Brigham and Women's Hospital
Founding Member, Mass General Brigham

On the Emergency Room's Front Line

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  - Medical Simulation
  - Medical Education
  - Procedure Education

Disclosures

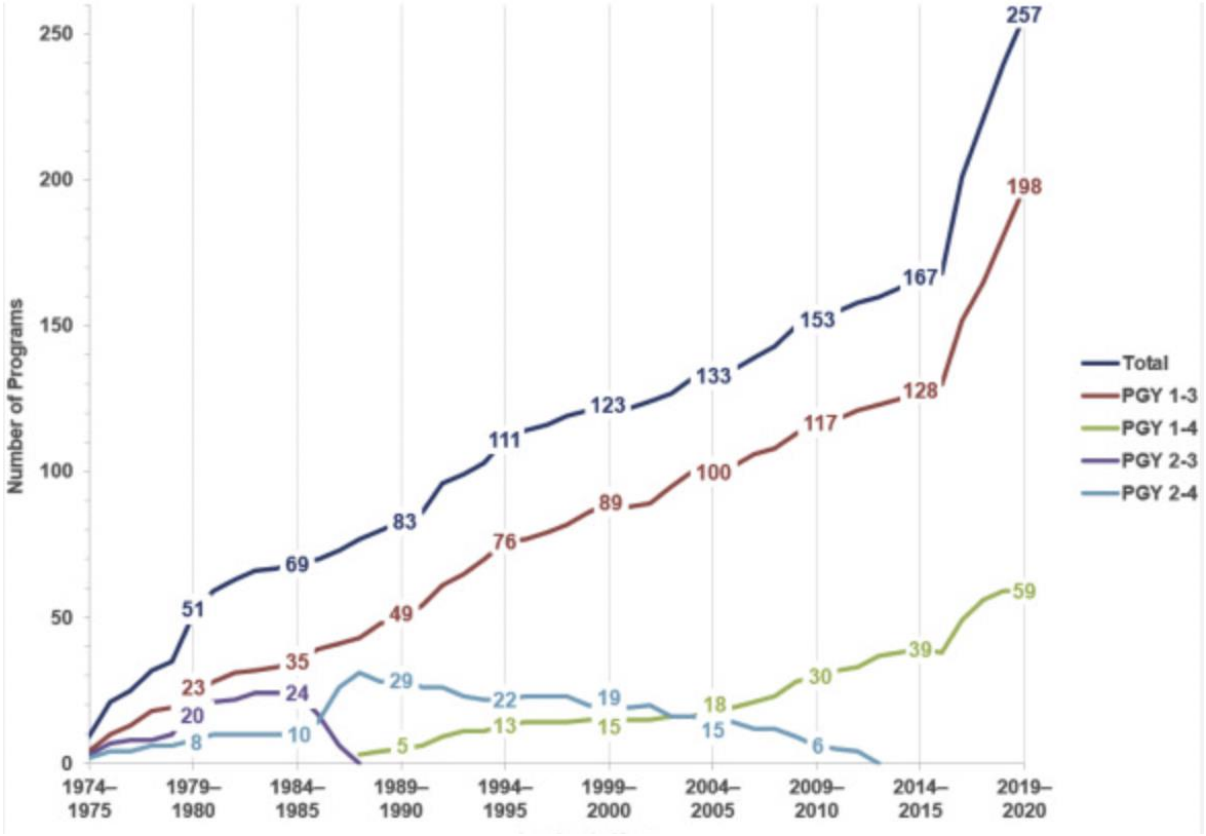
Dr. Eyre serves as an advisor for MedVR and ApoQlar, mixed reality (virtual reality and augmented reality) healthcare education companies. Their products have no relationship to the content of this presentation.

OBJECTIVES

- Describe the current landscape (and future) of Emergency Medicine
- Describe innovative models of care and alternative care pathways
- Share newer clinical decision rules and pathways

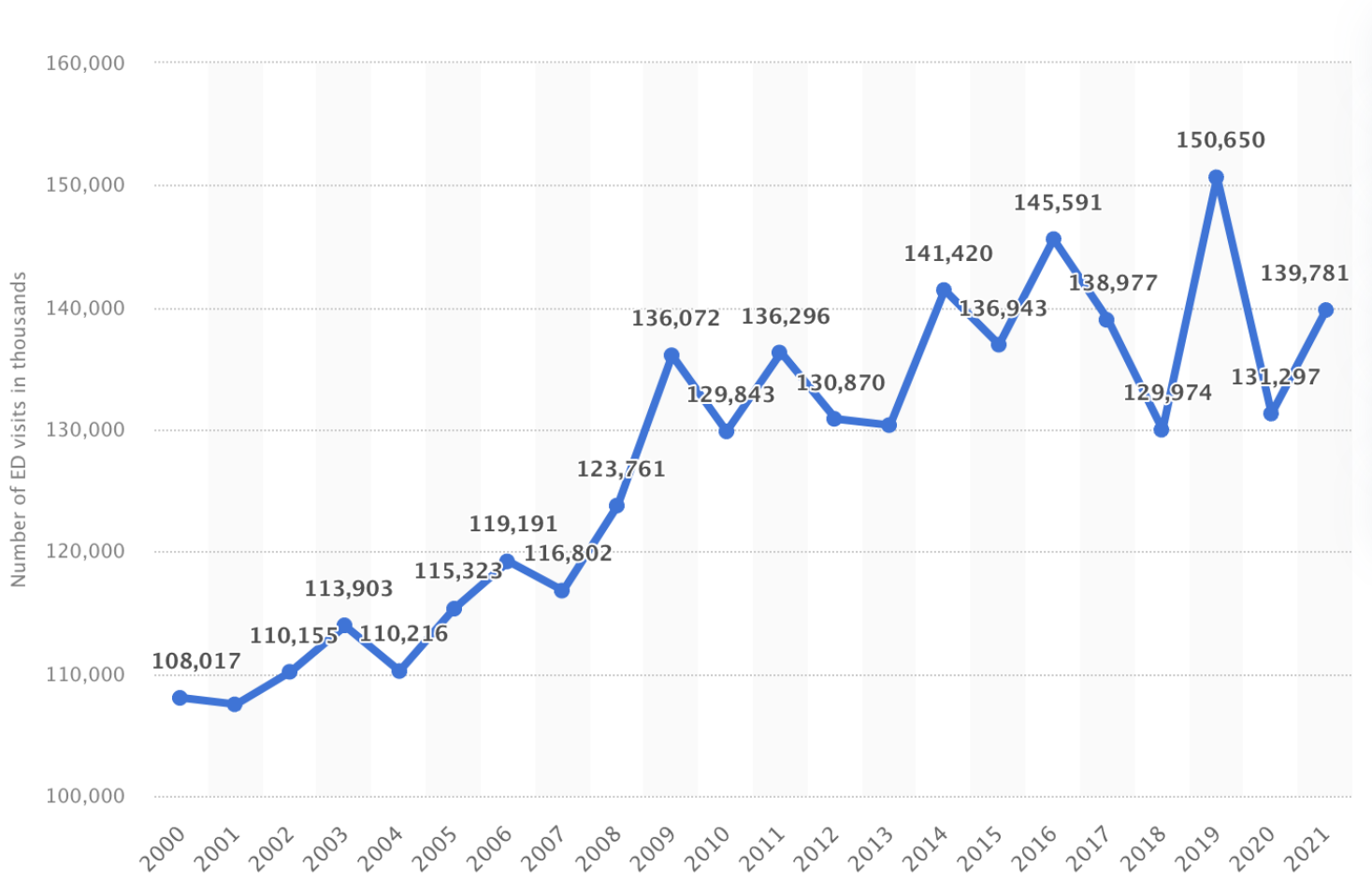
The Landscape of Emergency Medicine

- First EM residency program in 1970 at University of Cincinnati
- Became an independent specialty in 1979
- As of 2023, 272 EM training programs
- Numerous EM sub-specialties including:
  - Disaster Medicine
  - Medical Toxicology
  - Pre-Hospital Medicine (EMS)
  - Point of Care Ultrasound
  - Critical Care
  - Hyperbaric Medicine
  - Sports Medicine
  - Palliative Care
  - Aerospace Medicine
  - Pediatric EM
  - And many more…



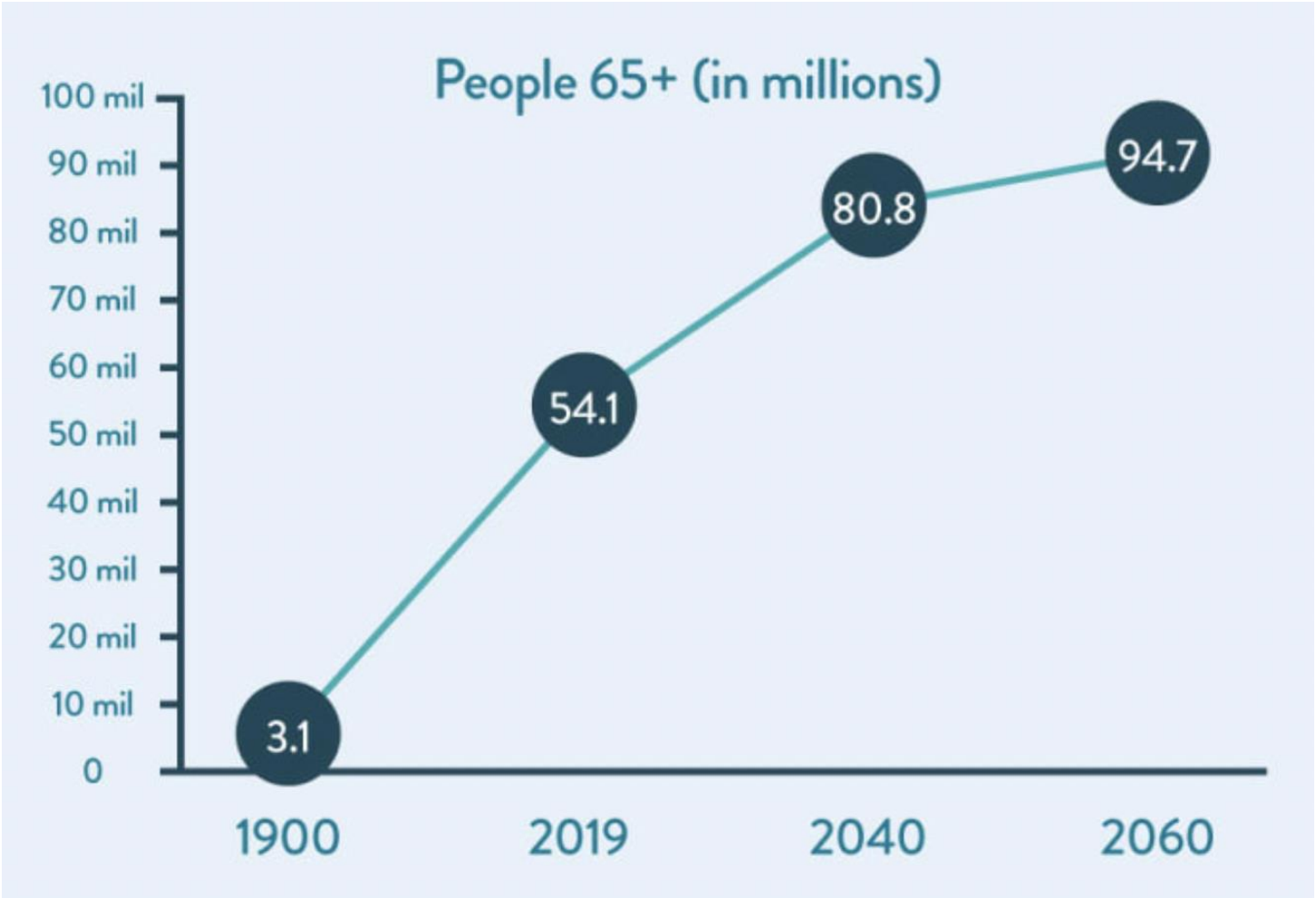
The Landscape of Emergency Medicine

- EM is rapidly becoming more popular and more competitive
- In 2022 3081 EM applicants, only 2702 matched
- Number of ED visits continue to rise overall



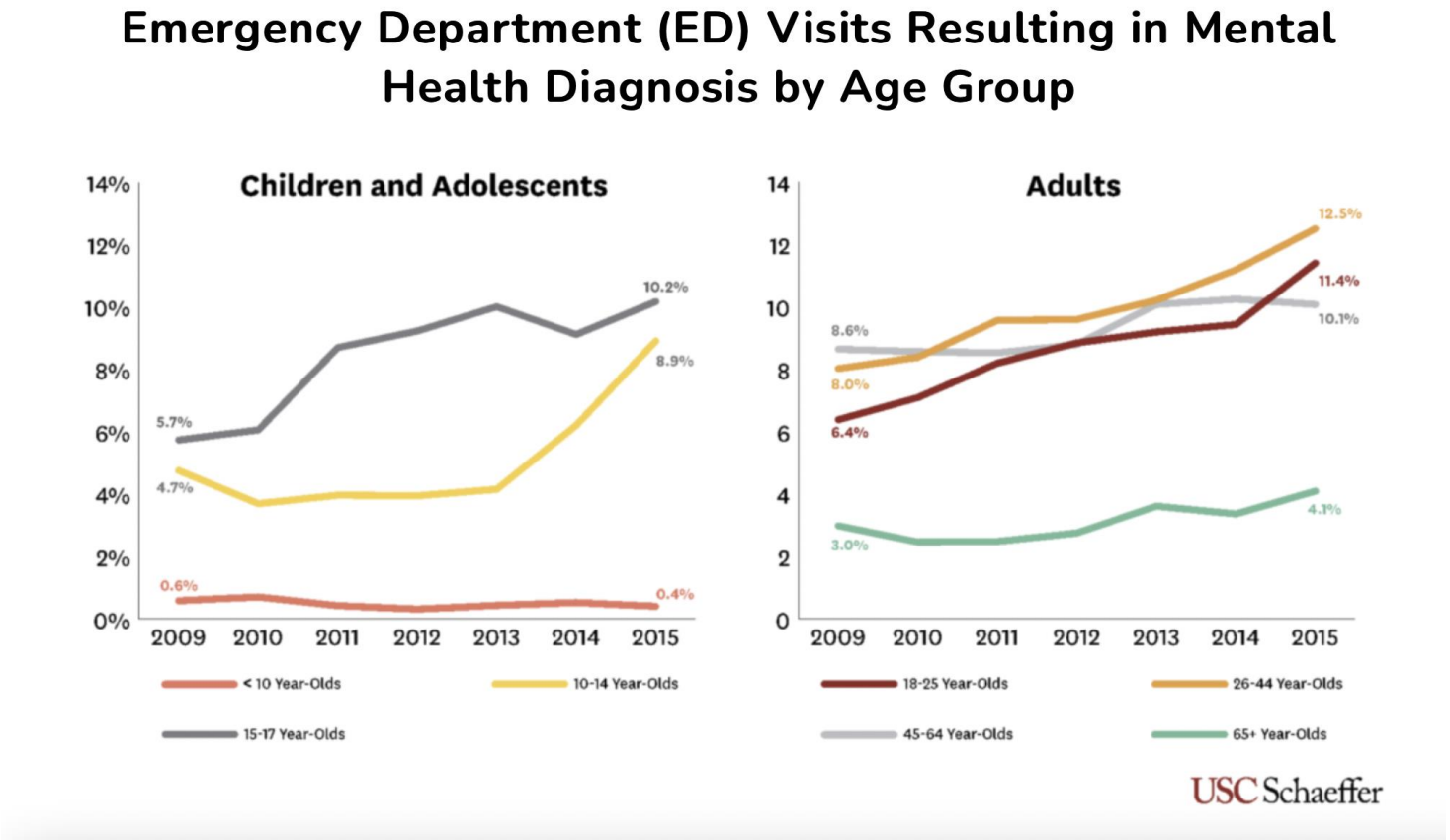
The Landscape of Emergency Medicine

- Patients are getting older
- Patients are more complex
- More care can be offered in the ED



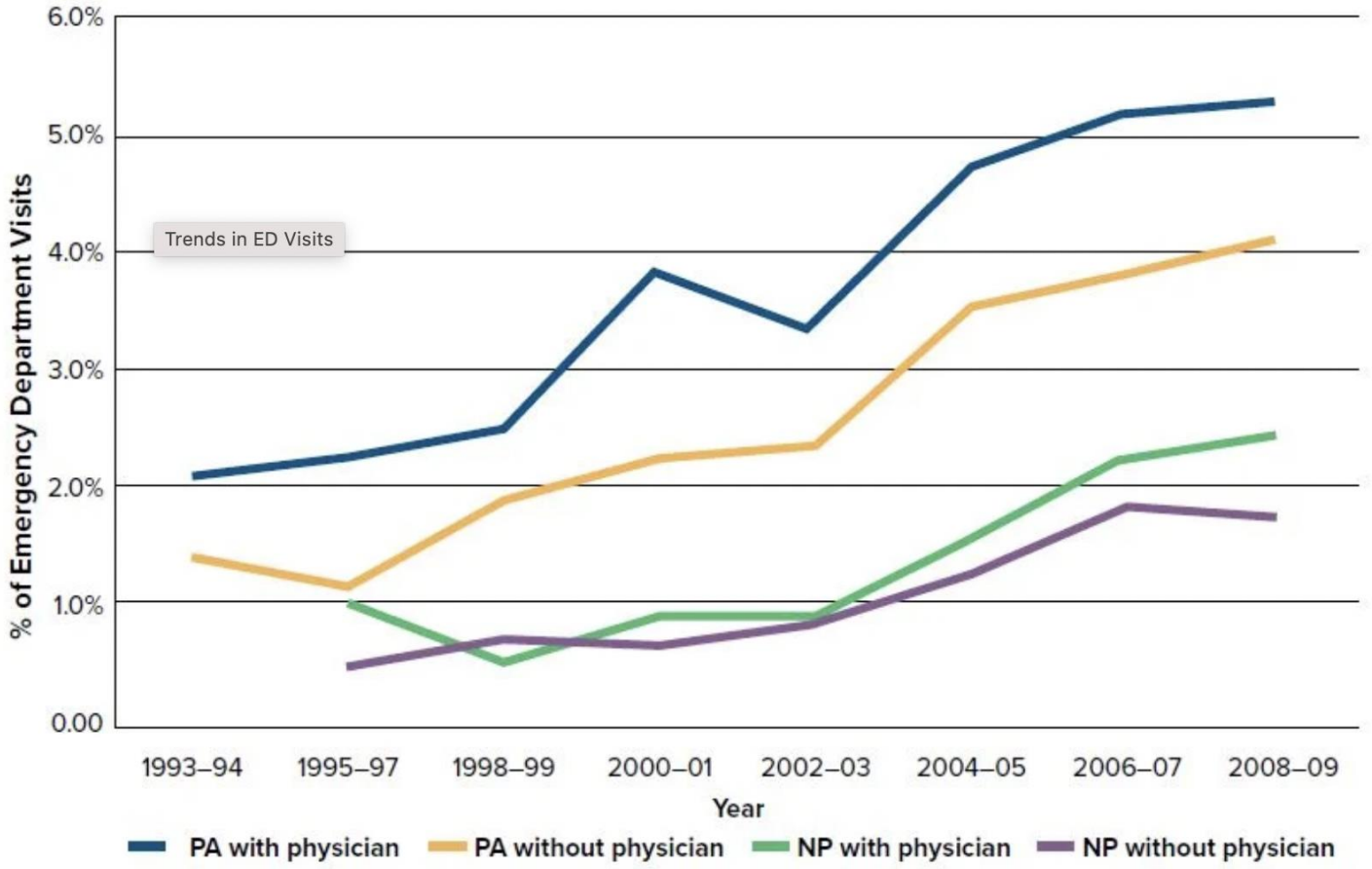
The Landscape of Emergency Medicine

- Increasing number of visits for mental health and behavior health emergencies



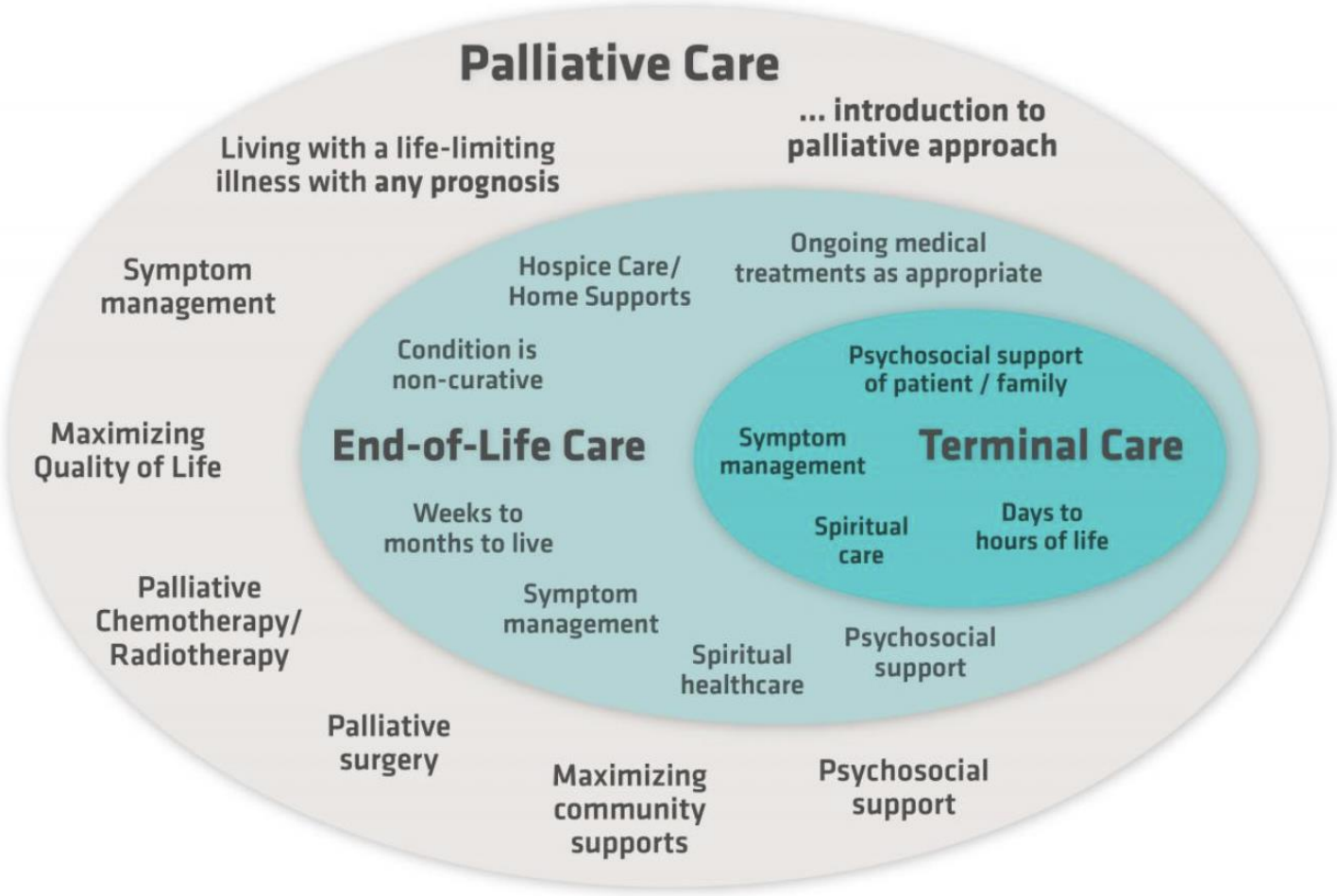
The Landscape of Emergency Medicine

- Increasing use of advanced practice practitioners



The Landscape of Emergency Medicine

- EM physicians are paying more attention to unmet palliative care needs and providing substance use disorder treatment

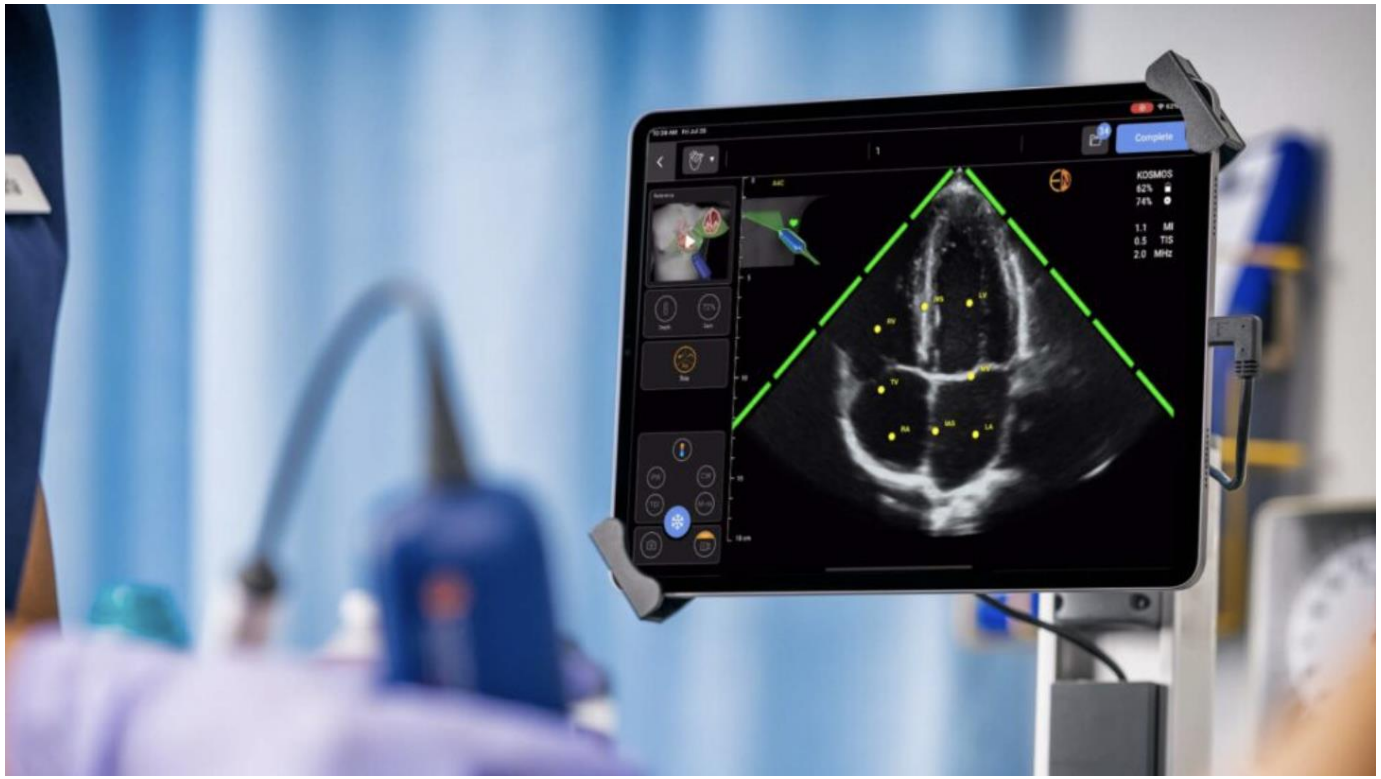


The Landscape of Emergency Medicine

- Point-of-care-ultrasound has been a game changer

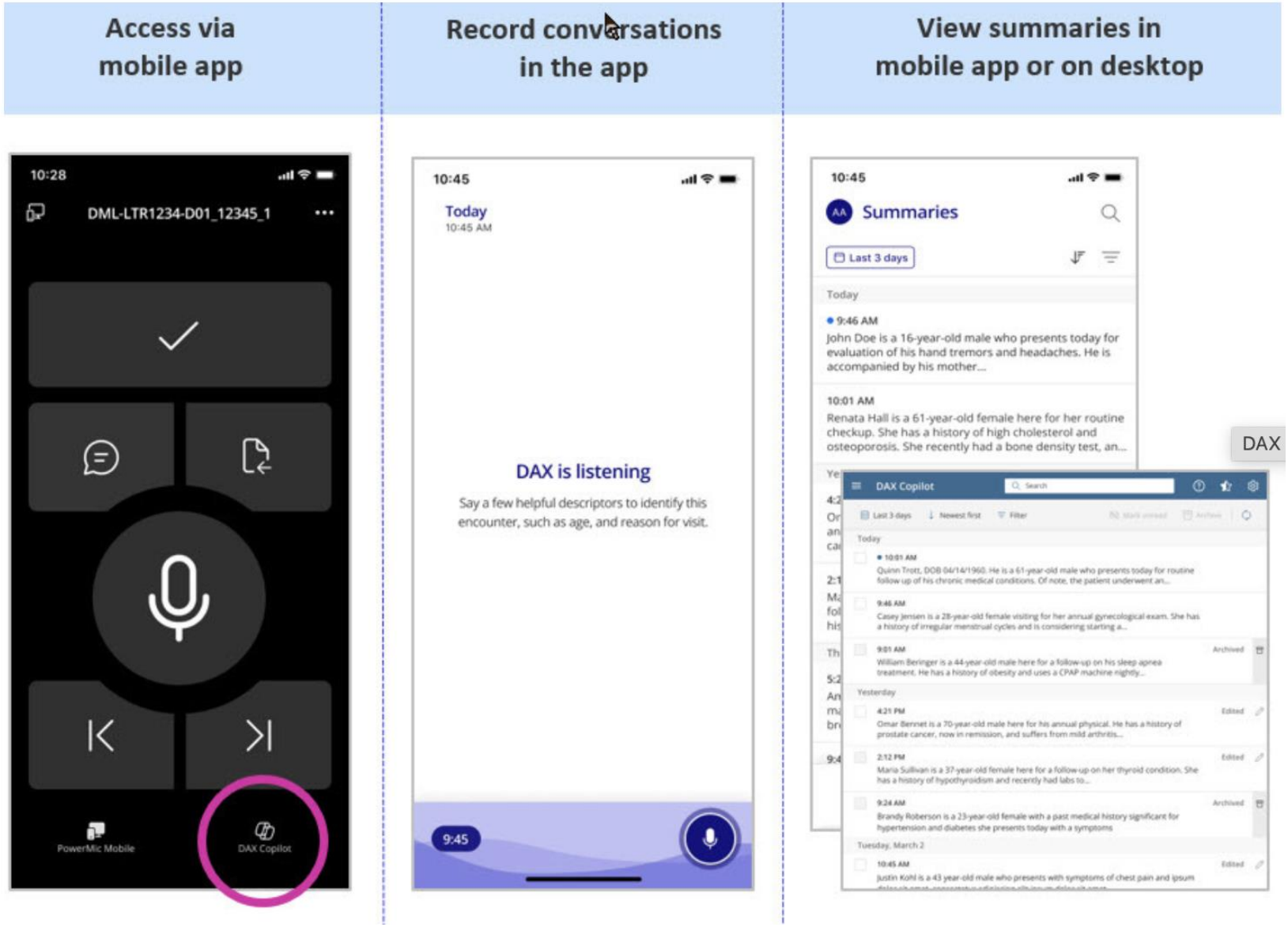
The Landscape of Emergency Medicine

- Artificial Intelligence is poised to make a huge impact in triage, diagnostics, treatment and documentation



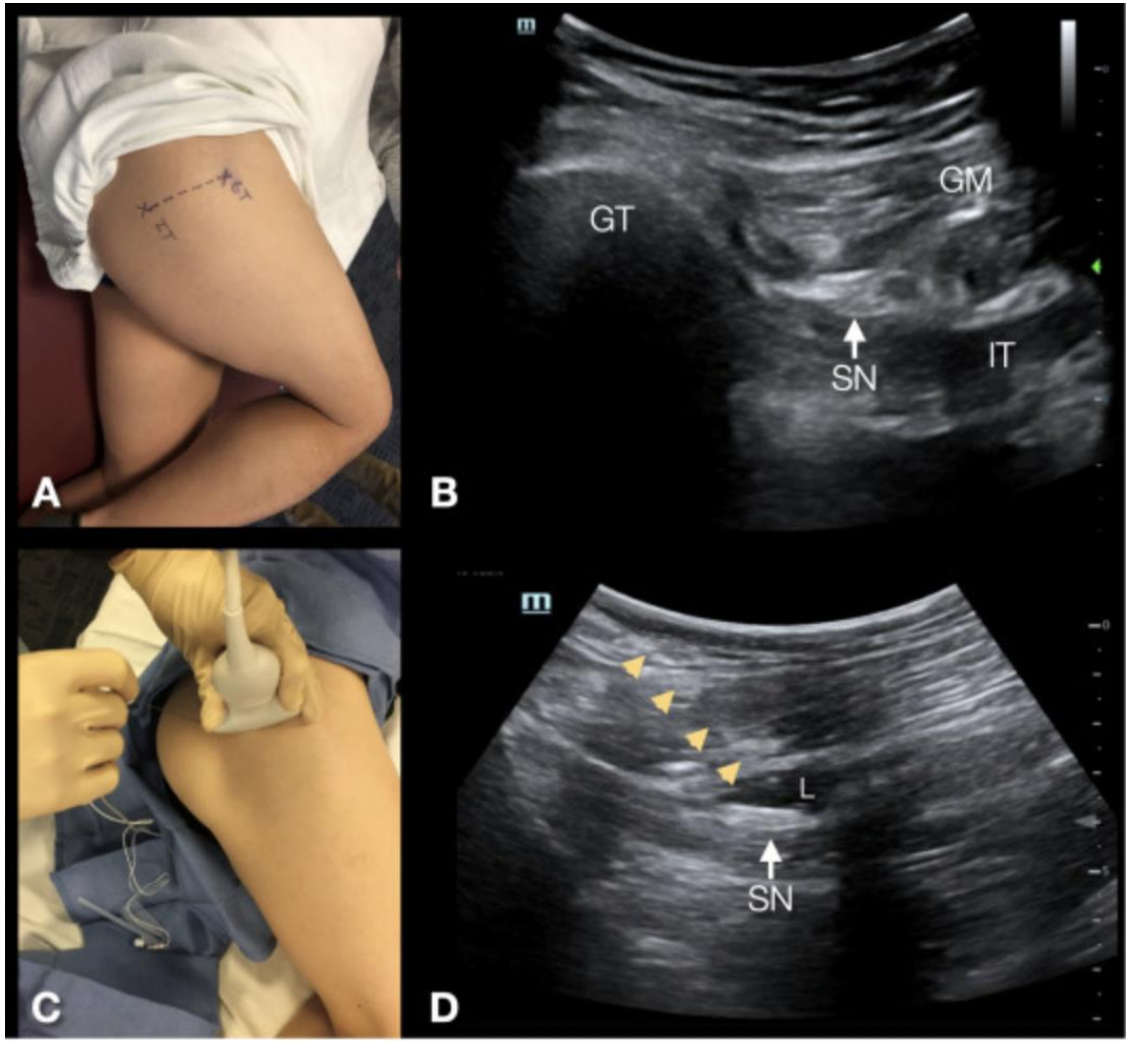
The Landscape of Emergency Medicine

- Ambient Listening AI-Assisted Documentation



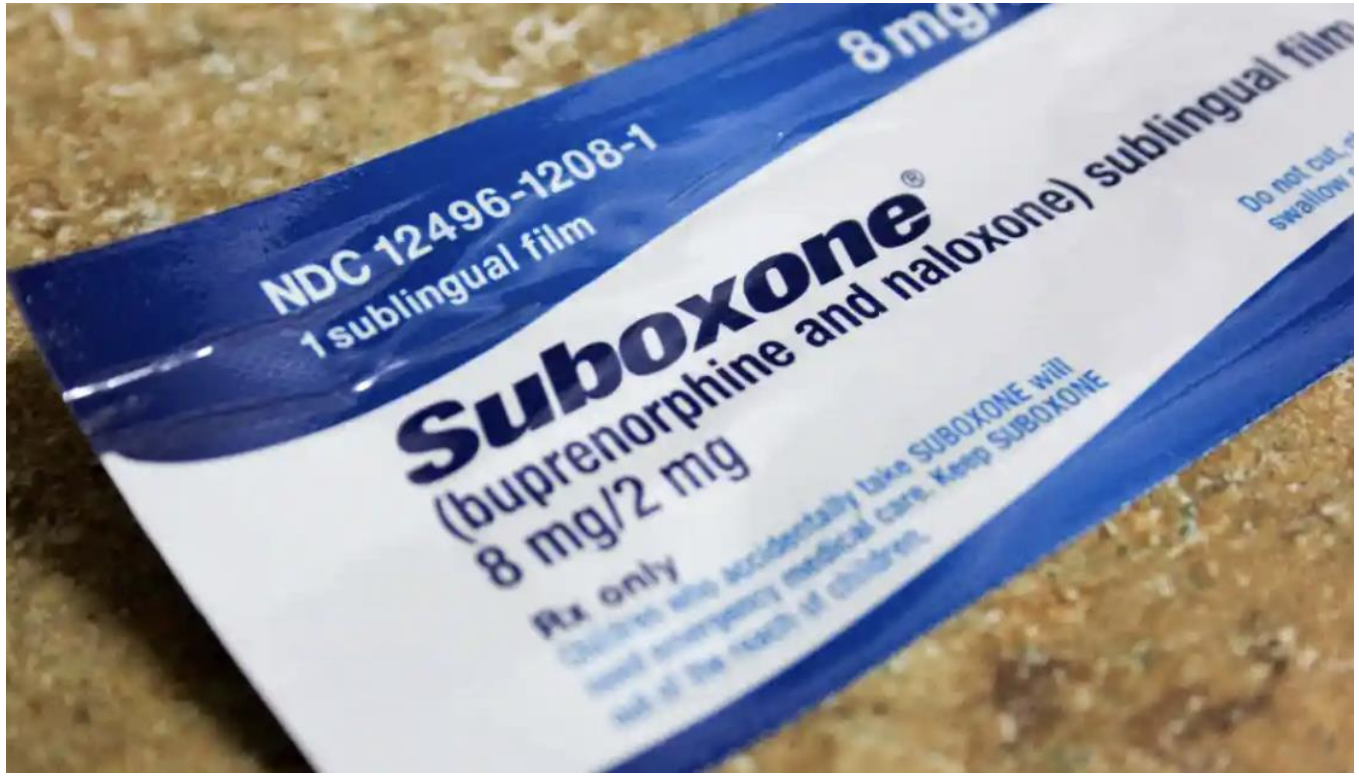
The Landscape of Emergency Medicine

- Increasing emphasis on multi-modal pain control using fewer long-term opioids, regional anesthesia (nerve blocks), and new uses for old medications (ketamine)



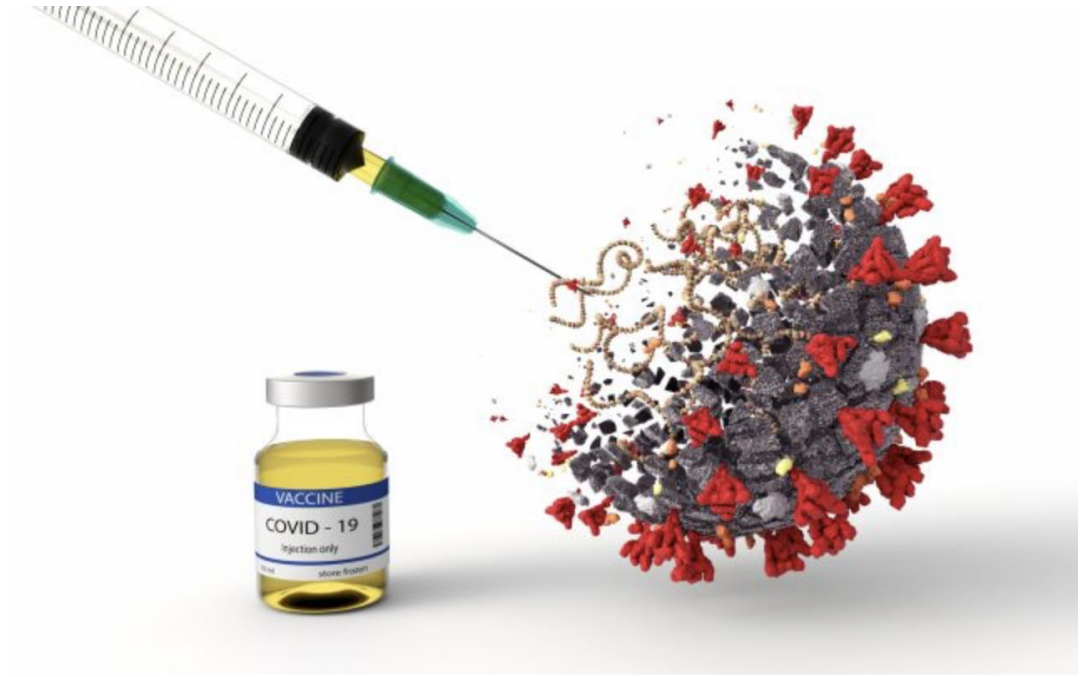
The Landscape of Emergency Medicine

- Increasing focus on social determinants of health, substance use disorder treatment, barriers to primary care, access to specialty care, and health literacy



The Landscape of Emergency Medicine

- The Covid19 Pandemic changed the specialty of Emergency Medicine at the time and for the future
  - PPE
  - Provider Risk
  - New Protocols
  - Lack of Evidence
  - Moral Hazard
  - Crisis Standards of Care
  - Public Health vs. Patient Health
  - Providing Vaccinations
  - Re-deployments
  - Boarding



The Landscape of Emergency Medicine

A	Complaint	Iso/Inf	CV-19	LOS
2	chest pain,shortness of...	☣	☣	04:25
3	Fatigue			01:42
2	Shortness of Breath	☣	☣	03:07
3	Abdominal Pain			04:17
3	Headache; Hypertensio...	☣	☣	14:16
2	Hyperglycemia	☣	☣	21:25
3	Abscess			02:07
2	Altered Mental Status;...			00:51
3	Cough	☣	☣	02:34
2	Chest Pain	☣	☣	02:20
3	Fever; Generalized Bo...	☣	☣	12:18
2	Fever	☣	☣	03:27
2	Headache	☣	☣	02:15
3	Abscess	☣		05:18
2	Abdominal Pain; Short...	☣	☣	23:57
3	Abdominal Pain	☣	☣	05:38
3	Wound Infection			02:28
3	Motor Vehicle Crash; C...			02:56
2	fever,shortness of breath	☣	☣	05:51
2	Hypotension	☣	☣	04:53
3	Chest Pain; Abdominal...	☣	☣	65:09
2	Shortness of Breath	☣	☣	29:24

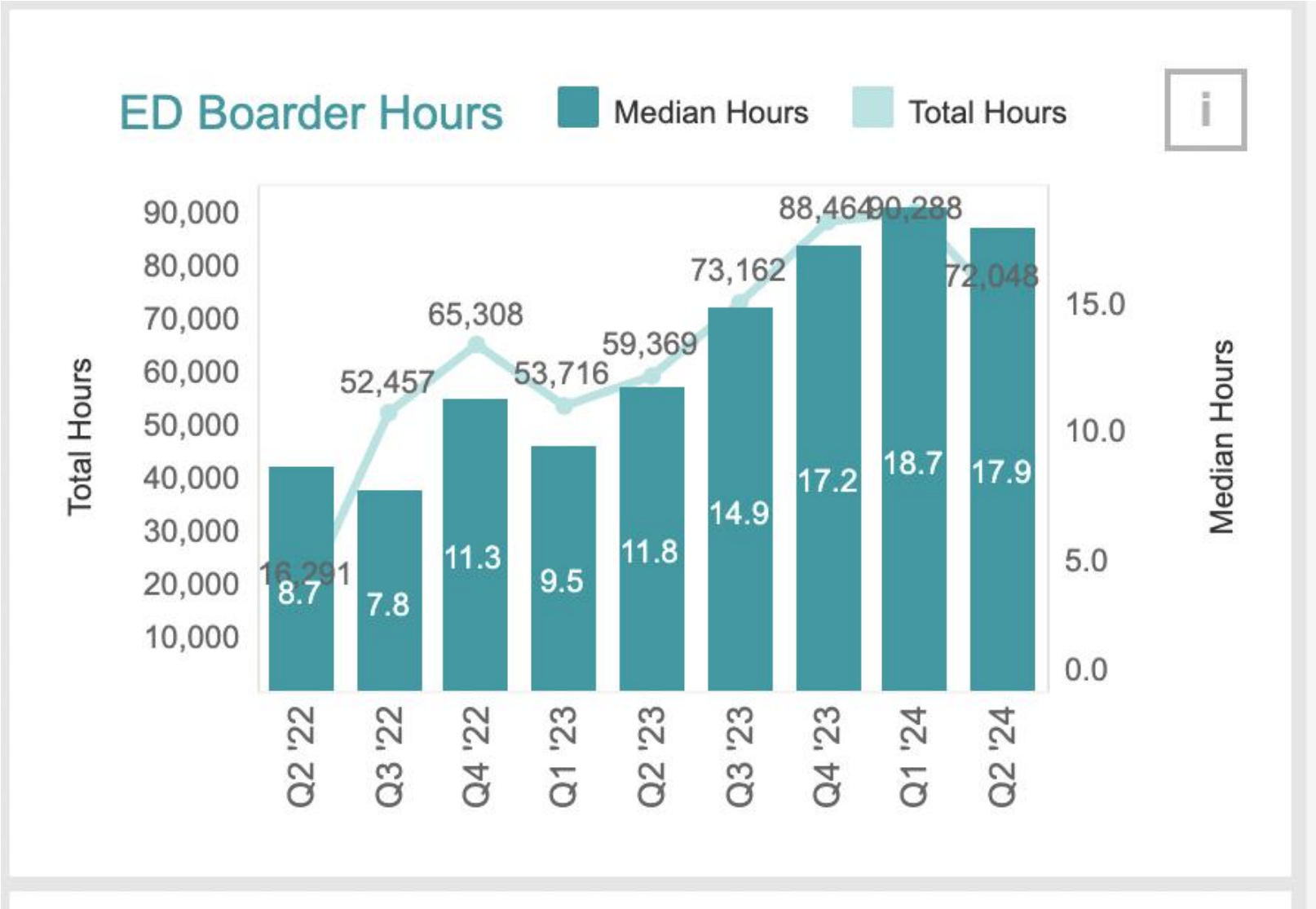
Bed	Fall	Pat	Age	Sex	EDi	Ref	A	Complaint	Hal	Iso/	CV-	LOS
58	🚶	S...	80 y	F			3	Fall				25:16
59	🚶	B...	53 y	F		R	2	Fever				48:36
59H		*R..*	65 y	M			3	Hypertension		☣	☣	04:35
60	🚶	*W..*	31 y	F			3	Sore Throat				46:27
61	🚶	R...	41 y	F			3	Nausea/Vomiting; A...		☣		23:49
62	🚶	G..	58 y	M	📥	R	2	Fever; Shortness of...		☣		73:11
63H		ⓘ	67 y	F			3	Vaginal Bleeding				06:59
64	🚶	C...	71 y	M		R	2	Failure To Thrive		☣	☣	19:00
65	🚶	G..	100 y	F	📥		2	Shortness of Breat...		☣	☣	39:59
65H		S...	28 y	F			2	Nausea/Vomiting				11:02
66		T...	70 y	F			2	Nausea/Vomiting				17:54
67	🚶	Z...	56 y	F			2	Abnormal ECG				17:57
68	🚶	C...	75 y	F		R	2	Fever; Headache; ...				23:52
69	🚶	ⓘ	77 y	M			3	Fatigue		☣	☣	17:08
69H		C...	83 y	F			2	Fall; Altered Mental...				00:22

Patient Boarding: An Example

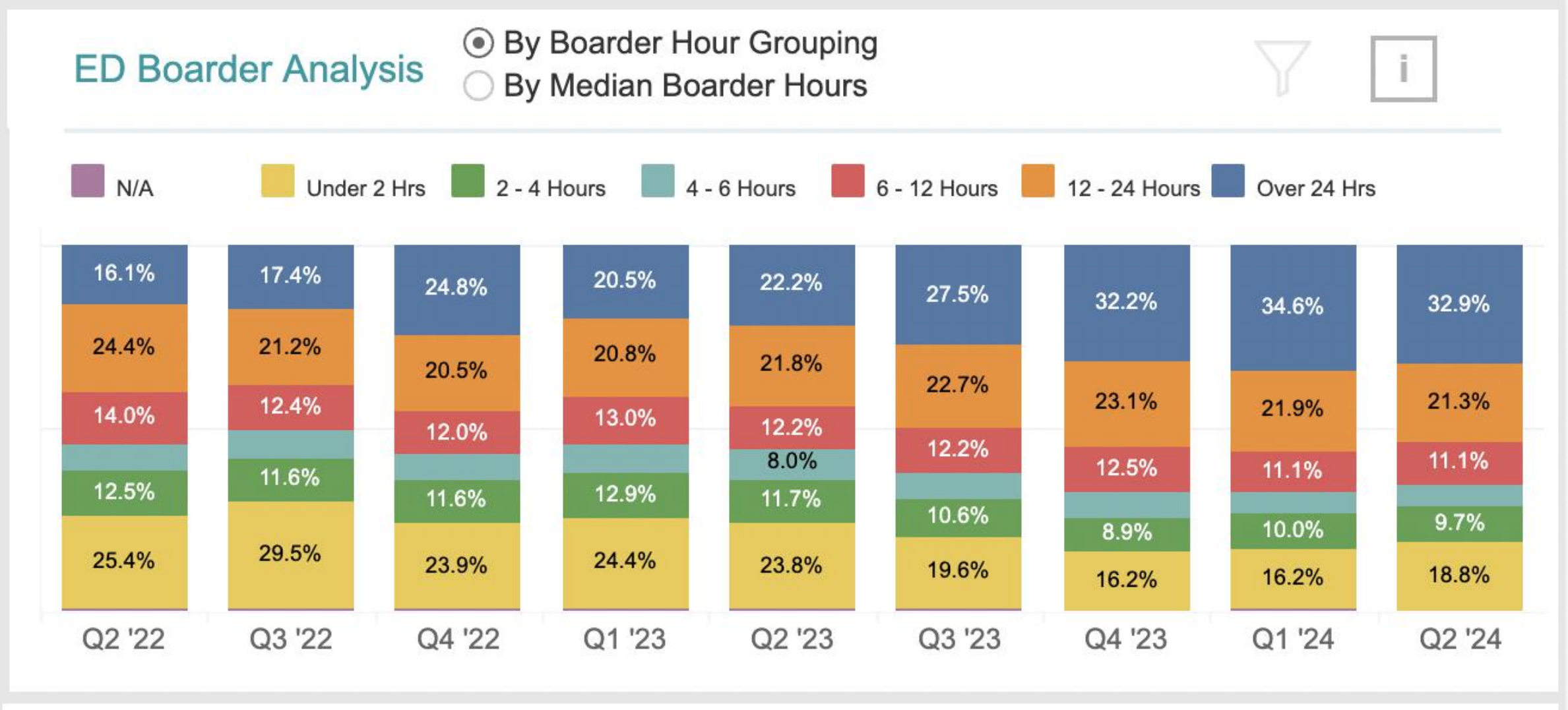
- Level 1 Academic Tertiary/Quaternary Emergency Department
- 43 Acute Care Beds
- 20 Observation Beds (often many closed to RN staffing)
- 1 Entire Pod (13 Beds) designated for boarding patients
- 7 Triage/Fast-track rooms
- Average of 40 Inpatient Boarders per day
- 80 Boarders some days

Hospital overcrowding in A&E departments 'killed 1,300' patients amid urgent waiting list warning | The Irish Sun (thesun.ie)

Patient Boarding: An Example



Patient Boarding: An Example



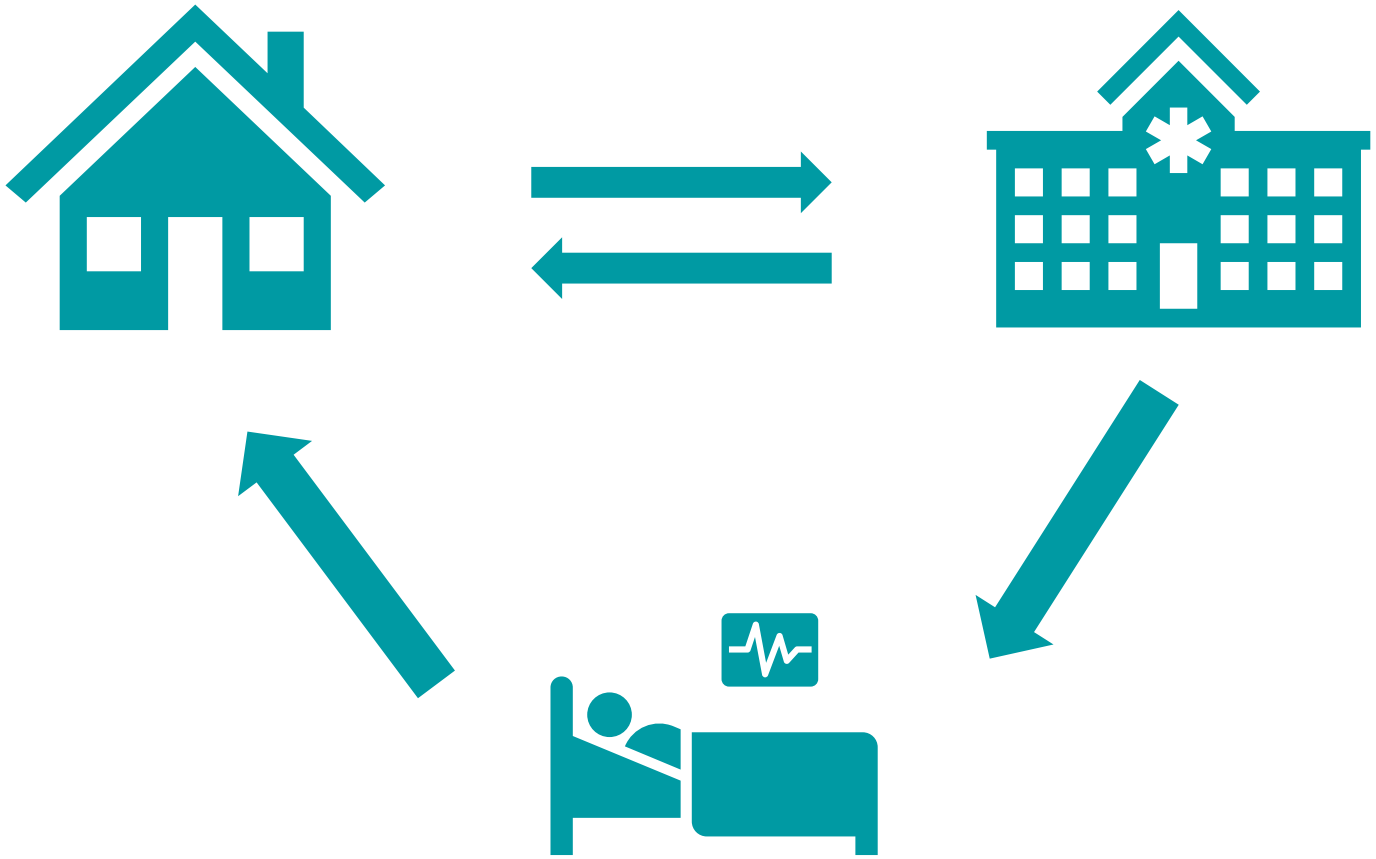
Patient Boarding: Why now?

- More patients in and fewer patients out (but admissions to medicine are stable)
- Poor access to primary care leads to poor preventative care and busy EDs
- Staffing challenges in both outpatient and inpatient settings
- When patients cannot be seen by outpatient providers, they come to the ED
- Much “elective” care was put off during the peak of Covid that is now urgent and emergent
- Significant challenges discharging patients with home care, to skilled nursing facilities, psychiatric facilities
- Hospitals still addressing financial deficits secondary to Covid

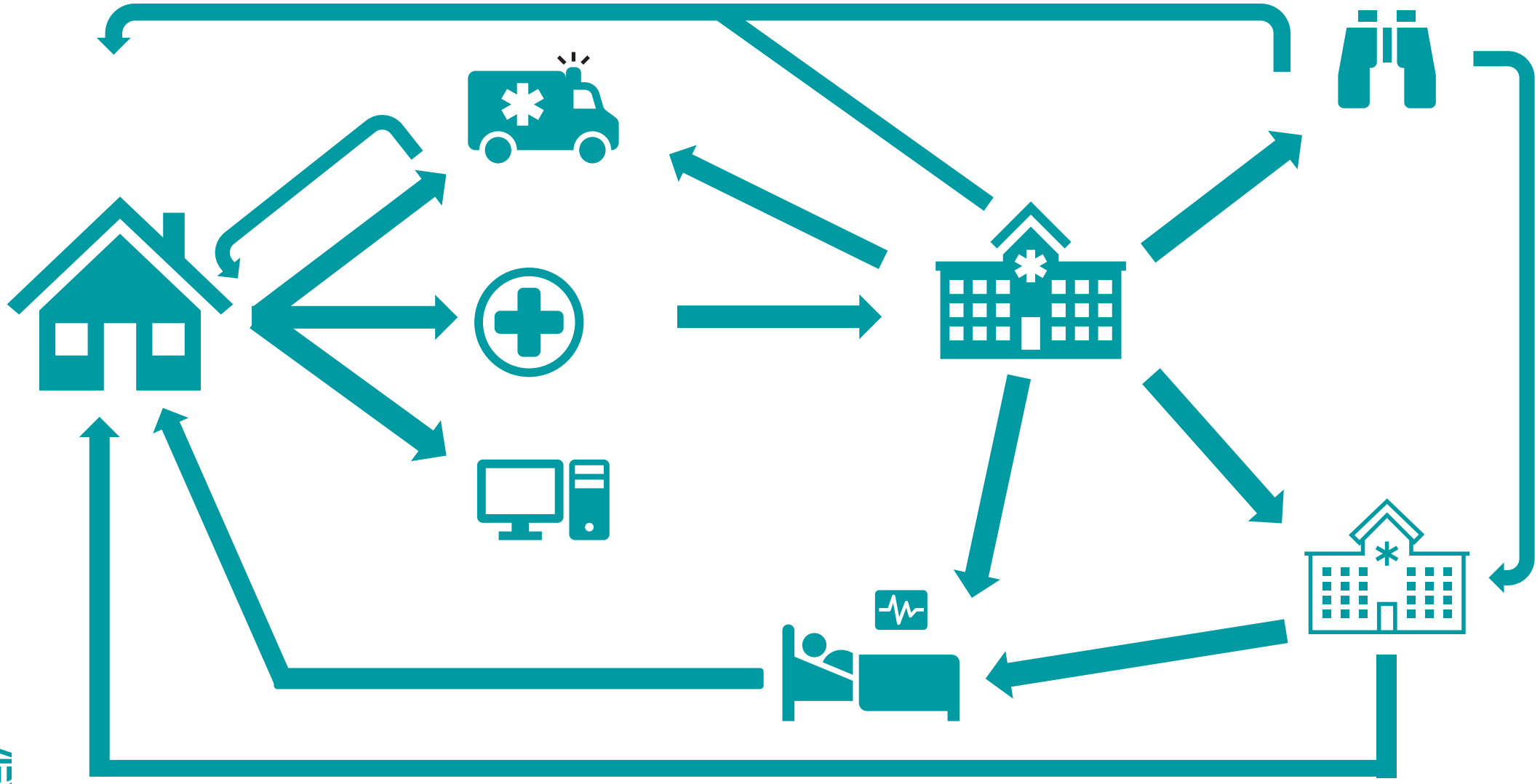
Patient Boarding: Solutions

- Boarding is a hospital problem, not an Emergency Department problem
- Adjust staffing times and locations
- Recruit staff, retain staff and develop workforce
- Expedite discharges (defer unnecessary workups, early discharge planning, creative dispositions, discharge lounges
- Appreciate the situation and be patient, flexible, and understanding
- Manage patient expectations
- Consider alternatives to referring patients to an ED
- Be thoughtful about who truly needs a tradition ED evaluation

Changing Emergency Care Landscape



Changing Emergency Care Landscape



Changing Emergency Care Landscape

What are common conditions treated in Home Hospital?

COPD, Asthma, Flu, Pneumonia, COVID-19

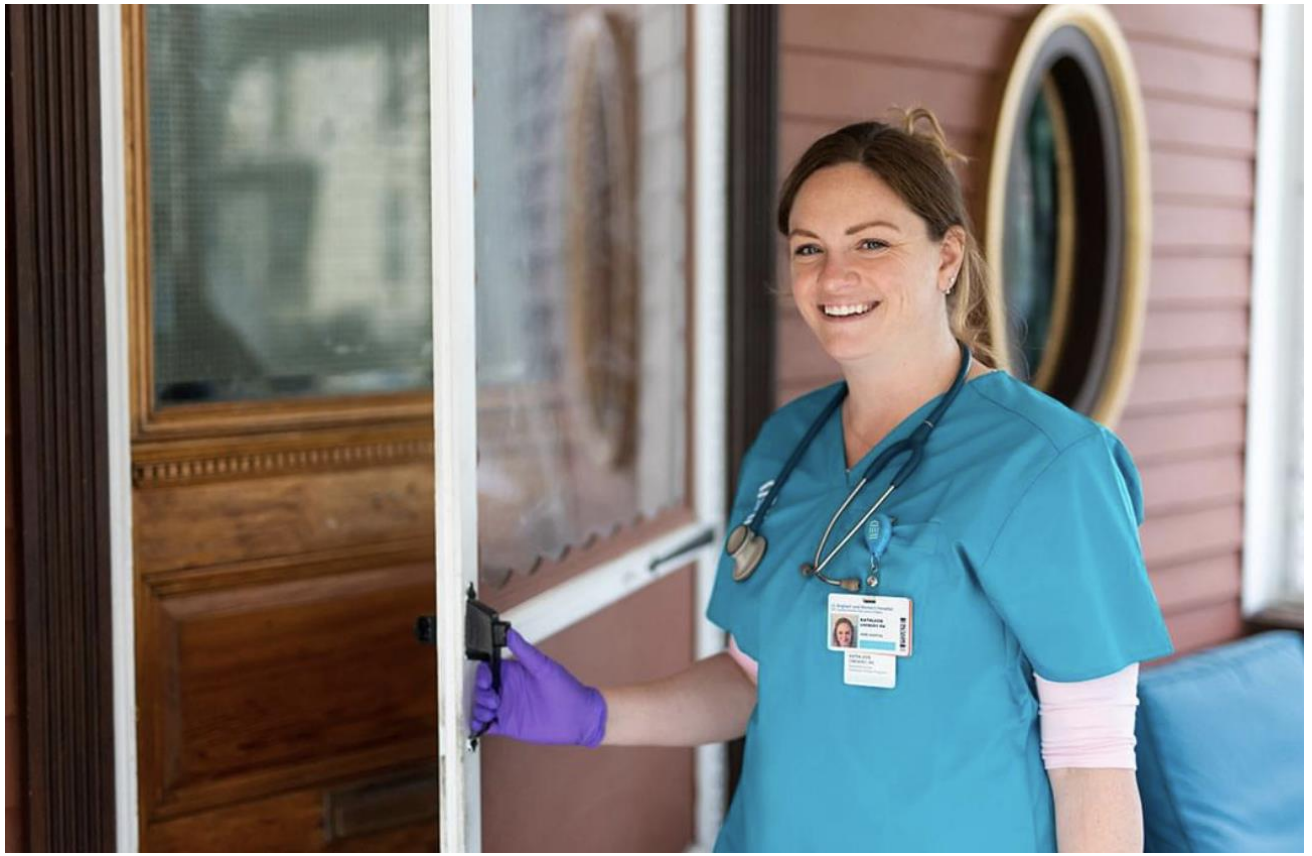
Heart Failure, A-Fib with RVR, Hypertensive Urgency, Severe hyperglycemia

Cellulitis, Complicated UTI, other infections

IBD Flare, Colitis, Diverticulitis, Pancreatitis

CKD with Volume Overload, Mild Adrenal Crisis

Acute Hepatitis, Decompensated Cirrhosis



Changing Emergency Care Landscape

What services does Home Hospital provide?

- 1x/daily in-person or virtual physician/APP care
- 2x/daily nursing or paramedicine visits
- 24/7 remote monitoring and nurse availability
- 24/7 Mobile Integrated Health medic response
- IV Medication up to 3x daily, or continuous infusions
- Diagnostics (labs, x-rays, imaging)
- Oxygen
- DME
- Medications
- Case management
- Specialty consults
- PT/OT/ST
- Home health aide / personal care aide
- Transportation
- Medically tailored meals
- Medical social services
- And much more… If any questions just ask!

So… ED's are busier than ever, patients are more complex, the care environments and pathways are changing

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One part of the solution is to avoid unnecessary ED visits, admissions, and workups

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Clinical Decision Rules and Treatment Algorithms

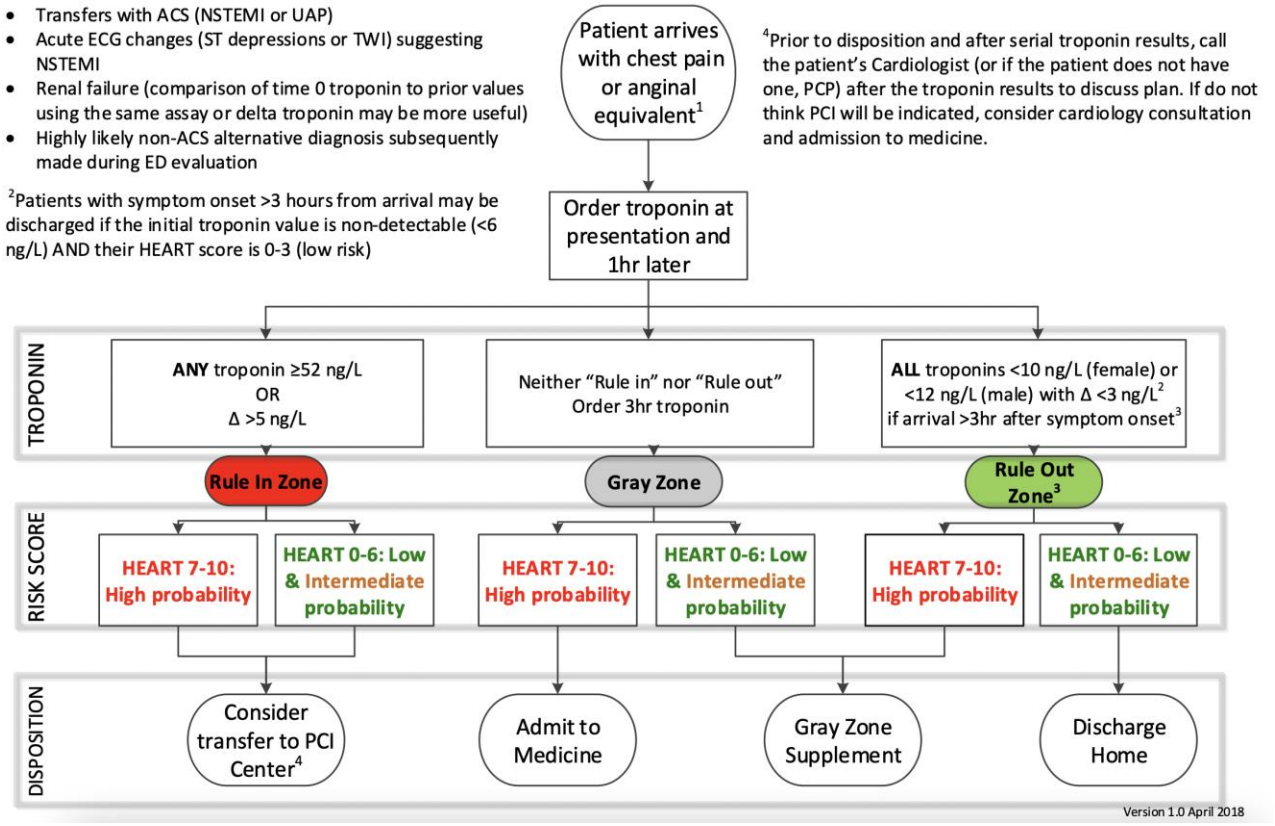
Cardiac Care

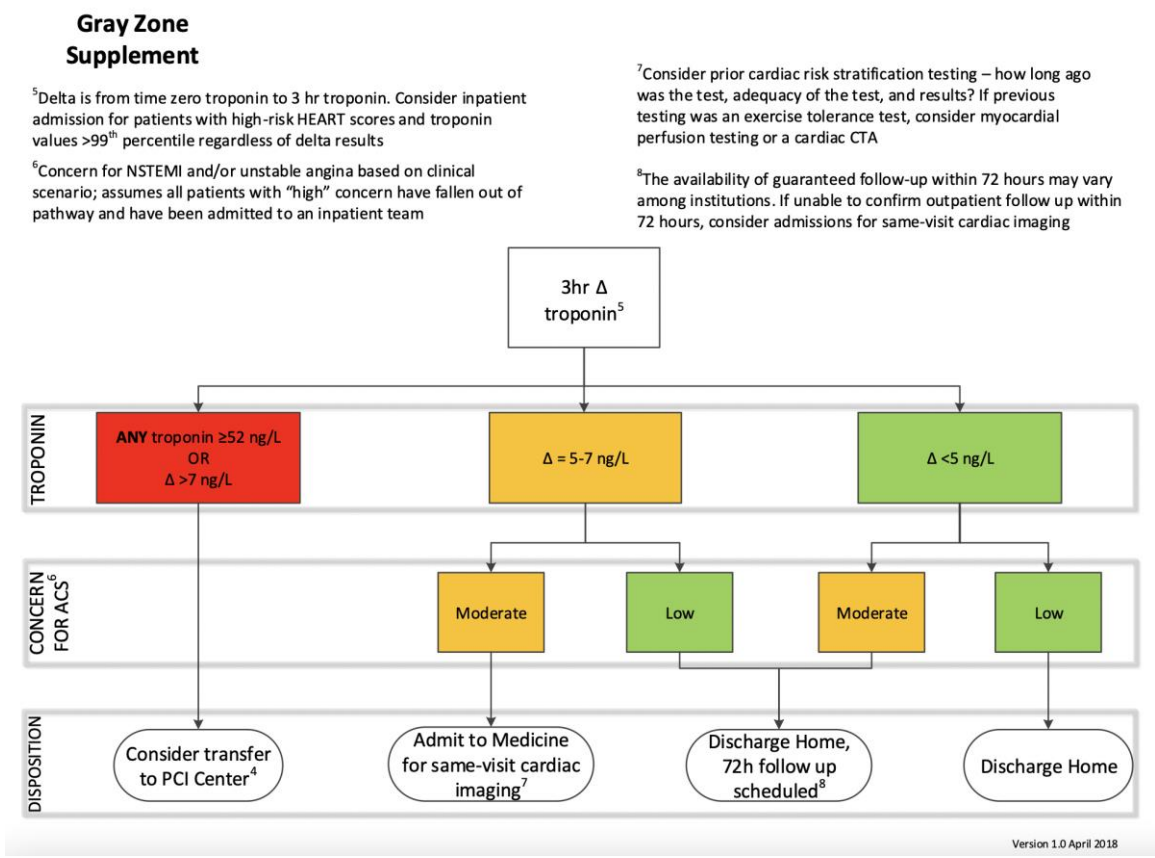
- HEART Score

History	Slightly suspicious	0			
	Moderately suspicious	+1			
	Highly suspicious	+2			
EKG 1 point: No ST deviation but LBBB, LVH, repolarization changes (e.g. digoxin); 2 points: ST deviation not due to LBBB, LVH, or digoxin	Normal	0			
	Non-specific repolarization disturbance	+1			
	Significant ST deviation	+2			
Age	<45	0	45-64	+1	≥65 +2
Risk factors Risk factors: HTN, hypercholesterolemia, DM, obesity (BMI >30 kg/m^2), smoking (current, or smoking cessation ≤3 mo), positive family history (parent or sibling with CVD before age 65); atherosclerotic disease: prior MI, PCI/CABG, CVA/TIA, or peripheral arterial disease	No known risk factors	0			
	1-2 risk factors	+1			
	≥3 risk factors or history of atherosclerotic disease	+2			
Initial troponin Use local, regular sensitivity troponin assays and corresponding cutoffs	≤normal limit	0			
	1–3× normal limit	+1			
	>3× normal limit	+2			

Cardiac Care

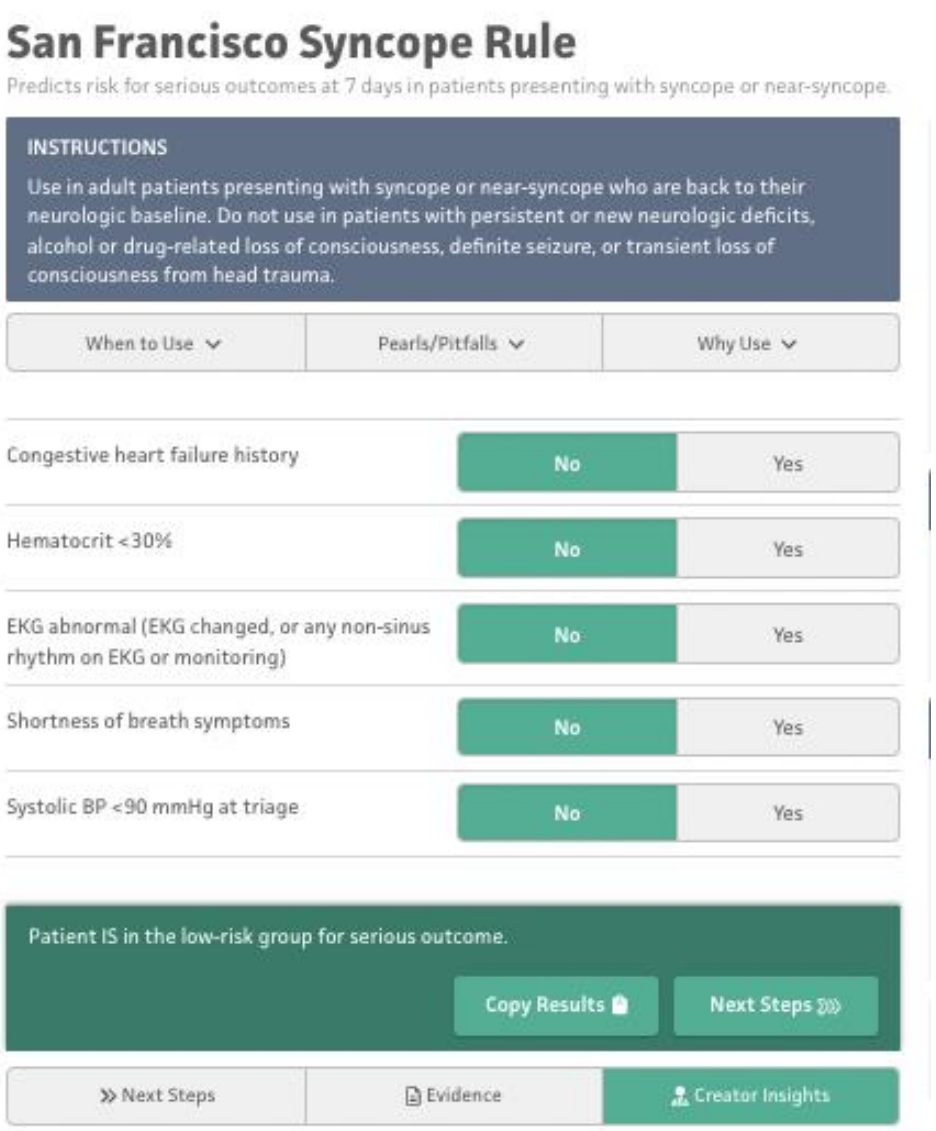
- High Sensitivity Troponin





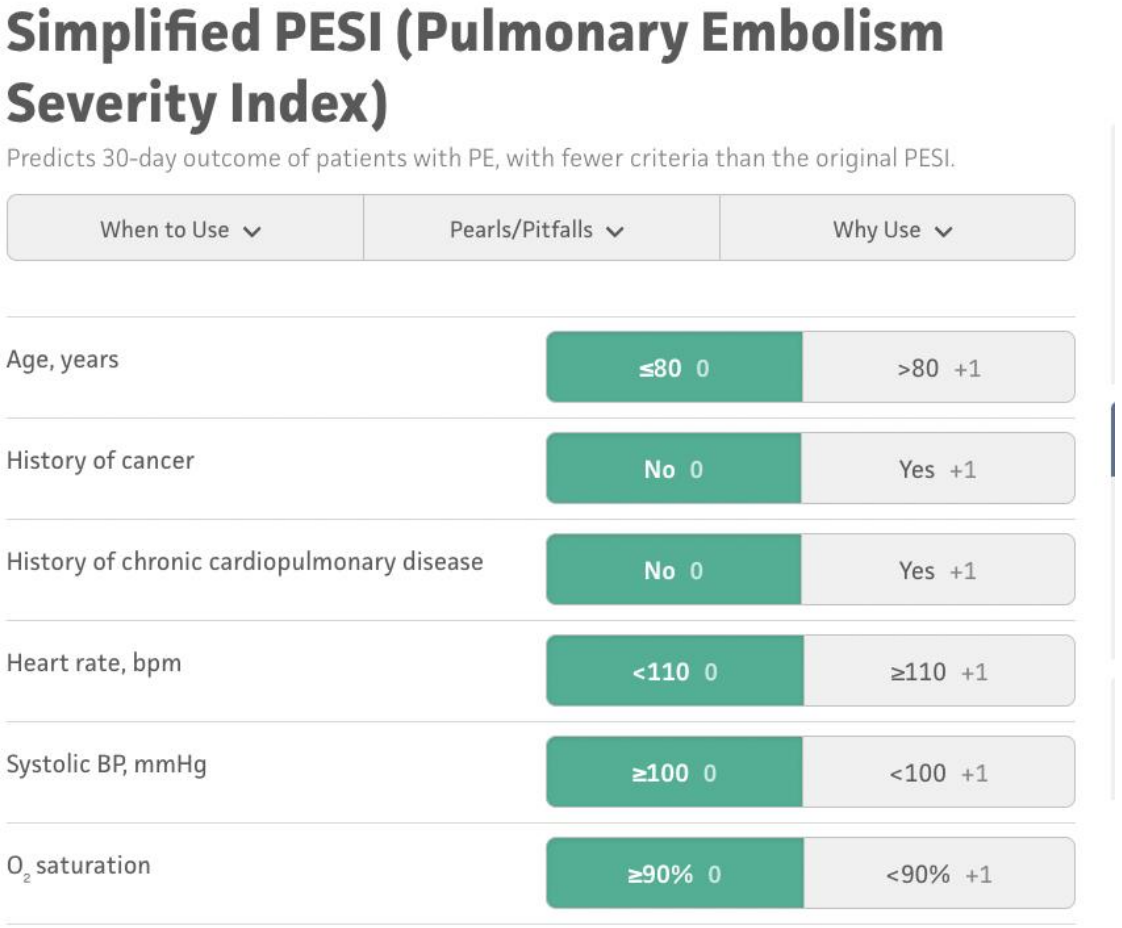
Cardiac/Pulmonary Care

- San Francisco Syncope Risk Score
- Canadian Syncope Rule



Cardiac/Pulmonary Care

- Wells Criteria and PERC Criteria for screening patients needing PE workup
- Age adjusted D-dimer and risk-adjusted D-dimer (YEARS study) to change threshold for CT angiography
- PESI, sPESI, Hestia criteria for identifying low-risk PE patients who can receive outpatient treatment



Simplified PESI (Pulmonary Embolism Severity Index)

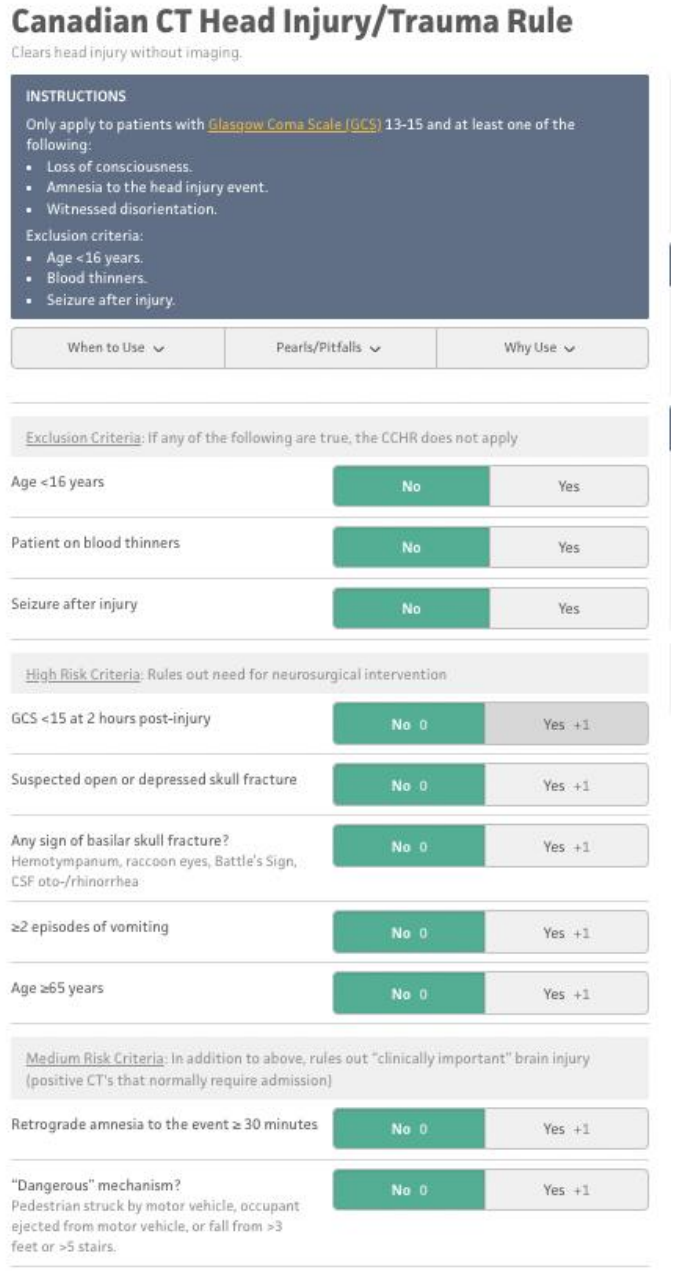
Predicts 30-day outcome of patients with PE, with fewer criteria than the original PESI.

When to Use | Pearls/Pitfalls | Why Use

Age, years	≤80 0	>80 +1
History of cancer	No 0	Yes +1
History of chronic cardiopulmonary disease	No 0	Yes +1
Heart rate, bpm	<110 0	≥110 +1
Systolic BP, mmHg	≥100 0	<100 +1
O_2 saturation	≥90% 0	<90% +1

Head Injury

- Canadian Head CT Rule
- New Orleans Injury Rule
- NEXUS Criteria



Canadian CT Head Injury/Trauma Rule

Clears head injury without imaging.

INSTRUCTIONS

Only apply to patients with Glasgow Coma Scale (GCS) 13-15 and at least one of the following:

- Loss of consciousness.
- Amnesia to the head injury event.
- Witnessed disorientation.

Exclusion criteria:

- Age <16 years.
- Blood thinners.
- Seizure after injury.

When to Use | Pearls/Pitfalls | Why Use

Exclusion Criteria: If any of the following are true, the CCHR does not apply

Age <16 years	No	Yes
Patient on blood thinners	No	Yes
Seizure after injury	No	Yes

High Risk Criteria: Rules out need for neurosurgical intervention

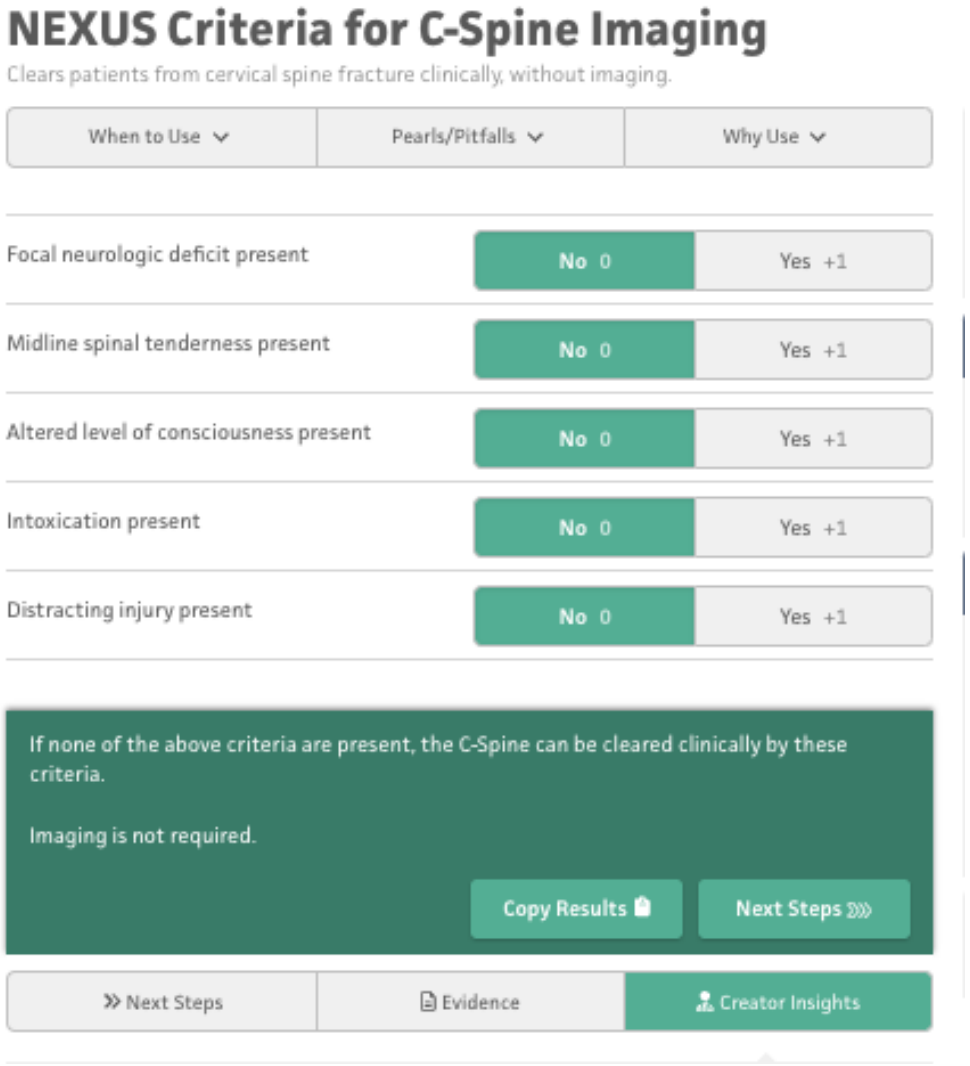
GCS <15 at 2 hours post-injury	No 0	Yes +1
Suspected open or depressed skull fracture	No 0	Yes +1
Any sign of basilar skull fracture? Hemotympanum, raccoon eyes, Battle's Sign, CSF oto-/rhinorrhea	No 0	Yes +1
≥2 episodes of vomiting	No 0	Yes +1
Age ≥65 years	No 0	Yes +1

Medium Risk Criteria: In addition to above, rules out "clinically important" brain injury (positive CT's that normally require admission)

Retrograde amnesia to the event ≥ 30 minutes	No 0	Yes +1
"Dangerous" mechanism? Pedestrian struck by motor vehicle, occupant ejected from motor vehicle, or fall from >3 feet or >5 stairs.	No 0	Yes +1

Cervical Spine Injury

- Canadian Cspine Rule
- NEXUS Criteria



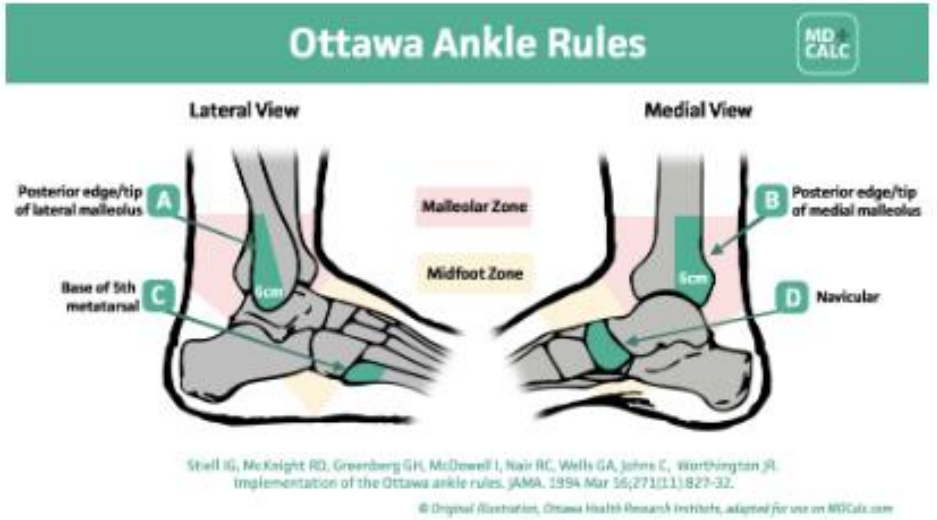
Knee and Ankle Injury

- Ottawa Foot and Ankle Rule
- Ottawa Knee Rule

Ottawa Ankle Rule

Rules out clinically significant foot and ankle fractures to reduce use of x-ray imaging.

When to Use | Pearls/Pitfalls | Why Use



Stiell IG, McKnight RD, Greenberg GH, McDowell I, Nair RC, Wells GA, Johns C, Worthington JR. Implementation of the Ottawa ankle rules. JAMA. 1994 Mar 16;271(11):827-32.

© Original illustration, Ottawa Health Research Institute, adapted for use on MDCalc.com

Location of pain

- Malleolar
- Midfoot

Inability to bear weight both immediately after injury AND in ED

Patient unable to take four steps

No | Yes

MOC REFLECTIVE STATEMENT

- Emergency Medicine is a young and rapidly changing specialty
- Our patient populations are getting older and more complex
- New technologies and a maturing specialty are allowing Emergency Physicians to broaden their scope of practice
- In response to many challenges and changes, our systems are adapting to create new care pathways, protocols and environments
- Clinical decision rules can help present unnecessary ED evaluations, testing and admissions

Knowledge Check #1

In which year was the first Emergency Medicine residency started?

A) 1950
B) 1970
C) 2000
D) 2010

Knowledge Check #1

In which year was the first Emergency Medicine residency started?

A) 1950

B) 1970

C) 2000

D) 2010

Knowledge Check #2

True or False: Any patient with a new pulmonary embolism requires ED evaluation

A) True

B) False

Knowledge Check #2

True or False: Any patient with a new pulmonary embolism requires ED evaluation

A) True

B) False

Knowledge Check #3

Which of the following patients may not require a head CT according to the Canadian Heat CT rule?

A) 45 year old male on Eloquis who fell off his bike with laceration
B) 25 year old female struck with a falling rock who lost consciousness and has vomited 5 times in the last 1 hour
C) 68 year old female struck by a pickleball racket with brief loss of consciousness and mild headache
D) 49 year old male with brief loss of consciousness after being hit in the head by a car door who is now back to baseline

Knowledge Check #3

Which of the following patients may not require a head CT according to the Canadian Heat CT rule?

A) 45 year old male on Eloquis who fell off his bike with laceration
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