Stroke Resuscitation Simulation

Building High-Performing Teams Through Crisis Resource Management

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Disclosures

Drs. Khosravani and Hawkes have no disclosures relevant to this talk.

Please fill out the evaluation form at the end.

Objectives

1. Describe the principles of Crisis Resource Management (CRM) and how they apply to hyperacute stroke care, including team communication, cognitive load management, and closed-loop communication during code stroke activations.
2. Identify practical strategies for implementing stroke resuscitation simulation training across neurology, emergency medicine, and critical care teams to improve team performance and trainee competency.
3. Recognize the impact of simulation-based education on acute stroke metrics, provider comfort, and interprofessional collaboration.


9:36

The Human Element

- Human factors #HighPerformingTeams is central to our operations and was the key ingredient to our QI work
- Ongoing stakeholder engagement, debriefing, compassion, Kindness, and empathy are key
- Culture, Culture, Culture
- QI work is never done!

What must go right here?

- Safe, timely, effective EMS handover
- Cohesive Team with RNs, PAA, MDs
- Urgent assessment in parallel with IV access, blood draw, and order entry
- Timely readiness for transfer to CT
- Availability of CT scanner and Tech
- Patient factors: Communication, Consent, Vitals, Family, Goals of Care

Is this patient a Thrombolysis candidate? EVT candidate?

It's all about Culture!

Quality Culture

Compassion

Partners	Patients, Emergency Medical Services, Interprofessional Teams: Stroke Team, Emergency Department, Medical Imaging, Quality and Patient Safety
Safe	CHANGE IDEA 1 - Patient identification Team pre-arrival briefing
Efficient	CHANGE IDEA 2 - Rapid registration, IV Access, Bloodwork, and Orders CHANGE IDEA 3 - Transfer of patient to CT for imaging on EMS Stretcher, with TNK in the Scanner
Effective	Assessment of candidacy for Thrombolysis and EVT

U of T NEUROLOGY

4 domains: Self, Team, Environment, Patient

Crisis Resource Management

- Origins – in airline industry, 1970's 70% of aviation crashes were due to human error
- Used by many acute providers – armed forces, aviation, aerospace
  - In medicine: Anesthesia, Critical Care, Emergency Medicine
- More than simulation

Crisis Resource Management

- A series of non-technical skills required for effective teamwork in crisis situations (high stakes, high value)
- A framework for consideration of the factors that impact individual and team performance
- A tool for mitigating and addressing variables that impact the team

Overarching Principles of CRM

- Situational Awareness
- Triage and Prioritization
- Cognitive Load
- Role Clarity
- Communication
- Debriefing
- Simulation

Situational Awareness

- Awareness of “cues” from the patient, the team, and the environment
- Synthesis - being aware of cognitive and diagnostic bias
- Continual re-evaluation of the situation, and resources
- Use checkpoints – as team leader to summarize the current state
- Regarding PPE - “there is no emergency in a pandemic” (Aaron Mishler, RN West Africa)

Triage and Prioritization

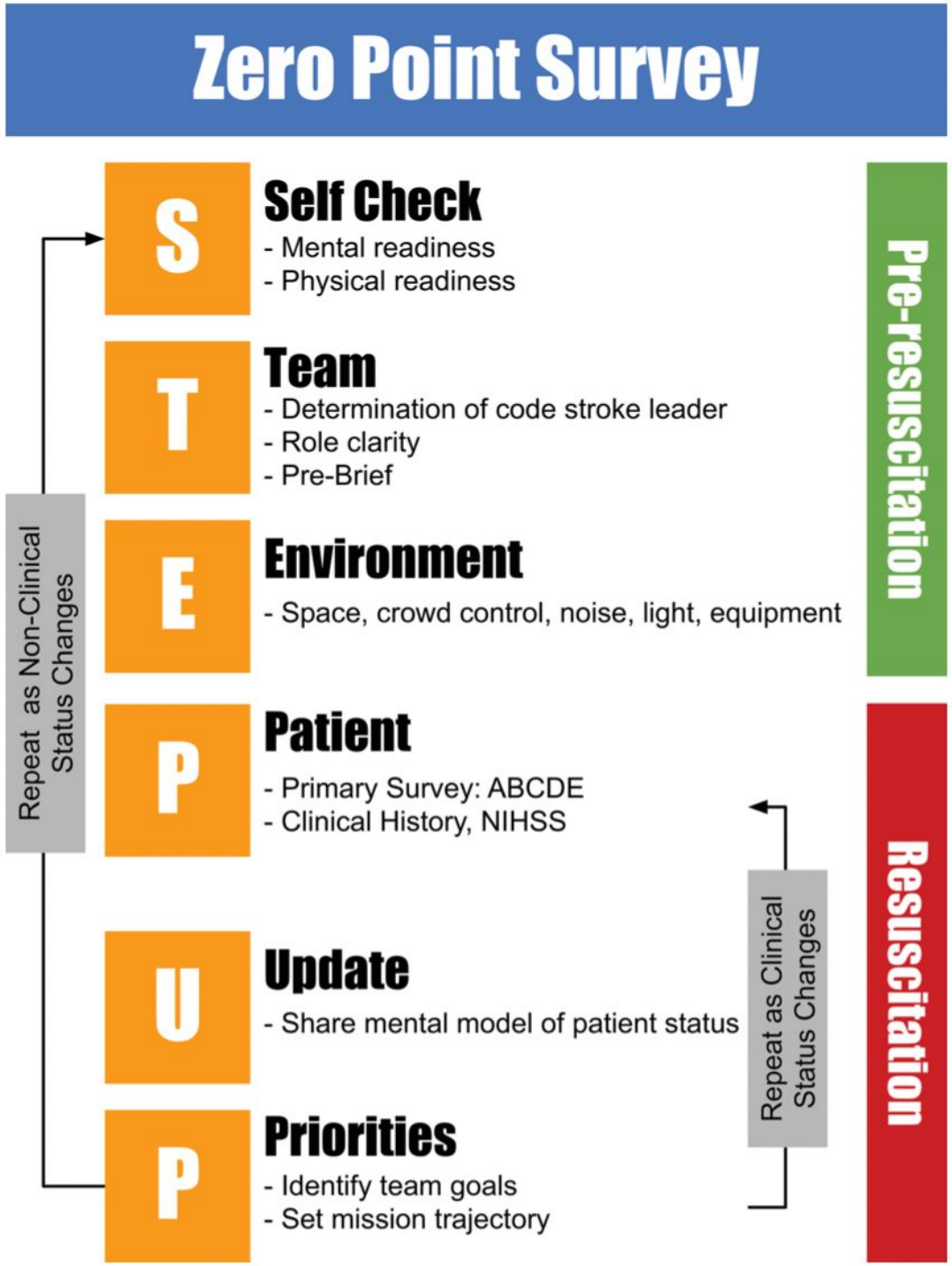
- Prioritization of medical tasks
- Prioritization of non-technical tasks (updating the family, other services, bed flow, etc.)
- Assessing each task – for its Effectiveness – in achieving the ultimate desired goal
- *evaluate input from the team – during debriefs
- Complete a “Zero Point Survey”

Cognitive Load

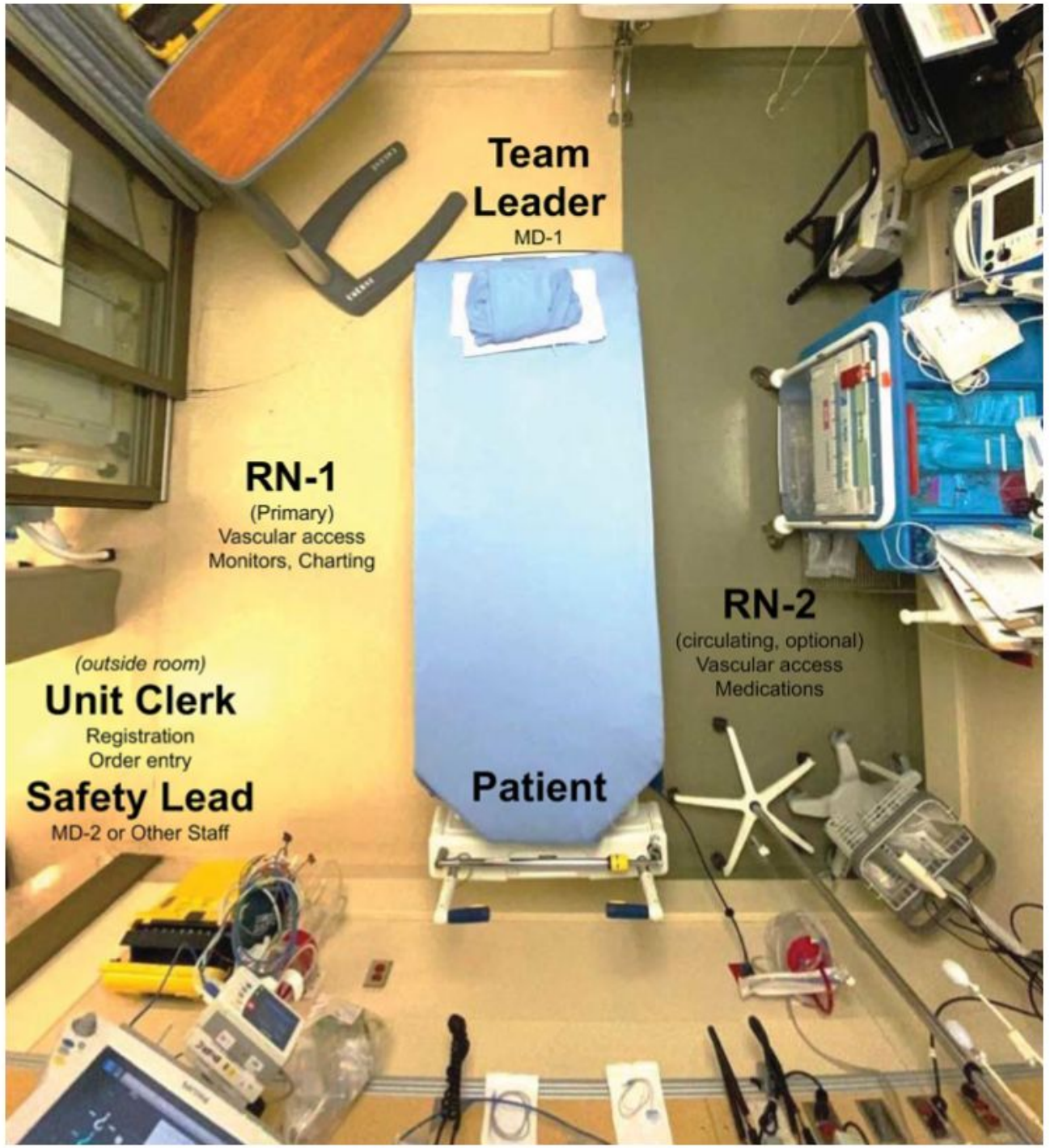
- High-stakes, high-stress
- Recognizing “working memory”, task saturation
- Stress inoculation – novice vs. experienced clinicians
- Barrier to situational awareness and high-performing teams
- Prof. Daniel Kahneman’s Recognition of
  - System 1 (reactionary) and System 2 (deliberate)
  - Circle back to System 2 frequently – shift some balance between system 1 and 2
- “Slow is smooth, smooth is fast”
- Digital environment and distraction

Role Clarity

- Clear understanding of teams role and responsibilities
- For codes – it means knowing members of the team, being able to use their first names to communicate
- Know your team – of their abilities, challenges, levels of comfort
- Awareness of the team at the day’s start



Neurocritical Care volume 33, pages 338–346 (2020)



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Debriefing

Hot Debrief

Initiate
- Announce to the team that a quick debriefing will occur
- Encourage all team members to participate

Safe Space
- Ensure psychological safety and a flat hierarchy
- Create a non-threatening, no-blame environment

Review
- Discuss chronological progression of events
- Allow team members to provide their own perspectives

Team Successes	Team Challenges
- Discuss personnel, process, and equipment issues - Discuss team communication and barriers - Avoid critique of individual performance - Avoid jumping to a solution	

Participate
- Ensure all team members have an equal opportunity to speak

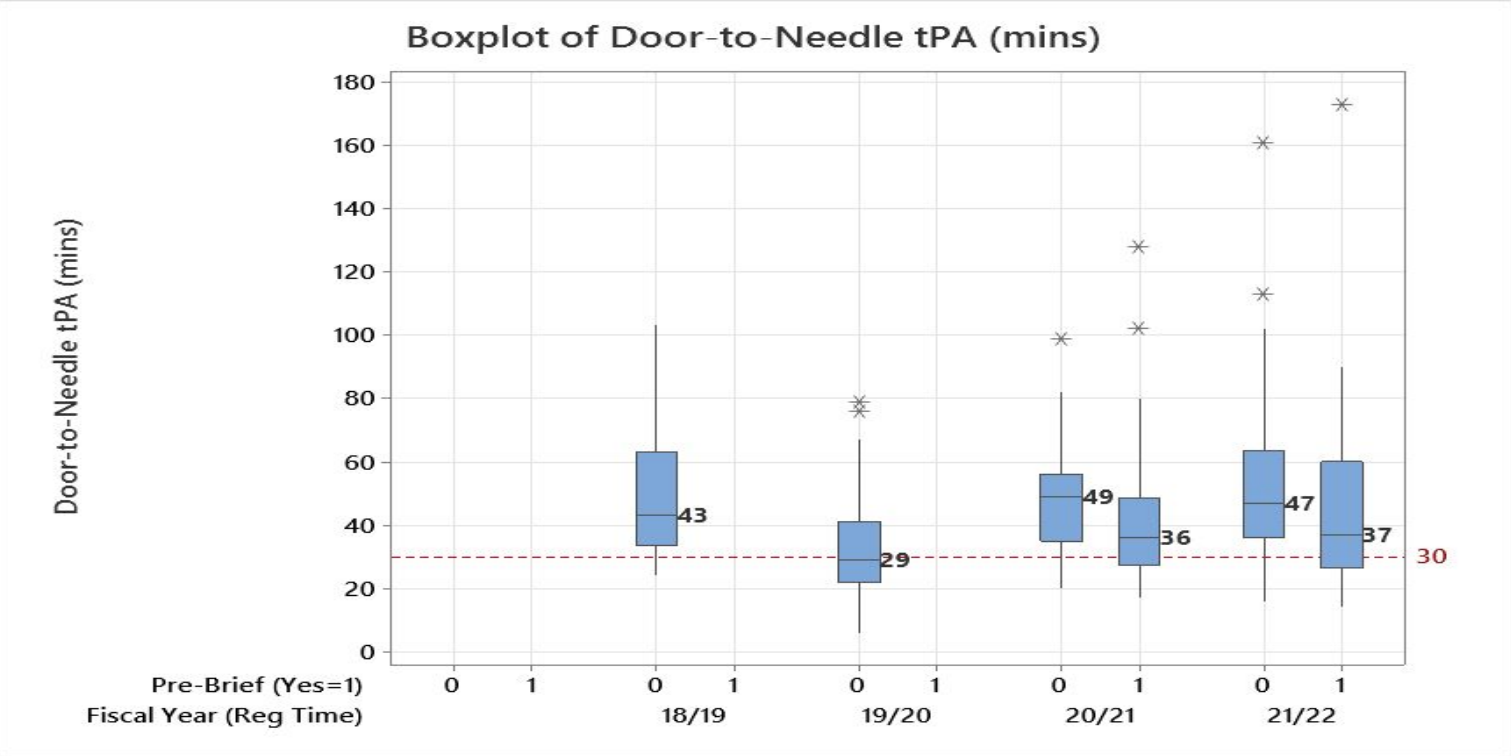
Follow-up
- Track and follow-up on voiced concerns
- Allow option for individuals to discuss concerns privately

Neurocritical Care volume 33,
pages 338–346 (2020)

Overview take-away points

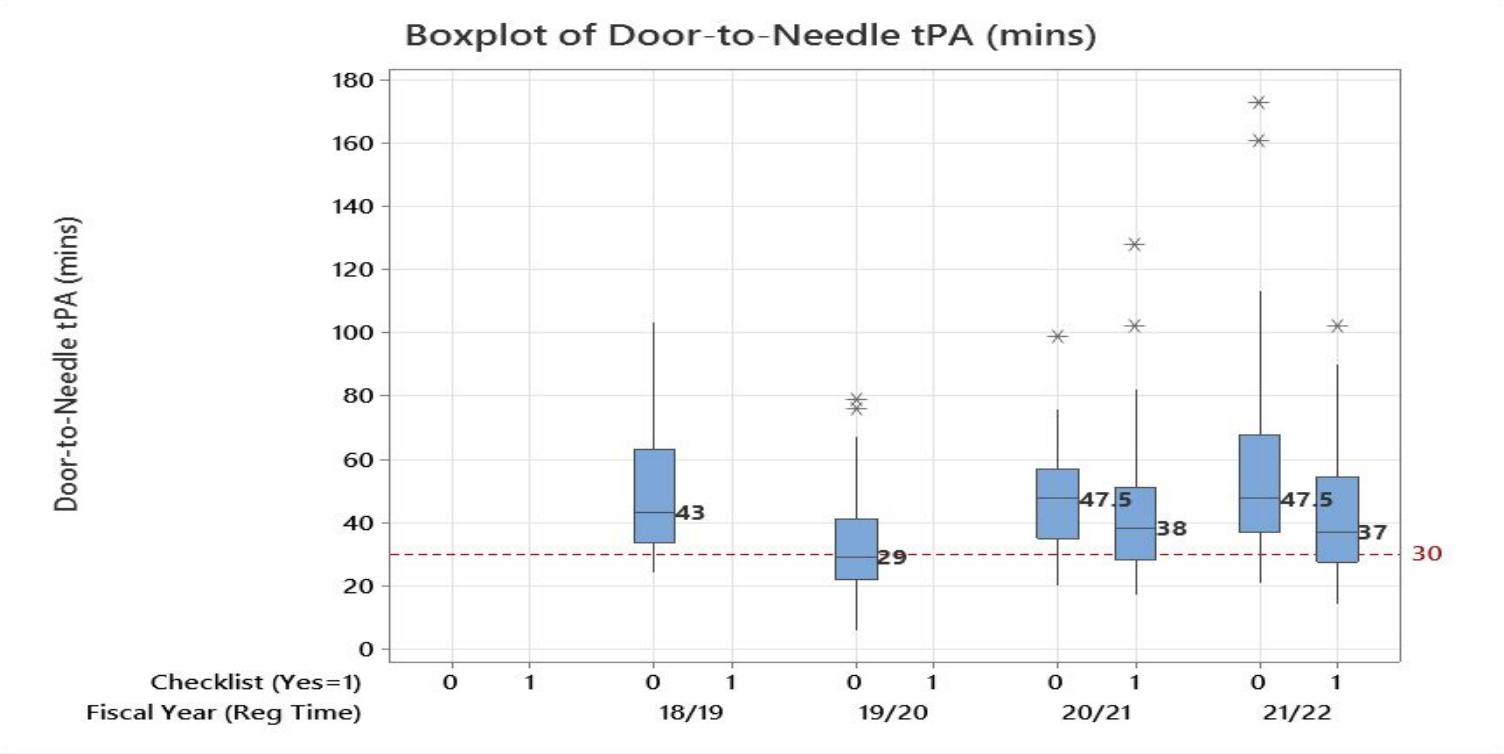
- Routine days can turn to adversity quickly
- When adversity occurs – be aware of one's status, physiologically and psychologically
- Be aware of distractions
- Prioritize, Do not Multitask through Discipline
- Know your protocols – use checklists when applicable
- Over communicate - that's good!
- Team dynamics are key – do hot debriefs post events

Impact of Pre-Brief on DTN Time



- 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 in 20/21 (p=0.017)
  - 10 minutes 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

Impact of Pre-CT Checklist on DTN Time



- 1 = checklist completed
- 0 = checklist not complete or unknown
- Checklist implemented in 19/20, but utilization data not included in extract
  - Know from previous data that utilization approximately 50% in first months of implementation.
- **Lower median observed when pre-CT checklist occurred**
  - 9.5 minutes in 20/21 (p=0.089)
  - 10.5 minutes in 21/22 (p=0.068)
- Differences are not statistically significant, but may be *clinically* significant
- Checklist continuing to have impact in 20/21 and 21/22

Educational Value

Which player would you predict would be the better shooter after 100 hours?

Player A:

200 practice shots per hour.
Colleague retrieves shots.
Keeps a record of shots made, shots missed, and errors.

"Perfect practice makes perfect"

Player B:

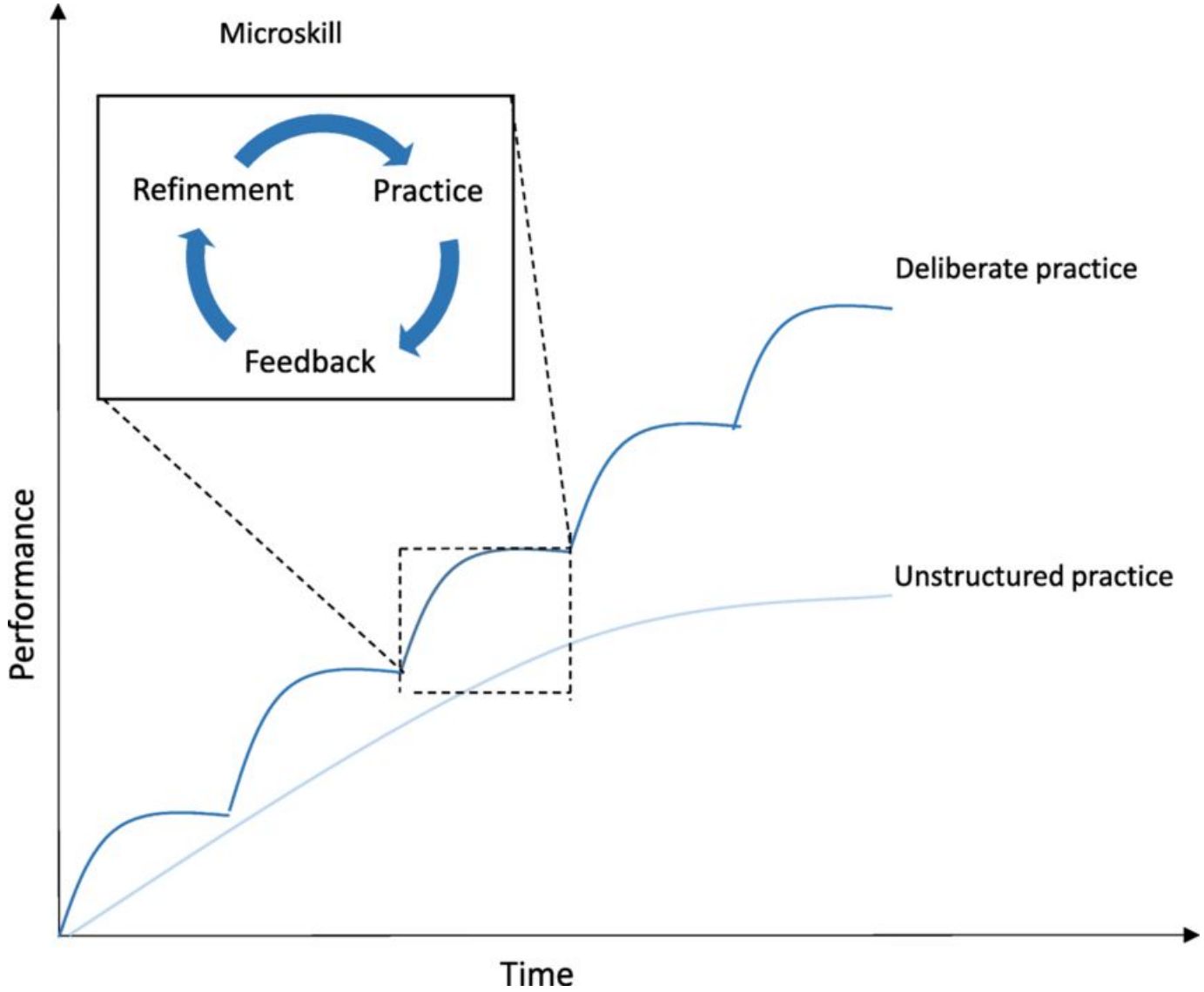
50 practice shots per hour.
Retrieves his own shots.
Dribbles leisurely, takes several breaks.

"Practice makes perfect"

Aubrey Daniels

Deliberate Practice

1. Intense repetition of a skill
2. Rigorous assessment of performance
3. Specific and informative feedback
4. Improved performance in a controlled setting




CODE STROKE!
LAST KNOWN WELL
09:15
NOW: 09:32
ACT FAST
F ACE
A ARM
S SPEECH
T TIME
CTA HEAD & NECK
L M1 OCCLUSION
LABS DONE!
OKAY KIDDO... LET'S DO NIHSS... YOU GOT THIS! (RIGHT? 😰)
NEURO TEAM HERE!
RIGHT SIDE WEAK
SLURRED SPEECH
GAZE DEVIATED TO LEFT
...SUSPECT L M1 OCCLUSION!
HR 88
BP 158/92
SpO2 97%
NIHSS PICTURE CARD
1a. LOC
2. GAZE
4. FACE
5a. ARM
5b. LEG
9. LANGUAGE
SAY: "IT IS A SUNNY DAY"
10. DYSARTHRIA
MMMPH!
11. EXTINCTION
FUTURE NEUROLOGIST
NIHSS SCORE
???
TOTAL: __ / 42
MMPHHH... DDAA...
THIS IS A BIG ONE... 😰
TIME IS BRAIN!
FLOPPPP

Challenges in Medical Education

1. Patient safety - How can learners acquire new skills and expertise without compromising patient safety?
2. Rare events - How can we ensure all learners are exposed to rare but important events/complications?
3. Non-technical skill development - How can we all improve as a multidisciplinary team (ie teamwork, situational awareness, leadership)?
4. Structured feedback - How can we provide feedback during time-sensitive events/procedures?
5. Stress management - How does the team manage a high stakes situation?

Simulation to the Rescue

We can all benefit!

Educational Goals of Simulation

1. Create a good learning climate (ie psychological safety)
2. Deliberate practice
3. Competency based education
4. Structured feedback on performance

Medical Students

SIGN

Student Interest Group in Neurology

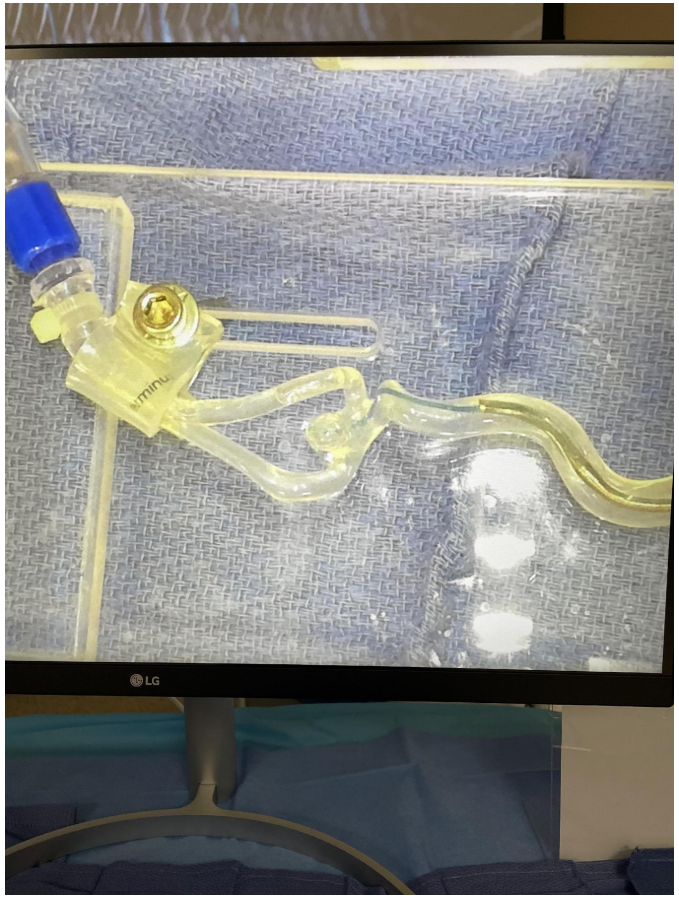
NEUROLOGY DISCOVERY WEEK

Pre-Residency (PGY0)

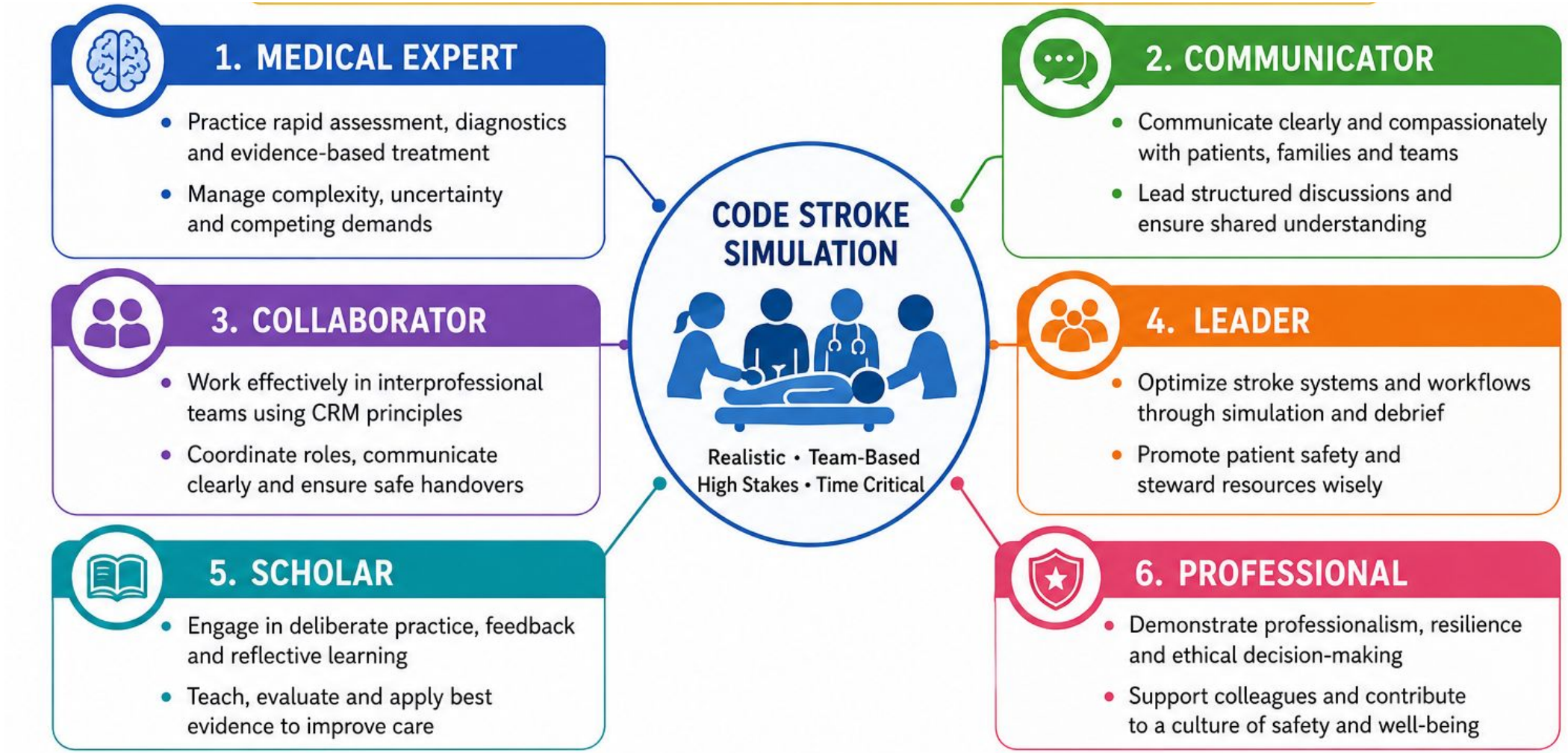

TORONTO
SRC

Neurology Residents

Fellows



Competence Based Learning



Allied Professionals

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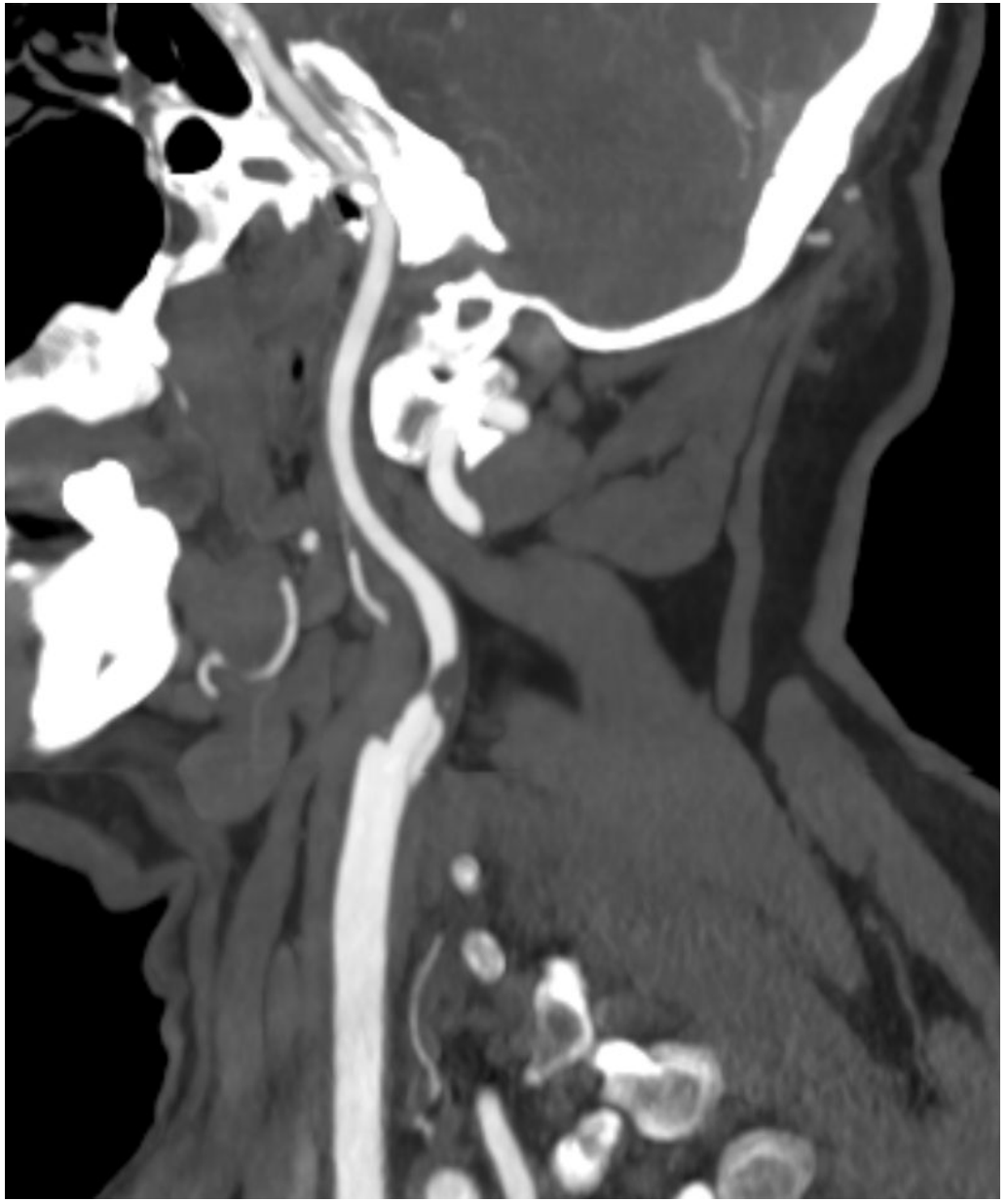
Staff Physicians



Evidence in Stroke/Neurovascular

1. Improved outcomes - Reduced DTN and DTCT times with implementation of simulation education
2. Increased confidence - NPs and PAs achieved similar confidence to neurology residents in code strokes following 3 simulation scenarios
3. Procedural skills - After 3-4 trials residents performed as safely as fellows with simulated cerebral angiography

The Future: #NICE Roadshow

Knowledge dissemination through simulation and digital platforms


CODE STROKE!
LAST KNOWN WELL
09:15
NOW: 09:32
ACT FAST
F ACE
A ARM
S SPEECH
T TIME
CTA HEAD & NECK
L M1 OCCLUSION
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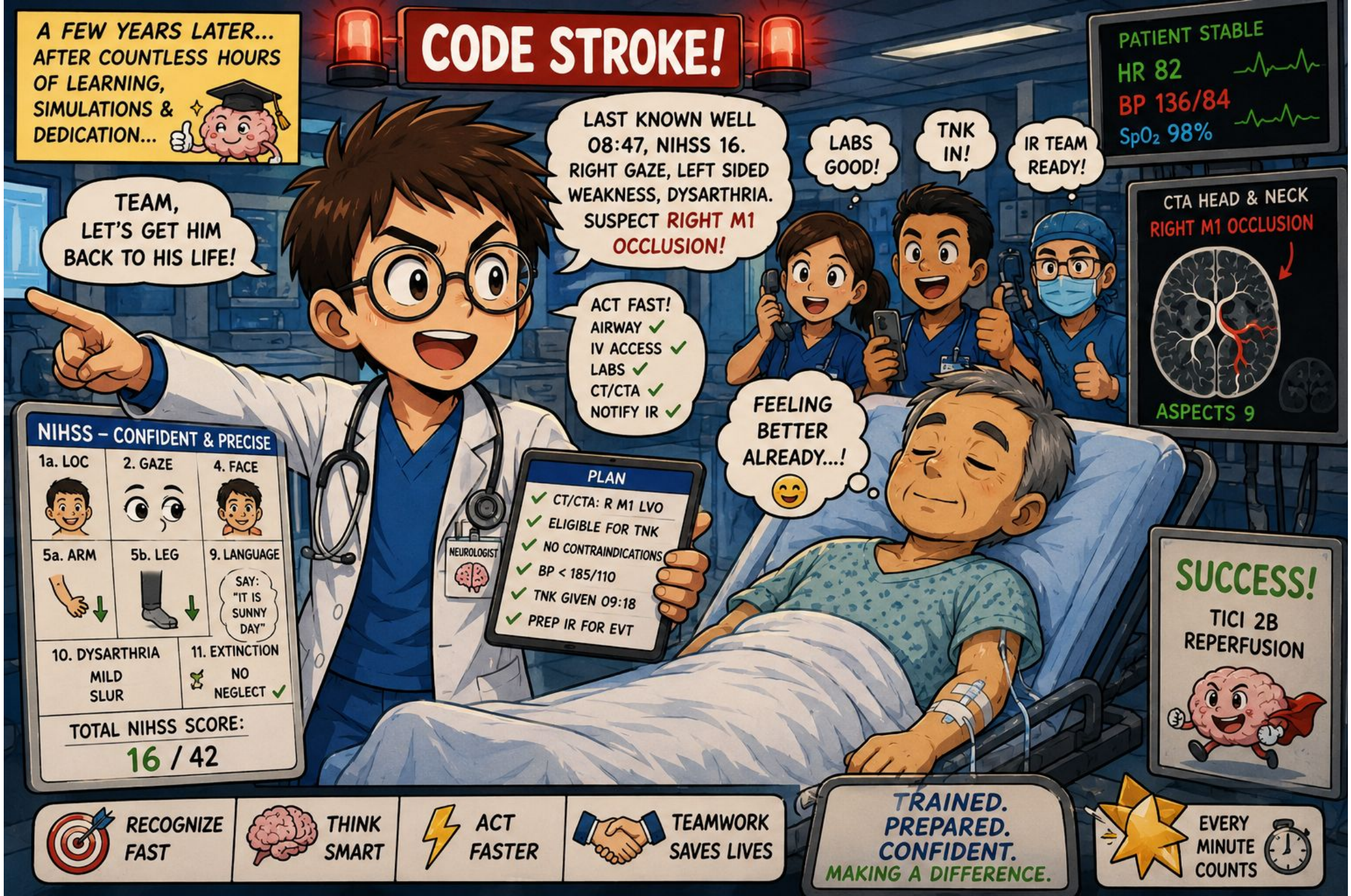
A FEW YEARS LATER... AFTER COUNTLESS HOURS OF LEARNING, SIMULATIONS & DEDICATION...
CODE STROKE!
PATIENT STABLE
HR 82
BP 136/84
SpO2 98%
TEAM, LET'S GET HIM BACK TO HIS LIFE!
LAST KNOWN WELL 08:47, NIHSS 16. RIGHT GAZE, LEFT SIDED WEAKNESS, DYSARTHRIA. SUSPECT RIGHT M1 OCCLUSION!
LABS GOOD!
TNK IN!
IR TEAM READY!
CTA HEAD & NECK
RIGHT M1 OCCLUSION
ASPECTS 9
ACT FAST!
AIRWAY ✓
IV ACCESS ✓
LABS ✓
CT/CTA ✓
NOTIFY IR ✓
FEELING BETTER ALREADY...!
NIHSS – CONFIDENT & PRECISE
1a. LOC
2. GAZE
4. FACE
5a. ARM
5b. LEG
9. LANGUAGE
SAY: "IT IS SUNNY DAY"
10. DYSARTHRIA
MILD SLUR
11. EXTINCTION
NO NEGLECT ✓
TOTAL NIHSS SCORE:
16 / 42
NEUROLOGIST
PLAN
✓ CT/CTA: R M1 LVO
✓ ELIGIBLE FOR TNK
✓ NO CONTRAINDICATIONS
✓ BP < 185/110
✓ TNK GIVEN 09:18
✓ PREP IR FOR EVT
SUCCESS!
TICI 2B REPERFUSION
RECOGNIZE FAST
THINK SMART
ACT FASTER
TEAMWORK SAVES LIVES
TRAINED. PREPARED. CONFIDENT.
MAKING A DIFFERENCE.
EVERY MINUTE COUNTS

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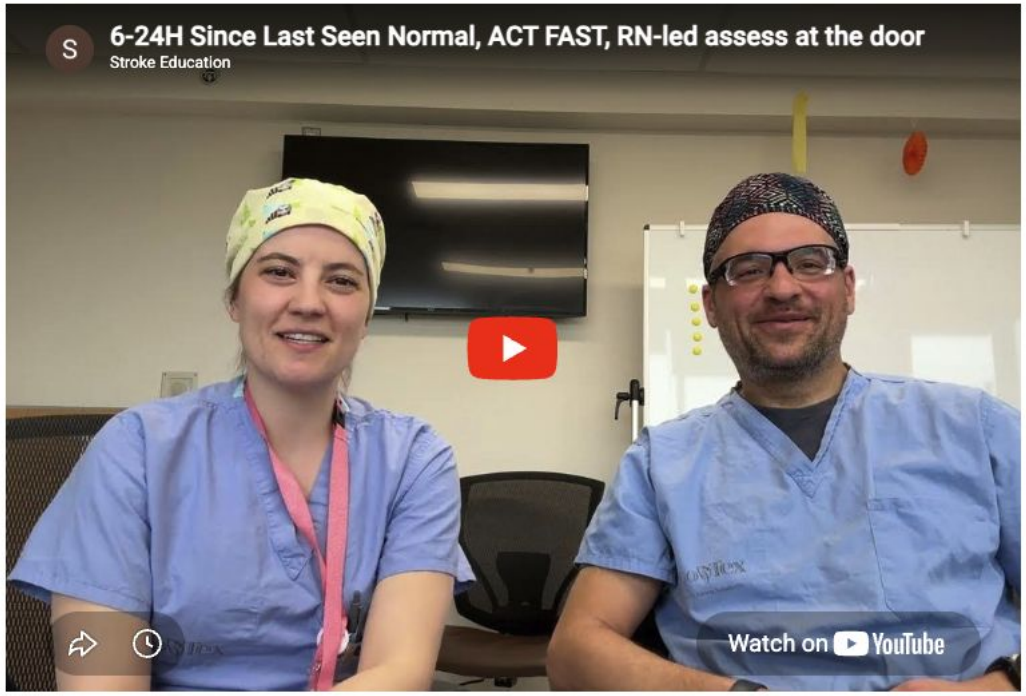
6-24 Hr ACT-FAST Protocol

6-24H Protocol - RN-Led - Do ACT-FAST*
Initiative to **"Do the ACT-FAST, Call More, Activate Less"** and
*this includes **"Assess at the Door", RN-Led 6-24H Since Confirmed Last Seen Normal time for Code Stroke Activation -> for access to the Cath Lab/EVT/Neuroangio**

The RN Triage group will "Do the ACT-FAST to assess criteria for activation; if ambiguous, call more and activate less".
Its is a Activate or Not protocol; when in doubt call the Stroke Staff on-call;
Checkout the excellent video primer below to see how actually qualifies. Remember, activation within 6-24H is for Access to EVT - to get EVT patients have criteria.

Here is a short just-in-time 10min. video explainer:



Delivering more simulation…

- Stroke complexity is increasing (patients and systems, and criteria)
- Bridge the gap between knowledge and performance
- CRM is essential to modern stroke care
- Share resources, cases, experiences
- Reach out to us any time

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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.

Please take 2 minutes to fill the evaluation form out. Thank you!