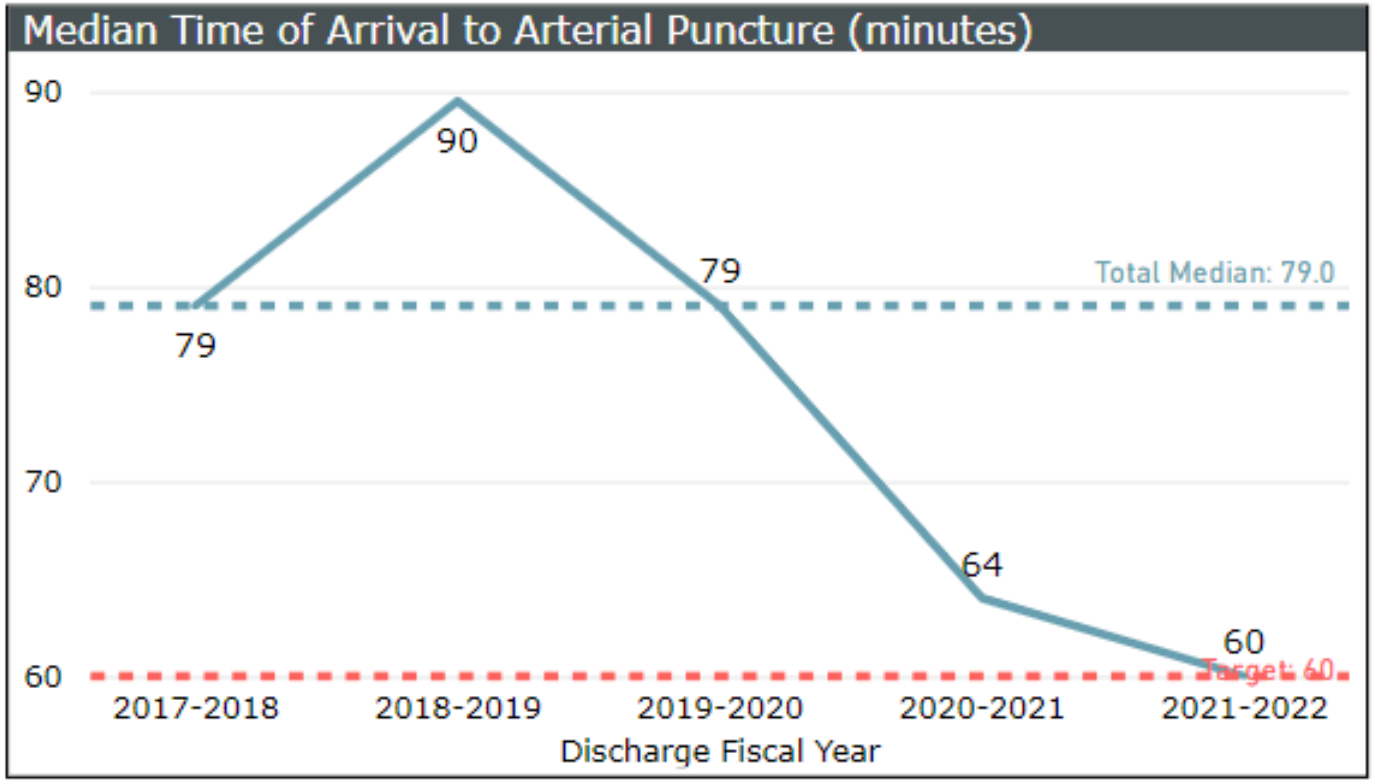
Results – Resource Utilization



Data source: manual data collection

Results – Time to Treatment

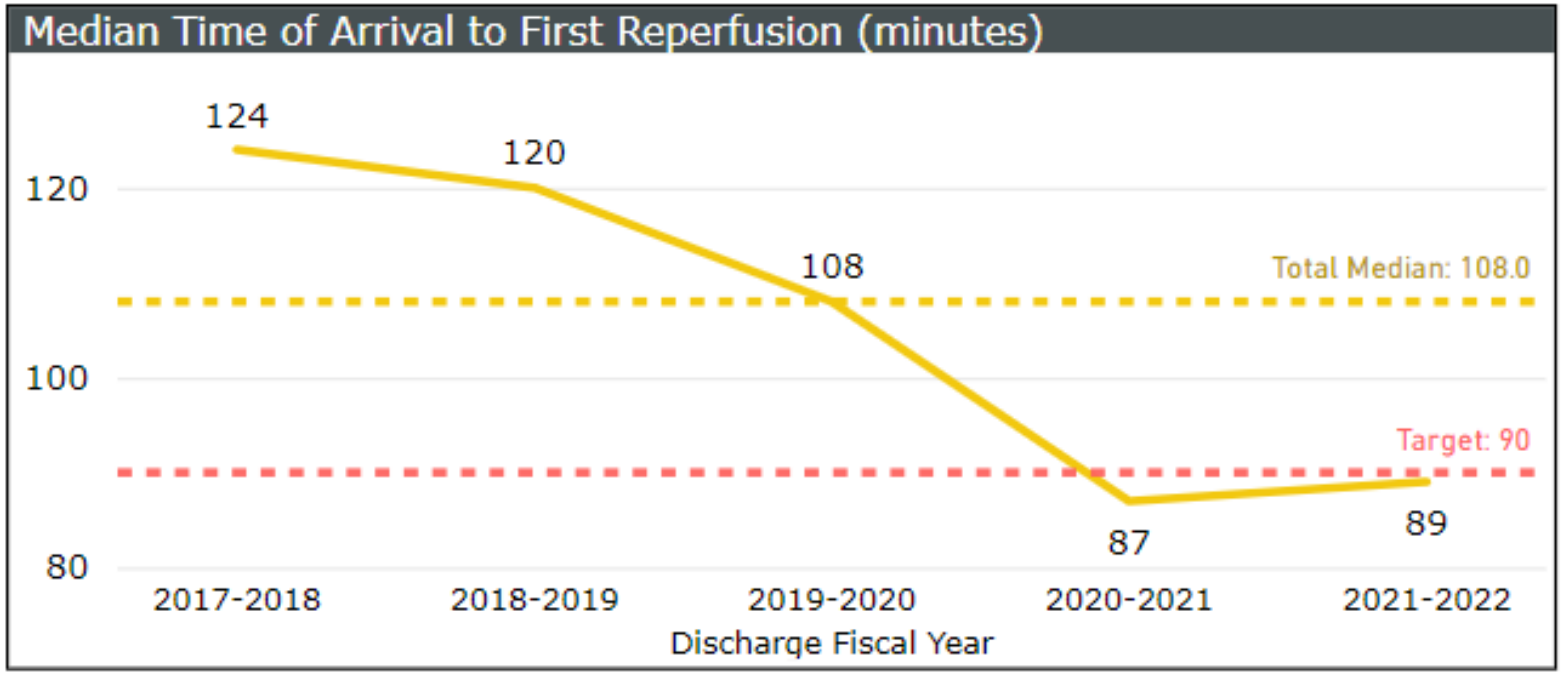
- **Reduction** in Median Door to Arterial Puncture (DTP) time during period of QI intervention
- Close to target of 60 minutes in FY 2020/21 and **achieved target** in FY 2021/22 (YTD Q3)



Data source: CIHI DAD

Results – Time to Treatment

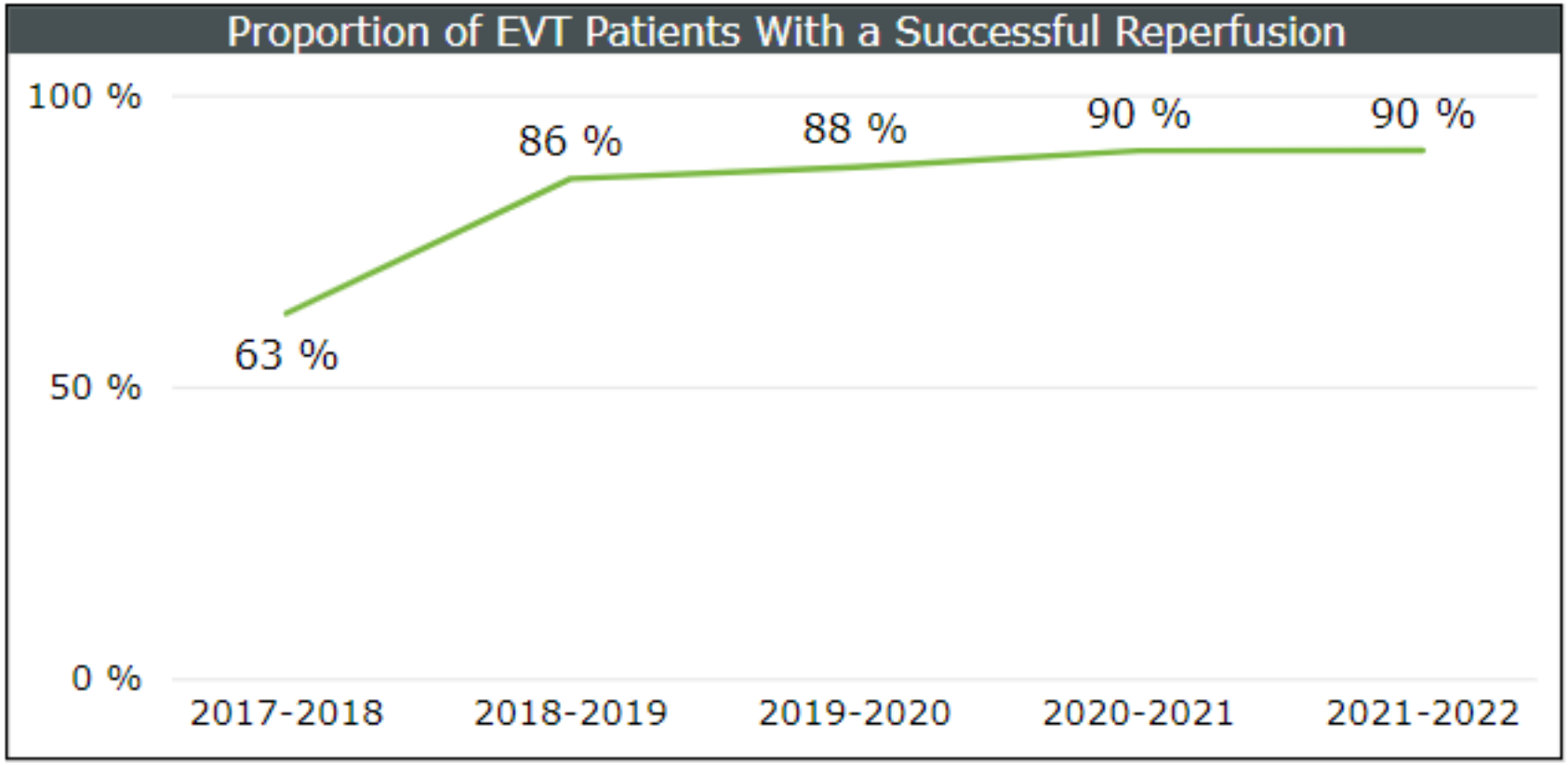
- **Reduction** in Median Door to First Reperfusion time during period of QI intervention
- **Below target** of 90 minutes in FY 2020/21 and FY 2021/22 (YTD Q3)



Data source: CIHI DAD

Results – Clinical Outcomes

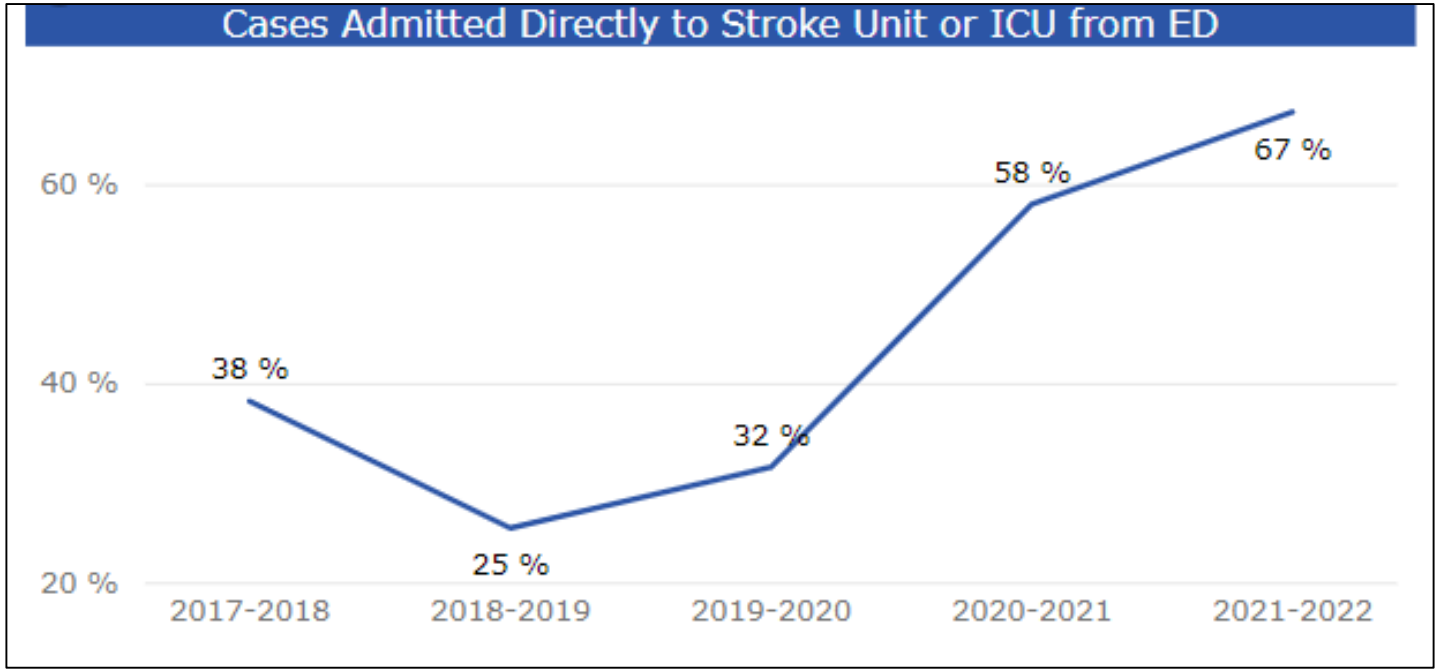
- **Increase** in EVT patients with a successful reperfusion



Data source: CIHI DAD

Results – Direct Access to Stroke Unit

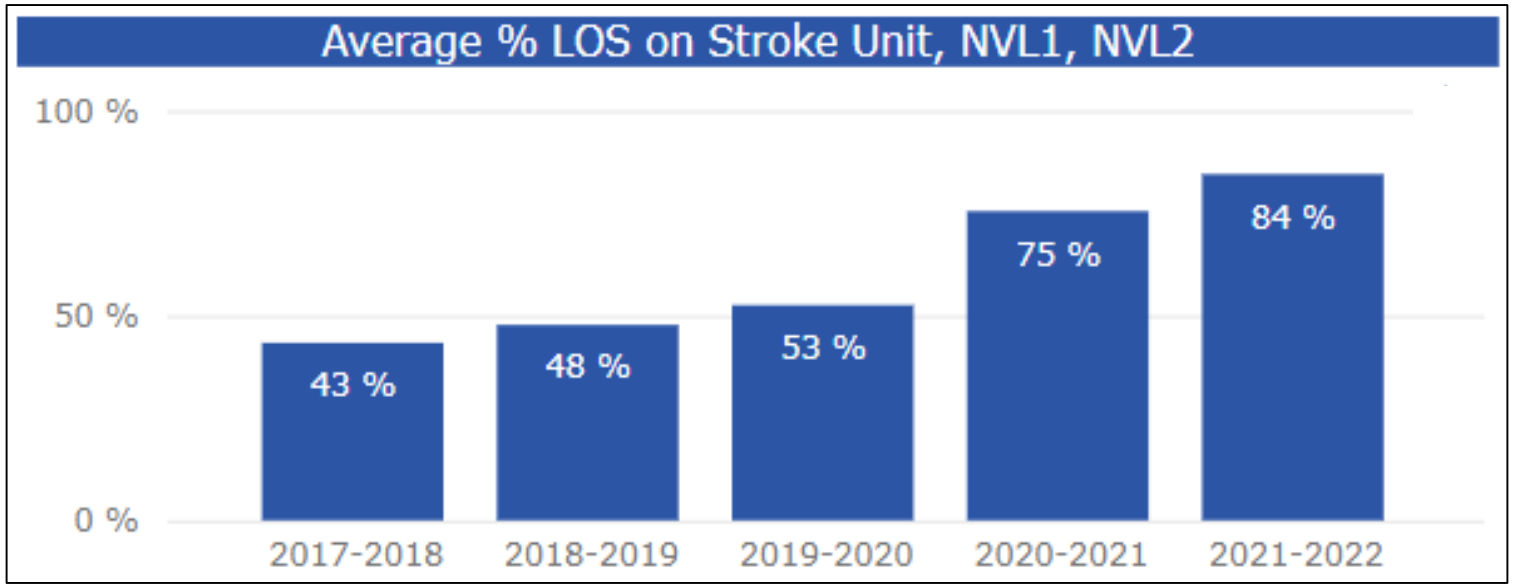
- **Increase** in proportion of EVT patients admitted directly to the Neurovascular Unit



Data source: Sunnybrook PowerBI Stroke Dashboard

Results – Access to Stroke Unit

- **Increase** in average proportion of length of stay (LOS) on Neurovascular Unit for EVT patients



Data source: Sunnybrook PowerBI Stroke Dashboard

Reflections & Lessons Learned

- **Infrastructure for QI**
  - Governance for stroke program, monthly Hyperacute QI Committee,
- **Ongoing engagement of all teams**
  - Focus on human factors, quality culture, kindness and empathy were key in fostering high performing teams
- **Access to data**
  - Visibility of key performance indicators to clinical team and organizational leadership highlighted opportunities and results
- **Celebrating successes, information sharing, and encouraging communication**
  - Monthly stroke outcome emails, QI snapshot, and quarterly performance reports to teams
- **Collaborative development of supporting tools**
  - Clinical Prioritization algorithm and EVT Order Set to create agreement and awareness of clinical priorities and scope for Code Stroke Nurse role
- **Pandemic…**
  - Strong foundation mitigated impact
- **Stroke Program commitment to continuous quality improvement**
  - QI leads and learning environment

DISCUSSION

Evaluation

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