

# SIMULATION CODE STROKE

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CENTER FOR  
IMMERSIVE AND  
SIMULATION-BASED  
LEARNING

STANFORD SCHOOL OF MEDICINE

- 
- No financial disclosures
  - Off label use-tpa within 4.5 hours of symptom onset

# You receive this patient in the ED

- A 61 year old woman who was brought from the shopping mall when she had acute onset slurred speech and left arm weakness





*Credit: Robert Gauthier / Los Angeles Times*



# What do neurology residents think about stroke codes?

“This is a high stress situation”

“It’s like they just dump you in the situation”

“It’s scary to be alone at night.”

# Why Use Simulation for Acute Stroke

- High acuity patient
- Large number of team members
- Complex decision making
  - Time sensitive treatments available
  - Rapid decision making required
  - Multiple factors in patient history, exam, radiologic studies needed

# Why Use Simulation for Acute Stroke

Novice neurology residents

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High acuity patient, multiple team members, complex  
decision making

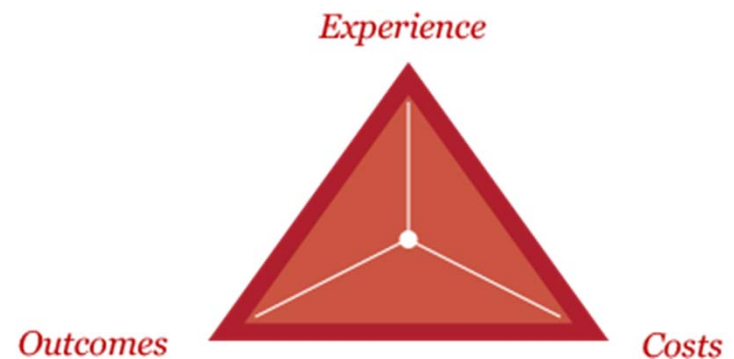
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**High risk for delays in treatment, decision errors**

# So what?

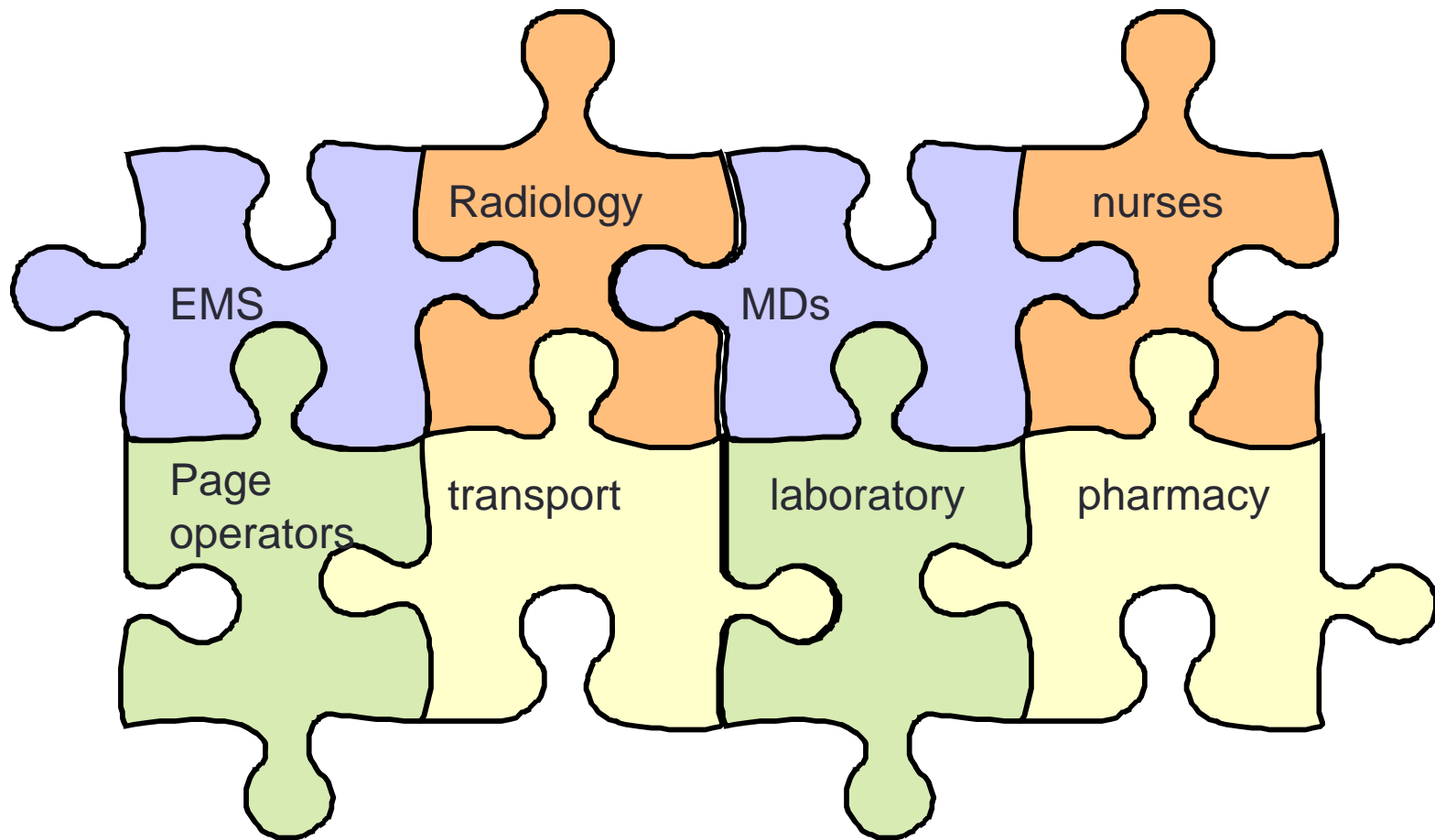
**High risk for delays in treatment, decision errors this can lead to**

- **Poor patient outcomes**
- **Decreased satisfaction of experience for patients and providers**
- **Increased cost burden to society with more disabled patients**





All the pieces of the puzzle.



# CRISIS RESOURCE MANAGEMENT



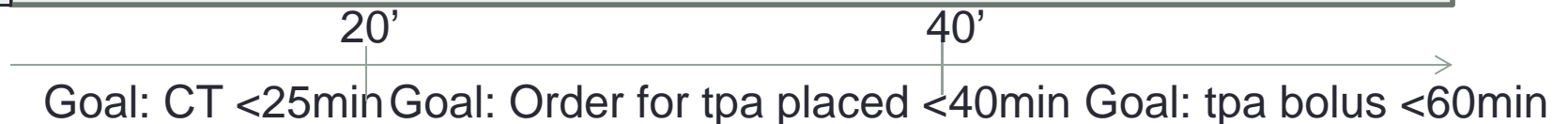
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# Acute Stroke Code Flowchart

RN 1	Stat labs, iv starts Accurate weight	Monitor vitals In CT, give prn meds	If tpa ordered, prepare tpa pump, iv tubes	Prepare pump, Start bolus
RN 2	hook to transport monitor NIHSS with neuroMD Insert foley			
Team Member	ED MD: orders, screening	CT: Clear table Rads- protocols MDs	Rads: reads scan, call MDs	PharmD: stand by for orders, mix and deliver
Neuro Fellow/A ttdg	Arrive at CT to review scan If coming from home, Can make tpa decision on phone		If BP ok, hx/criteria ok, verbally verify tpa order to start bolus	
Neuro Res	Hx, exclusion NIHSS, go to CT Call fellow, family	Review CT No bleed- tell RN/ED MD to order tpa	If BP ok, hx/criteria ok, verbally verify tpa order to start bolus	





# Simulation for Neurology Residents

- **Learning objectives**
  - abbreviated history
  - use NIHSS as tool for physical exam
  - Interpretation of non-contrast head CT
  - calculate tpa dose
  - write tpa order set
  - courteous yet efficient manner with patient
  - Coordination with other care providers

# Methods

1. Stroke neurologist trained actor to play a standardized patient
2. A stroke nurse interacted with trainees and carried out nursing duties.
3. 6 residents attended a 4 hour training session with 2 scenarios
4. Trainees communicated with the stroke attending and RN during scenario
5. Debriefing occurred after each scenario
6. Trainees completed evaluations after the simulation

# Types of Scenarios

ischemic stroke requiring  
i.v. tPA



warfarin-associated  
intracranial hemorrhage



CSN: 48381

Language: English

Age/Sex: 65 Y / M

Last Wt: 73 kg (160 lb 15 ... Attend Prov: None

Isolation: None

? Close X

- Patient Summary
- Chart Review
- Results Review
- Intake/Output
- Synopsis
- Allergies
- Problem List
- History
- Notes
- Order Entry
- Order Review
- Admit
- Consult
- Transfer
- Discharge
- Order Set

- Order Set
- Order Sets
- Orders

### IP NEU TPA ALTEPLASE PROTOCOL

Right click on an Order Set to add to favorites.

Open Order Sets Clear Selection Remove Open

# EPIC TPA ORDER SET

**Orders** ↑ ↓

Select/Release Sign and Held Orders | Select Pended Orders + New Order Clear All Orders Next

Pharmacy Hospital Insurance Drug Supply 1 (60) 52 (1) M TO A (E) S (ACIFIC) (Patient Preferred) 650-355-9901

Pharmacy (Drug Association) Education

Order mode: Standard Providers

Pend Orders Sign & Hold Sign Orders

### Order Sets

#### Manage User Order Sets

#### IP NEU TPA ALTEPLASE PROTOCOL Add Order

##### NOTIFY PHYSICIAN

###### Notify MD

Notify MD:

Routine, PRN, 1. Severe Headache 2. Acute hypertension 3. Decline in neurological exam 4. Nausea or Vomiting.

Notify MD: Adverse Reactions to Alteplase

Routine, PRN, If adverse reactions to Alteplase please notify MD Emergently and be prepare to discontinue the tPA infusion and obtain an emergent head CT scan.

##### NURSING

###### Nursing Protocols

Patient on TPA Ateplase Protocol

Protocol: TPA Alteplase protocol  
CONTINUOUS starting Today at 0930 Until Specified

###### Vital Signs

Vital Signs During Infusion every 15 min

STAT, EVERY 15 MIN First occurrence Today at 0930 for 4 occurrences

Neurological checks during infusion every 15 min

STAT, EVERY 15 MIN First occurrence Today at 0930 for 4 occurrences

Vital Signs : Q 15 min x 2 hr then q 30 min x 6, then q 1 hr

STAT, AS SPECIFIED starting Today at 0919 Until Specified, Q 15 min x 2 hr then q 30 min x 6 , then q 1 hr

Neurological Checks q 15 min x 2 hr then q 30 min x 6, then q 1 hr

STAT, AS SPECIFIED starting Today at 0919 Until Specified, Q 15 min x 2 hr then q 30 min x 6, then q 1 hr

Pulse Oximetry/O2 Sats

STAT, CONTINUOUS starting Today at 0930 Until Specified

##### MEDICATIONS

###### Thrombolytic Therapy

alteplase (ACTIVASE) 100 mg IV infusion

0.9 mg/kg, Intravenous, ONCE

###### Administration

Administration

STAT, CONTINUOUS, 1. Program IV pump using the "Alteplase (stroke)" program which will deliver the 10% bolus over 1 minute and the remainder of the dose over one

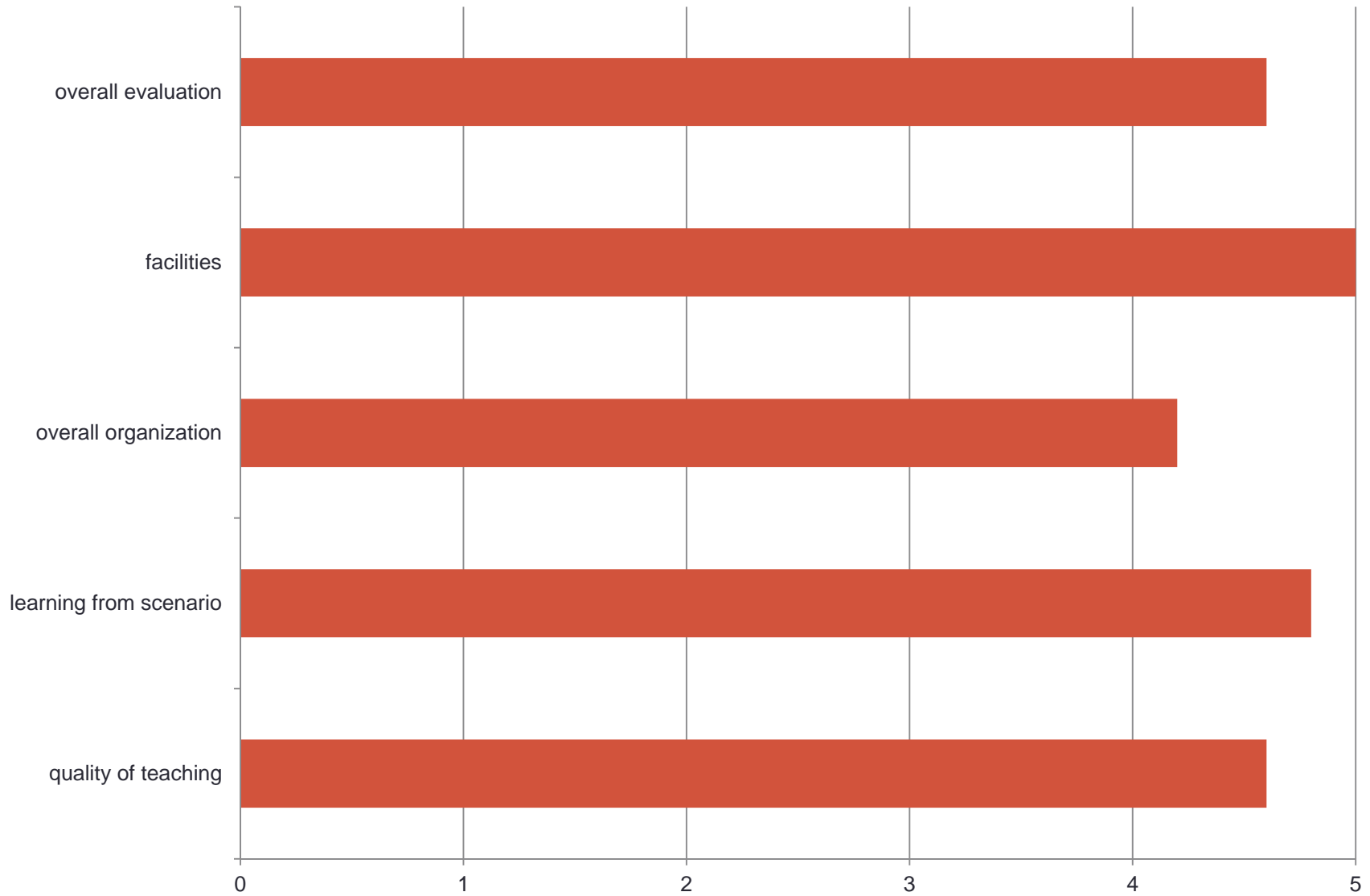
More Activities







## Evaluation of Experience by Trainees



# Post Stroke Simulation Knowledge

- Average score of 9/10 in post stroke knowledge assessment
- Included array of multiple choice questions covering clinical content
- And crisis resource management

# Feedback by Trainees

- *“Having a real life actor was really helpful to learn how to act quickly during an emergency.”*
- *“Realistic situation without risk- this is great for learning.”*

## Expansion

- Work with ED RNs in multi-disciplinary teams in simulation
- Expansion to other acute neurologic emergencies (herniation syndrome)
- Simulations for use in process flow improvements

## Multi-disciplinary teams in stroke simulation

- Work with new ED RN trainees to help train RN roles
- Had neurologist participate to reinforce CRM training

# Acute herniation syndrome

- Used mannequin as patient
- Operationalized technical skills including intubation, interpreting scans, administering acute medical therapies
- Coordination of care with other care providers and consultants

## In situ simulations

- In a performance improvement project
- Tested alternative work flows to identify pitfalls and equipment and personnel needs
- Used simulation with standardized patient (volunteer) to practice new work flows prior to real world execution



# Opportunities

- Better team based care
- Process improvement
- Core clinical and technical proficiencies