

On the Emergency Room's Front Line

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- Interests:
 - 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.



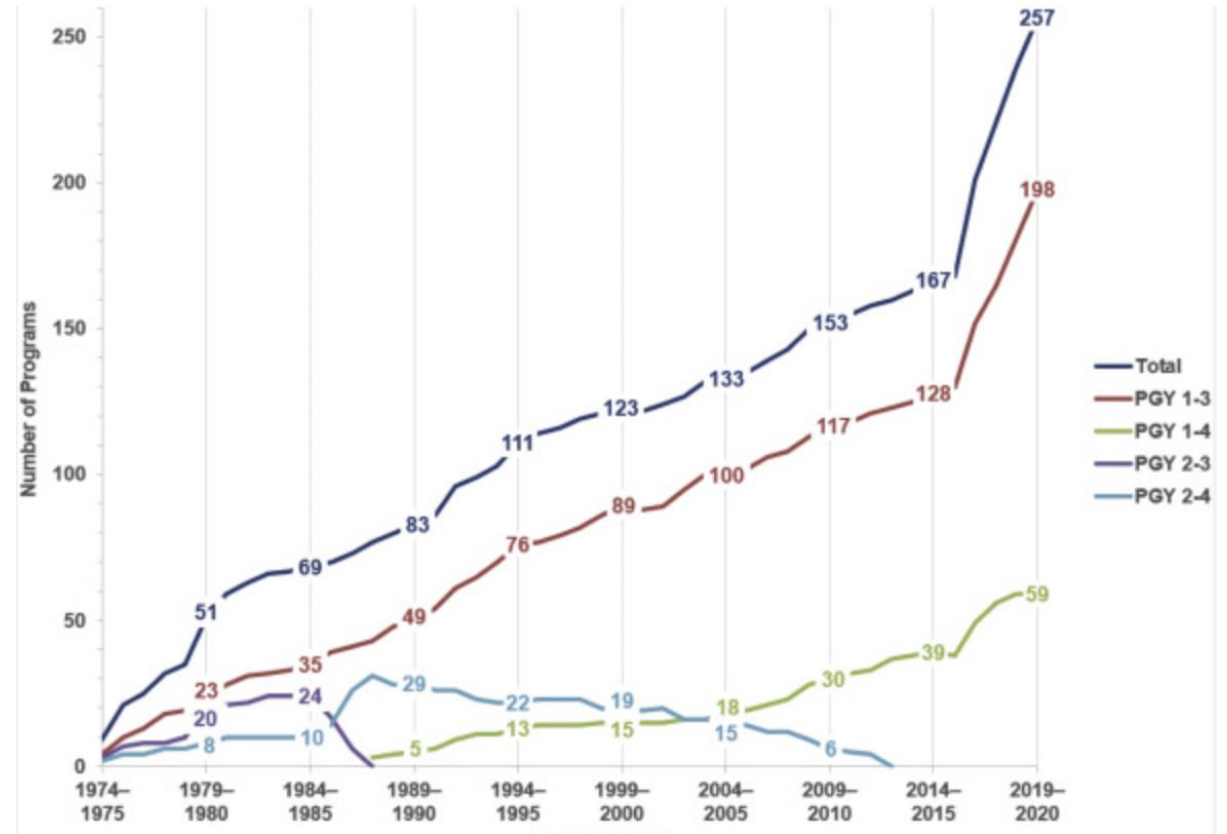
OBJECTIVES

- 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



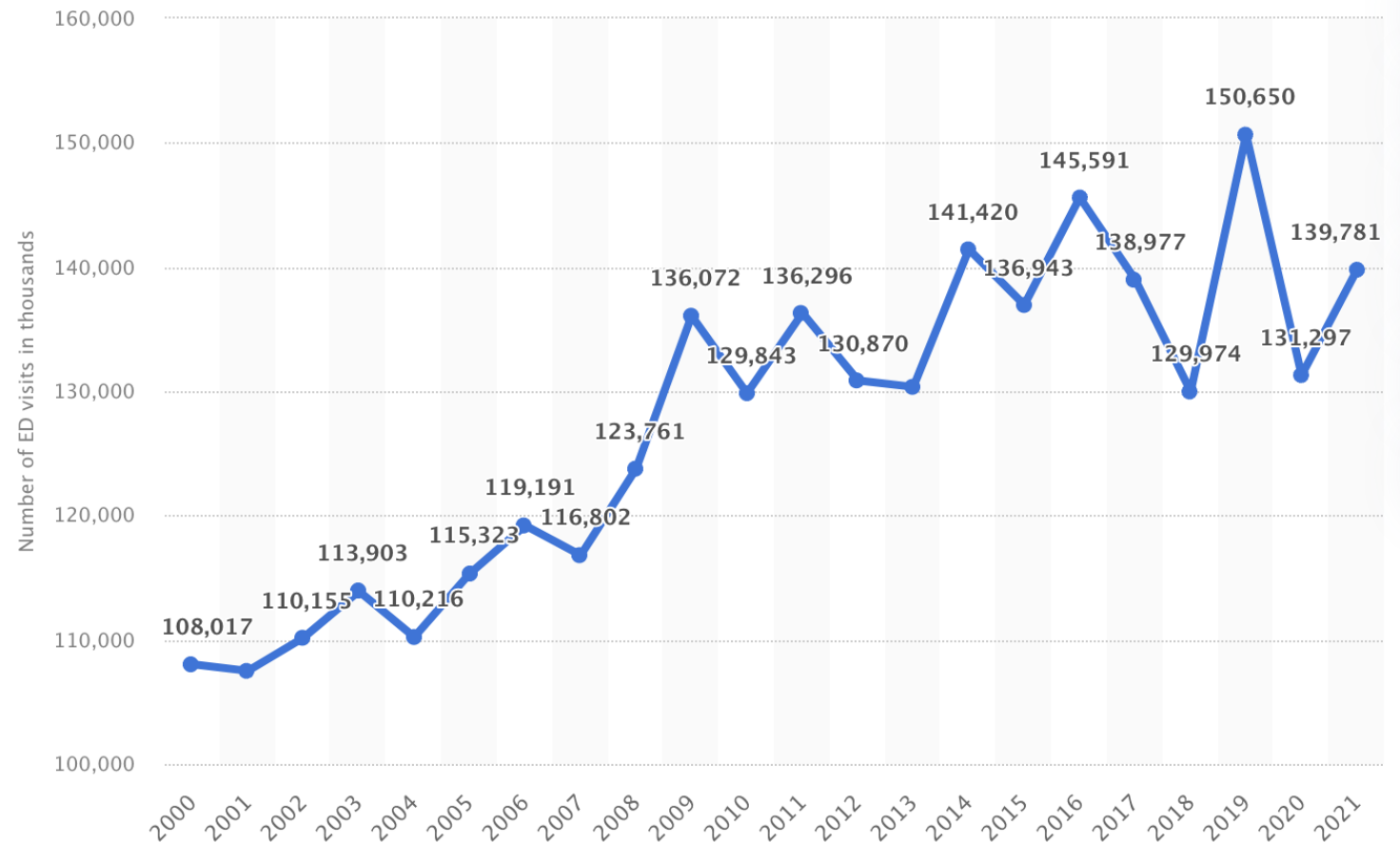
The Landscape of Emergency Medicine

- 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...



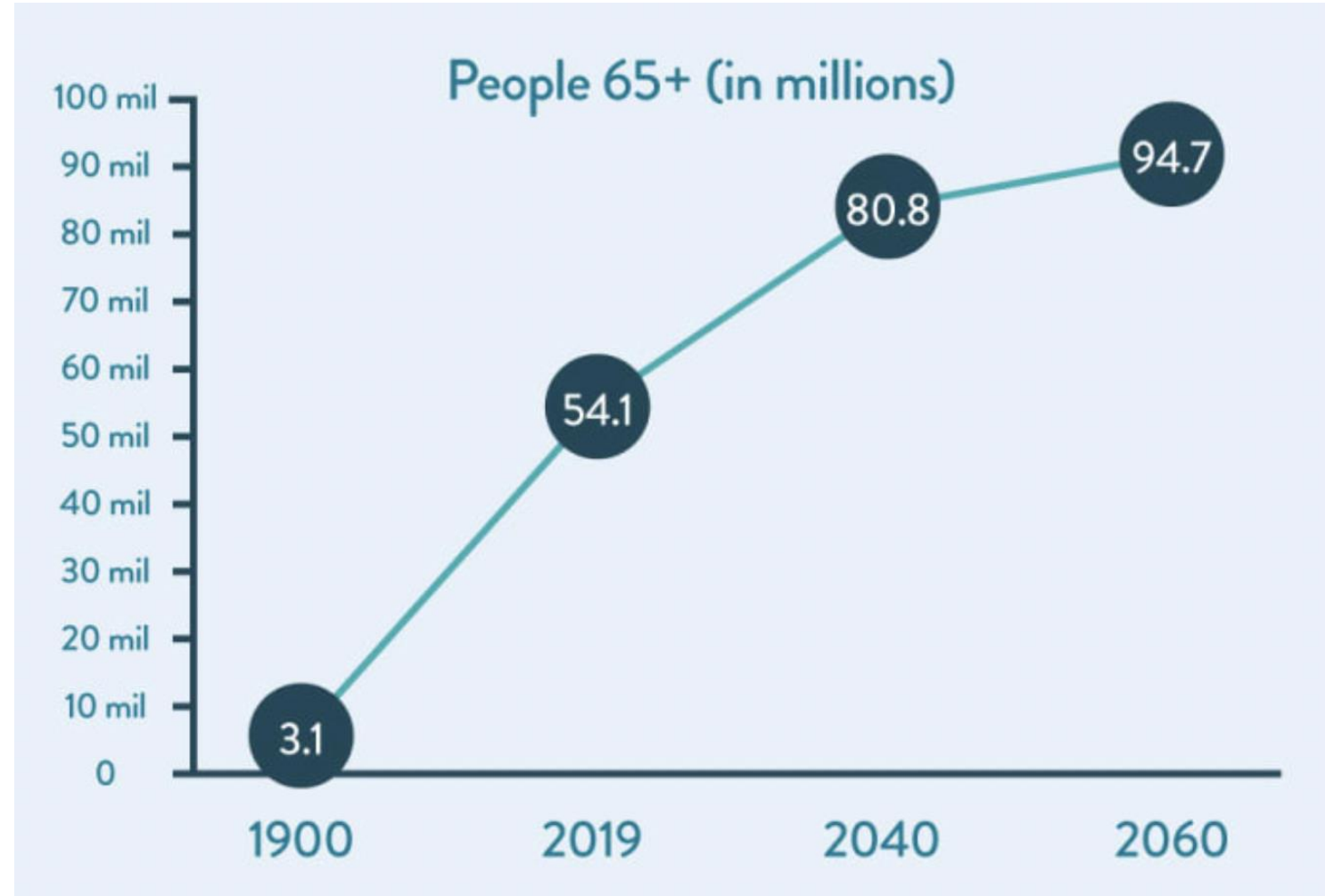
The Landscape of Emergency Medicine

- 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

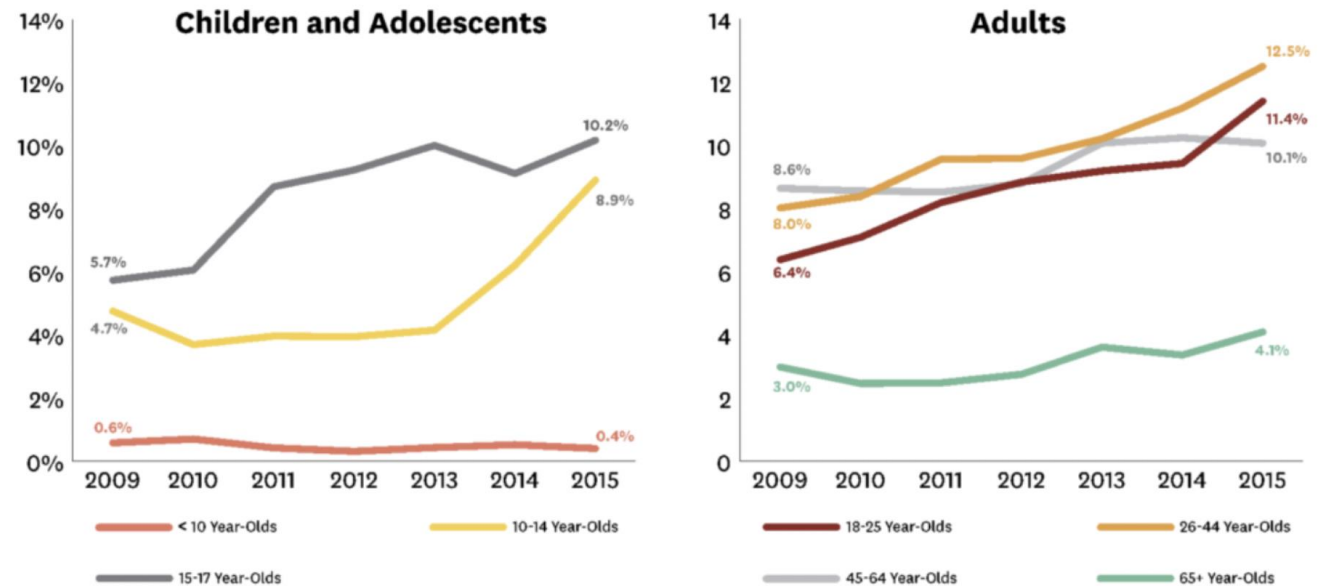
- Patients are getting older
- Patients are more complex
- More care can be offered in the ED



The Landscape of Emergency Medicine

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

Emergency Department (ED) Visits Resulting in Mental Health Diagnosis by Age Group

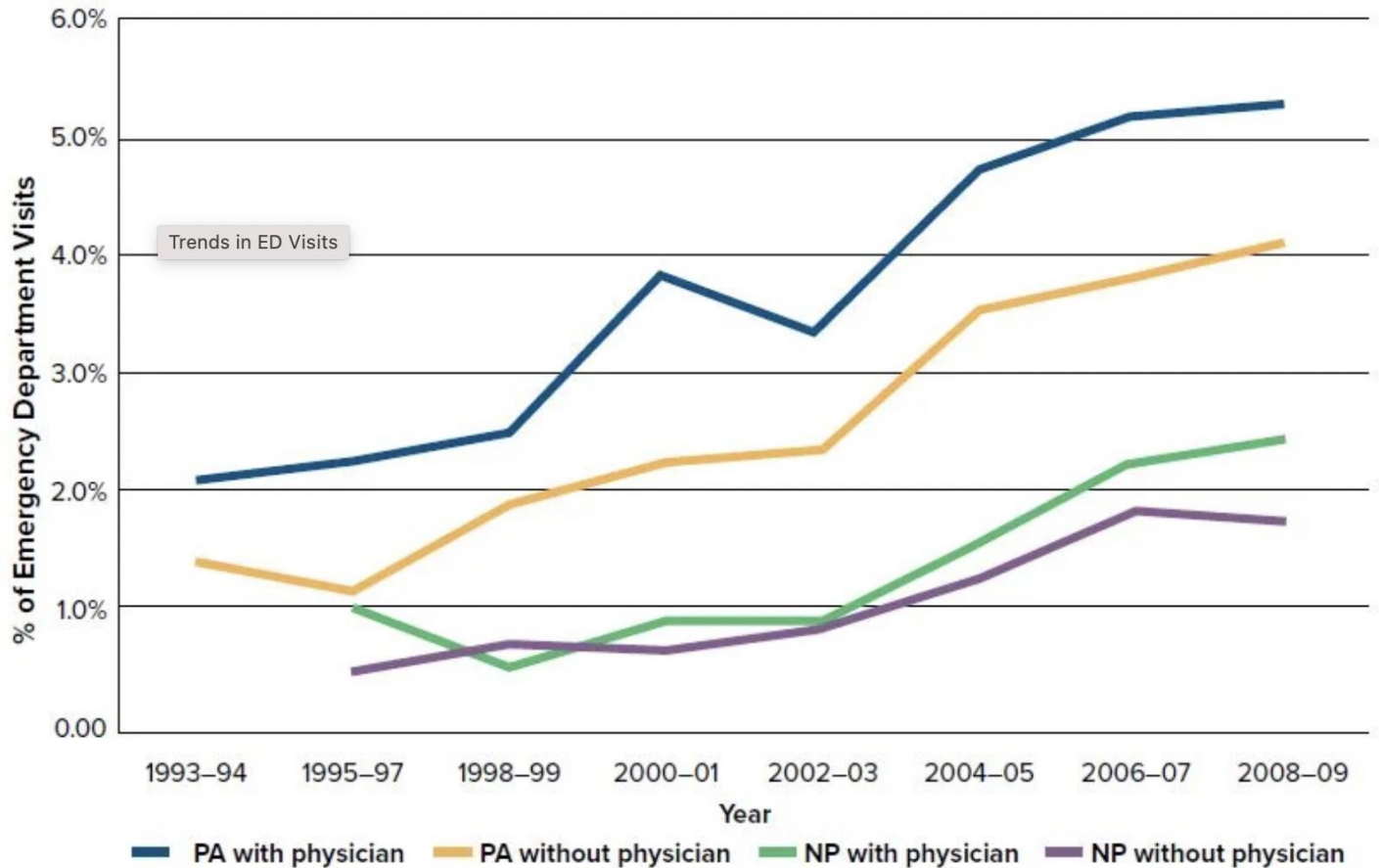


USC Schaeffer



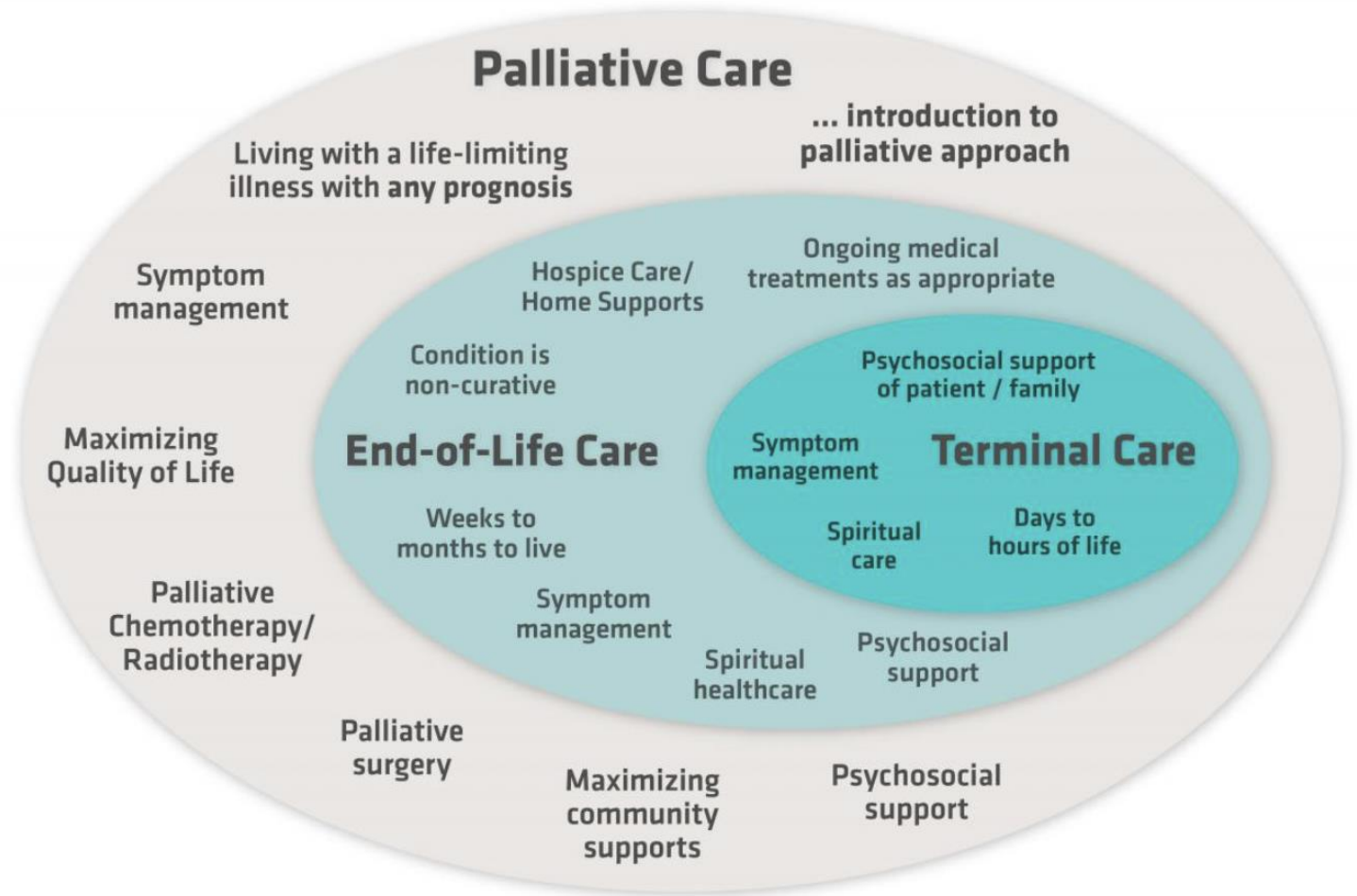
The Landscape of Emergency Medicine

- 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



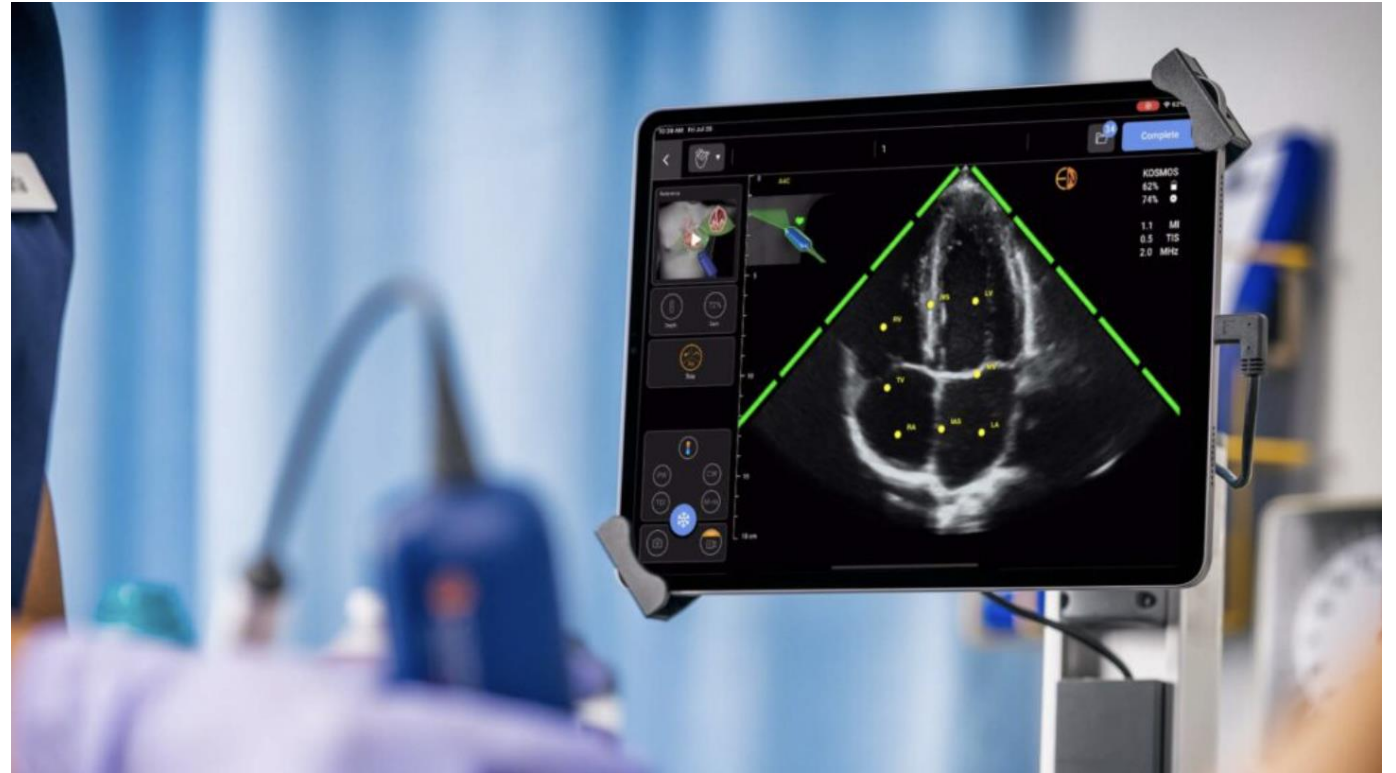
The Landscape of Emergency Medicine

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



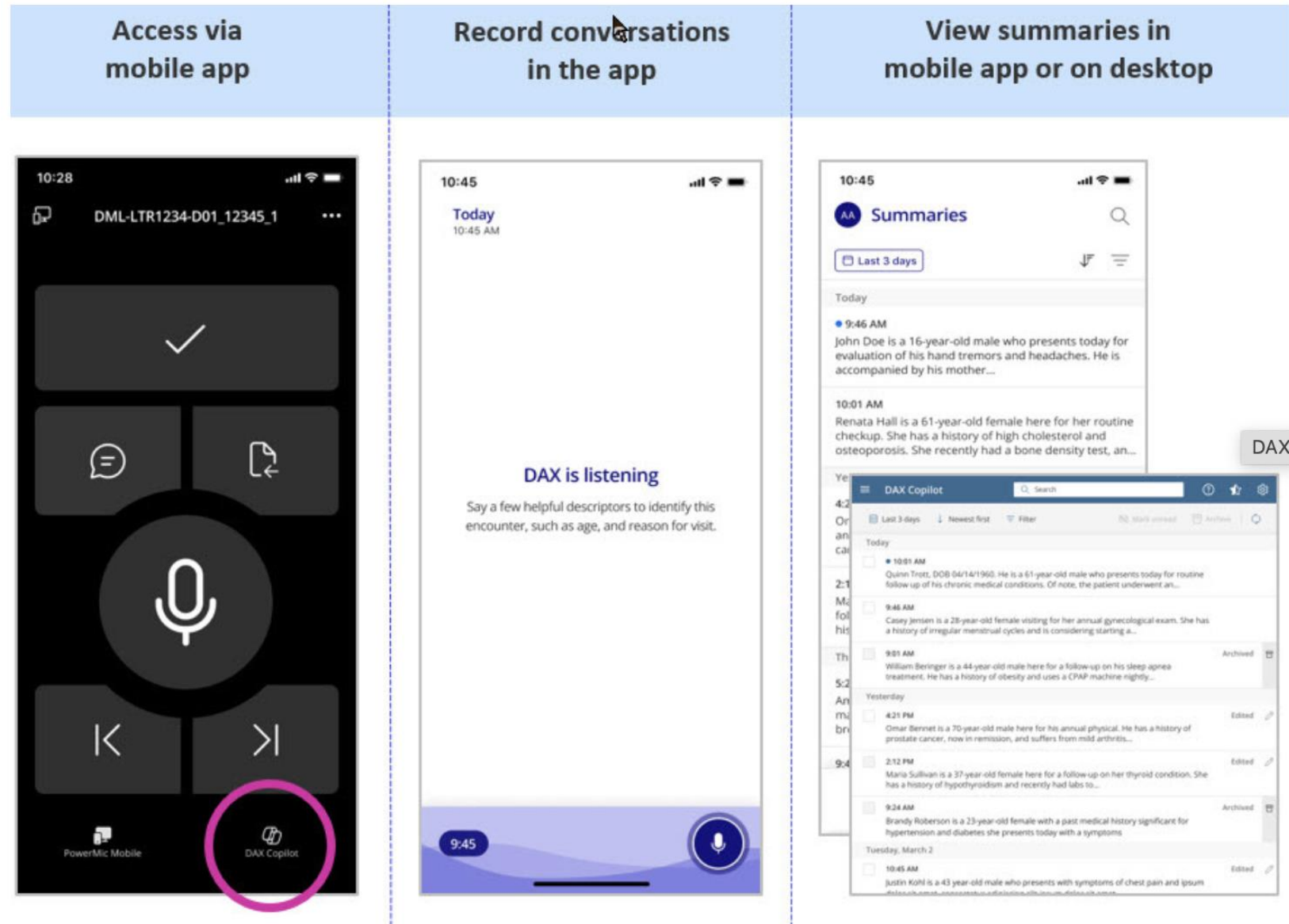
The Landscape of Emergency Medicine

- Artificial Intelligence is poised to make a huge impact in triage, diagnostics, treatment and documentation both in the hospital and out of hospital



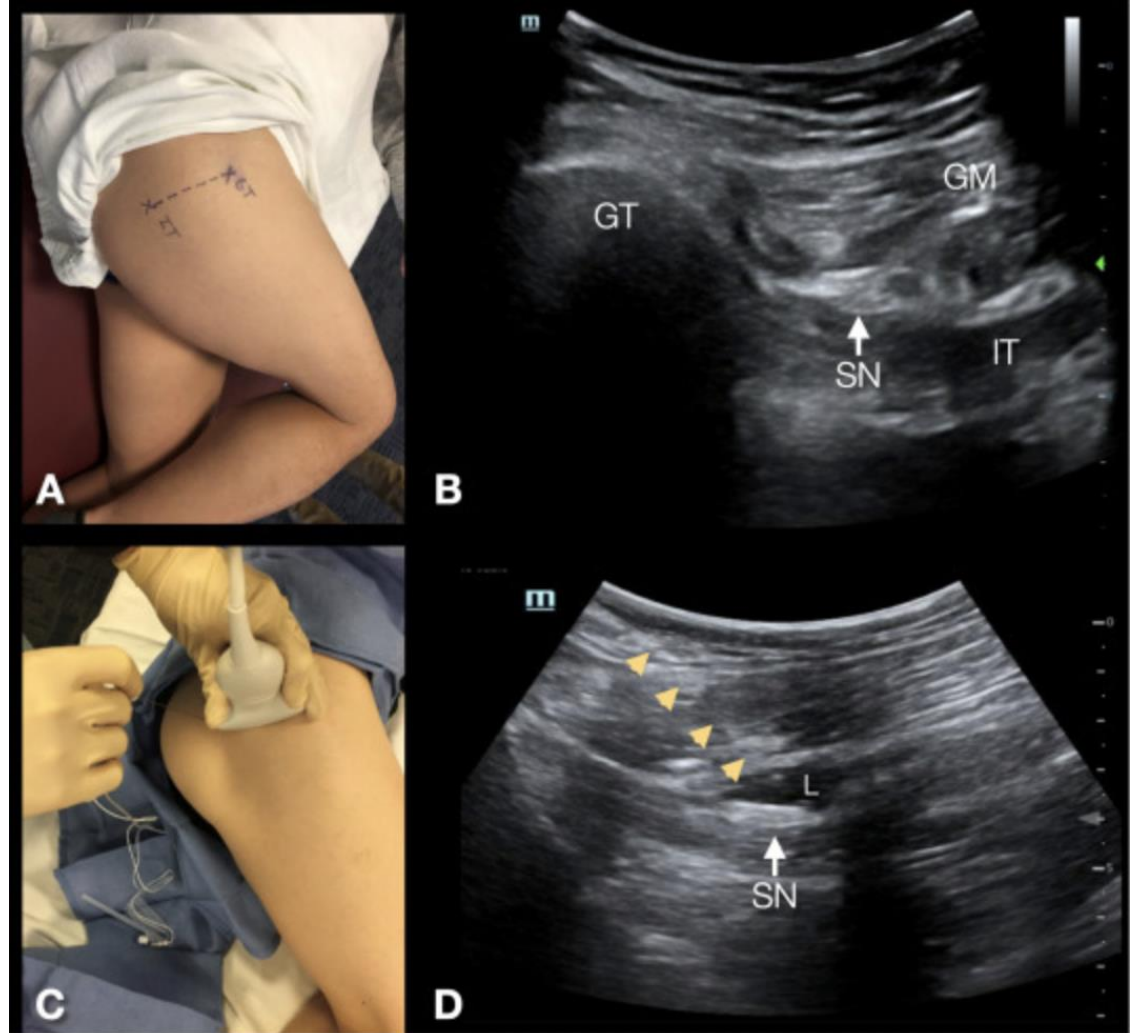
The Landscape of Emergency Medicine

- Ambient Listening AI-Assisted Documentation



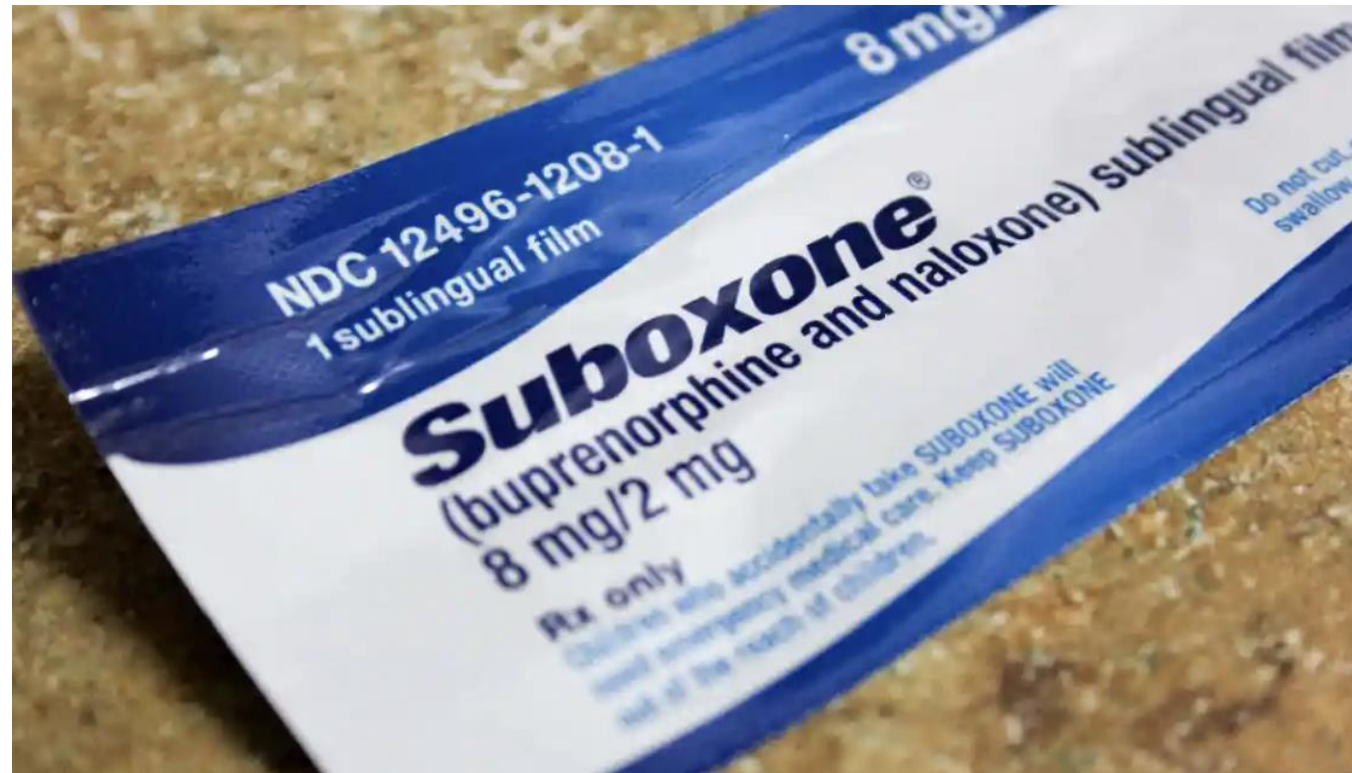
The Landscape of Emergency Medicine

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



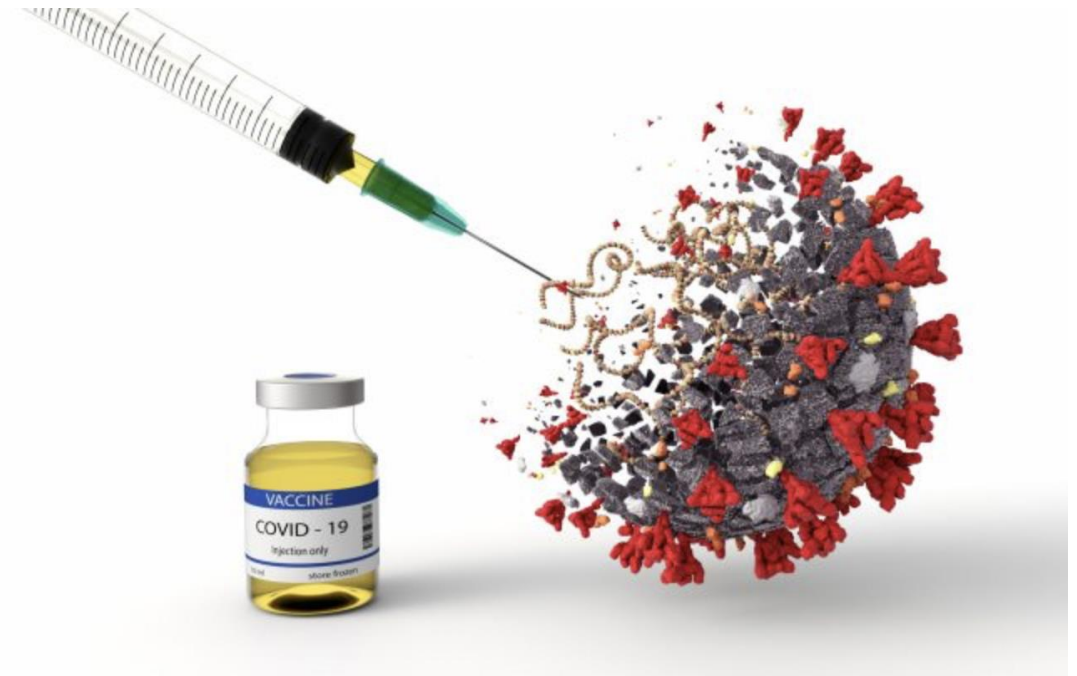
The Landscape of Emergency Medicine

- 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		①	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	🚶	①	77 y	M			3	Fatigue		⚠	⚠	17:08
	69H		C...	83 y	F			2	Fall; Altered Mental...				00:22



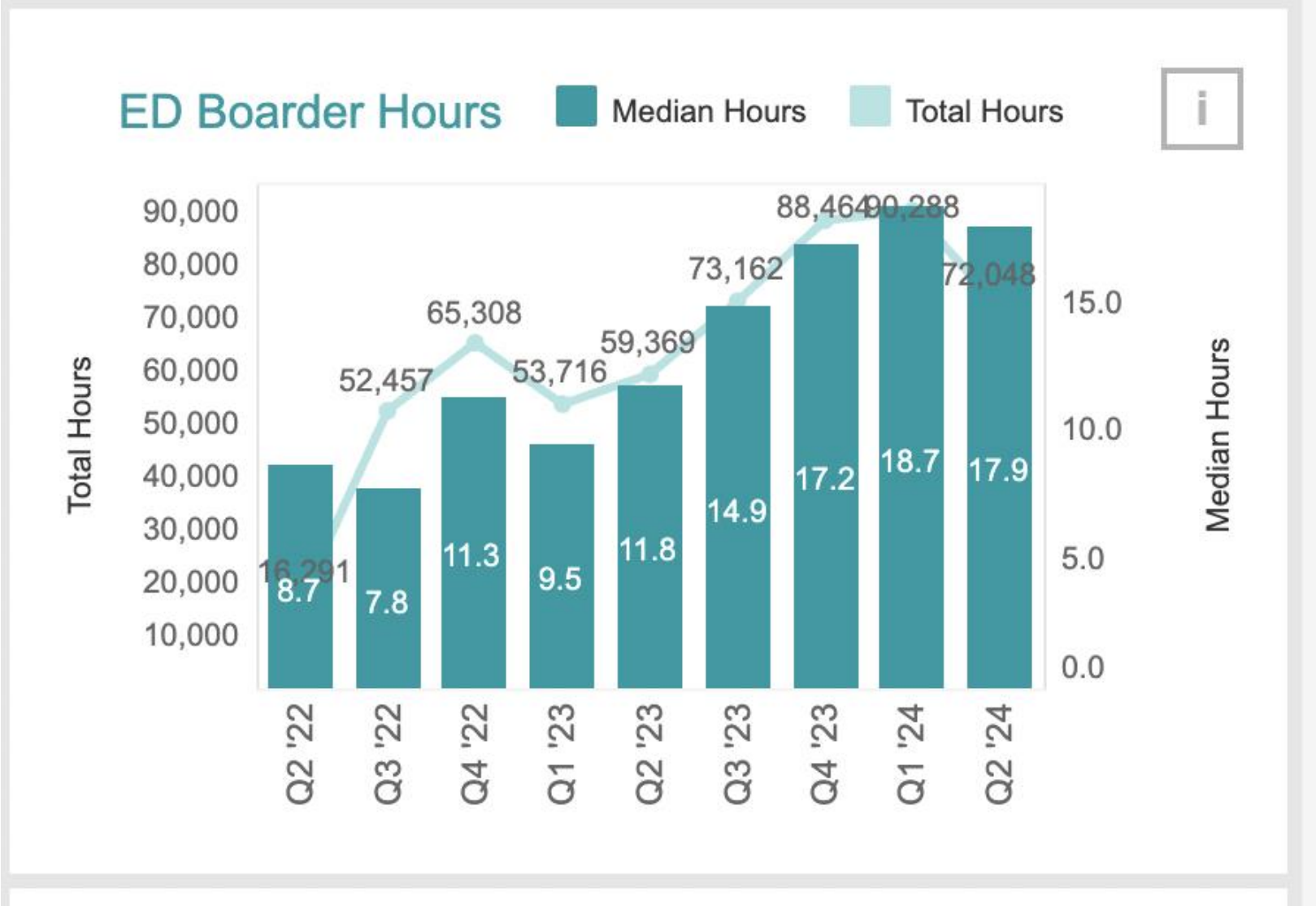
Patient Boarding: An Example

- 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

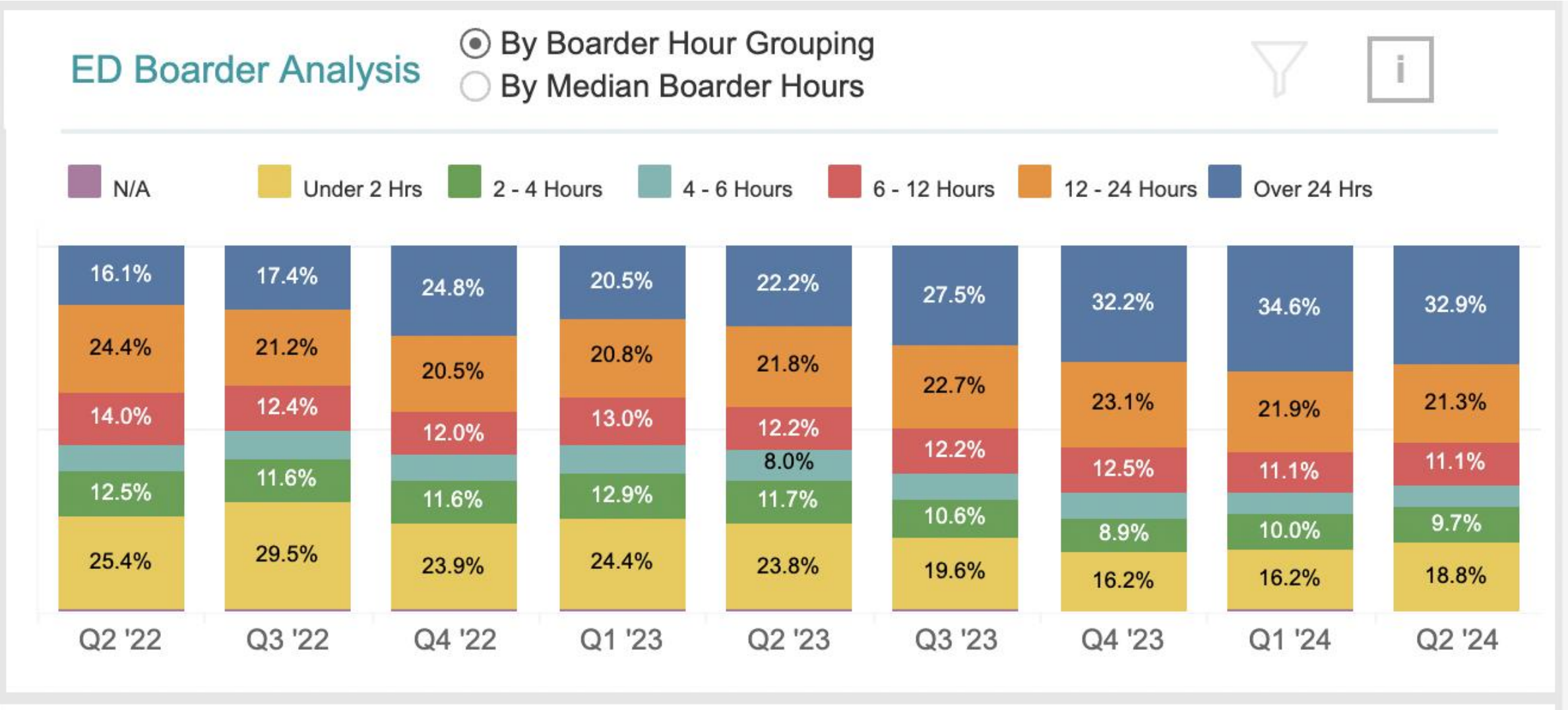


Hospital overcrowding in A&E departments 'killed 1,300' patients amid urgent waiting list warning | The Irish Sun (thesun.ie)

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
- Outpatient resources are being strained

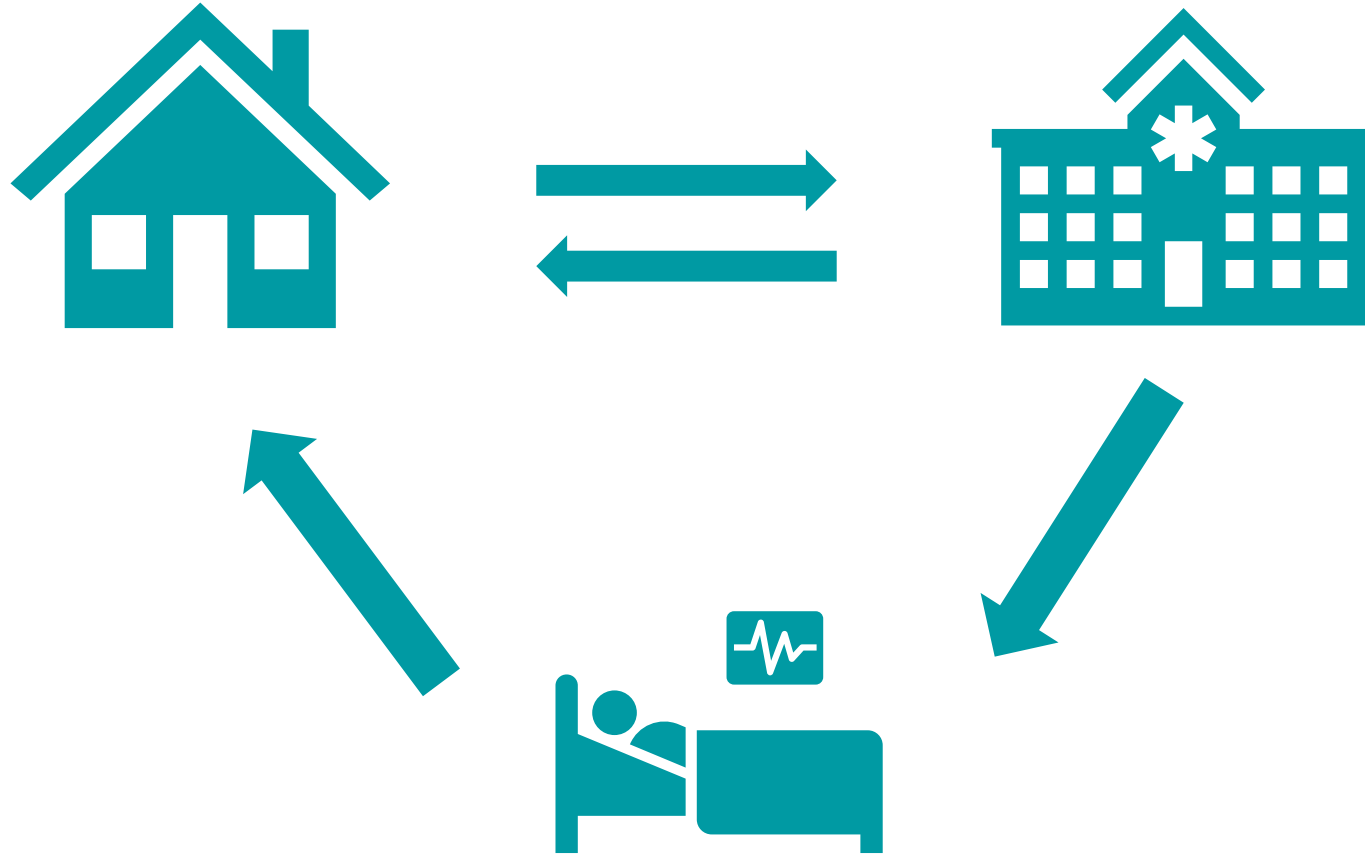


Patient Boarding: Solutions

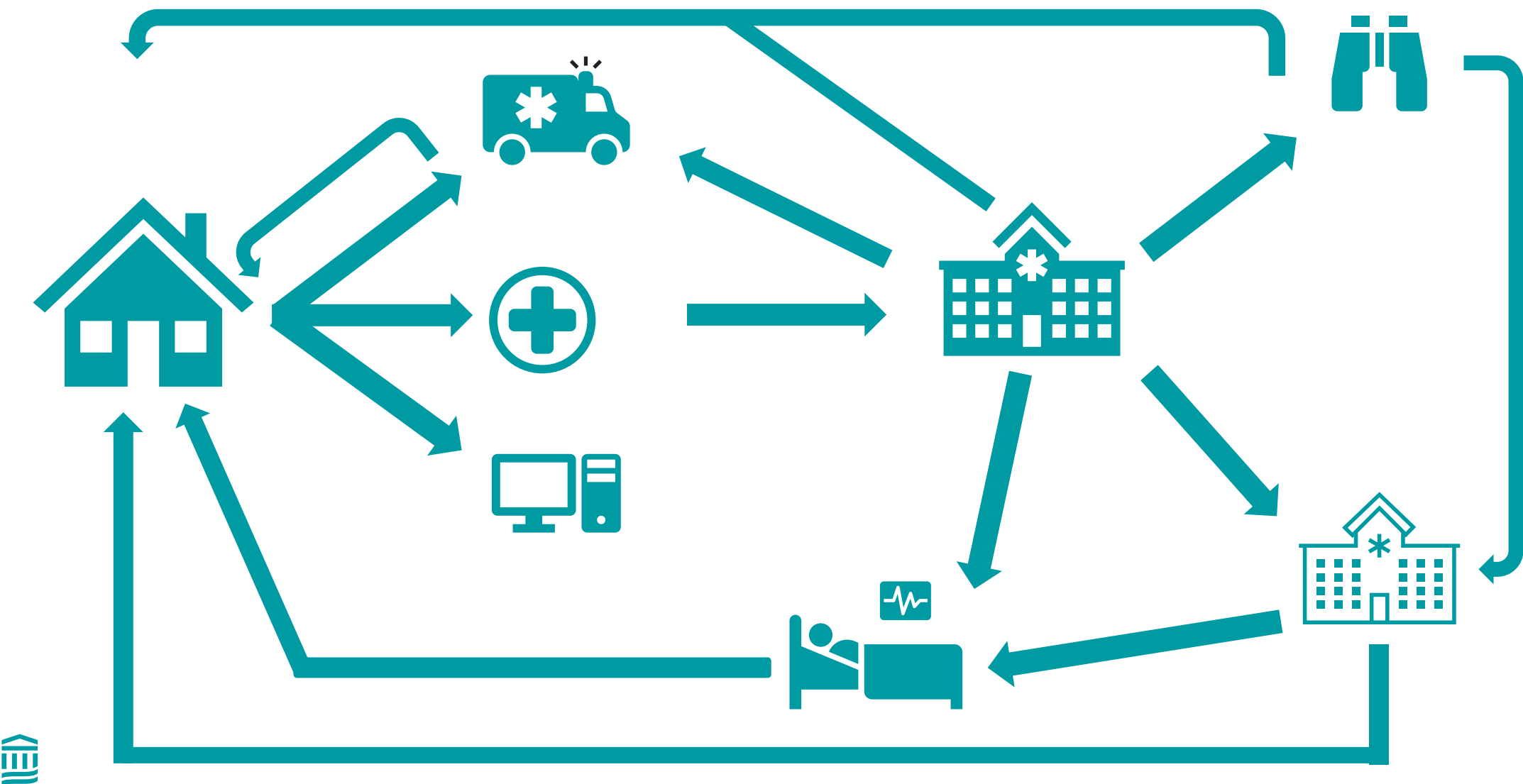
- Boarding is a hospital problem, not an Emergency Department problem
- Adjust staffing times and locations
- Recruit staff, retain staff and develop workforce
- Expedite discharges (defer unnecessary workups, early discharge planning, creative dispositions, discharge lounges)
- Appreciate the situation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



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!





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

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			

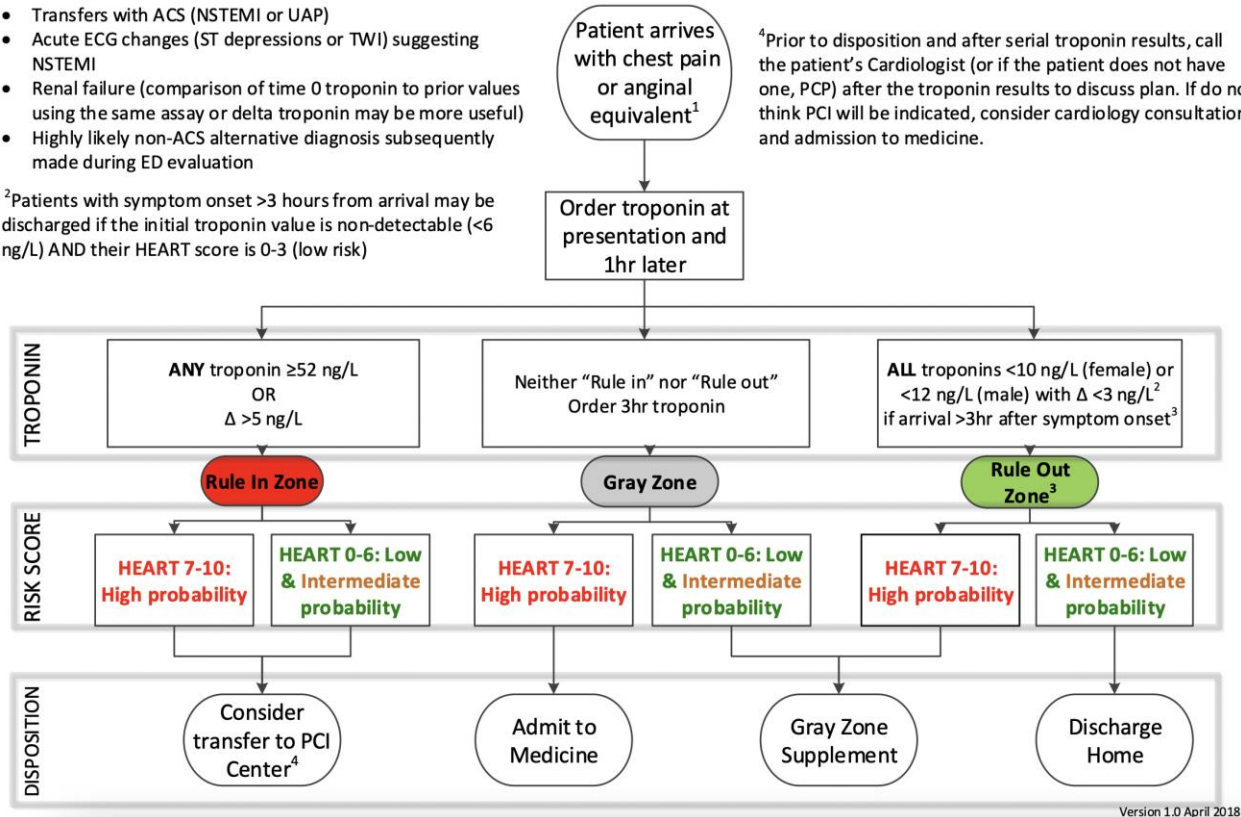


Cardiac Care

• High Sensitivity Troponin

- Transfers with ACS (NSTEMI or UAP)
- Acute ECG changes (ST depressions or TWI) suggesting NSTEMI
- Renal failure (comparison of time 0 troponin to prior values using the same assay or delta troponin may be more useful)
- Highly likely non-ACS alternative diagnosis subsequently made during ED evaluation

²Patients with symptom onset >3 hours from arrival may be discharged if the initial troponin value is non-detectable (<6 ng/L) AND their HEART score is 0-3 (low risk)



⁴Prior to disposition and after serial troponin results, call the patient's Cardiologist (or if the patient does not have one, PCP) after the troponin results to discuss plan. If do not think PCI will be indicated, consider cardiology consultation and admission to medicine.

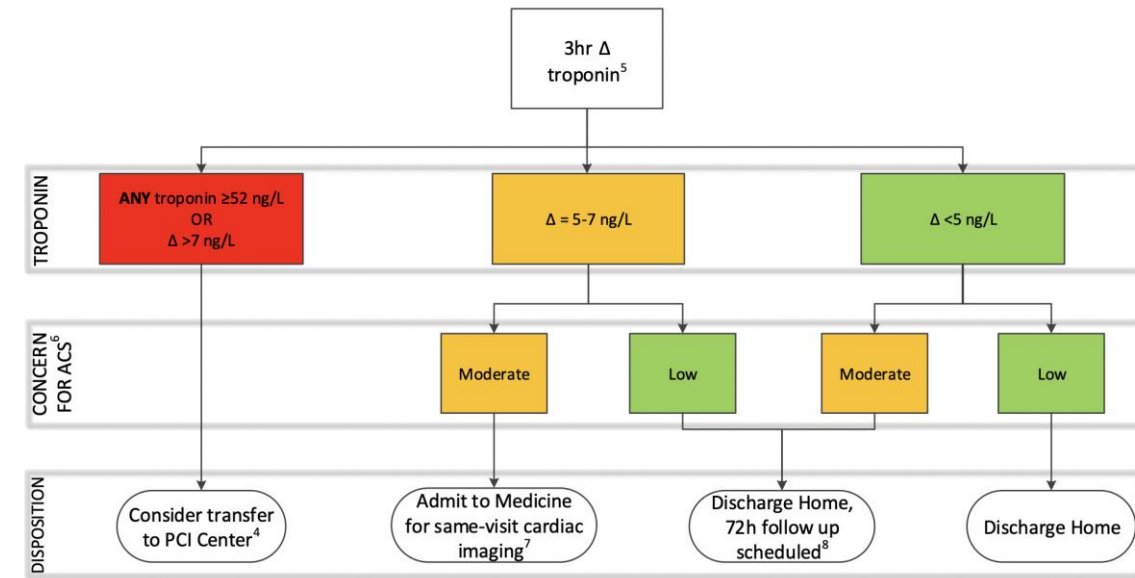
Gray Zone Supplement

⁵Delta is from time zero troponin to 3 hr troponin. Consider inpatient admission for patients with high-risk HEART scores and troponin values >99th percentile regardless of delta results

⁶Concern for NSTEMI and/or unstable angina based on clinical scenario; assumes all patients with "high" concern have fallen out of pathway and have been admitted to an inpatient team

⁷Consider prior cardiac risk stratification testing – how long ago was the test, adequacy of the test, and results? If previous testing was an exercise tolerance test, consider myocardial perfusion testing or a cardiac CTA

⁸The availability of guaranteed follow-up within 72 hours may vary among institutions. If unable to confirm outpatient follow up within 72 hours, consider admissions for same-visit cardiac imaging



Cardiac/Pulmonary Care

- San Francisco Syncope Risk Score
- Canadian Syncope Rule

San Francisco Syncope Rule

Predicts risk for serious outcomes at 7 days in patients presenting with syncope or near-syncope.

INSTRUCTIONS

Use in adult patients presenting with syncope or near-syncope who are back to their neurologic baseline. Do not use in patients with persistent or new neurologic deficits, alcohol or drug-related loss of consciousness, definite seizure, or transient loss of consciousness from head trauma.

When to Use ▾

Pearls/Pitfalls ▾

Why Use ▾

Congestive heart failure history

No

Yes

Hematocrit <30%

No

Yes

EKG abnormal (EKG changed, or any non-sinus rhythm on EKG or monitoring)

No

Yes

Shortness of breath symptoms

No

Yes

Systolic BP <90 mmHg at triage

No

Yes

Patient IS in the low-risk group for serious outcome.

Copy Results 📄

Next Steps ➡➡

➡➡ Next Steps

📄 Evidence

👤 Creator Insights



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 otorrhea/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

NEXUS Criteria for C-Spine Imaging

Clears patients from cervical spine fracture clinically, without imaging.

When to Use ▼	Pearls/Pitfalls ▼	Why Use ▼
Focal neurologic deficit present	No 0	Yes +1
Midline spinal tenderness present	No 0	Yes +1
Altered level of consciousness present	No 0	Yes +1
Intoxication present	No 0	Yes +1
Distracting injury present	No 0	Yes +1

If none of the above criteria are present, the C-Spine can be cleared clinically by these criteria.

Imaging is not required.

Copy Results 📄

Next Steps ➤➤➤

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📄 Evidence

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Knee and Ankle Injury

- Ottawa Foot and Ankle Rule
- Ottawa Knee Rule

Ottawa Ankle Rule

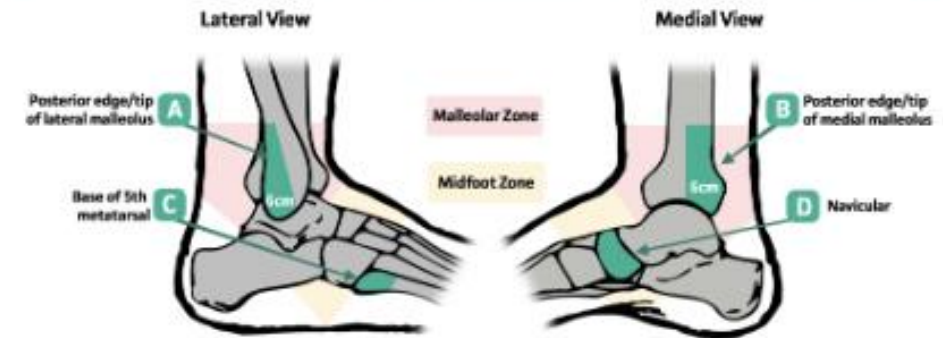
Rules out clinically significant foot and ankle fractures to reduce use of x-ray imaging.

When to Use ▾

Pearls/Pitfalls ▾

Why Use ▾

Ottawa Ankle Rules



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 30;271(11):1827-32.

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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 prevent 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 Head CT rule?

- A) 45 year old male on apixaban 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 Head CT rule?

- A) 45 year old male on apixaban 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



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