Adenosine versus diltiazem on reversing supraventricular tachycardia in emergency department (the ADVISED study): a multi-center cohort study

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Background

- Supraventricular tachycardia is a common cardiac dysrhythmia in the emergency department (ED) that poses a therapeutic challenge .

- Adenosine and diltiazem are two commonly used pharmacological agents for SVT management, but **few comparative studies exist**.

- To evaluate **the efficacy of bolus intravenous adenosine versus diltiazem in the termination of spontaneous SVT** in the ED.

Study Aim

- A retrospective, multicenter, cohort study conducted in BSW EDs throughout North Texas.

- All adult patients (age ≥ 18 years) who presented with SVT and received either adenosine or diltiazem as the initial treatment by EMS or in the ED between January 2019 and July 2020 were eligible for inclusion. Patients who presented with an arrhythmia other than SVT or had significant missing data were excluded.

- The primary outcome was the rate of successful cardioversion, defined as a sustained sinus rhythm within 30 minutes of the initial treatment.

Method

- The efficacy of adenosine-first and diltiazem-first treatment groups were compared based on the time to achieve relapse-free termination of SVT into a sinus rhythm from the initial administration of bolus IV medication.

- **The rate of successful cardioversion was not significantly different between the groups (85.6% vs. 85.3%, p=1.0).**

- **Similar efficacy was observed between adenosine and diltiazem in managing stable SVT within the ED.**

- While adenosine remains the recommended first-line agent per current guidelines, diltiazem can be a viable alternative, particularly when rhythm uncertainty exists.

Discussions
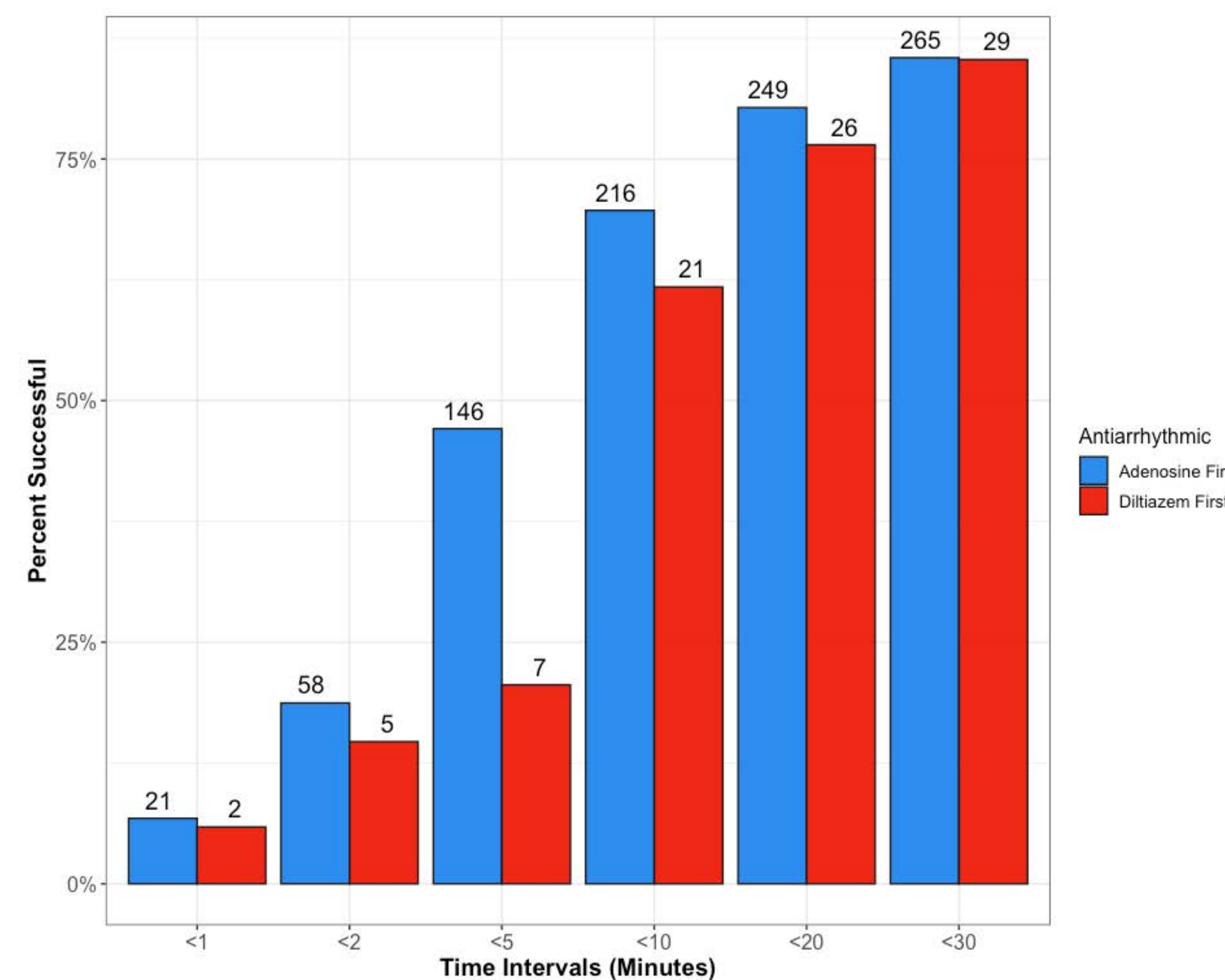
Results

Demographic & Clinical Characteristics

Characteristics	First received Adenosine (n = 310)	First received Diltiazem (n = 34)	p-value
Age, median (IQR)	56 (46-69)	68 (56-74)	0.013
Male gender, n (%)	130 (42%)	16 (47%)	0.6
Race, n (%)			0.009
White	239 (77%)	23 (68%)	
Black	61 (20%)	6 (18%)	
Asian	4 (1.3%)	4 (12%)	
Hispanic or Latino, n (%)	40 (13%)	4 (12%)	>0.9
Tobacco use, n (%)	132 (44%)	18 (55%)	0.3
Diabetes mellitus, n (%)	79 (26%)	12 (35%)	0.3
Hypertension, n (%)	156 (51%)	21 (62%)	0.3
Coronary artery disease, n (%)	39 (13%)	5 (15%)	0.8
Congestive heart failure, n (%)	46 (15%)	4 (12%)	0.8
COPD, n (%)	19 (6.3%)	3 (8.3%)	0.5
Stroke, n (%)	10 (3.3%)	2 (5.9%)	0.3
Cirrhosis, n (%)	7 (2.3%)	0 (0.0%)	>0.9
Chronic kidney disease, n (%)	28 (9.2%)	3 (8.8%)	>0.9
Cancer, n (%)	33 (11%)	9 (26%)	0.023
Transplant history, n (%)	2 (0.7%)	0 (0.0%)	>0.9
Systolic blood pressure, median (IQR)	125 (109-146)	130 (118-141)	0.2
Pulse, median (IQR)	168 (137-189)	133 (96-162)	0.002
Respirations, median (IQR)	20.0 (18.0-22.0)	18.0 (18.0-20.0)	0.2
Temperature, median (IQR)	98.20 (97.90-98.60)	98.10 (97.90-98.30)	0.025
Body mass index, median (IQR)	30 (25-35)	28 (25-29)	0.063
Serum potassium concentration, median (IQR)	4.00 (3.60-4.20)	3.95 (3.70-4.30)	>0.9

BSWMC-Plano Emergency Department Surge Plan – The ED Annex

Renet Roy MD, Alan Weier MD, Casey Cox BSN, RN, CEN, NE-BC, Devin Robinson DMSc, PA-C, Vanessa Beard BSN, RN, Bailey Patterson BSN, RN

Objective

- The Emergency Department (ED) experiences periods of patient surges, high volumes, and high holds that can slow the care provided in the ED.

- The ED Annex was developed to cope with over-capacity situations so that high quality, patient centered care delivery is not compromised.
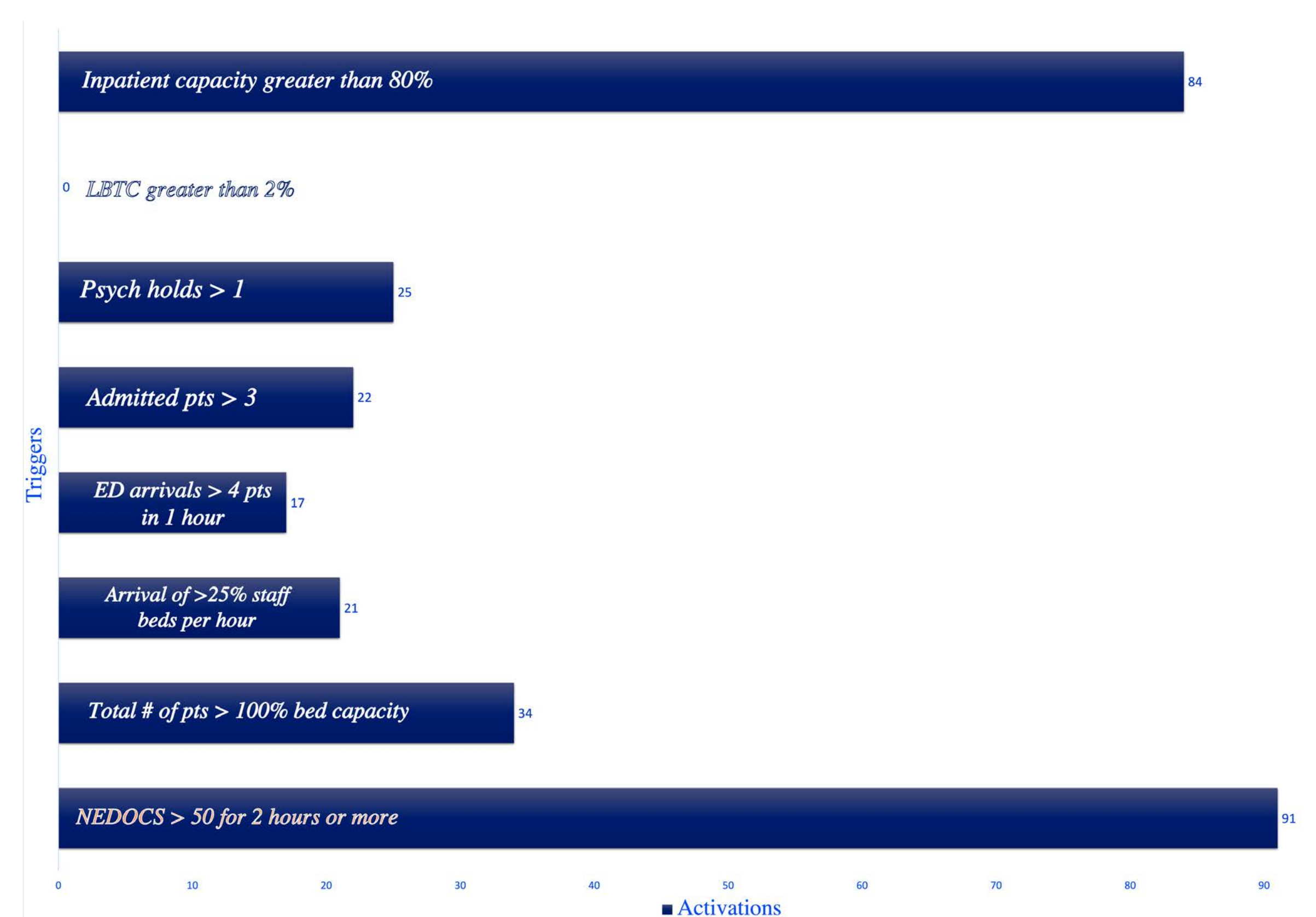
Background

- ED Annex (EDX) opened on November 27, 2023

- Fully functioning 8-bed care area

- Staffed by 1 APP, 2 nurses and 1 tech. Primarily APP-run with physicians also flex in during high surge.

- Hours: 12pm - 12am.

Goals

- Improve patient throughput
- Improve quality of care
- Reduce left before treatment complete (LBTC)
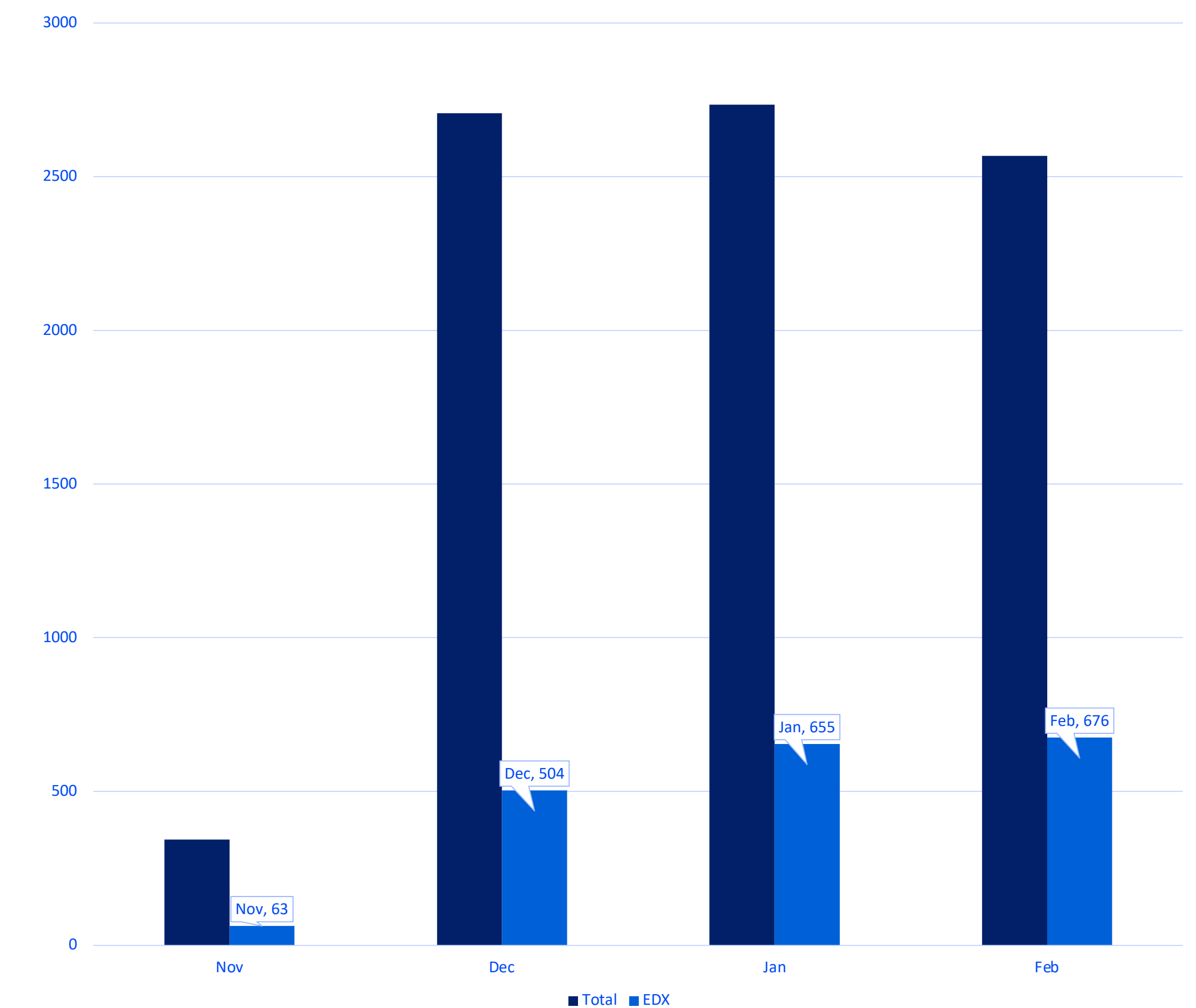- Ensure patient safety
- Enhance patient experience

Triggers

Horizontal bar chart showing trigger activations:
- Inpatient capacity greater than 80%: 84
- LBTC greater than 2%: 0
- Psych holds > 1: 25
- Admitted pts > 3: 22
- ED arrivals > 4 pts in 1 hour: 17
- Arrival of >25% staff beds per hour: 21
- Total # of pts > 100% bed capacity: 34
- NEDOCS > 50 for 2 hours or more: 91

Legend: ■ Activations

Exclusion

ESI Levels 1, 2
Procedural Sedations
Obvious deformities/dislocations
Non-weigh- bearing post trauma
Falls with LOC and/or AMS
≤ 24 months old
≥ 20 weeks OB
Any Assault / Victimization
Psychiatric / Behavioral Health
≥ 65 years old and + Sepsis Screen
Known or suspected immunosuppression
Stroke symptoms within 24 hours of arrival
Non-traumatic chest pain
Active/obvious GI bleed
>1 person assist (wheelchair dependent / bed bound)
Vertigo and/or ataxia
>2L continuous oxygen

Total ED Census vs EDX use

Bar chart comparing Total ED Census and EDX use by month:
- Nov: Total, EDX (Nov, 63)
- Dec: Total, EDX (Dec, 504)
- Jan: Total, EDX (Jan, 655)
- Feb: Total, EDX (Feb, 676)

Legend: ■ Total ■ EDX

Results

- ED annex has been a resounding success.

- Approximately 1/4 of total ED patients per month receive high-quality, safe care through EDX daily.

- The ED annex has allowed us to provide prompt care and minimize wait times even in disaster-level conditions.

Acknowledgement

- Thank you to Casey, Vanessa, Devin, Bailey, and all other BSW Plano ED physicians and staff for their hard work and dedication to providing high quality care to our community.

How to make them stay!
Cancer center as an intervention for LBTC

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INTRODUCTION

With increasing patient volume and limitations in hospital resources, emergency departments (EDs) face significant challenges in providing high quality and timely patient care. These throughput challenges have led to an increase in the number of patients who leave before treatment is complete (LBTC). There have been numerous studies done evaluating the potential impact of rising LBTC numbers in the emergency department. In one such study, Mataloni et al, they discovered patients who LBTC had higher rates of readmission and increased mortality risk. In another study, done by Jarvis et al, they examined the financial and medicolegal significance of LBTC patients which highlights the value of focusing on this patient population. This highlighted that not only does this patient population have risk for worse outcomes, but it also increased risk for malpractice and negatively impacts revenue for the department. Review of a 2021 study done Ben Natan et al pointed towards low-acuity triage score as well as longer length of stay to be the most significant risk factors for LBTC. In an effort to target both risk factors, one of the solutions enacted by the Waxahachie emergency department involves using an adjacent clinical office space after hours to see lower acuity patients.

METHODS

This is a retrospective chart review of patients presenting to the ED at Baylor Scott & White Waxahachie who received a disposition of left before treatment complete (LBTC).
It involved calculating the total number of LBTC month by month in 2022 before use of the cancer center to the number in 2023 after implementation of the cancer center.
To obtain these number we calculated and compared the percentages of patients that were marked as LBTC per month during the hours of 5pm to 11pm by the total volume of patients seen in the ED that month.
We also reviewed the LBTC rate in months where cancer center utilization was higher than 50% and compared it to periods where utilization was lower than 50%.
We calculated the confidence interval for both periods to evaluate for statistical significance.

OBJECTIVES

The focus of our study was to evaluate the impact of using the cancer center after hours on LBTC rates. We hope to demonstrate that using an adjacent clinical space, such as the cancer center, to help with throughput
of patients will encourage the use of alternative care spaces in other emergency departments lacking clinical space.

RESULTS

The total patient volume seen in the Baylor Scott & White Waxahachie emergency department during 2022 was 53,453 with a total LBTC of 3061 (5.73%). Of those who LBTC in 2022, 1170 (2.19%) of them occurred during the hours of 1700-2300 when the cancer center would be opened for ED patients. The total patient volume in 2023 was 52,254 with a total LBTC of 2762 (5.28%). Of those who LBTC in 2023, 1022 (1.95%) occurred during cancer center operation. Analysis of this data showed a trend toward increasing LBTC rates prior to opening the cancer center in 2022 and a decreasing trend after opening in 2023. The results of this retrospective analysis did not reach statistical significance.

The total volume of patients seen during the months where cancer center utilization was more than 50% was 35,733 and the LBTC percentage for that period was 1.76%. The total volume of patients seen during months where the cancer canter utilization was less than 50% was 34,878 and the LBTC percentage was 2.29%. This decrease in LBTC percentage did reach statistical significance.

LBTC % during Cancer Center Hours
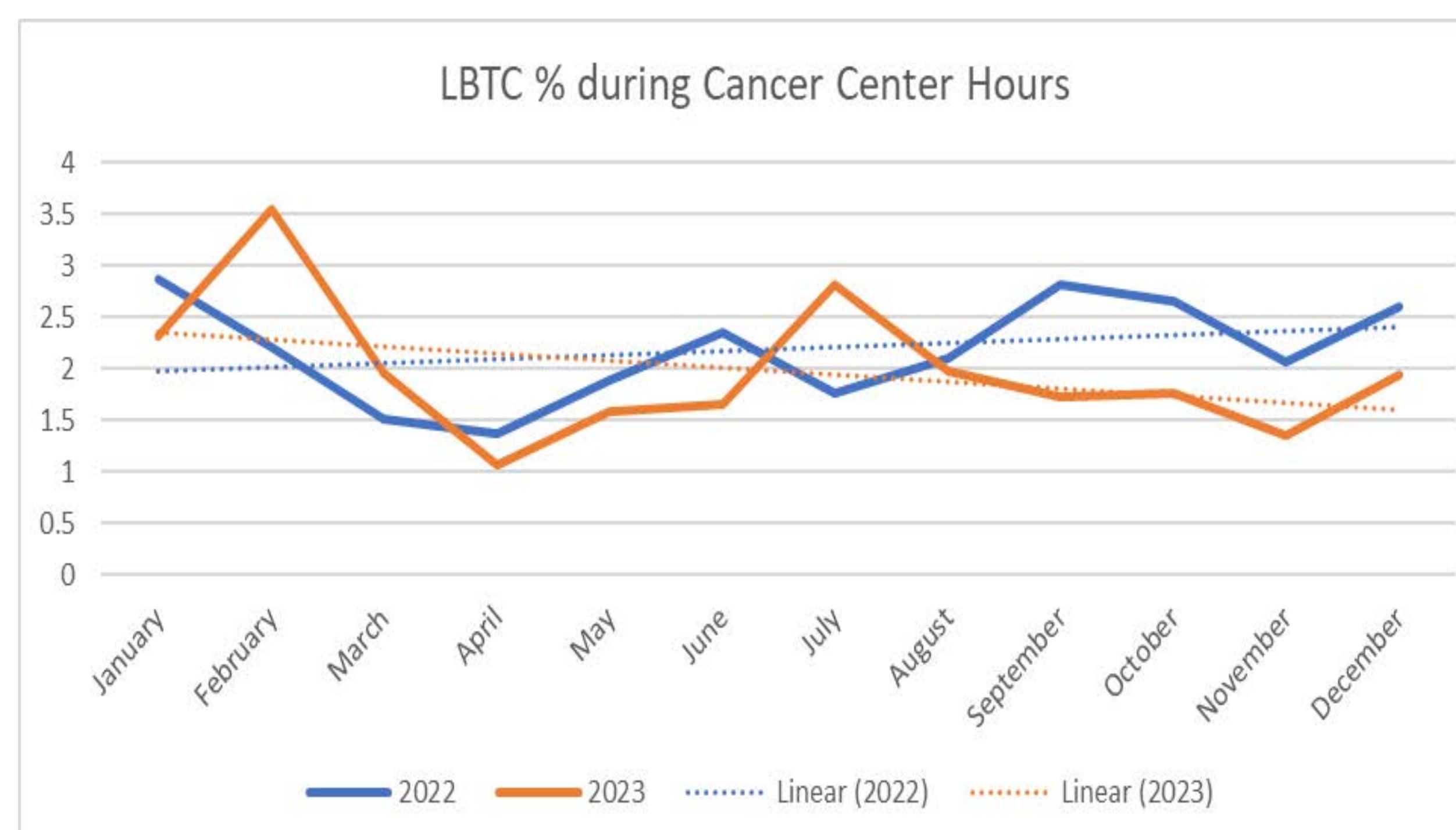
LBTC % based on utilization
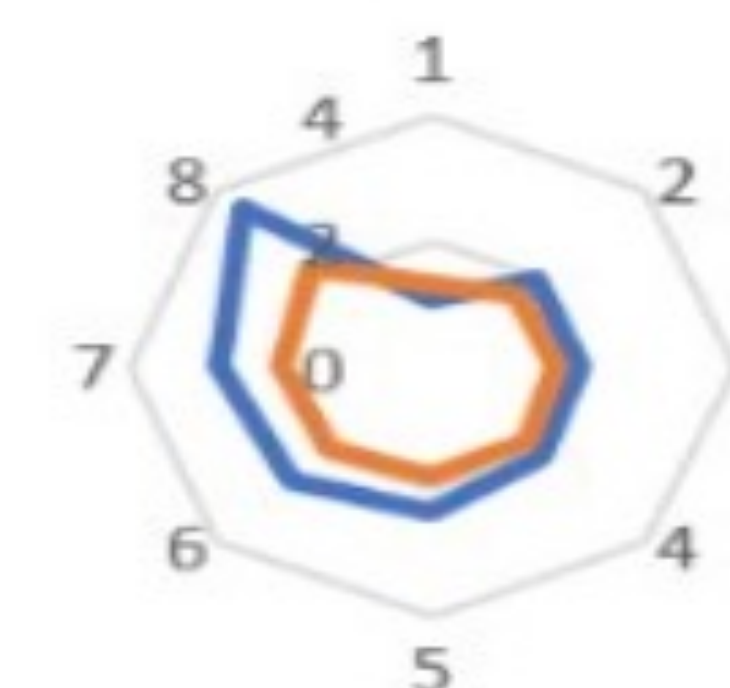
DISCUSSION

The most difficult resource limitations we have encountered when evaluating throughput is clinical space. The cancer center serves as an area where emergency department patients can be seen and examined quickly in a private setting.
 While comparison of LBTC percentages between 2022 and 2023 did not show a statistically significant difference after implementation of the cancer center, we felt this was likely due to low and inconsistent utilization before August. Specifically, we found the months of February and July to be outliers and upon further investigation found that the cancer center was opened only 11 days each month. Removing both months, the percentage LBTC would be 2.23% in 2022 and 1.732% in 2023 which would have reached statistical significance. To further assess this hypothesis, we decided to examine the data on the entire 16-month period where the cancer center has been utilized. We divided the data into high utilization months where the cancer center was open for more than 50% of the days that month and low utilization months where it was open less than 50%. We did find that months with higher cancer center utilization correlated with lower LBTC percentages. This demonstrates that by finding adjacent clinical space to operate and using it regularly can help to decrease the LBTC rate during busier evening hours in the emergency department.

CONCLUSION

Implementation of the cancer center during busy days from the hours of 1700-2300 influenced the percentage of patients who left before treatment was complete. Furthermore, increased utilization of the cancer center during the month showed a statistically significant improvement in the percentage of LBTC patients during the hours where it was operational.

Ben Natan M, Zeevi S, Goldschmid N. Patients Who Leave the Emergency Department Before Treatment Completion: A Retrospective Cohort Study. J Emerg Med. 2021 Jul;61(1):82-88. doi: 10.1016/j.jemermed.2021.01.009. Epub 2021 Feb 27. PMID: 33648784.
Chrusciel J, Fontaine X, Devillard A, Cordonnier A, Kanagaratnam L, Laplanche D, Sanchez S. Impact of the implementation of a fast-track on emergency department length of stay and quality of care indicators in the Champagne-Ardenne region: a before-after study. BMJ Open. 2019 Jun 19;9(6):e026200. doi: 10.1136/bmjopen-2018-026200. PMID: 31221873; PMCID: PMC6588991.
Hwang CE, Lipman GS, Kane M. Effect of an emergency department fast track on Press-Ganey patient satisfaction scores. West J Emerg Med. 2015 Jan;16(1):34-8. doi: 10.5811/westjem.2014.11.21768. Epub 2014 Dec 5. PMID: 25671005; PMCID: PMC4307722.
Jarvis PR. Improving emergency department patient flow. Clin Exp Emerg Med. 2016 Jun 30;3(2):63-68. doi: 10.15441/ceem.16.127. PMID: 27752619; PMCID: PMC5051606

Coronary CTA for Emergency Department Risk Stratification of Acute Coronary Syndrome

Samir Shahani MD MBA, Amro Alsaid MD, Renet Roy MD, Srinivasa Potluri MD, Karim Al-Azizi MD, Zuyue Wang MD, Molly Szerlip MD, Sherri Long BSN MBA, Jessica Villalobos BSN, Chandra Rohr BSN

Background

- Chest pain is one of the most common reasons that people seek care in the ED
- Moderate to High-Risk patients get admitted often for risk stratification
- Current Risk Stratification Tools estimate <1% Risk of MACE for low-risk discharges
- ACC endorses Coronary Computed Tomography Angiogram (CCTA) for risk stratification in intermediate-high risk stable chest pain patients.
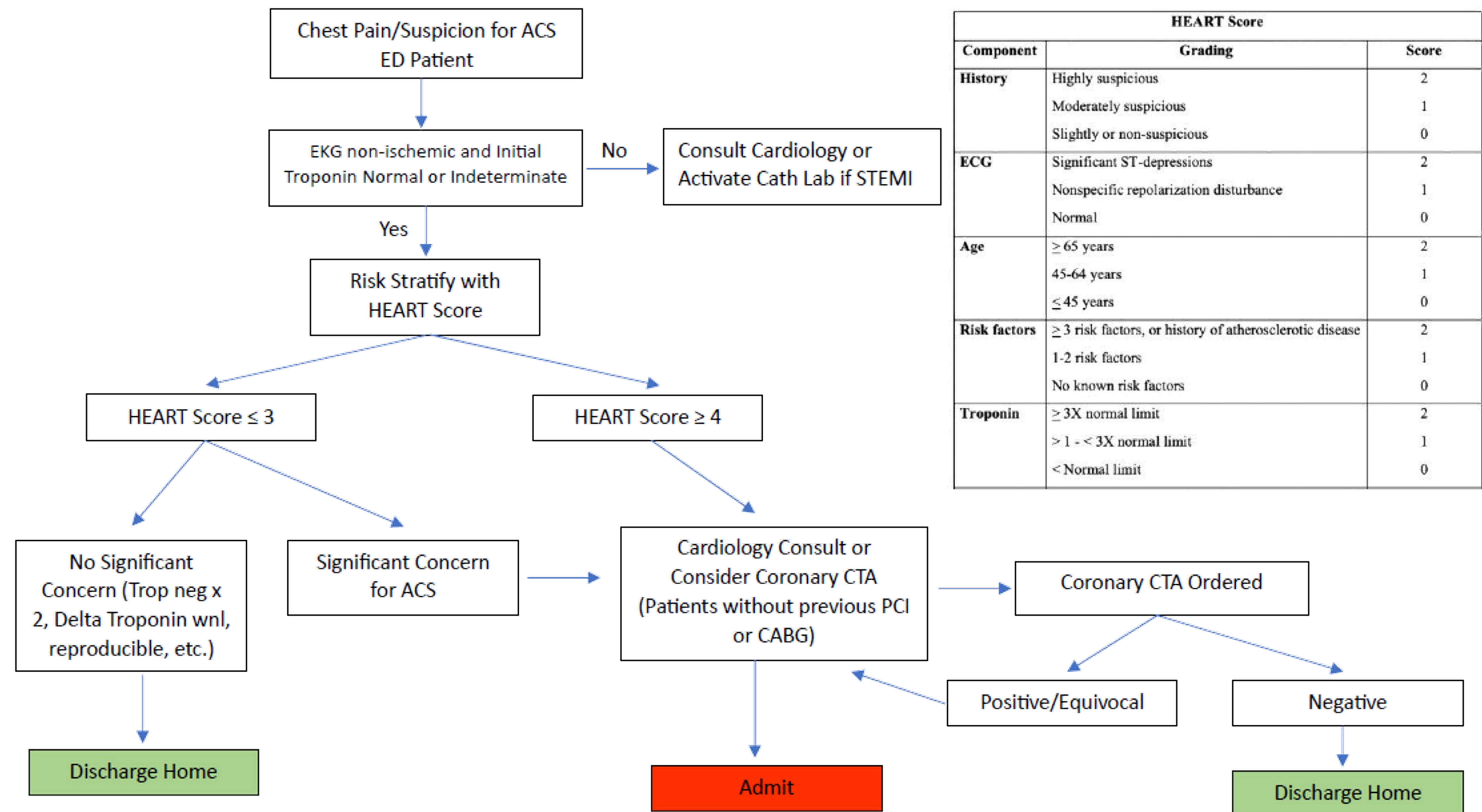
Use of Coronary CTA in the ED

- High sensitivity (86-100%) and high NPV (93-100%)
- Increases accurate diagnosis of Coronary Artery Disease (CAD)
- Decrease time from presentation to identification of CAD
- Decreased ED and hospital stay
- Facilitate safe ED discharge
- Possibly lower costs

Exclusions

- Coronary Calcium score > 1000, previous stents and CABG
- Performed between 7am to 3 pm, weekdays
- GFR <30 ml/min (unless on dialysis)
- No contraindication to beta blocker/nitroglycerin

ED CCTA Algorithm

Flowchart:
- Chest Pain/Suspicion for ACS ED Patient
- EKG non-ischemic and Initial Troponin Normal or Indeterminate → No → Consult Cardiology or Activate Cath Lab if STEMI
- Yes → Risk Stratify with HEART Score
  - HEART Score ≤ 3
    - No Significant Concern (Trop neg x 2, Delta Troponin wnl, reproducible, etc.) → Discharge Home
    - Significant Concern for ACS → Cardiology Consult or Consider Coronary CTA (Patients without previous PCI or CABG)
  - HEART Score ≥ 4 → Cardiology Consult or Consider Coronary CTA (Patients without previous PCI or CABG)
    - → Coronary CTA Ordered
      - Positive/Equivocal → Admit
      - Negative → Discharge Home

| HEART Score		
Component	**Grading**	**Score**
History	Highly suspicious	2
	Moderately suspicious	1
	Slightly or non-suspicious	0
ECG	Significant ST-depressions	2
	Nonspecific repolarization disturbance	1
	Normal	0
Age	≥ 65 years	2
	45-64 years	1
	≤ 45 years	0
Risk factors	≥ 3 risk factors, or history of atherosclerotic disease	2
	1-2 risk factors	1
	No known risk factors	0
Troponin	≥ 3X normal limit	2
	> 1 - < 3X normal limit	1
	< Normal limit	0

Results

- CCTA ordered 45 times in ED from May 1st 2023 to March 15, 2024 out of BSW The Heart Hospital Plano based on the above algorithm
- 23.6% of patients with Heart ≤ 3 were admitted, 83% of whom had intervenable obstructive heart disease
- 63.2% of patients with Heart score ≥ 4 were able to be discharged from ED with no MACE at 30 days

Discussion/References

- Overall, ED use of CCTA is a beneficial tool for risk stratification in ED chest pain patients to capture intervenable disease and avoid admissions for non-obstructive CAD in moderate-high risk patients

- Coronary Computed Tomography Angiography From Clinical Uses to Emerging Technologies: JACC State-of-the-Art Review. J Am Coll Cardiol 2020;76:1226-43.
- 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Empowering Communities: An Overdose Response Team Program and its Life-Saving Impact
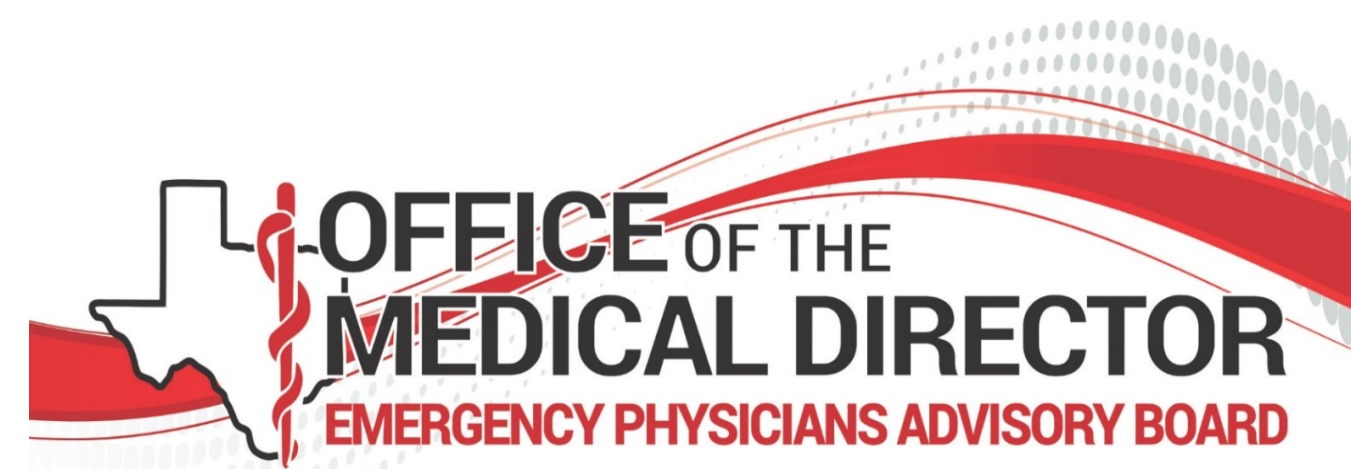
Angela Cornelius, MD, MA, FACEP, FAEMS[1,2,3]; Matt Willens NRP[1,4]; Brandon Pate NRP[4]; Brian Miller, MD, FACEP, FAEMS[1,5];Jeff Jarvis MD MS, EMT-P, FACEP, FAEMS[1,2,3]

[1]Office of the Medical Director, Metropolitan Area EMS Authority, Fort Worth, TX; [2] JPS Health Network, Fort Worth, TX; [3]Integrative Emergency Physicians; [4]MedStar Mobile Healthcare; [5]University of Texas Southwestern Medical Center Department of Emergency Medicine, Division of EMS, Dallas, TX

Background

- Opiate use disorder is a significant problem in most American cities. In the United states in 2019 70,630 drug overdoses occurred of which 49,860 were the result of opioid use. Within Texas there were 1402 opioid overdose deaths in 2018. Fort Worth, Texas is no exception. In 2021 increases overdoses were seen, fentanyl was implicated in adults and all opioids in teenage. Medstar Mobile healthcare has treats an average of 100 people a month for opiate and other overdoses. Over the last 5 years 49% (2453/4964) of all overdoses transported by MedStar were transported to John Peter Smith Hospital with an additional 900 AMA on the scene. Medstar Mobile Healthcare has created an Overdose Response Team (ORT) in response to the increase in overdoses being seen in our community.

EMS Utilization

| EMS Utilization of ORT Program Participants	Pre-Enrollment	Post-Enrollment	%Δ
All 911 Calls	886	524	-40.86%
*EMD Determinant is "Overdose/Poisoning/Ingestion"	128	55	-57.03%
*Primary Impression contains "Opioid"	32	7	-78.13%
*Primary Impression contains "Overdose"	88	10	-88.64%

Results

- 911 calls were reduced by more than 40% for this patient population.
- "Overdose/Poisoning/Ingestion" report to dispatch was reduced by more than 57%.
- Primary impressions of EMS encounters with opiate or overdose for these patient were reduced by 78% and 88.6%.
- Fatal overdoses were reduced by 13.9%.

Methods

- Retrospective review of electronic health records.
- Large metropolitan EMS system
- Time period 1/2022-12/2023.
- Descriptive statistics used to determine the change in 911 calls, in reported. "Overdose/Poisoning/Ingestion" to dispatch, in primary impressions of opiate or overdose.

Reduction in Overdose Impressions

EMD "Overdose/Poisoning/Ingestion"   Primary Imp "Opioid"   Primary Imp "Overdose"

■ pre-enrollment   ■ post enrollment
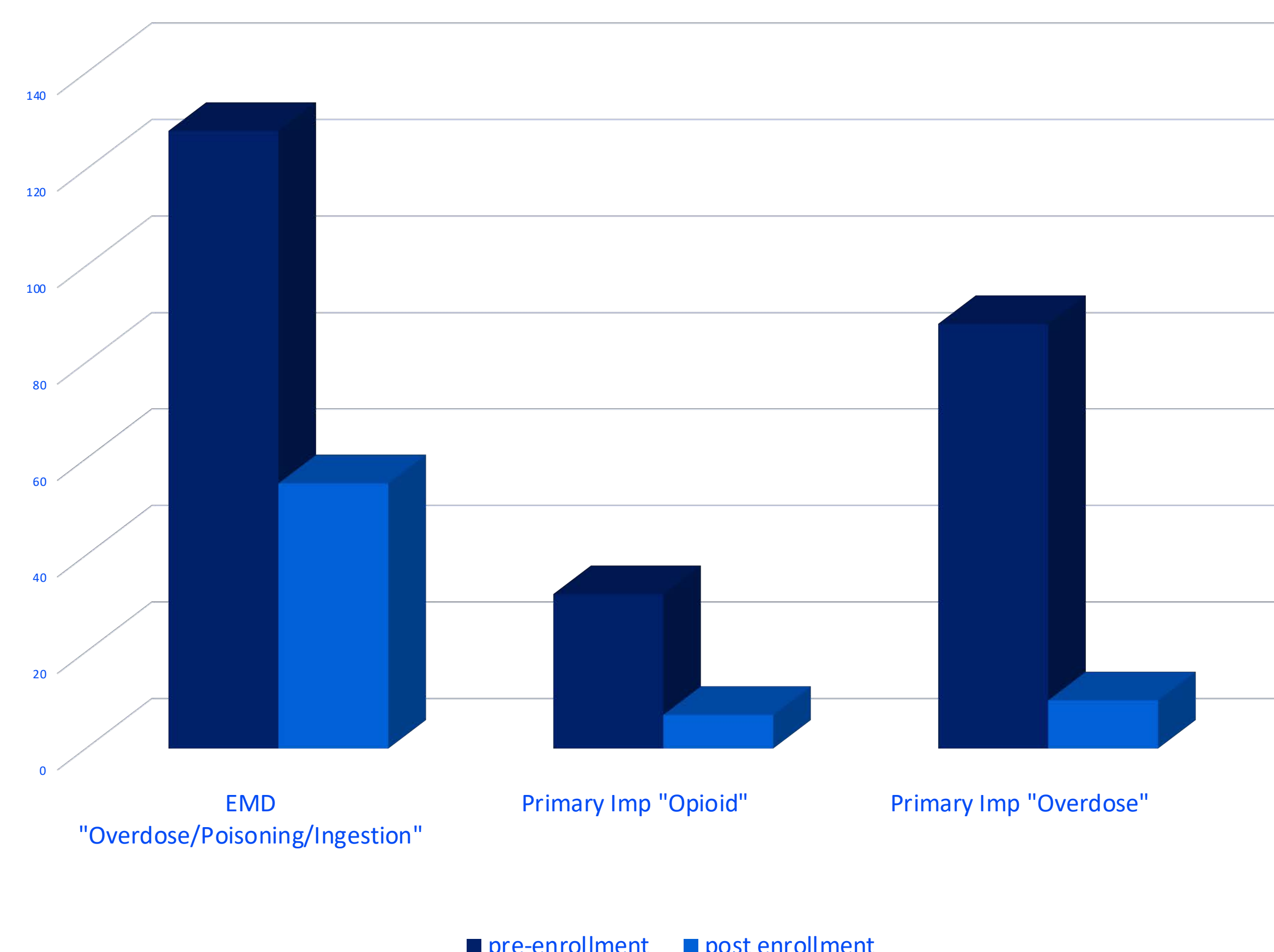
Summary / Conclusion

- In this large, urban system, an opiate response team intervention showed reduction in 911 calls, "Overdose/Poisoning/Ingestion" being reported to dispatch, and reduction of primary impressions containing opiate or overdose.
- This data captured patients who agreed to the program and may have missed further overdoses by those who declined the program.
- This data only captures patients within the Medstar service area.
- This data may inform future EMS resource deployment and intervention.

Development and External Validation of Clinical Features-based Machine Learning Models for Predicting COVID-19 in the Emergency Department

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Background

- In prior research, we developed an approach by using machine learning (ML) algorithms to predict serious acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection based on clinical features of patients visiting **the emergency department (ED) of Baylor Scott & White All Saints Medical Center (BAS)** during the early coronavirus 2019 (COVID-19) pandemic.

Study Aim

- To **externally validate this approach** within a distinct ED population.

Method

- All adult patients (age ≥ 18 years) who visited the ED with suspected COVID-19 and underwent testing for SARS-CoV-2 using RT-PCR method were eligible for inclusion.
- The primary outcome was a positive RT-PCR for SARS-CoV-2 confirming the diagnosis of COVID-19.
- Collected records were split into training (consisting of data from the model development) and testing (consisting of data from the external validation) cohorts.
- Several ML algorithms were constructed and K-fold cross-validation was adopted during the training process. The models' performances were evaluated by using the area under the receiver operating characteristic curve (AUROC) in the

Discussions

- **Random forest** (**AUC 0.785**, 95% confidence interval [CI] 0.747–0.822) performed better than **gradient boosting** (**0.774**, 95% CI 0.739–0.811) and **extra trees classifier** (**0.72**, 95% CI 0.677–0.762) under 7-fold cross-validation. There was no significant difference between the constructed models.
- Our study validates the use of ML for predicting COVID-19 in the ED and demonstrates its potential for predicting emerging infectious diseases based on models built by clinical features with temporal and spatial heterogeneity.

Results
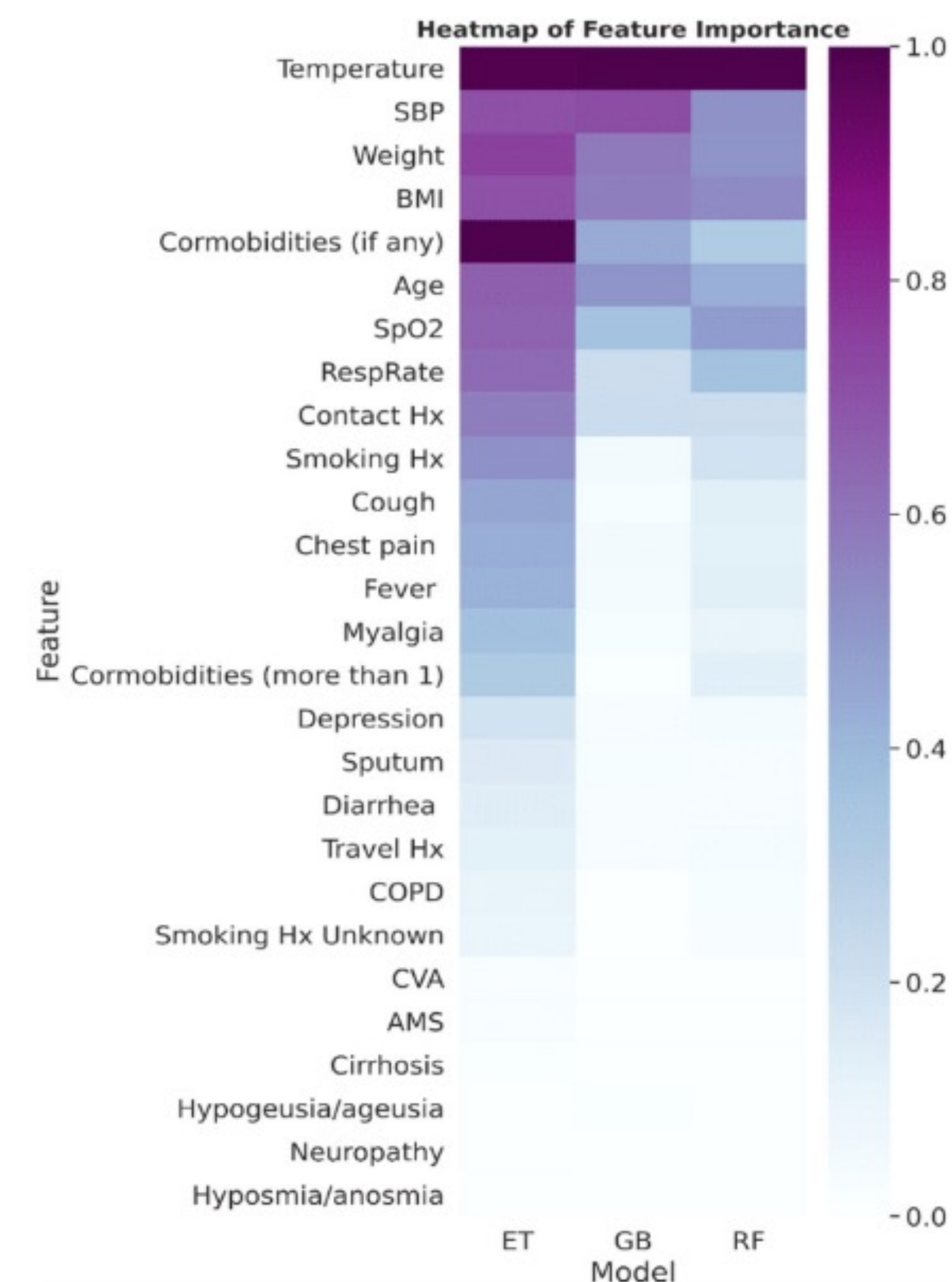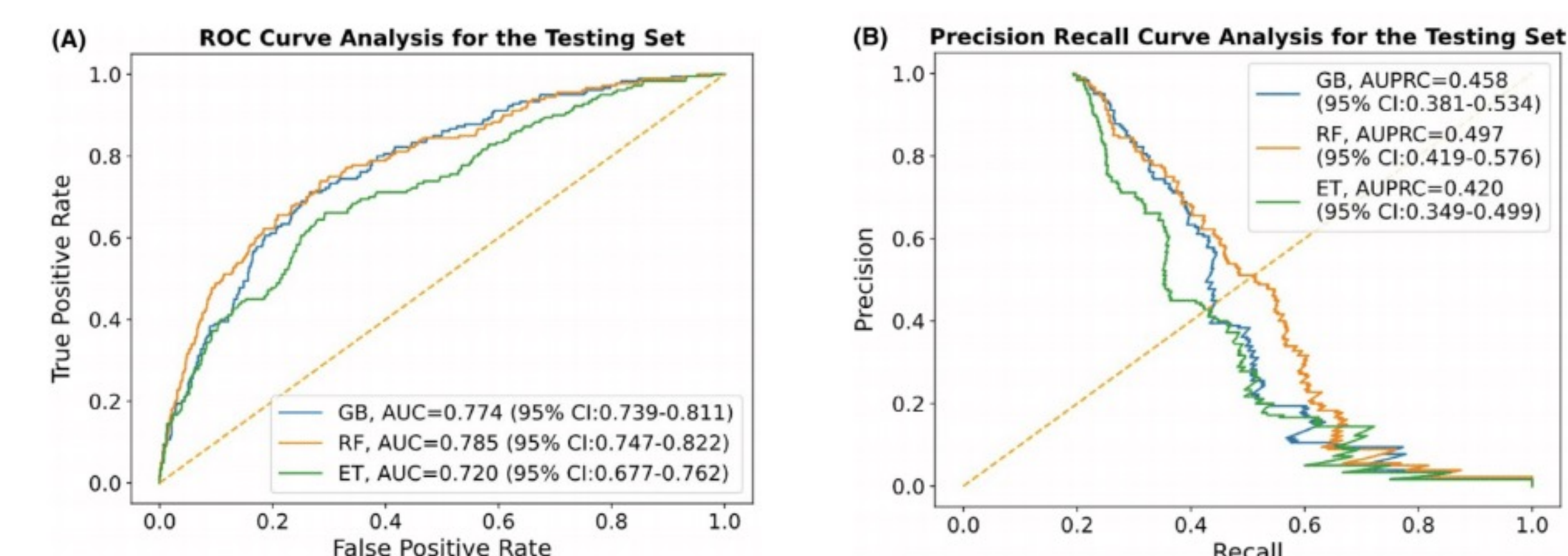
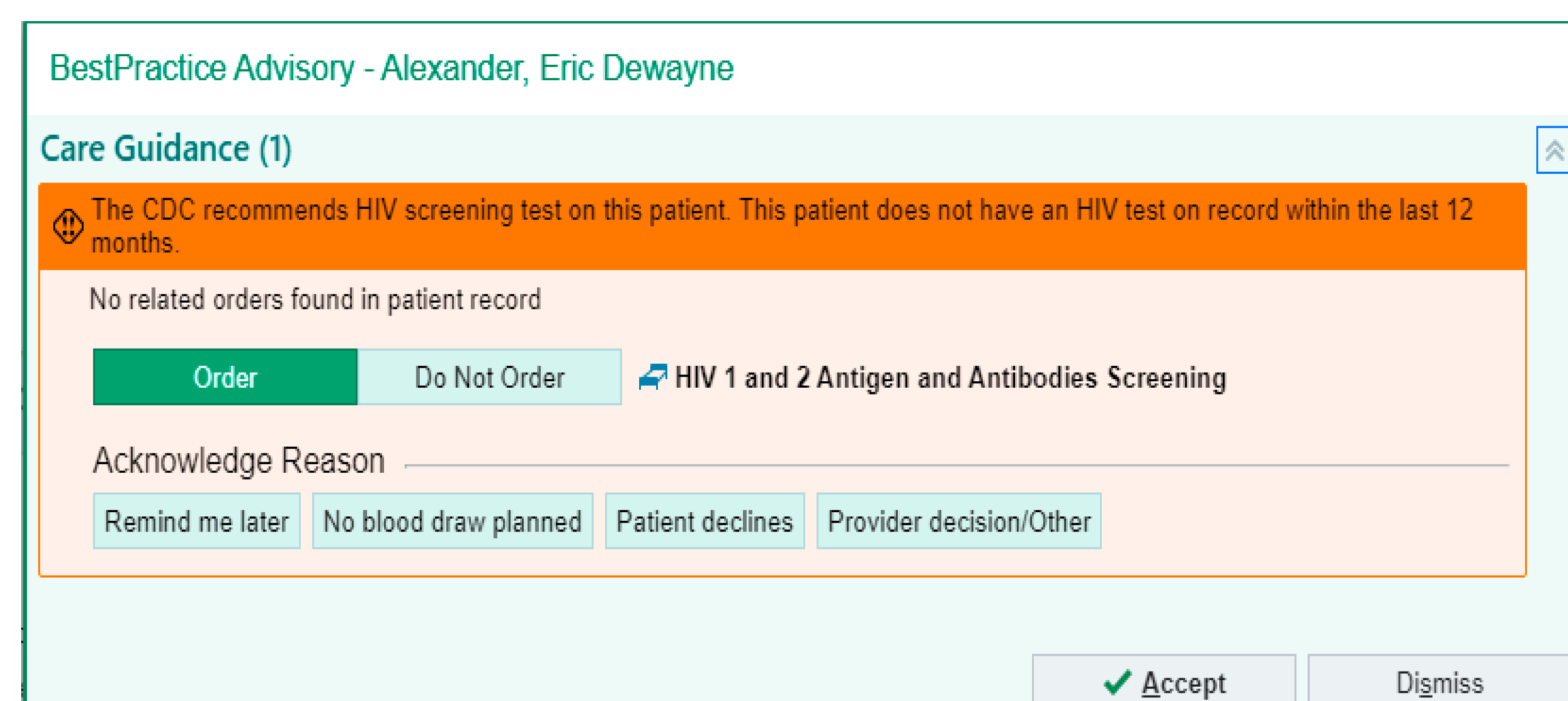# HIV Screening in the BUMC ED: A Public Health Opportunity

Seamus Lonergan, MD; Amanda Bradley, NP; Will Huggins, PA

BACKGROUND

o CDC data from 2019 found an estimated 1,189,700 million people aged 13 and older had HIV in the U.S.

o CDC estimates that 13% of people with HIV do not know they have it.

o Texas DSHS reports that Emergency Departments (EDs) account for highest % of new HIV diagnoses.

o Early Diagnosis through ED screening is one way to prevent transmission and slow the HIV epidemic.

o Financial support was obtained through Gilead Sciences FOCUS award program to implement routine screening for HIV in the Baylor University Medical Center ED.
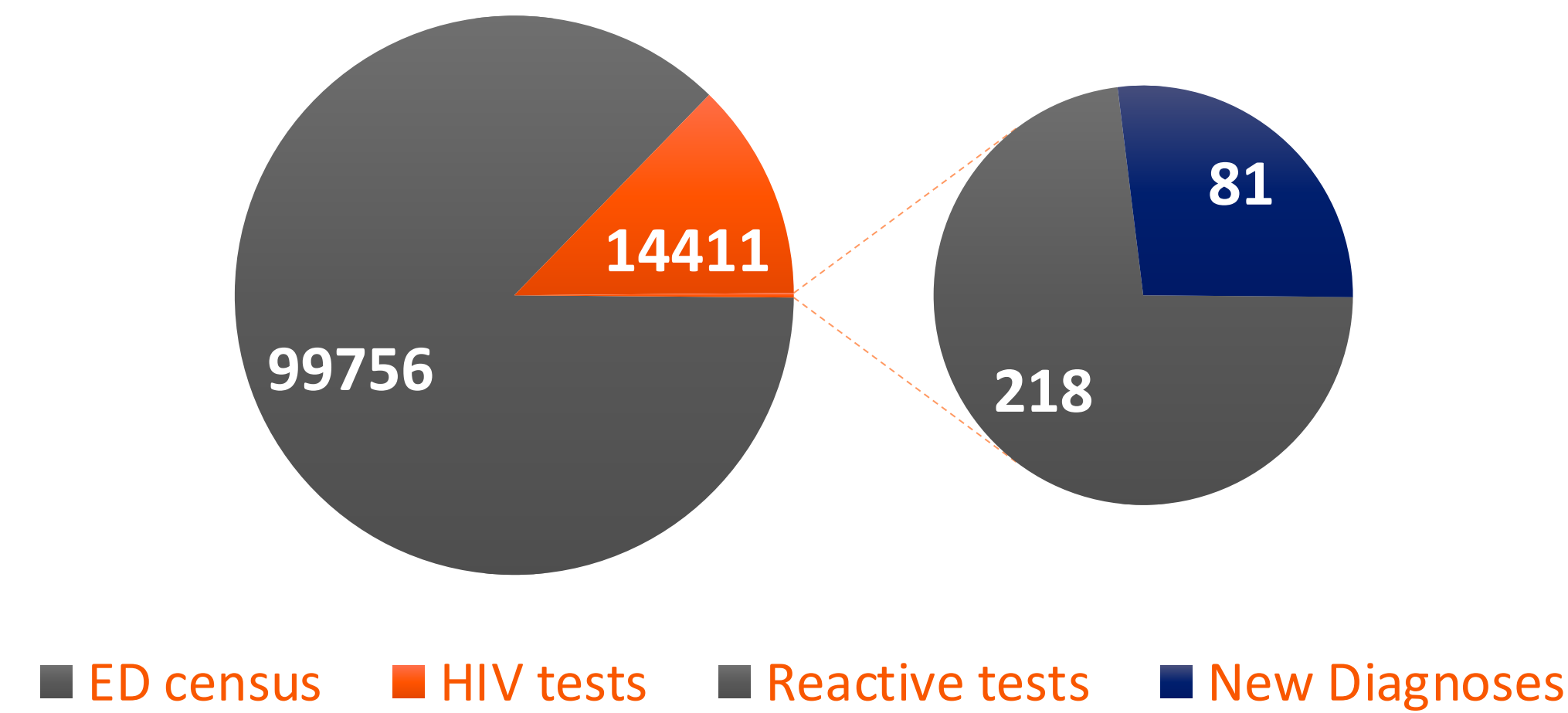
IMPLEMENTATION OF HIV TESTING

o Screening criteria were identified

- Age 18-65
- No previous diagnosis of HIV
- No previous test in last year
- Blood draw in ED

o EPIC EMR utilized Best Practice Alert (BPA) to prompt ordering HIV test when criteria met
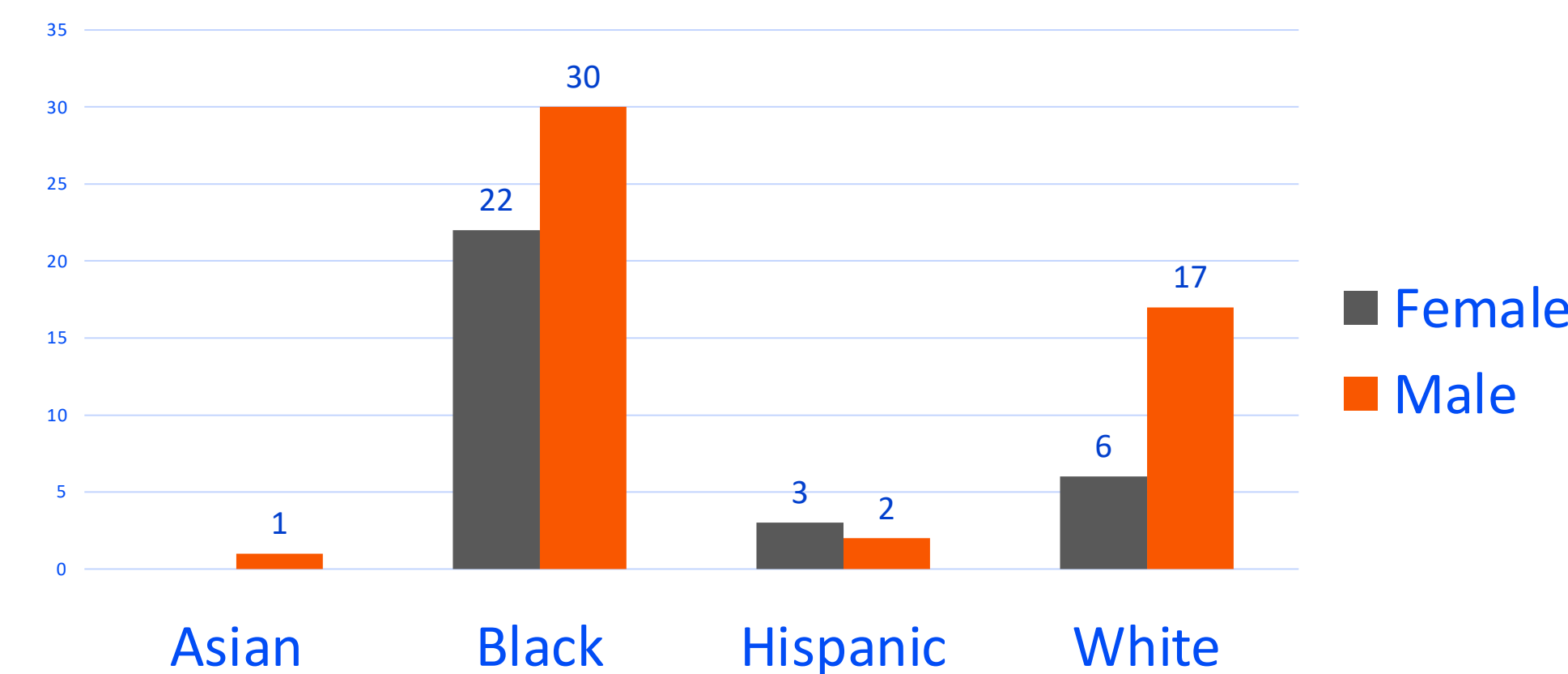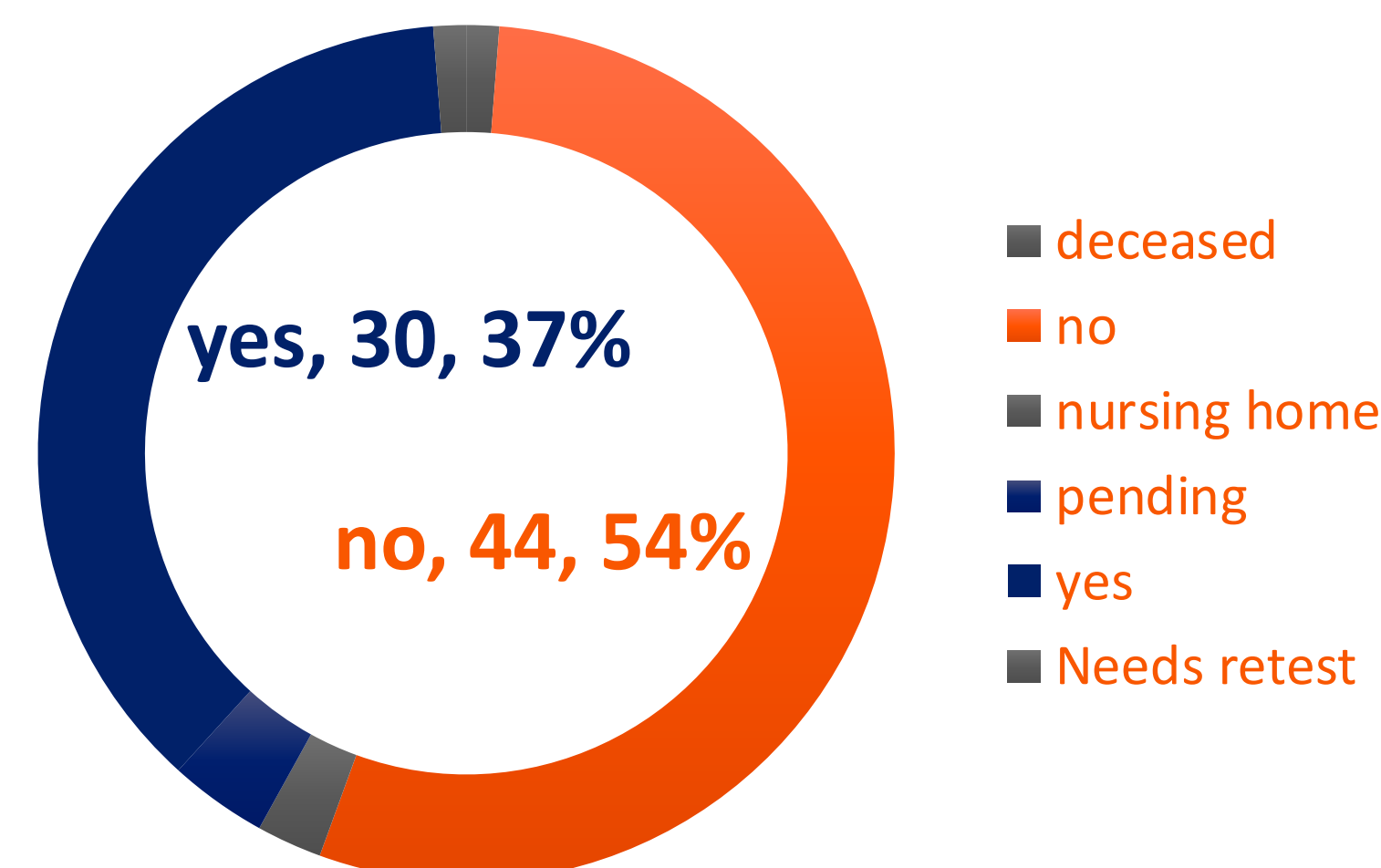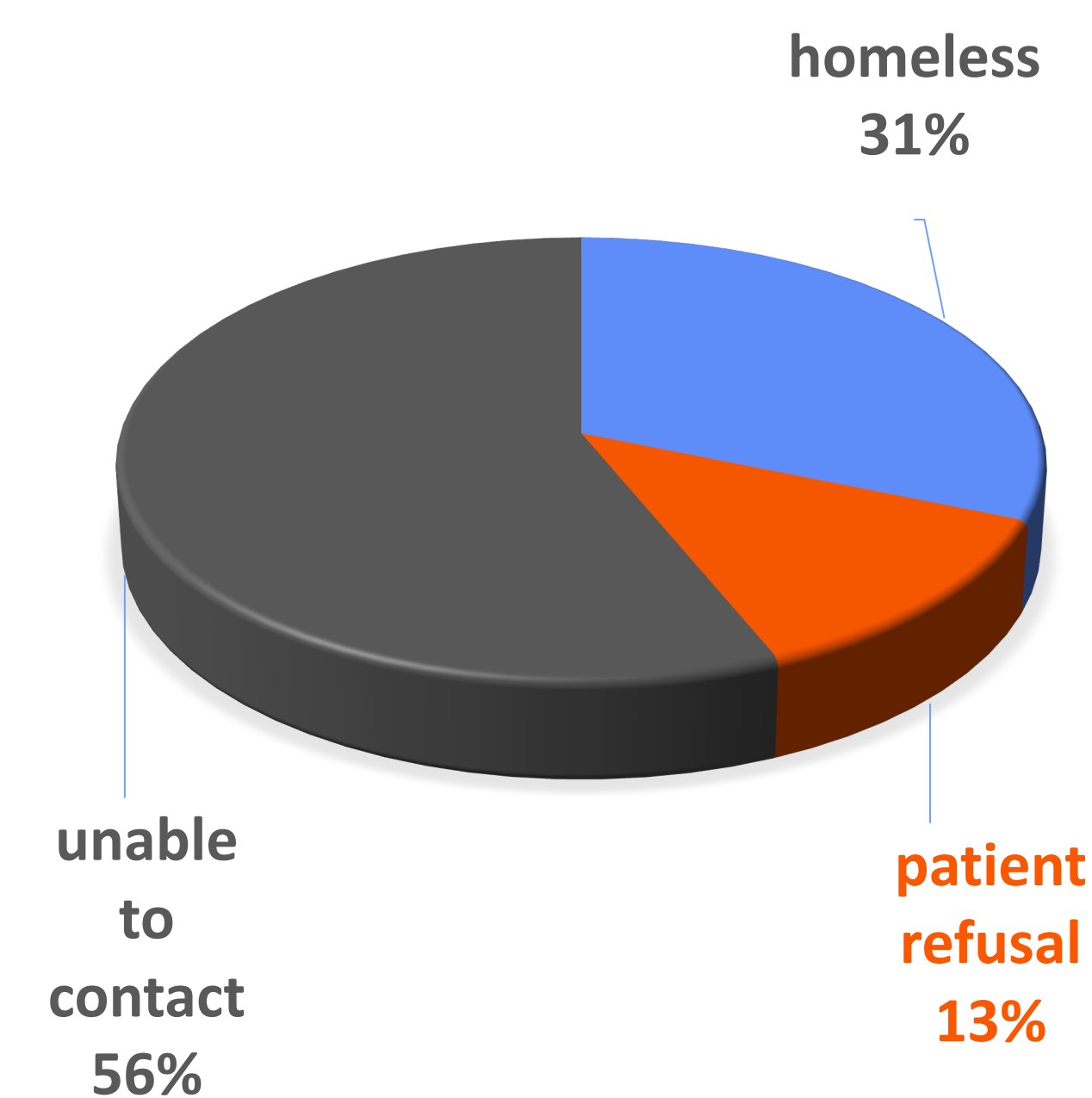
BestPractice Advisory - Alexander, Eric Dewayne

Care Guidance (1)

⊕ The CDC recommends HIV screening test on this patient. This patient does not have an HIV test on record within the last 12 months.

No related orders found in patient record

| Order | Do Not Order | ⇄ HIV 1 and 2 Antigen and Antibodies Screening |

Acknowledge Reason

| Remind me later | No blood draw planned | Patient declines | Provider decision/Other |

✔ Accept   Dismiss

RESULTS – 1 YEAR

Data Summary

99756 / 14411 / 218 / 81

■ ED census ■ HIV tests ■ Reactive tests ■ New Diagnoses

Race and Gender Demographics

	Asian	Black	Hispanic	White
Female		22	3	6
Male	1	30	2	17

■ Female ■ Male

LINKAGE TO CARE

yes, 30, 37%
no, 44, 54%

■ deceased
■ no
■ nursing home
■ pending
■ yes
■ Needs retest

LINKAGE CHALLENGES (48)

homeless 31%
unable to contact 56%
patient refusal 13%

CONCLUSIONS

o Over 14,000 patients tested through our ED in 1 year (14.4% of census).

o 81 new diagnoses made (6.7/month) confirming research that patients are living with undiagnosed HIV.

o Demographic data shows the majority of new HIV-positive individuals in our community are black.

o Multiple new diagnoses were made on patients requiring admission for late-stage HIV/AIDS and 3 died.

o We positively impacted 30 lives through diagnosis and linkage to care.

o Linkage was more challenging than anticipated due to patient factors including homelessness, psychiatric illness, inability to contact, and patient refusal.

FUTURE DIRECTIONS

o BUMC ED is currently in year 2 of testing with the addition of a dedicated clinical care navigator to determine if improvement in linkage rate is possible.

o We believe other Emergency departments in and outside the BSW system could implement a similar HIV screening program.

o There is opportunity for funding through Texas DSHS grants and our Gilead FOCUS partners to help fund personnel and supplies to expand HIV screening.

o There is opportunity to expand testing to other Public Health crises including Hep C and Syphilis.

Don't Let 'em Go!
Left Without Being Seen: An Interdisciplinary Priority Project

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Heidi Knowles MD, FACEP, Devin Sandlin, MD, Nathan Hoot, MD, Sudhakar Karlapudi MBBS, MBA,FACP, CMO, Julie Moore, DNP, MBA, RN, ACNO, Jessica Kirby DO, FACEP
And all of our admin residents/chiefs, and all the front-line staff, nurses, APPs, and physicians!

Background

In Emergency Medicine, one of the defining metrics of a facility's success and safety, is the number of patients who leave the facility without being seen by a physician. This percentage is a topic of conversation, planning, and collaborative meetings between nursing leadership and physicians to ensure a provider sees patients who enter through the doors before they decide to leave. Left without being seen (LWBS) affects the community a facility serves in various ways. Most importantly, at John Peter Smith hospital, approximately 23 percent of all Emergency Department (ED) patients are admitted to the hospital for inpatient treatment. Previously, the LWBS rate was on average 7.3 percent in a 24-hour period. So, for example, when the LWBS rate was at 7.3 percent that meant that if the facility had 350 patient encounters in a day, 26 of them left, and 6 of them should have been admitted. In essence, that means that 6 of the patients needed a higher level of continuing care, which was not provided to them. That relates to lost revenue and a disservice to the patients. According to a study by Smalley et al., the potential net revenue annualized, from decreasing LWBS is approximated at 9.5 million dollars for a similar size hospital (2021).
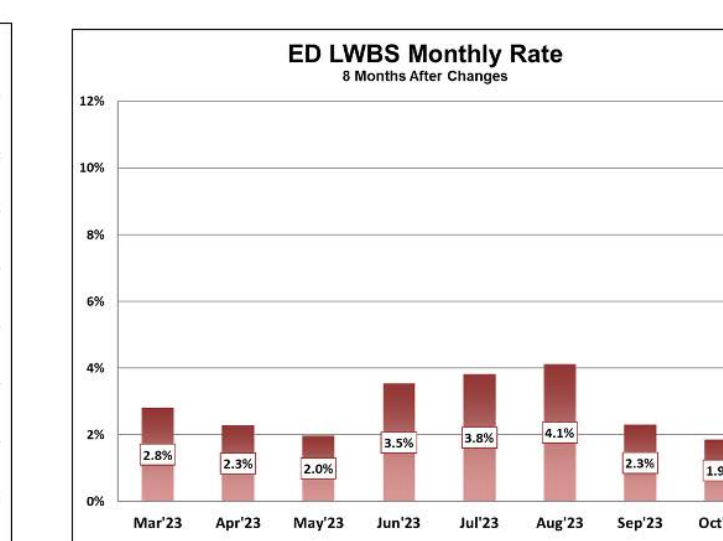
Data Review

ED Arrival Monthly Volume — 8 Months Prior to Changes

ED LWBS Monthly Rate — 8 Months Prior to Changes

ED Patient Experience Monthly Scores — 8 Months Prior to Changes

When reviewing the data, our busiest month during the past eight-month time period was January 2023, with 10,044 visits, with 9.5 percent left without being seen, which equates to 954 patients leaving the Emergency Department without being seen by a physician. Considering the admission rate, 220 patients would have met admission criteria. With these astounding numbers, the lost revenue and patient risk were evident. These metrics are all gathered by the RN Data Analyst for the department and sent out to all nursing and physician leadership every morning, seven days a week. After this report is sent out, there can be adjustments made in staffing or follow-ups performed. This report is called the "Daily Dashboard", and shows the number of patients who were seen during the previous 24 hours, how many patients LWBS, the number of "boarded" patients there were waiting for hospital beds and the times in which patients left the ED. The patients who left are also broken down by LWBS, left against medical advice, and eloped. According to the Center for Medicaid and Medicare Services (CMS), the national average is only three percent but preferred to be as low as possible to keep in tune with the goal of timely and effective care (CMS, n.d.). To decrease the number of patients LWBS, they must present to the ED, be seen by a provider (either an advanced practice provider or physician) and they must complete a medical screening exam (MSE) prior to leaving the facility.
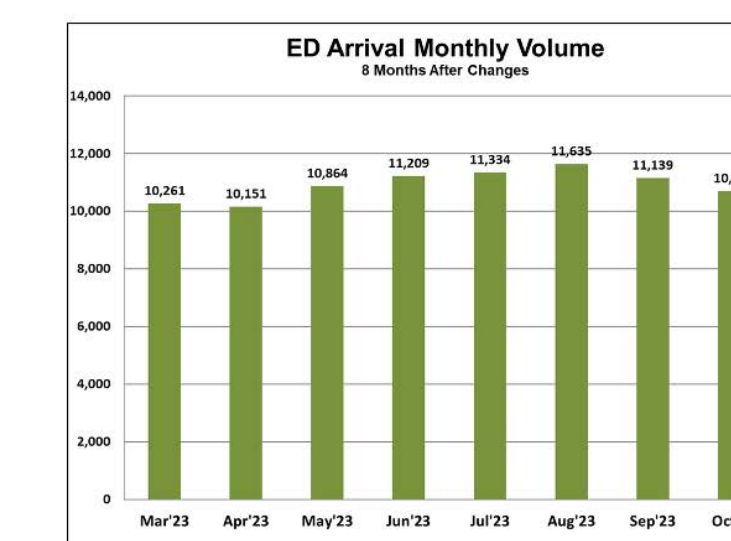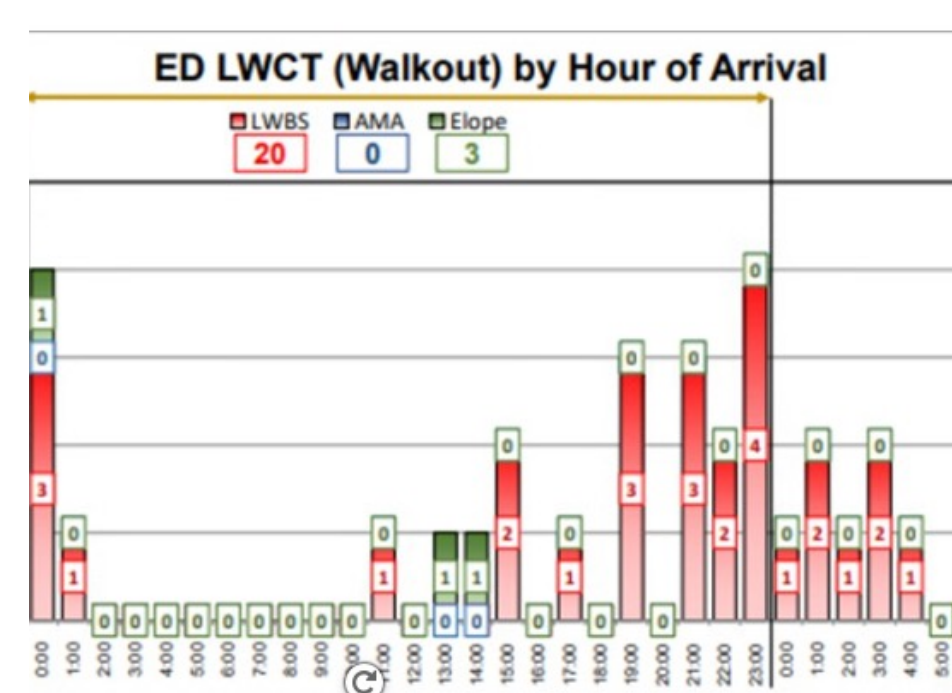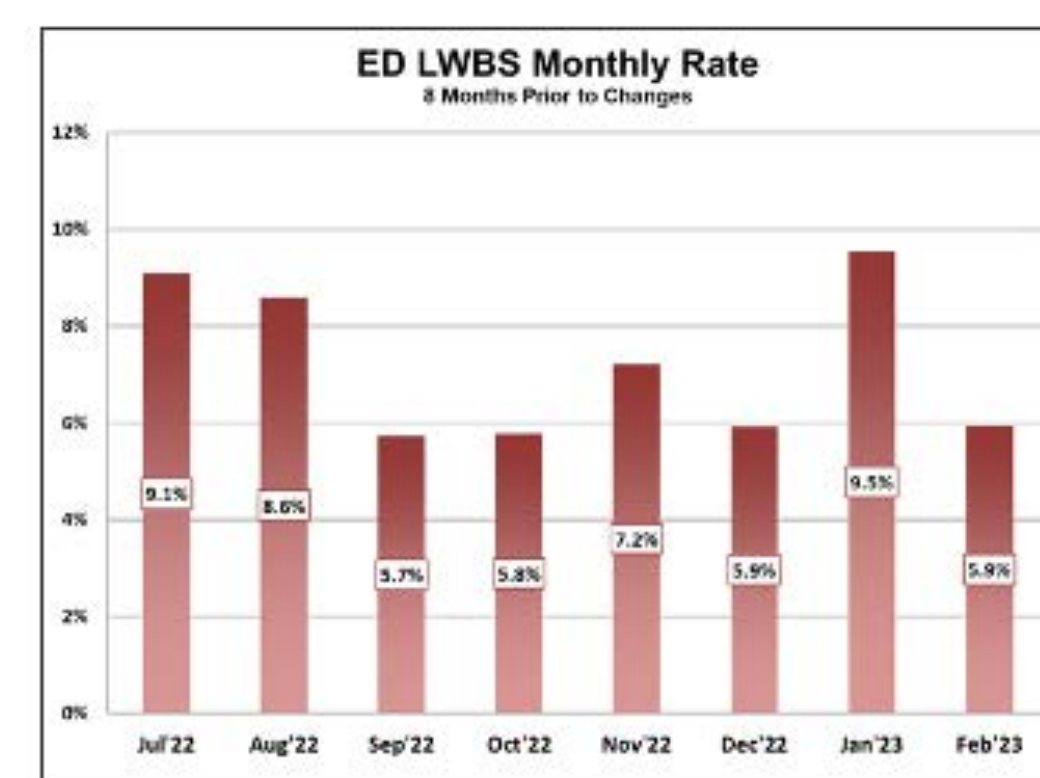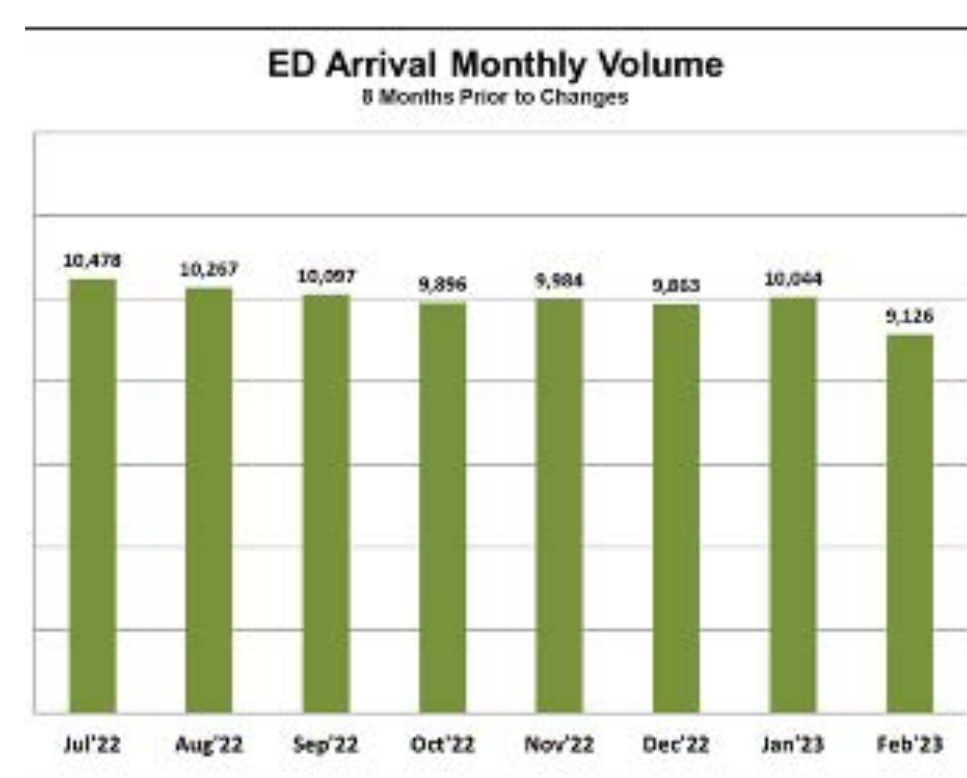
Methods

According to recent data, it was noted that many of the patients who leave the ED do so during the night shift. This was due to several contributing factors. For one, the ED volume builds slowly throughout the day until about 2300 hours, so the largest number of patients at any given time was between 1900 and 2300. Many patients checked into the department and were escorted over to the waiting area, where they see how many other patients are waiting, and decide to leave at that point. Another issue is that two of the lower acuity or "fast-track" patient care areas closed during these hours, due to physician, provider, and nursing staffing. The initial one closed at 1900, so they stopped bringing patients to that area at 1700, and the other closes at 0100, so they stop bringing patients back at 2300. This causes further congestion and the wait times for the lower acuity patients are increased. When patients must wait for longer than expected, they tend to leave quickly. As shown in the table below, prior to 1900, (when the last fast-track area stops pulling patients), there were only four patients who had LWBS. The numbers greatly escalate when that last fast-track area shuts down, and the lower acuity patients must wait a longer period of time.

ED LWCT (Walkout) by Hour of Arrival

Plan for Improvement

After the opportunity for improvement, was identified by both physician and nursing leadership, a retreat was planned for involved parties. The goal for this retreat was to identify the causative factors and brainstorm on how to come together, to increase the number of patients we were able to see. There were several ideas brought forth from this time together, with the most pertinent known as "Pull to Full", or direct bedding. This plan encouraged our Patient Flow Coordinators to immediately place patients in beds if they were available. Previously, patients were placed in beds slower to ensure that neither nursing or physician staff received too many patients at once, and to make sure that when unstable patients presented, there was room for them. Although this was a complete change in thought process, it was decided this was an initiative that would decompress the waiting room, therefore decreasing the amount of stress in the department overall.
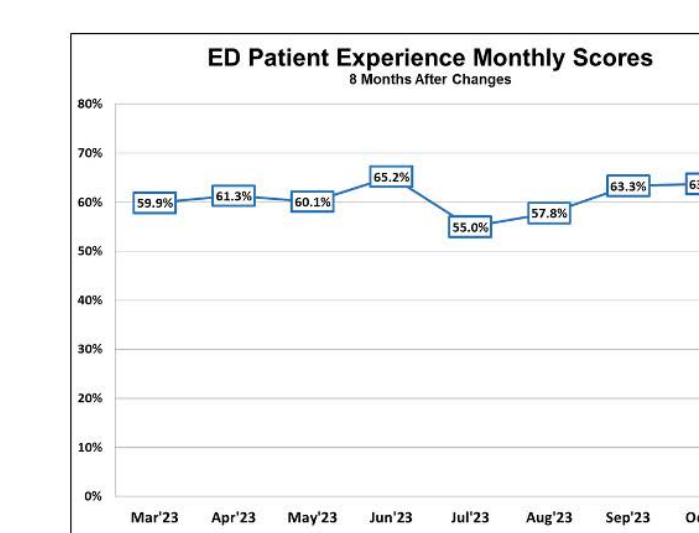
Another initiative proposed, was a change in both physician and nurse staffing. According to the previous physician staffing schedule, the physicians that worked in the "Flex" area arrived at 0900 and pulled patients from the Vertical (or low acuity) Waiting Room. This would assist the department with the rush that came in and helped keep the number of the lower acuity patients from climbing too quickly throughout the day. However, there were no areas that assisted with the Main Waiting Room, where the patients who were ill and needed cardiac monitors were held. At this point, it was decided to shift the focus of Flex to take the stable Main patients and open a new area "Intake" for the ESI priority 4 and 5 patients.

In addition, it was also decided that the hours of the "Flex" area would be increased, based on the daily data. The initial hours of operation for Flex were 0900-0100 on Monday through Wednesday, and 0900-1700 on Thursday and Friday. As evidenced by the graph above, this was noted to be a detriment when many of the patients who left walked out in the early hours of night shift. After reviewing the data, the hours for Flex were to be changed to 0900-0100, Monday through Friday and 0900-1900 on Saturday. This required an increase in staff for both physicians and nursing and took a collaborative effort, to ensure as many patients as possible were seen.

These plans deemed buy-in as a non-negotiable. When volume began to build, it would be the front-line staff's responsibility to ask patients who attempt to leave to stay and to bring a physician to them in the waiting room to complete an MSE prior to them leaving. They would also be able to alert management when patients want to leave, and they would be able to speak to the patient explaining the process and see if there is anything that could be done to make them more comfortable. The Team Leads and Patient Flow Coordinators were also involved in this goal and were empowered to have the lowest number of patients who left without being seen. This gave staff ownership in the metric, and a healthy competition.

Results

These changes in the Emergency Department to decrease the Left Without Being Seen (LWBS) began in March 2023. Since that point, drastic improvements have been made throughout the department to accommodate the increased needs as well as better suit the departmental needs. Contract and then seasonal nurses, have been a consistent factor in the department to ensure the department is better staffed, which in turn leads to quicker turnover throughout the department. Additional mid shift positions have also been added, consistent with the influx of patients.

On average, the Left Without Being Seen rates have decreased drastically, now on par with the national average, even during our highest volume months on record. In addition to the increased ability to see patients, a decrease in the Left Without Being Seen percentage is congruent to an increase in payment and reimbursement. In comparison to the same months in previous years, the estimated increase in revenue from June 2023 to October 2023 was $2,875,678. Of note, this was accomplished without an increase in patients who left without completing treatment or against medical advice. Also of significance, there was a substantial increase in patient experience scores due to decreased wait times and improved staffing numbers.

ED Arrival Monthly Volume — 8 Months After Changes

ED LWBS Monthly Rate — 8 Months After Changes

ED Patient Experience Monthly Scores — 8 Months After Changes

Sustainability

- This endeavor, is one that has become a point of pride and accomplishment, for our department and leadership. The drive to sustain excellence is at the forefront, of daily workflow, and there are several measures taken to ensure lasting results:
- ED Operations meetings every Tuesday, with both ED physician and nursing leadership to problem solve and trend issues.
- Ad Hoc meetings, with Trauma Services, Critical Care, Environmental Services, Radiology, and Transportation to set goals and discuss specific delays monthly.
- A second retreat was held in August 2023, with ED staff, physicians, and nursing leadership to prioritize and set future goals. These retreats allow staff members to participate in an open forum with leaders and physicians to facilitate process improvement and promote communication between the groups.

Photo from the second retreat, "Stronger Together"
August 29, 2023

IS THE BARK WORSE THAN THE BITE?

Corina Sturgeon NP, Chukwuagozie Iloma DO, Connie Swickhamer, DO, Blake Johnson, MD

INTRODUCTION

- Rabies belongs to a member of the Rhabdoviridae family that primarily targets nerve cells spreading along the peripheral nerves to the central nervous system, including the brain.

- Rabies is transmitted through direct contact with the saliva of an infected animal via a bite or scratch.

- In Texas, the most common source for human transmission are skunks, bats, foxes, raccoons, and coyotes.

- Domestic animals such as dogs and cats, are also susceptible to rabies although transmission to humans is rare.

- Thanks to effective animal vaccination programs, cases of rabies in domestic animals are relatively rare in the United States.

- Since 2008, there have been 23 cases of human rabies infection, 8 of which were due to exposures outside of the U.S.

- At BSW Irving, we noticed a relatively inappropriate initiation of the rabies vaccine series based on the bite and a wide variation in practice among providers.

- We set a goal to educate our ED physicians and APPs with the aim of ensuring that the vaccine series is initiated appropriately and to decrease practice variance in our ED.

Laboratory-confirmed rabies in domestic animals, 2023

Laboratory-confirmed rabies in wild animals, 2023

METHOD

- Retrospective analysis of EMR pharmacy data for rabies vaccine initiation and administration for 2022 and 2023 in the ED.

- Identified opportunities for improvement.

- Initiated plan to develop education for all ED physicians and APPs.

- Education provided in June 2023 at monthly ED meeting.

- Prospective data collection and analysis to evaluate progress and practice changes among ED providers.

RESULT

Animal Bites presentation by months 2023



2023 Rabies Vaccination

RESULT

- 42 vaccinations in the 6 months prior to education.

- 15 vaccinations in the 6 months after education.

- This demonstrates a 64% decrease in vaccinations post education.

- Survey of ED providers showed improved awareness and increased effort of providing patient education on rabies transmission in Texas.

CONCLUSION

- Preliminary data suggests that education of our ED providers led to utilization of more appropriate initiation criteria for Rabies vaccine series.

- Data also demonstrated significant decrease in the total number of Rabies vaccine series.
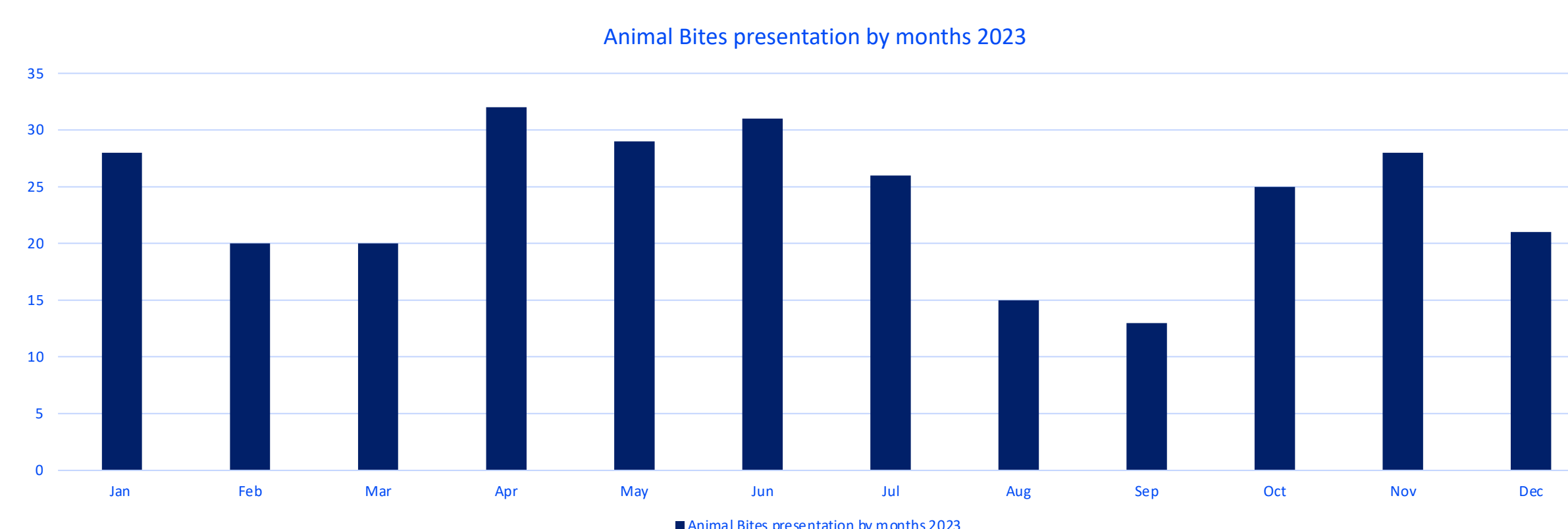
PLAN

- Our plan includes:
  - Ongoing ED Provider education.
  - Continued data collection and analysis.
  - Continued patient education regarding the real numbers of Rabies cases/transmissions.
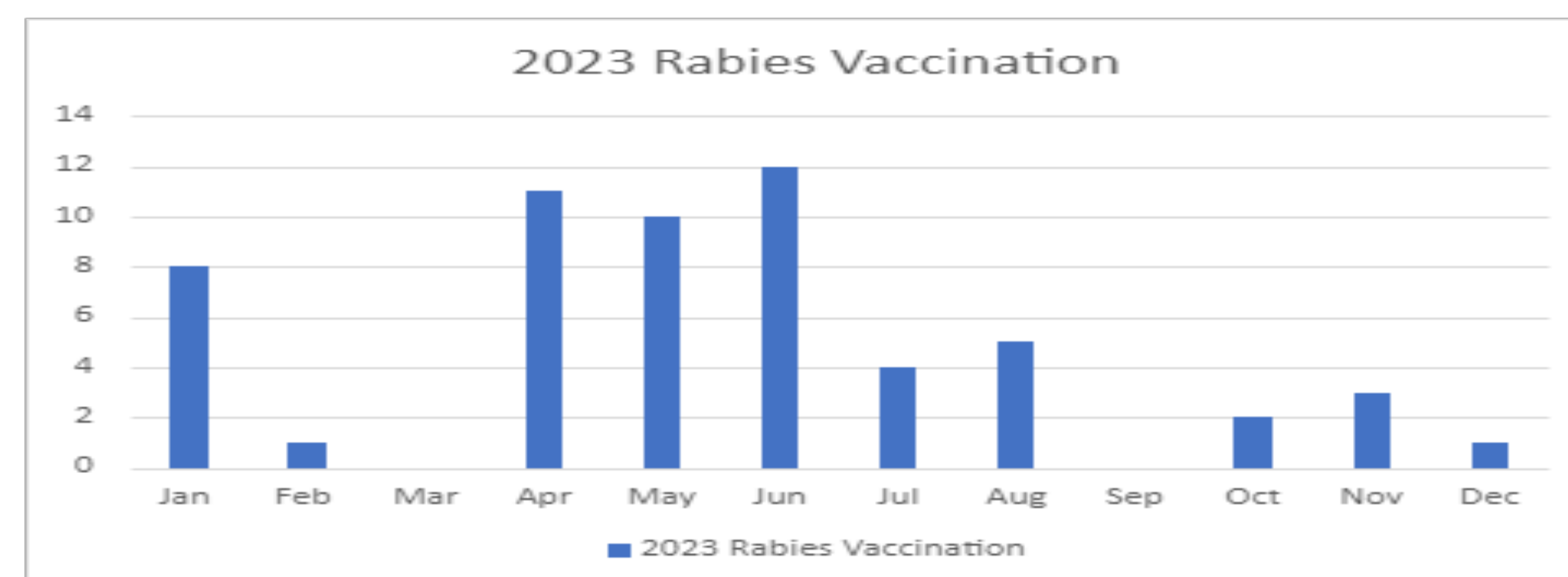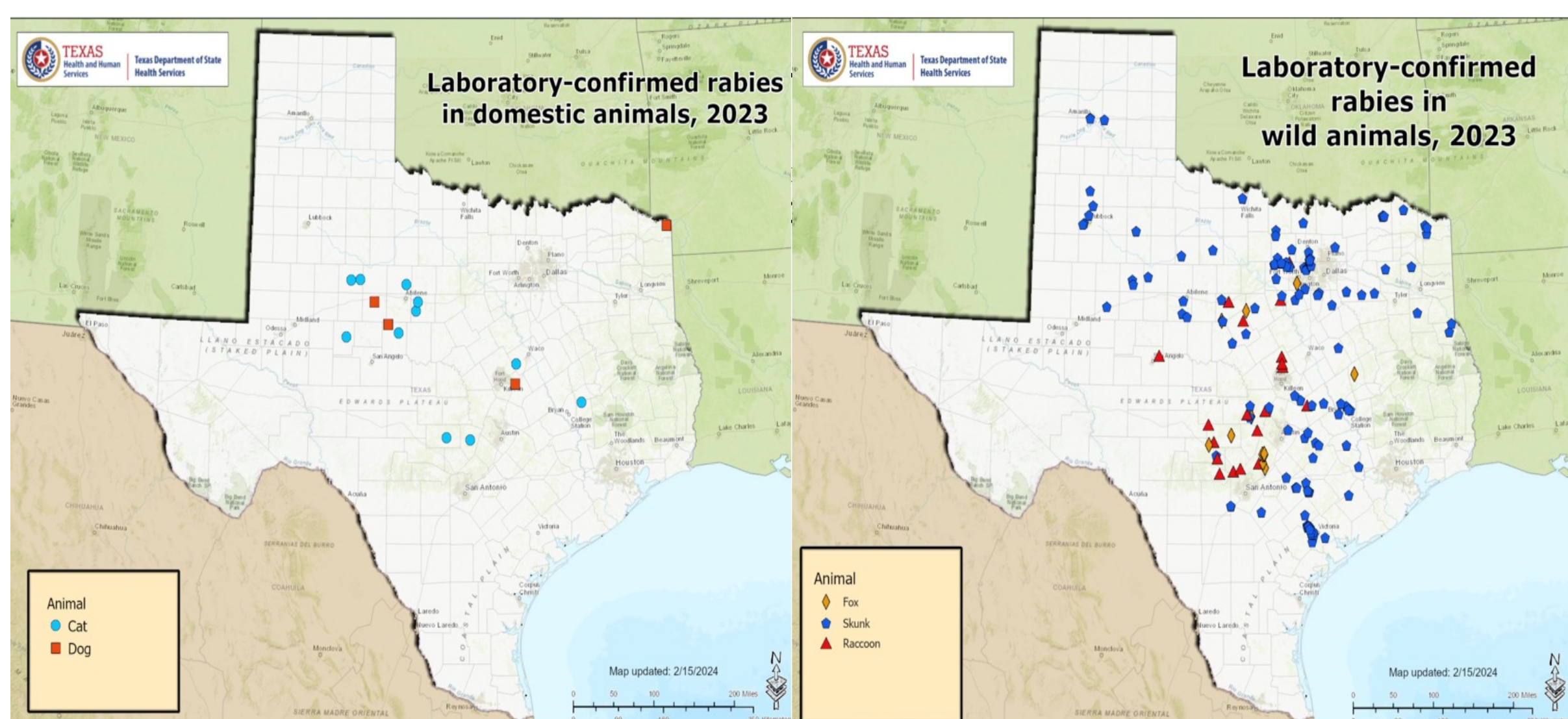
ED and Obstetrics ED Collaboration Matrix

Baylor Scott & White McKinney

Steven Blake Baker MD MPH FACEP, Mark Beaird MD

Introduction

- BSW McKinney operates a 23-bed main emergency department and a 4-bed obstetrics emergency room.
- Baylor Scott and White has a published guideline that governs triage of patients with a wide degree of latitude.
- Facilities can be empowered to enact policies that address the needs of their site.
- It has long been a request of our emergency department that non-viable second trimester miscarriages and postpartum vaginal bleeding be managed in the Ob ED.
- This would allow a specific population to receive care in a less chaotic setting with specialized physician and nursing support.

Methods

- A work group was established to investigate the feasibility of these requests.
- Included EM physician, ObGyn hospitalist physician, EM nursing leadership, ObGyn nursing, CMO, and CNO.
- Case counts were collected to inform discussions about care burdens.
- Ultimately, it was decided that a formalized matrix to help guide triage and management would be produced.
- After multiple revisions, all stakeholders agreed to implement the matrix.
- Now 2nd trimester miscarriages and postpartum vaginal bleeding less than 7 days after delivery is managed in the Ob ED.

OVERVIEW OF ED/OBED CARE FOR OB PATIENTS BSW MCKINNEY

OB CATEGORY 1 <20 weeks with non OB primary problem	OB CATEGORY 2 <20 weeks with primary OB problem	OB CATEGORY 3 >20 weeks with non OB primary problem	OB CATEGORY 4 >20 weeks with primary OB problem	OB CATEGORY 5 POST PARTUM	
Examples: • Orthopedic • SOB • URI Evaluated and managed in ED Consult with OB as needed	**2A Within scope of practice of ED providers** Examples: • Threatened/missed abortion • Evaluation for ectopic • Hyperemesis Evaluated/managed in ED Consult with OB as needed *ED Doc to OB Doc collaboration to develop plan for patient* **2B Outside of normal scope of practice for ED providers** Examples: • Second trimester miscarriage in progress • Cervical incompetence/hourglass membranes • Previable PPROM Patient sent to L&D Evaluated/managed by OB	**3A Primary non -OB problem and NO OB problem** Examples: • Chest pain • SOB • Orthopedic Evaluated/managed in ED Consult with OB as needed Fetal monitoring not indicated *ED Doc to OB Doc collaboration to develop plan for patient* **3B Primary non-OB problem that could affect wellbeing of pregnancy. No active OB problem.** Examples: • Respiratory failure • Cardiac condition with maternal compromise • Trauma Evaluated/managed in ED OB Consulted OB/Nurse monitors fetus *ED Doc to OB Doc collaboration to develop plan for patient* **3C Non OB problem and OB problem** Example: Chest pain/SOB in OB patient with bleeding Evaluated/managed in ED with continuous monitoring/L&D nurse/OB consult VS Evaluated/managed in OBED with consultation with IM Hospitalist team Based on acuity/stability of non OB problem, fetal status, likelihood of delivery	Evaluated and managed in OBED Examples: Contractions Bleeding Possible ROM Abdominal pain in pregnancy	**5A Per policy : evaluated and managed in OBED** Patients presenting with the following: Seizure and suspected eclampsia Severe pre-E (SBP >160, DBP >110) or SBP >140, DBP>90 and scotomata severe headache, or RUQ pain/epigastric pain Postpartum bleeding within 7 days post delivery	**5B Per policy: evaluated and managed in ED** Post partum complaints not meeting criteria for 5A Examples: Bleeding > 7 days postpartum Infection Spinal headache Non-OB complaints Consult with OB as needed

Improving Front End Flow in the FSED Environment and Downstream Impacts

Kim Sells RN, Laura Jensen RDMS, Michael George MD

Background

- This Free-Standing Emergency Department (FSED) recently opened and faced several struggles including a direct strike by Category 4 hurricane that significantly interrupted operations, in addition to a change in EM provider group. We sought to complete a hard reset to improve operations.
- We believe that throughput is the major driver in the FSED market and sought to make improvements that benefit all down stream processes.
- We identified opportunities to improve throughput for our FSED by improvements in Door to Room/triage, decreasing LWOT and AMA (LBTC) percentages, and improvements in patient satisfaction as measured by NPS (Net Promotor Scores).

People: Staff/Management – Issue

- Leadership challenges:
  - Hired full time Clinical Manager, Radiology Lead, Site Program Director.
- Staffing challenges in all areas (RNs, techs, imaging, front office).
- Hired 18 RN's, imaging staff, and front office personnel.
  - Hired full time EVS.
- Lack of clinical oversight for RNs.
  - Trained RNs, techs, and imaging staff in lab with proper competencies signed and charted.
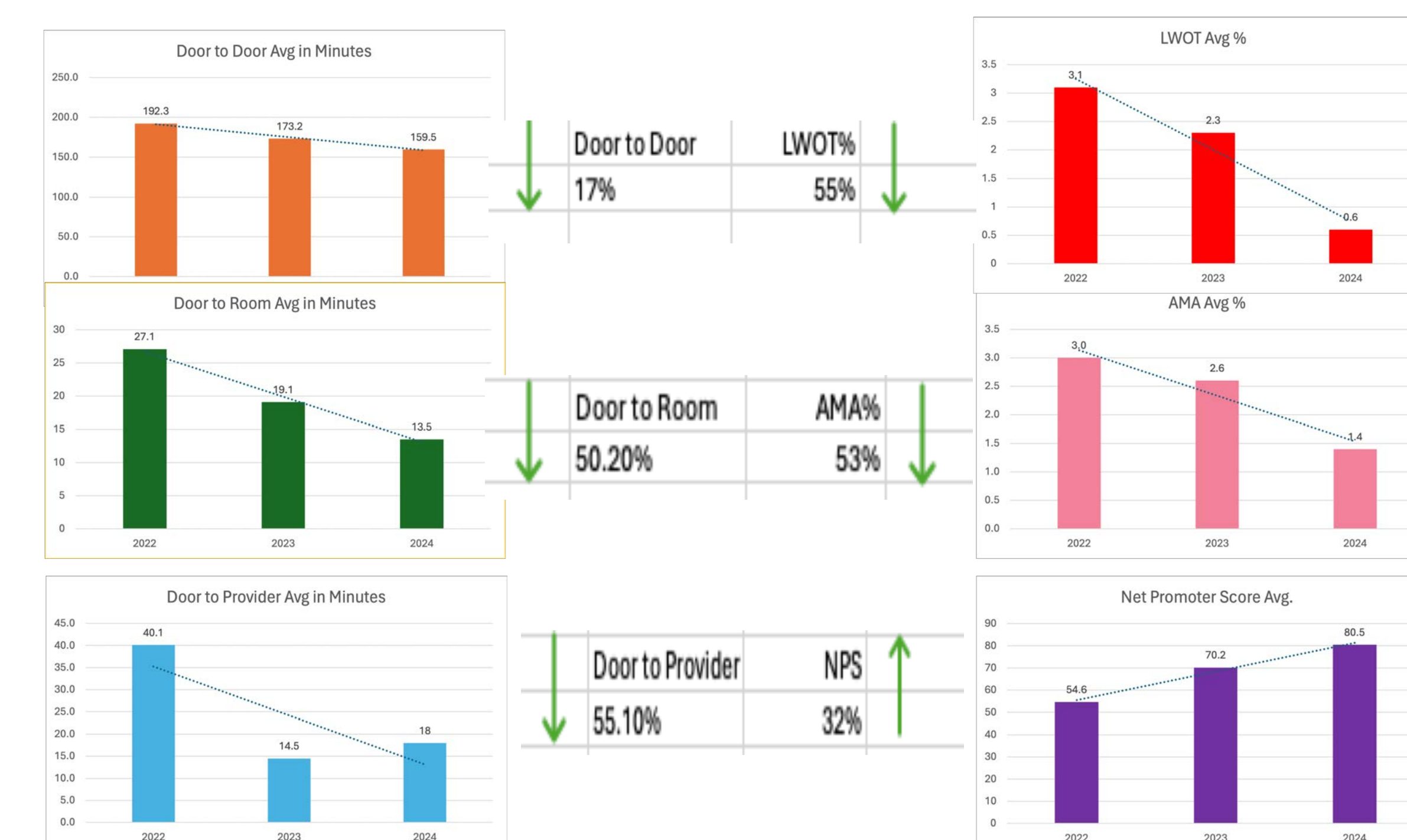
Operations - Protocols

- Absence of clinical protocols and knowledge of protocols for clinical team.
  - Implemented protocols and educated all nurses and providers on approved protocols.
  - Immediate leader intervention for LWOTs and AMAs
- Absence of downtime protocols and processes (front office, clinical and imaging).
  - Developed downtime manuals for clinical, and front office processes.
- Lack of issue resolution steps for all shifts, ie: equipment failure, transfer issues
  - Created FSED specific charge nurse guidelines and expectations.

Teamwork and Communication

- Absence of internal communication between teams and leadership.
  - Developed a metric board and educated staff on goals.
  - Addressed daily roadblocks for teams.
  - Implemented 2-way radio communication for shift communication/patient flow.
- Lack of KPI knowledge and facility metric status.
  - Educated staff about KPI's and importance of goals.
- Front desk inefficiencies.
  - Created systems for staff education on front desk
- Ancillary Service.
  - Lab staff training outstanding for clinical and imaging.
  - Radiology training.
  - Creation of radiology protocols and guidelines.

Results

| Door to Door | LWOT% |
| 17% | 55% |

| Door to Room | AMA% |
| 50.20% | 53% |

| Door to Provider | NPS |
| 55.10% | 32% |

Conclusions

- Change management in a new environment is challenging and best accomplished through gap analysis and implementation of plans specific to each challenge.
- Improvement in front end throughput resulted in a decrease in patient who Left Before Treatment was Complete, and improved patient satisfaction.
- The most important factor noted resulting in the improvements was communication and teamwork.

Pre-Hospital Antibiotics for Patients with Severe Sepsis

Dana Stapp RN, Morgen Priest RN, Dr. Justin Northeim, Dr. Gordon Aalund
Emergency Department Baylor Scott & White Medical Center at Grapevine

Severe Sepsis

- Sepsis is responsible for 20% of deaths globally and is the leading cause of inpatient mortality.
- Early diagnosis and intervention has been shown to reduce mortality, length of stay, and readmissions.
- At our hospital, 80% of sepsis cases are diagnosed and treatment is initiated during evaluation in the emergency department.
- In septic shock, for every hour that appropriate antibiotic (Abx) administration is delayed there is up to an 8% increase in mortality.
- Our Goal was to reduce initial antibiotic times for patients with severe sepsis needing EMS transport.

EMS Protocol

1. Age ≥18 and Suspicion of Sepsis
2. TWO or more of the following: LATCH
   - **L** -Lactate (> 2.0)
   - **A** -Altered Mental Status (New or Worsening)
   - **T** -Temperature (> 100.4 or < 96.8)
   - **C** -Capnography (ETCO2 < 25)
   - **H** -Hypotension (SBP < 100 or MAP < 65)
3. Cefepime 2g IV/IO
4. If hypotensive IV fluids should be the priority
5. Document antibiotic name, date, route
6. Document Start time and Stop time

Education and Support

- Addition of documentation fields in triage section of EPIC to make prehospital antibiotics and fluids easier to record.
- Education of Providers and Utilization of SmartPhrases in EPIC (.sepsisID) for proper documentation of prehospital antibiotics prior to blood cultures (BCx).
- EMS providing detailed documentation in run sheets and contacting sepsis coordinator.
- Sepsis coordinator performing reviews on these patients and giving feedback to team.

Participants

- Working with our EMS partners, we developed a pilot program to identify patients with severe sepsis and administer empiric antibiotics prior to arrival.
- We partnered with 2 of our local EMS agencies during the pilot: Grapevine EMS and North Richland Hills EMS (NRH).
- BEST EMS developed the protocol and provided education for Grapevine EMS. NRH EMS already had a program in place.
- ED Nursing leadership and the Quality Department provided education to Nursing and Providers.

Results

Total Patients Received Field Antibiotics (First 5 months)	21 patients
EMS First Patient Contact to Antibiotic Start Time average	22 minutes
Antibiotic Start Time to ED Arrival average	16 minutes
Average Order to Blood Culture Collected in ED (All sepsis pts)	70 minutes
Average Reduction of First Contact to Initial Antibiotics	48 minutes
SEP1 Fallouts	0/21

Discussion

- Review of these cases demonstrated the protocol was applied to appropriate patients (patients were diagnosed with Sepsis).
- Concerns about drawing BCx after Abx and reduced sensitivity are mitigated by BCx vials with antibiotic binding agents. 70% of our patients are already on antibiotics when BCx are being collected.
- Our pilot demonstrated Prehospital Antibiotic Protocol does significantly reduce the time to first dose of antibiotics for severely septic patients.
- This program was compliant with CMS Sepsis guidelines.

Improving Patient Arrival to Provider Times in a Community Emergency Department

Kelly Busch, MSN, RN, CEN; Cassandra Cervantes, BSN, RN, CEN; Eric Daniel, MD, FACEP; Donna Hassani, MD; Justin Nelson, RN; Amanda Sustaita, NP; Jeremy Zobell RN, MSML
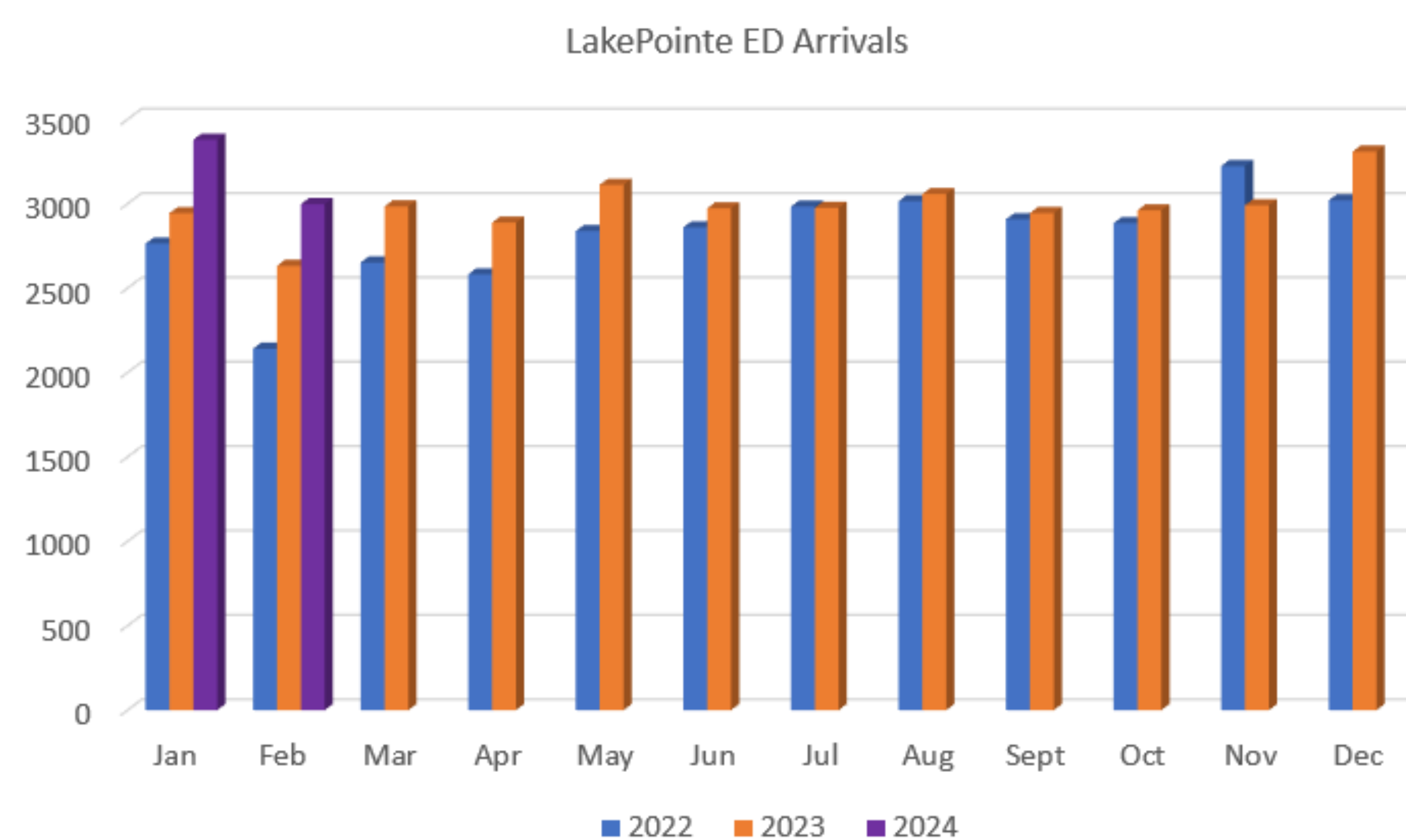
INTRODUCTION

- BSW Lake Pointe is a community hospital located in Rowlett, TX, a suburb east of Dallas. Currently we see approximately 105 patients/day in our ED and have had an approximately 6% increase in volume over the preceding 12 months. We also experienced a 16% increase in overall ED volume from Jan 2021 to Jan 2022. We began struggling to meet our patient arrival to provider goal consistently in the fall of 2022. This was due to many factors including ED volume increases, ED boarding of admitted patients, lack of overall physical space in the ED, nursing shortages and room closures. In early 2023 we came together as a team to address this and implemented changes starting in March 2023.
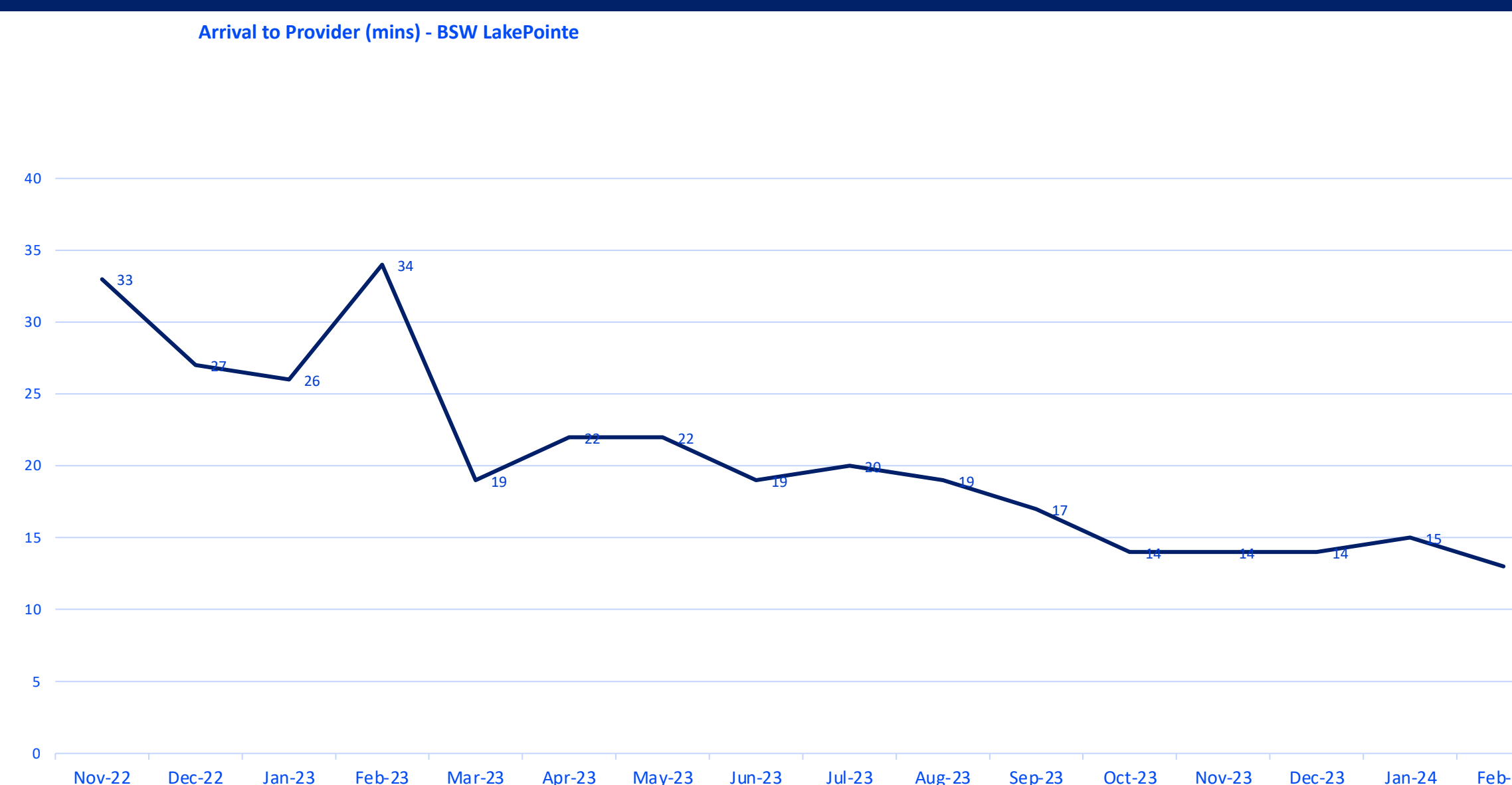
INTERVENTIONS

- New vertical flow process of seeing lower acuity patients in hall beds/recliners
- Hardwiring immediate bedding/pull to full
- Increasing Physician coverage - started March 2023 (3 days/wk, Mon-Wed); fully implemented September 2023
- Matching nursing/provider staffing; staffing to patient arrival data; shifting start times earlier for both nursing and providers
- increasing scribe coverage for the physicians
- Improving nursing shortages; nursing on call program implemented; staffing LVNs for lower acuity patients
- When we were at capacity - mobilizing the APP to triage for provider in triage/starting SDOs in triage with a dedicated resource from nursing to assist with orders
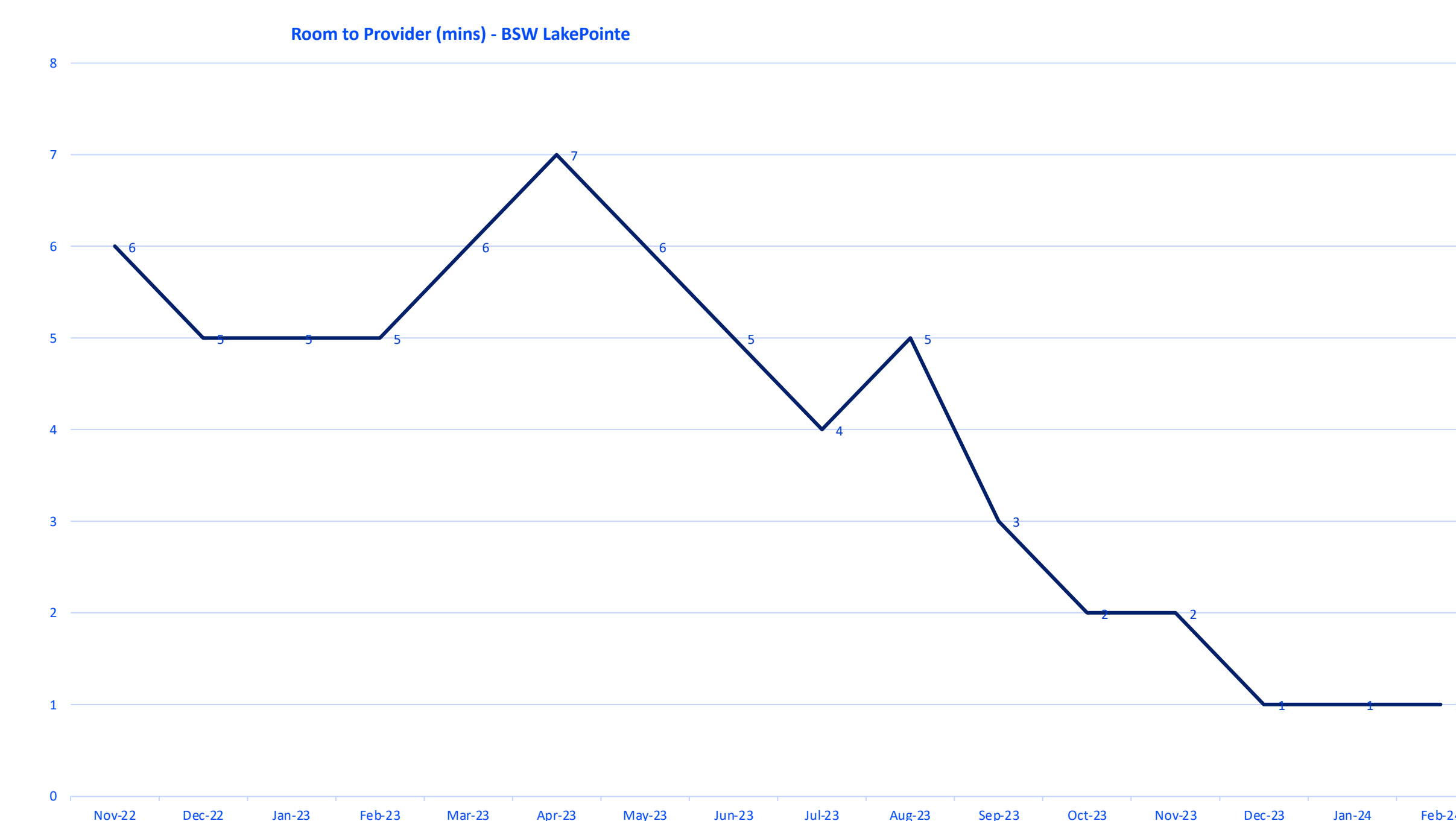- Paging EMS arrivals overhead in the ED for all to hear

BSW LAKEPOINTE VOLUME DATA

LakePointe ED Arrivals

RESULTS

Arrival to Provider (mins) - BSW LakePointe

Room to Provider (mins) - BSW LakePointe

CONCLUSION

- Over the last 12 months we have been able to improve our patient arrival to provider times consistently maintaining them at ≤ 15 minutes for the last 5 months. We have been able to better match staffing to patient arrivals and match resources between nursing and providers. We have been able to better utilize our limited physical space/capacity with hall recliners for lower acuity patients and have accomplished this even with increasing volume. When at capacity our APPs are now consistently mobilizing to triage to see patients and get workups started and nursing has provided a resource to help carry out these orders. Improving patient arrival to provider times takes a coordinated nursing and provider team approach.

Is It Necessary to Perform Lung Cancer Screening in the Emergency Department?

Hao Wang, Luqman Bingham, Radhika Cheeti, Naomi Alanis, Alejandra Powers, Muirheid Timothy, Miles Murray

Introduction

- ❖ Lung cancer has become the second most common cancers and the leading cause of cancer death in the United States.
- ❖ Implementing lung cancer screening at the ED targeting specific vulnerable populations may help improve early lung cancer detection and facilitate ongoing patient treatment. However, such findings are lacking in the literature. It is suggested that ED can act as a novel site to targeted patients for cancer screening.
- ❖ We aim to determine the value of performing lung cancer screening in the Emergency Department (ED).
- ❖ To identify factors associated with first-diagnosed lung cancer at the ED and recognize specific patient populations vulnerable to lung cancer screening.

Methods

- ❖ We included all patients aged between 50- to 80-year-old, who presented at the ED seeking healthcare between January 1, 2019, and December 31, 2023.
- ❖ Patients' healthcare seeking patterns (i.e., clinic and ED visits in the past) and whether they met national lung cancer screening guidelines were compared between patients who had first diagnosed lung cancer at ED and ones without.
- ❖ Factors associated with first diagnosed lung cancer patients were analyzed by multivariate logistic regressions.
- ❖ To determine the association among lung cancer screening, patient preferred language speaking, and new lung cancer at ED, an interaction analysis was conducted.
- ❖ Adjusted odds ratios (AOR) with their 95% confidence interval (CI) were reported. STATA 14/2 (College Station, TX) was used for all statistical analyses in this study.

Results

- ❖ From 2019 to 2023, there were 75,516 unique patients aged 50-80 presented at ED, only approximately one in four patients had lung cancer screening documented.
- ❖ We identified 143 individuals as having been first diagnosed with lung cancer. Patients who tested positive according to the lung cancer screening guidelines exhibited the highest prevalence when compared to those who did not.
- ❖ These findings provide insight into the status of lung cancer screening at the study ED.

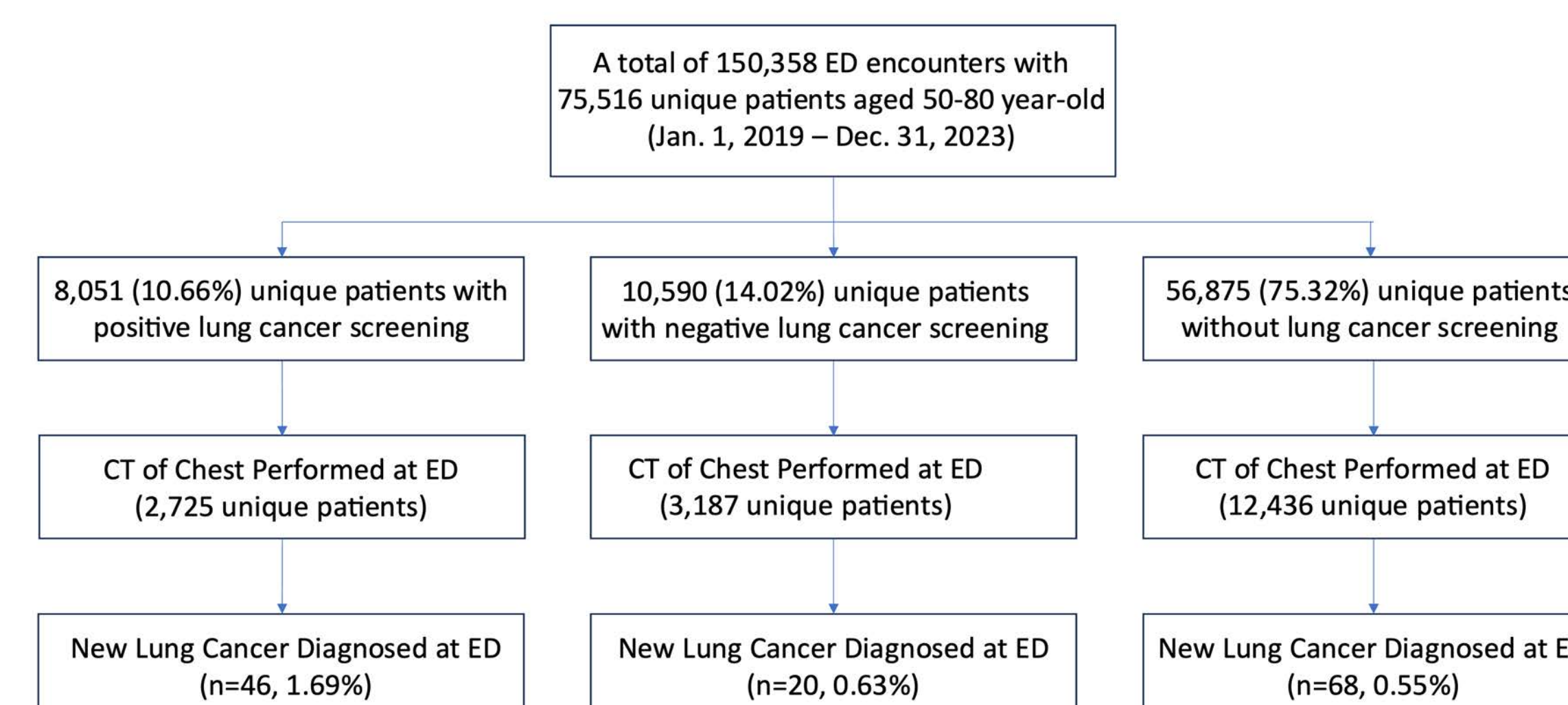Figure 1. Status of Lung Cancer Screening at Study ED

Table 1. Clinical factors and lung cancer screening associated with the new lung cancer diagnosed at ED

	New Lung Cancer diagnosed at ED (n=134)	No New Lung Cancer diagnosed at ED (n=18,214)	P value
Lung cancer screen --- n (%)			<0.001
Patients with positive lung cancer screen	46 (1.69)	2,679 (98.31)	
Patients with negative lung cancer screen	20 (0.63)	3,167 (99.37)	
Patients with unknown lung cancer screen	68 (0.55)	12,368 (99.45)	
Number of clinical visits --- number			
Mean (SD)	10 (16)	16 (25)	0.0043
Median (IQR)	4 [2-11]	8 [3-20]	<0.001
Number of ED visits --- number			
Mean (SD)	2.1 (1.6)	1.4 (1.2)	<0.001
Median (IQR)	2 [1-2]	1 [1-1]	<0.001

Results

Figure 2. Multivariate logistic regression analysis of factors associated with new ED lung cancer.
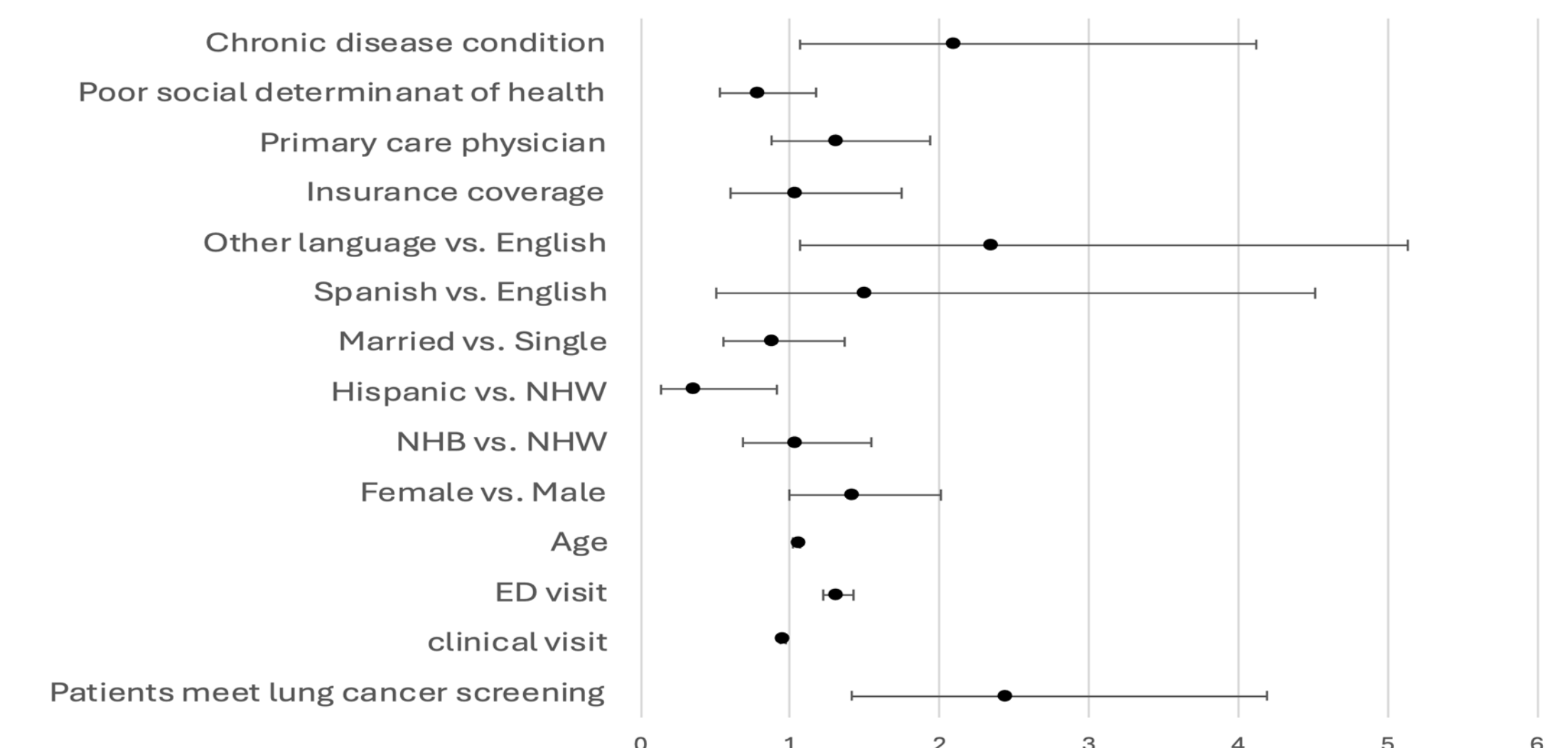

Table 2. Interaction analysis of lung cancer screen and preferred language speaking associated with new ED lung cancer using multivariate logistic regression.

	AOR	95% CI	P value
Lung cancer screen and preferred language speaking			
Negative lung cancer screen and speaking English/Spanish (ref)			
Negative lung cancer screen and speaking other languages	3.64	[0.56-23.45]	0.174
Positive lung cancer screen and speaking English/Spanish	2.36	[1.33-4.22]	0.004
Positive lung cancer screen and speaking other languages	6.83	[1.36-34.20]	0.019
Clinical visits	0.95	[0.93-0.97]	<0.001
ED visits	1.30	[1.18-1.44]	<0.001
Age	1.08	[1.05-1.12]	<0.001

Conclusions

- ❖ Currently, there is a lack of lung cancer screening initiatives in the Emergency Department.
- ❖ There may be potential benefits to initiating lung cancer screening among ED individuals who meet the lung cancer screening guidelines, especially those whose preferred language is neither English nor Spanish.

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Machine Learning to Predict In-Hospital Cardiac Arrest for COVID-19 Patients with Suspected Pneumonia in the Emergency Department

Eric H Chou, MD, Steven Maher, MD, Toral Bhakta, DO

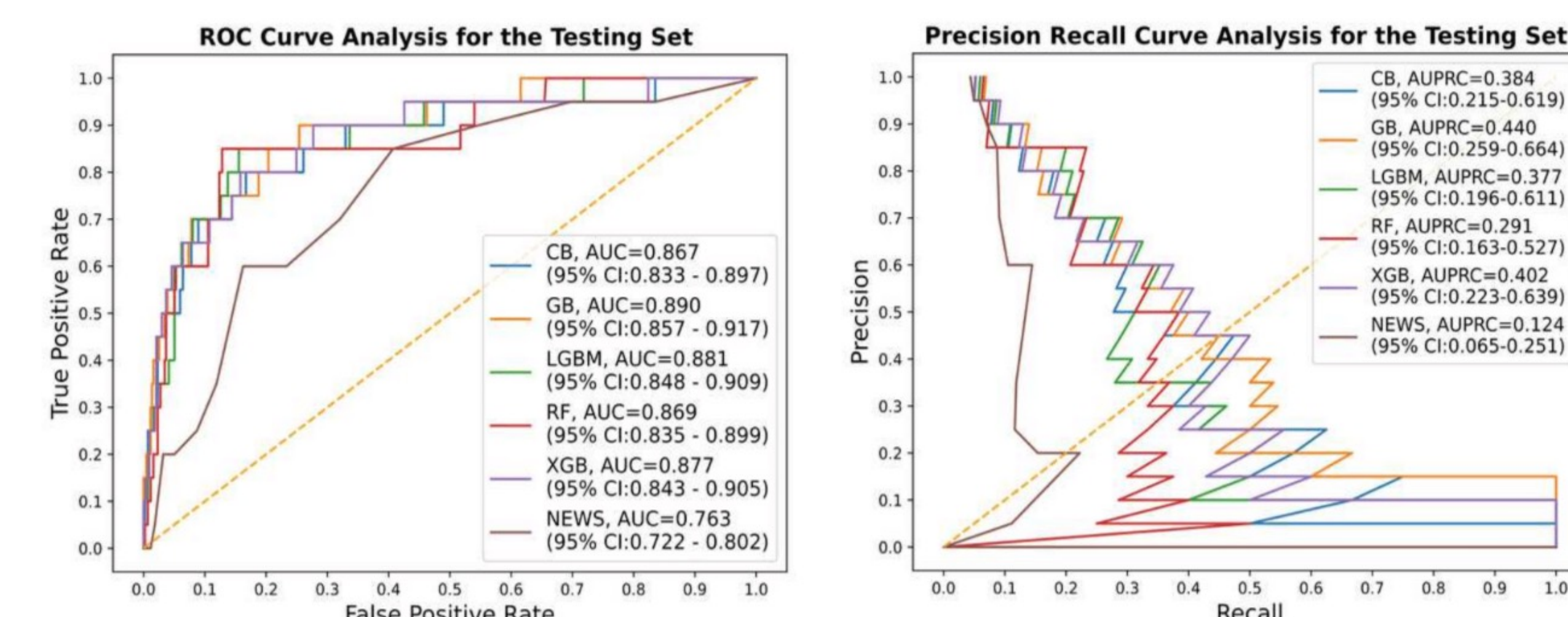Dept. of Emergency Medicine, Baylor Scott and White All Saints Medical Center, Fort Worth, TX

Background

- Patients with COVID-19 have an increased risk of fatality after a cardiac arrest.
- There are scarce models for stratifying the risk of IHCA in COVID-19 patients with suspected pneumonia.
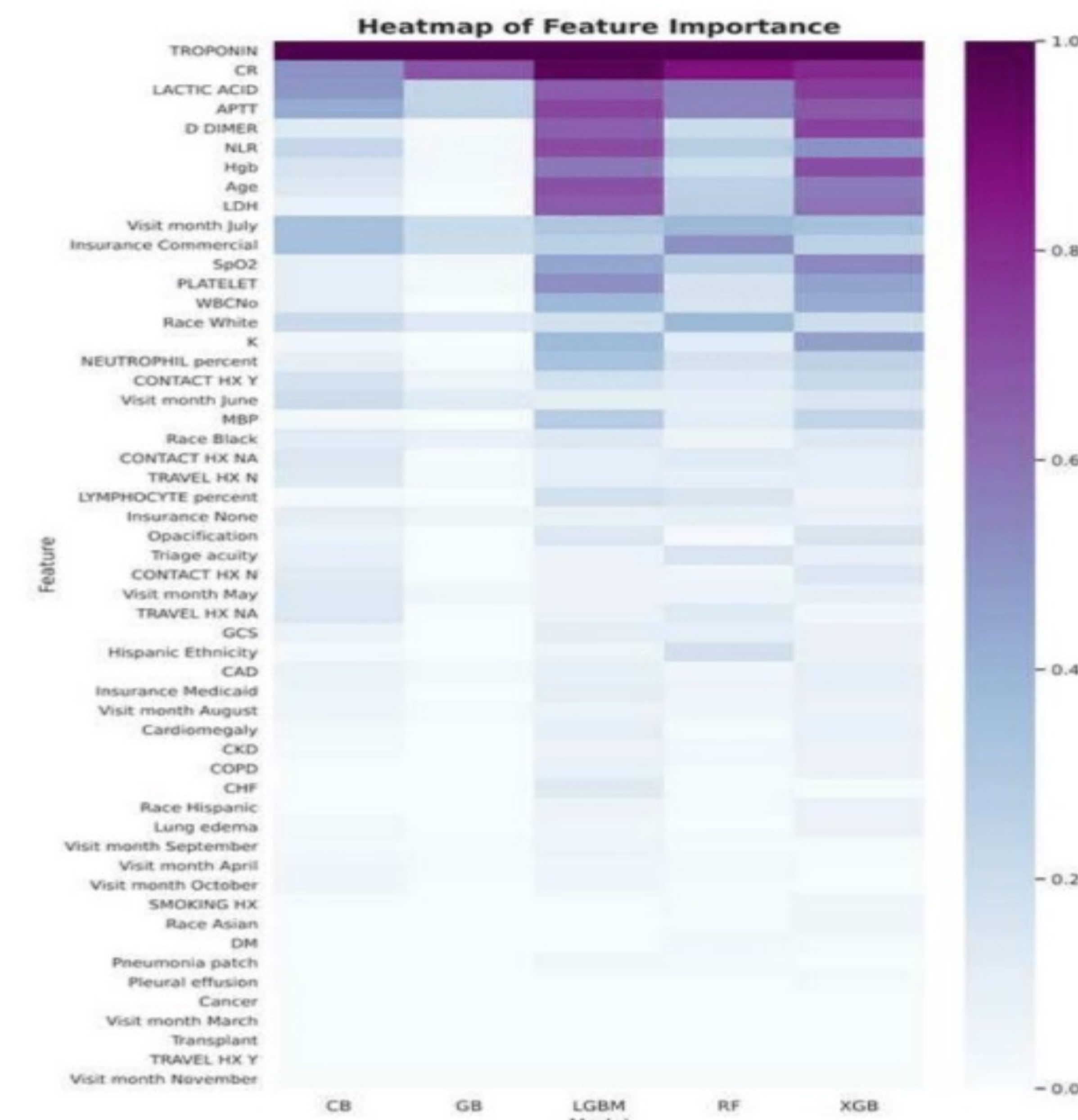
Study Aim

- To develop and validate the machine learning (ML) models to predict IHCA in patients presenting to the ED with COVID-19 and suspected pneumonia.

Method

- We retrieved data from the EMR of Baylor Scott & White Health (BSWH).
- All RT-PCR-confirmed COVID-19 adult patients (age ≥ 18 years) who visited one of the five EDs in BSWH between March and November 2020 were eligible for inclusion. Patients who presented with out-of-hospital cardiac arrest or a DNR order were excluded.
- The primary outcome was IHCA requiring resuscitation, defined as the absence of a detectable pulse with attempted resuscitation in the ED.
- Collected records were split into training (consisting of data from one urban and two suburban hospitals) and testing (consisting of data from one urban and one suburban hospitals) cohorts.
- Several ML algorithms were constructed and K-fold cross-validation was adopted during the training process. The models' performances were evaluated and compared with the National Early Warning Score (NEWS) by using the area under the receiver operating characteristic curve (AUROC) in the testing cohort.

Discussions

- Of the constructed ML models, Gradient Boosting classifier achieved the best performance of AUC (0.890, 95% CI: 0.857-0.917). All constructed ML models performed significantly better than the NEWS scoring system (AUC: 0.763, 95% CI: 0.722-0.802).
- The constructed ML models have the potential to identify IHCA in patients with COVID-19 in the ED and save more lives if successfully implemented in our decision support system.

Results

ROC Curve Analysis for the Testing Set

CB, AUC=0.867 (95% CI:0.833 - 0.897)
GB, AUC=0.890 (95% CI:0.857 - 0.917)
LGBM, AUC=0.881 (95% CI:0.848 - 0.909)
RF, AUC=0.869 (95% CI:0.835 - 0.899)
XGB, AUC=0.877 (95% CI:0.843 - 0.905)
NEWS, AUC=0.763 (95% CI:0.722 - 0.802)

Precision Recall Curve Analysis for the Testing Set

CB, AUPRC=0.384 (95% CI:0.215-0.619)
GB, AUPRC=0.440 (95% CI:0.259-0.664)
LGBM, AUPRC=0.377 (95% CI:0.196-0.611)
RF, AUPRC=0.291 (95% CI:0.163-0.527)
XGB, AUPRC=0.402 (95% CI:0.223-0.639)
NEWS, AUPRC=0.124 (95% CI:0.065-0.251)

Heatmap of Feature Importance

Patient-Centered Communication Course

Baylor Scott & White McKinney ED

Steven Blake Baker MD MPH FACEP, Katy Miller M.Ed, Kevin Spera MS, Aubre Tijerina MBA BSN

Introduction

- Emergency Department patient satisfaction, as measured by the Press Ganey survey, has historically been low at BSW McKinney. This contrasts sharply with the department's performance on quality metrics and other measurable domains.
- As such, there may be a discordance between patient perception of their care quality and the quality of care delivered.
- We postulated that this may be heavily influenced by communication factors. Specifically, ED teams may not be communicating in timely or patient-centered ways.

Methods

- BSW McKinney ED, in partnership with BSW System Patient Experience staff, conducted a series of classes to teach patient-centered communication skills.
- Doctors, APPs, and Nursing leadership attended three monthly classes to learn these skills. Attendees were also educated on highly effective team communication and knowledge translation methods. This facilitated a "train the trainer" approach with attendees responsible to teaching skills to their respective teams.
- Each class had a different objective:
  - ❑ Class 1: What makes an effective team?
  - ❑ Class 2: How do we establish coaching relationships?
  - ❑ Class 3: How do we sustain a culture of coaching to drive change?

Results

PATIENT SATISFACTION PG PERCENTILE RANK

- Intervention start is marked with the orange arrow.

- Despite increasing monthly volume and boarding hours, we have seen sustained improvement in our PG percentile rank.

Main Emergency Department				
DOMAIN/QUESTION	FY24 YTD N= 1241	Rank	Target	Since FY23
Doctors informative re treatment	86.4	92	83.6	Improved by 2.9
Doctors took time to listen	87.8	88	86.0	Improved by 1.8
Informed about delays †	73.3	77	70.3	Improved by 4.1
Nurses kept you informed †	84.4	81	82.9	Improved by 1.9
Nurses' responses to quest/concerns	87.1	78	85.9	Improved by 1.5
Staff worked together care for you	87.7	91	85.2	Improved by 2.5
Cleanliness of ER/ED †	89.0	92	87.2	Improved by 1.8
Likelihood of recommending	82.2	78	80.1	Improved by 2.7

1/15/2024 9:21 AM ET

Skills Pneumonic and Educational Handout

ICE
Ask to understand perspective

Ideas
- "What do you think might be causing this?"
- "What do you think would help?"

Concerns
- "What concerns do you have?"
- "What have you heard about _____?"

Expectations
- "What are you hoping to leave with today?"
- "What have you heard about _____?"

PEARLS®
Relationship-building responses

Partnership language
"Let's work on this together."
Emotion
"I imagine this is frustrating for you."
Apology or **A**cknowledgement
"I'm sorry to hear how hard this has been."
Respect
"I appreciate the effort you have made."
Legitimization
"Others in your situation often feel the same way."
Support
"I am going to stick with you through this."

ART teach-back

ASK the patient to summarize
- "To make sure that I explained things well, what are the next steps?"
- "When you speak with your family member or colleague, what will you tell them we discussed?"

RESPOND
- "Sounds like a good summary."

TELL/TEACH
additional points, as needed

Making an Impact: Purposeful Rounding in the ED

Morgen Priest, BSN RN NE-BC BSWH Grapevine Emergency Department Manager

PLAN

Problem Statement- The Emergency Department (ED) at Baylor Scott and White Medical Center– Grapevine (BSWMC) is a busy department with many patients being admitted to the hospital daily. Efficient throughput, safe/quality care is always a focus as well as excellent customer service and patient satisfaction. To be successful with our service and satisfaction expectations, team members need the tools and resources to know where to prioritize their efforts.

Background- ED Nursing Domain Press Ganey scores have been just under goal for the department during the last fiscal year. The ED leadership, nursing and tech team members decided to refresh the basics of patient and family purposeful roundings to ensure they contained intentional conversations and interactions that would translate compassionate connections with patients and families.

PLAN

Root Cause- In May 2023, the mean ED Nursing Domain Overall Score was 89.54 or 69th percentile. This was the lowest monthly score recorded for the fiscal year. Through discussions amongst ED leadership, team member rounding, and charge nurses, it became clear that a refresh of the basics of purposeful rounding would be most impactful. Less experienced ED RNs (49% with less than two years experience), new ED tech support, and newer to our ED RNs, made up a significant percentage of the ED workforce. The expansion of service lines also played a part in competing priorities and focus- growing trauma patient population, growing stroke program and sepsis requirements for treatment and documentation. The ED team decided to focus on back to basics of purposeful rounding to enhance the patient experience but also help team members work more efficiently and remove barriers and frustrations.

Ted E. Bear

CHECK

ED Nursing Domain Pt Experience Scores
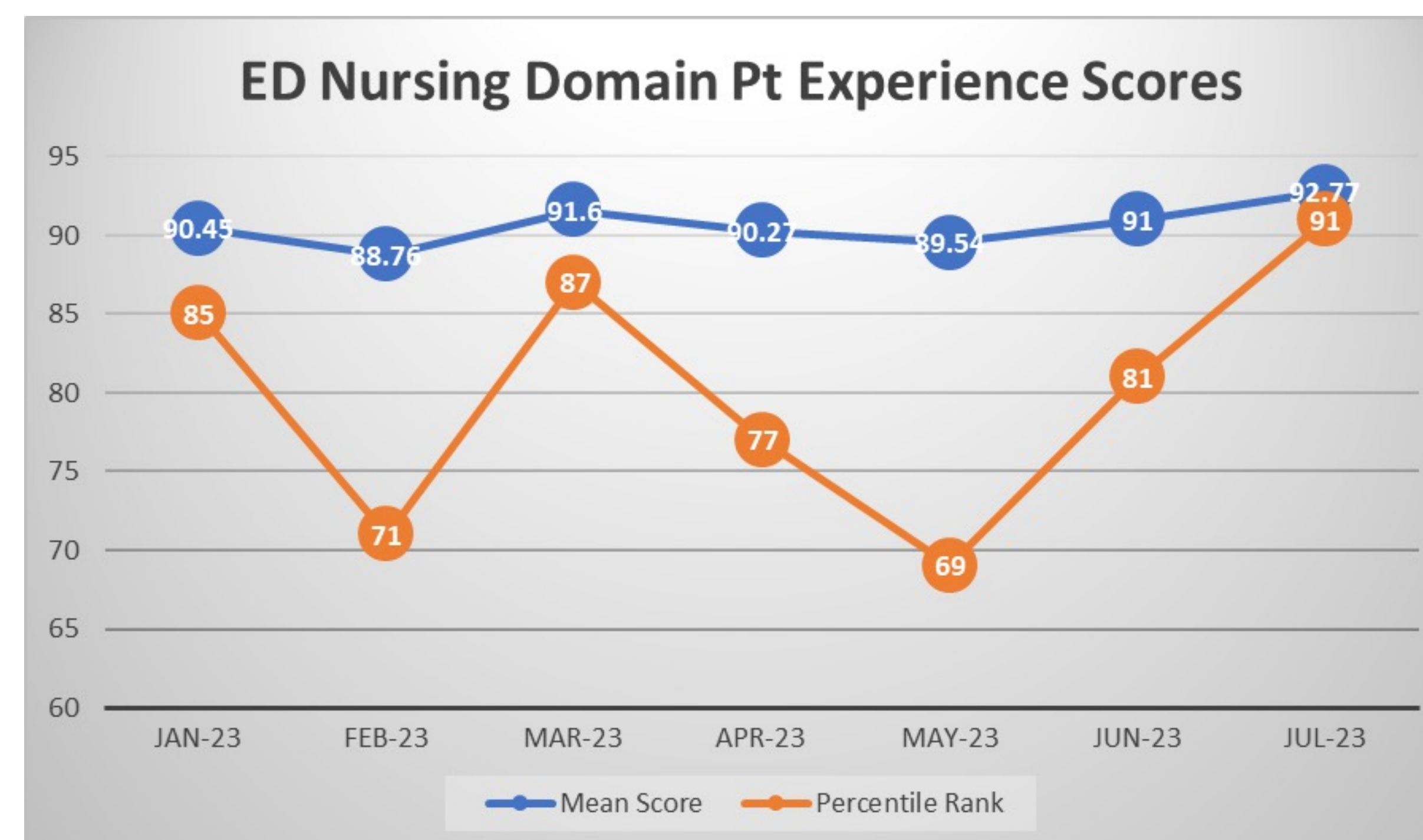
DO

Interventions-
- Starting June 2023, daily discussions at huddle to refresh the 5 P's of purposeful rounding- Pain, Potty, Position, Possessions, Personal Needs.
- Creation of Purposeful Rounding Check Offs specific to ED RN and ED Tech and socialized to team.
- End of June 2023, 1:1 Purposeful Rounding Check Offs completed with 100% of ED team members by ED Leadership. This was an intentional mock patient room where ED team members individually demonstrated a purposeful round and were scored on key elements that included: introduction (establishing a relationship and trust with the patient), inform and communication (includes the 5 P's), closing/thank you, and challenge area to include the compassion/empathy interaction.
- End of July 2023 and ongoing leader rounding on patients being performed by ED leadership weekly with a focus on validation of purposeful rounding, recognition of team members performance and connection with patients/families.

Role	Name	Title	Credentials
Executive Sponsor	Kris Cuthair	Director Acute Care Services and ED	MSN RN NEA-BC
Team Leader	Morgen Priest	Manager ED	BSN RN NE-BC
Team Member	Nicole Hart	Supervisor ED	BSN RN
Team Member	Amber Small	Supervisor ED	BSN RN CEN TCRN
Team Members	Entire ED Team	RNs and EDTechs	

ACT

- **Spread/Sustainment** – Plan to submit project for ENA Lantern Award. ED Leadership continues to perform leadership rounding and will add this check off to new hires going forward.
- Nursing Domain Overall Mean Score has continued to perform above 92.4 percentile from September- December 2023.

EFFICACY AND SAFETY OF BOLUS NOREPINEPHRINE IN THE EMERGENCY DEPARTMENT
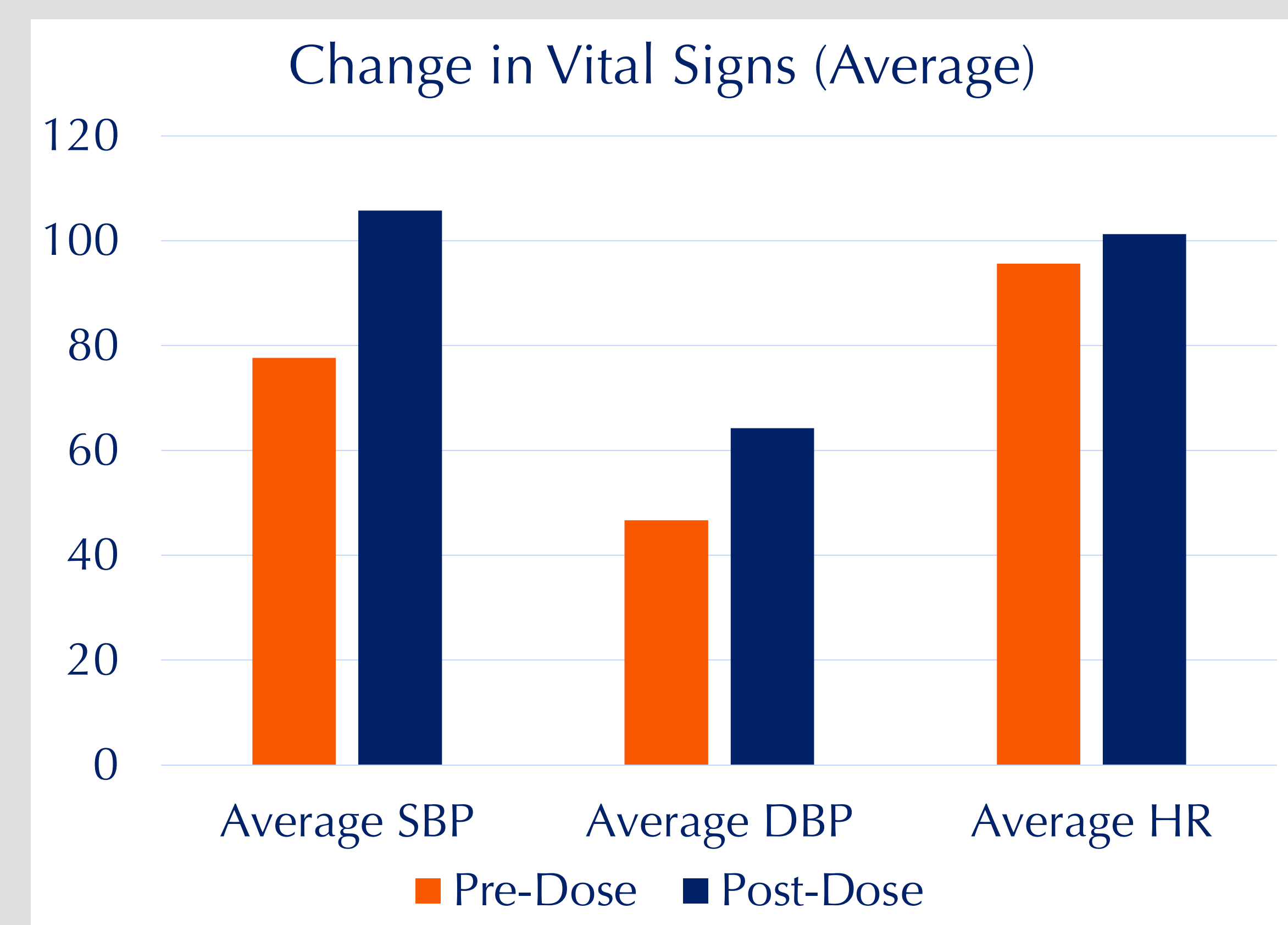
BaylorScott&White HEALTH

Katie Weigartz, PharmD, BCPS; Kayla Leathem, PharmD, BCCCP; Olivia Collins, PharmD;
Trey Van Dyke, PharmD; Chris Snider, PharmD, BCEMP; Robert Barnes, MD, FACEP
Baylor University Medical Center

INTRODUCTION

- Norepinephrine (NE) is a commonly used vasopressor in the Emergency Department (ED)
- Bolus dose (IVP) vasopressors are utilized in emergency settings as rescue therapy, often called "push-dose-pressors"
- NE is ideal for use as a push dose vasopressor due to the balance of alpha and beta receptor agonism
- Other IVP vasopressors, epinephrine and phenylephrine, require bedside compounding prior to administration[1,2]
- NE in ready-to-use standard concentration is often available in the ED and requires no further diluting prior to IVP[2]
- A 2019 study determined 9 mcg NE IVP has the same relative potency of 100 mcg IVP phenylephrine[3]
- NE is often used in the operating room and obstetrics spinal anesthesia as IVP[4]

STUDY DESIGN

OBJECTIVES

- Evaluate the safety and efficacy of NE IVP administered in the ED

INCLUSION

- Received bolus dose of NE in the ED January 2020-February 2024
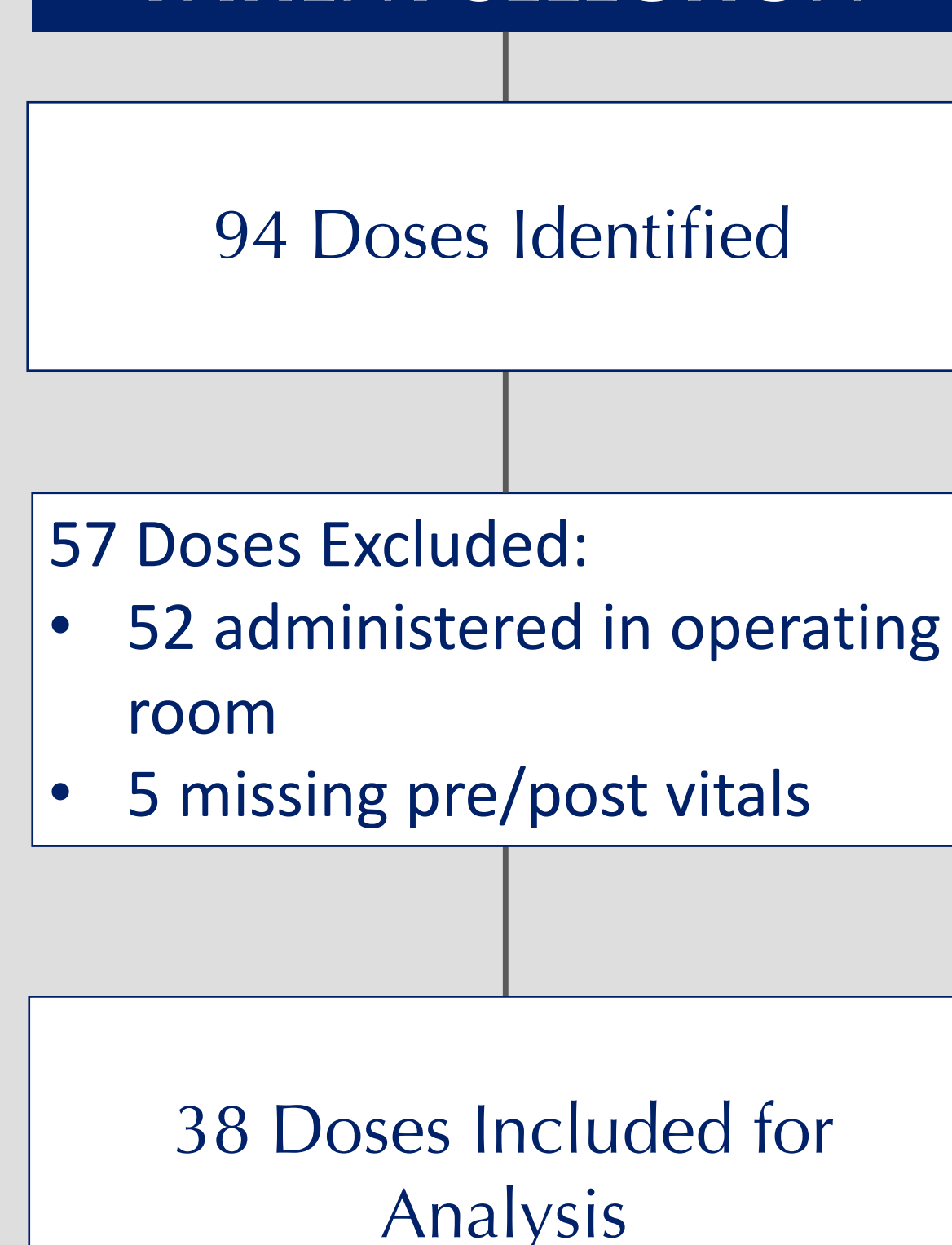- Age ≥ 18 years

EFFICACY ENDPOINTS

- Change in systolic blood pressure (SBP)
- Change in diastolic blood pressure (DBP)
- Change in heart rate (HR)
- Suspected cause of hypotension

SAFETY ENDPOINTS

- Documentation or treatment of extravasation
- Post-dose SBP greater than 180 mmHg
- Post-dose DBP greater than 110 mmHg

Norepinephrine bolus doses raised the systolic blood pressure 28 mmHg on average.

RESULTS

PATIENT SELECTION

94 Doses Identified

57 Doses Excluded:
- 52 administered in operating room
- 5 missing pre/post vitals

38 Doses Included for Analysis

BASELINE DEMOGRAPHICS

Age	63.3 years (+/- 12.5)
Gender	68.4% male
Shock Diagnosis (n)	
Peri-Intubation	14
Vasodilatory	8
Cardiogenic	1
Neurogenic	1
Unknown	14
Norepinephrine Infusion prior to IVP	36.8%
Dose Administered	29.6 mcg (+/- 12.9)

RESULTS

Change in Vital Signs (Average) — bar chart comparing Pre-Dose and Post-Dose values for Average SBP, Average DBP, and Average HR.

EFFICACY ENDPOINTS

Average change in SBP	28 .1 mmHg (+/- 34.6)
Average change in DBP	17.6 mmHg (+/- 30.5)
Average change in HR	5.6 BPM (+/- 19.7)

SAFETY ENDPOINTS

Extravasation	1
Post-Dose SBP >180 mmHg	0
Post-Dose DBP >110 mmHg	1

CONCLUSIONS

- NE IVP is a feasible option as a "push-dose-pressor" for hypotension in the ED
- Further analysis on ideal dose and utility in specific types of shock is warranted
- Large scale studies are needed to confirm results

REFERENCES

1. Norepinephrine [package insert]. Lake Forest, IL: Hospira, Inc; 2020 June.
2. ASHP Best Practices: Position and guidance documents. 2014. ASHP.
3. Mohta M, et al. Int J Obstet Anesth 2019;38:25-31.
4. Wang X, et al. BioMed Res Int. 2018 Dec 31;2018:1869189.

Performance and Fairness Evaluation of AI/ML for Patient Wait-time Prediction in Emergency Department ---
Introduction of Comprehensive Quality Assessment of AI/ML Predictions

Hao Wang, Usha Sambamoorthi

Centered in Care Powered by Pride

Introduction

- ❖ Prolonged Emergency Department (ED) wait time leads to poor healthcare quality.
- ❖ Using artificial intelligence and machine learning (AI/ML) to predict patient wait time could help ED operation management, however, the quality of AI/ML model prediction is largely unknown.
- ❖ We aim to 1) construct models for predicting ED wait times, 2) assess the performance of the model predictions, and 3) identify potential fairness issues in predictions using different AI/ML models.

Methods

- ❖ ED patients assigned an Emergency Severity Index (ESI) level of 3 at triage were included in AI/ML model predictions.
- ❖ Patient wait time was categorized as <30 minutes and ≥30 minutes.
- ❖ We employed three AI/ML algorithms, namely extreme gradient boosting (XGBoost), random forest (RF), and logistic regression (LR), for predicting patient wait times.
- ❖ Performance assessment utilized accuracy, recall, precision, and F1 score.
- ❖ To determine feature importance, we utilized SHapley Additive exPlanations (SHAP) to interpret the output from the XGBoost model.
- ❖ Patients were further stratified into subgroups by gender (male and female), race and ethnicity (non-Hispanic white, non-Hispanic black, and Hispanic), and socioeconomic status (patients with or without insurance).
- ❖ A fairness false negative rate (FNR), demographic parity, and equalized odds were conducted for each subgroup.

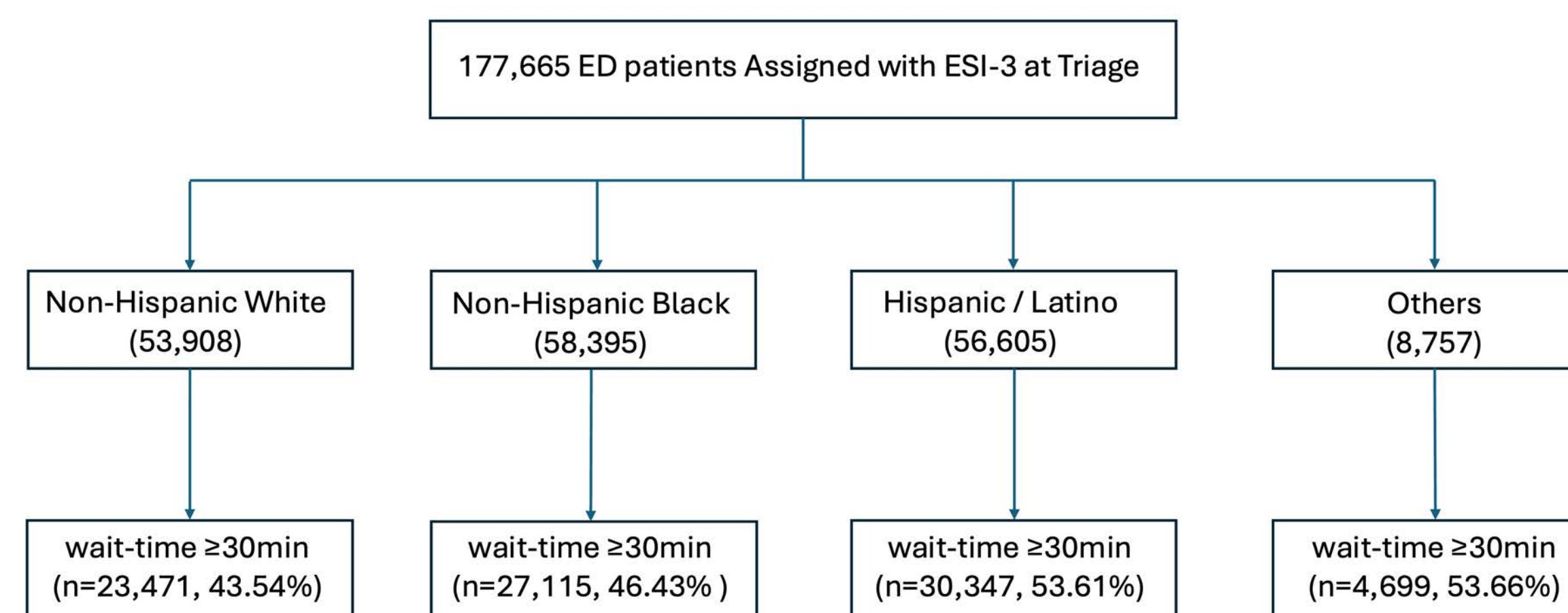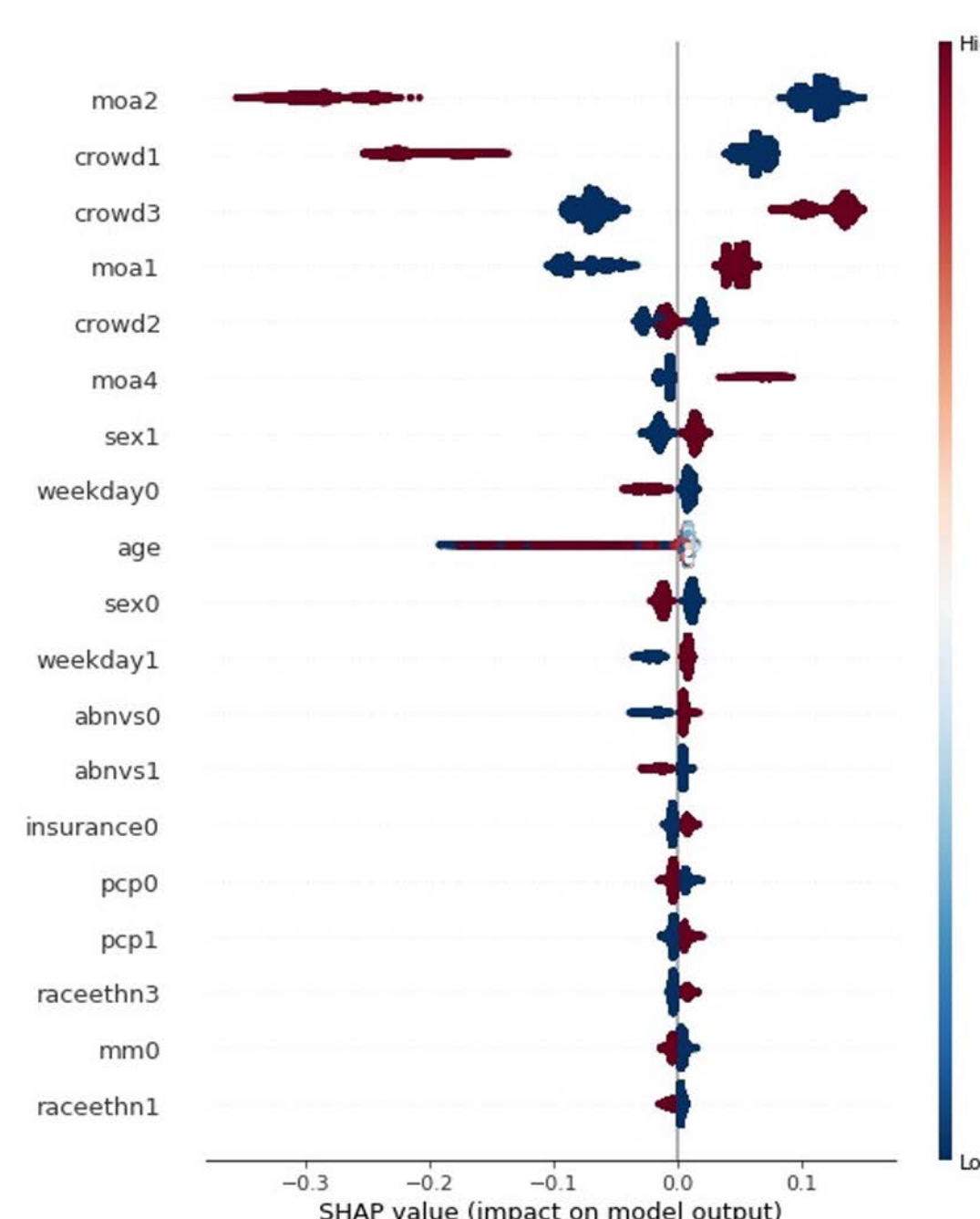## Results

Figure 1. Prolonged Wait time by Race and Ethnicity

Table 1. Performance accuracy comparison of using three different machine learning algorithms with all variables to predict patient wait times.

	XGBoost		Random Forest		Logistic Regression	
	Training	Testing	training	testing	Training	Testing
Accuracy	0.75	0.75	0.75	0.74	0.75	0.74
Recall	0.80	0.80	0.80	0.80	0.80	0.80
Precision	0.71	0.71	0.71	0.71	0.71	0.71
F1 score	0.75	0.75	0.75	0.75	0.75	0.75
AUROC	0.81	0.81	0.81	0.81	0.81	0.81

Figure 2. SHAP beeswarm summary plot of essential features contributing to XGBoost model prediction.

Results

Table 2.Fairness metrics (Demographic Parity and Equalized Odds). Across various racial and ethnic groups, both demographic parity and EO ratios were consistently less than 80%, regardless of the AI/ML models used.

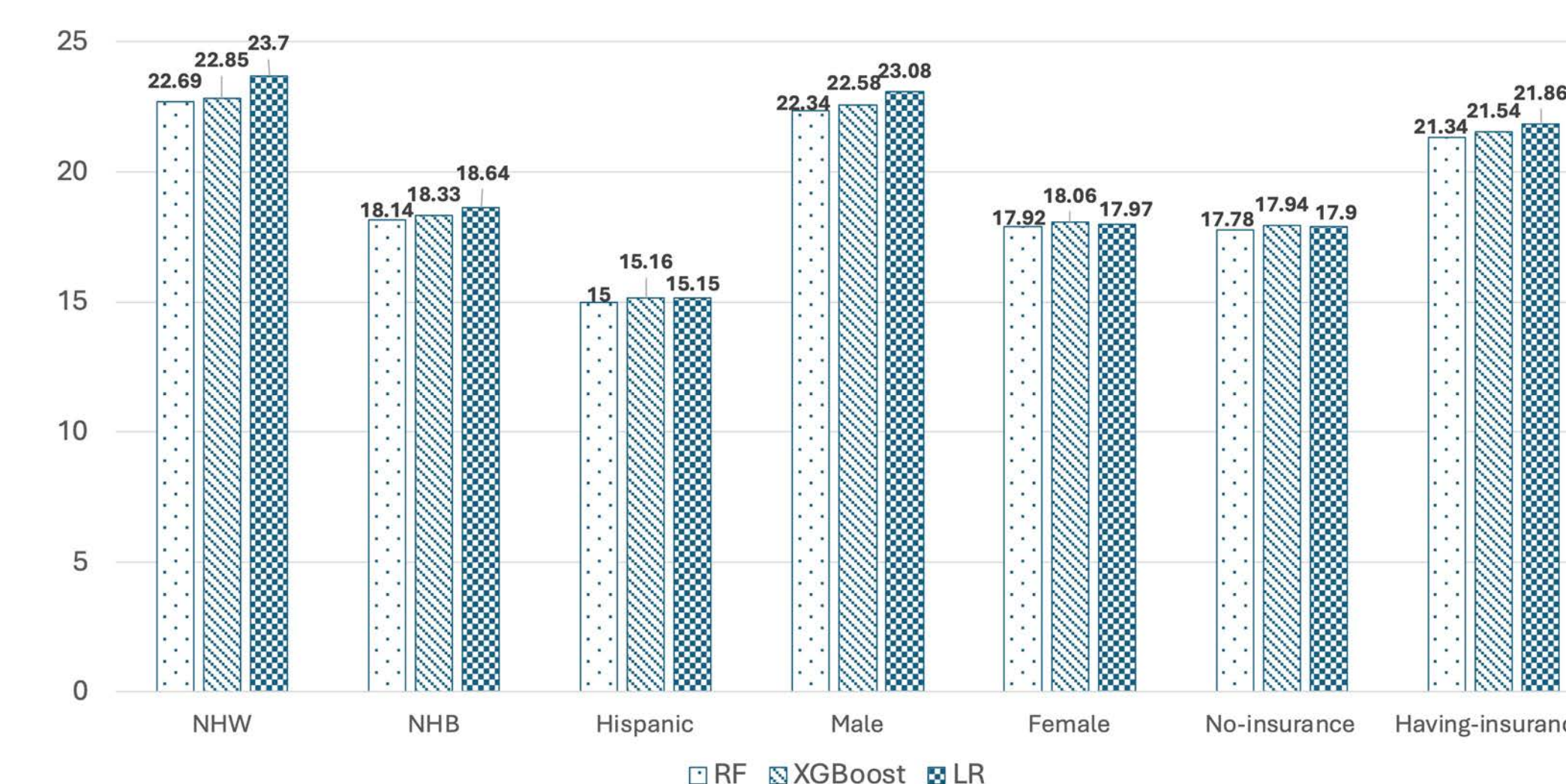|	Gender Group (Male vs. Female)	Racial & ethnic Group (NHW, NHB, Hispanic, Others)	Insurance Group (Yes vs. No)
XGBoost			
Demographic parity difference	0.09	0.15	0.09
Demographic parity ratio	0.85	0.76	0.85
Equalized odds difference	0.05	0.13	0.08
Equalized odds ratio	0.84	0.67	0.78
RF			
Demographic parity difference	0.09	0.16	0.09
Demographic parity ratio	0.85	0.75	0.85
Equalized odds difference	0.05	0.14	0.08
Equalized odds ratio	0.84	0.66	0.78
LR			
Demographic parity difference	0.09	0.16	0.09
Demographic parity ratio	0.84	0.74	0.85
Equalized odds difference	0.05	0.14	0.08
Equalized odds ratio	0.83	0.65	0.77

Figure 3. Various false negative rates (FNRs) for predicting patient wait times using different AI/ML algorithms.

Conclusions

AI/ML algorithms demonstrate acceptable performance in categorizing the wait times of ED patients. Disparities persist in predicting patients with different races and ethnicities, genders, and socioeconomic status. To enhance the utility of machine learning model predictions in clinical practice, it is crucial to conduct both performance assessments and fairness evaluations.

Point-of-Care Ultrasound in Airway Evaluation and Management

Judy Lin, MD, Jon Wolfshohl, MD, Andrew Shedd, MD, Jennifer Walker, MD, Eric H Chou, MD
Baylor Scott and White All Saints Medical Center, Fort Worth, TX

Introduction

- Airway management is a common and critical procedure in acute settings, such as the Emergency Department (ED) or Intensive Care Unit (ICU) of hospitals.

- Point-of-care ultrasound (POCUS) has emerged as a promising tool for airway management due to its familiarity, accessibility, safety, and non-invasive nature.

Study Aim

- To provide a comprehensive overview of the key evidence on the use of ultrasound in airway management.

- The following five views can be used to assess the upper airway: suprahyoid, thyro-hyoid, thyroid, cricothyroid, and suprasternal.

Upper Airway POCUS Views and Main Function

1. Suprahyoid: Oral space assessment
2. Thyrohyoid: Epiglottis identification
3. Thyroid: Vocal cord function
4. Cricothyroid: CTM identification
5. Suprasternal: ETT Confirmation

Figure 1. Views to Assess the Upper Airway.

- Confirmation of Endotracheal Intubation with Ultrasound. (A) Place the transducer transversely on the anterior neck at the level of the suprasternal notch for the best visualization and diagnostic accuracy. (B) Tracheal ETT position: only one A–M interface (arrow) with comet tail artifact(arrowhead) and posterior shadowing is observed (C) Esophageal ETT position: two A–M interfaces(arrows) with comet-tail artifacts (arrowheads) and posterior shadowing are noted (the "double tract" sign).

Results

- We summarize a standardized protocol to evaluate for difficult laryngoscopy:. Difficult Airway Evaluation with Sonography (DARES) Protocol
- Abbreviations: DSE, distance to epiglottis; HMD, hyomental distance; TT, tongue thickness; HMDR2, HMD extended/HMD neutral; HMDR1, HMD ramped/HMD neutral.
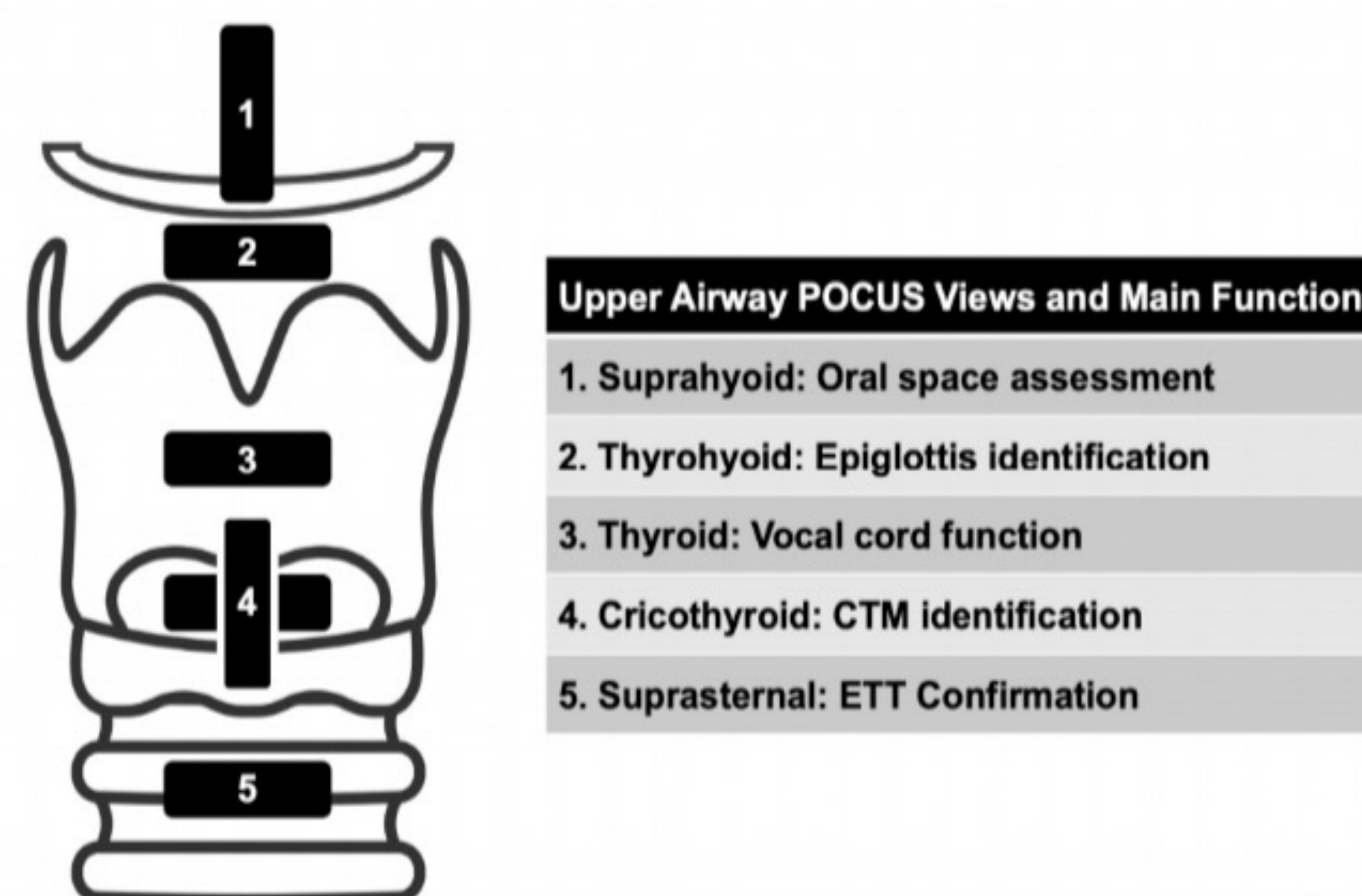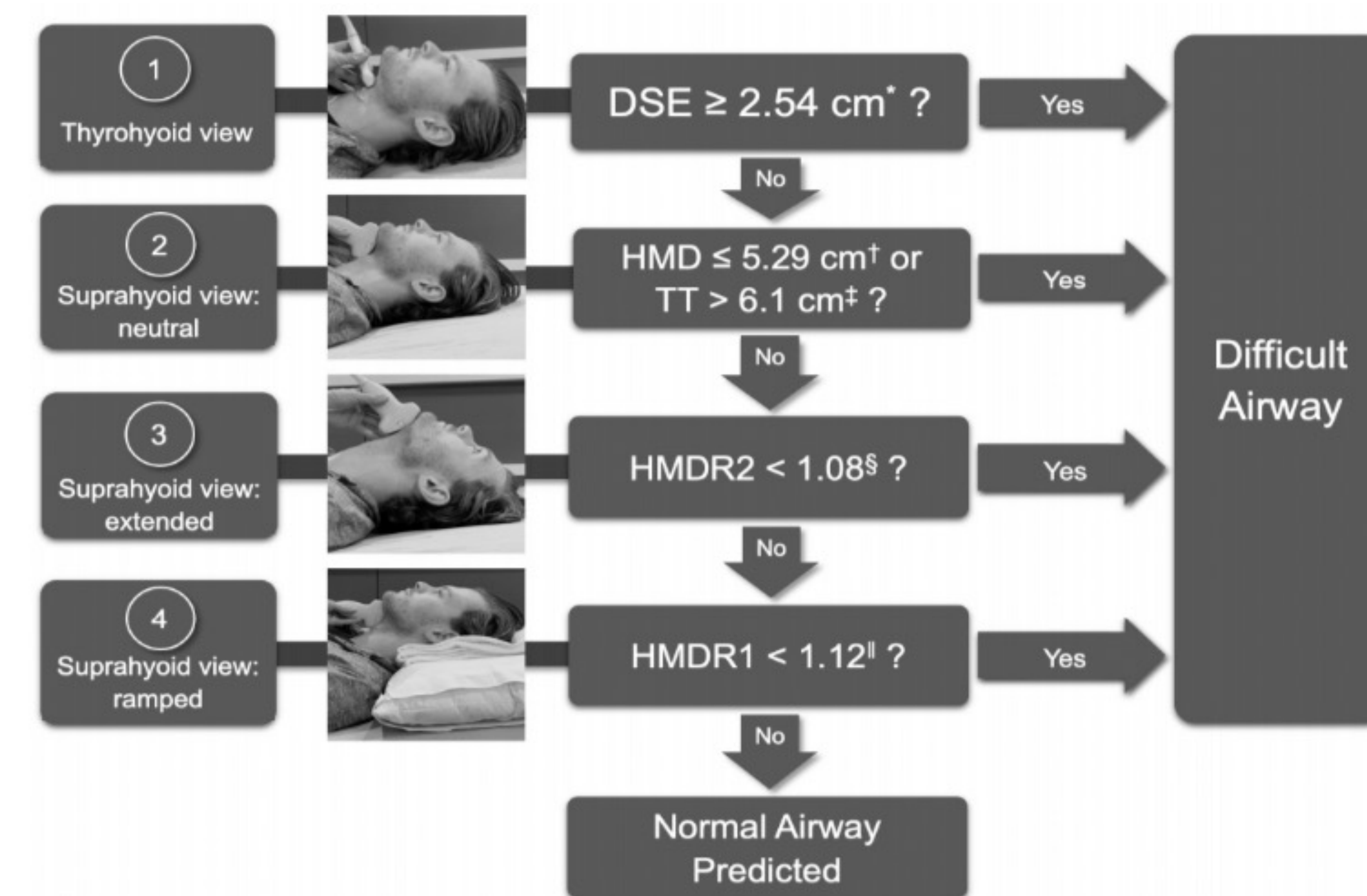

Conclusion

- POCUS is an accurate and reliable tool for ETT confirmation, anatomic airway measurements, prediction of the difficult airway, post-extubation laryngeal edema, and cricothyrotomy guidance.
- We summarized the DARES protocol for assessing the upper airway for difficult laryngoscopy.
- Future studies should be prompted for the role of POCUS in difficult airway prediction and management.

Prognostic value of cardiac troponin in patients with supraventricular tachycardia in the emergency department: a multi-center cohort study

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Background

- Supraventricular tachycardia accounts for approximately 50,000 ED visits each year.
- Cardiac troponin I (cTnI) elevation indicates underlying heart disease and is known to predict adverse cardiac events.
- **There is limited evidence regarding the prognostic value of cTnI among patients presenting with SVT in the emergency department.**

Study Aim

- To investigate **the prognostic value of troponin to predict 30-day major adverse cardiac events (MACE) in adult patients who had stable SVT** in the ED.

Method

- A retrospective, multicenter, cohort study
- All adult patients (age ≥ 18 years) who presented with stable SVT in the ED between January 1, 2019 and January 16, 2021 were eligible for inclusion. Patients who presented with an arrhythmia other than SVT, did not have a troponin collected, or had significant missing data were excluded.
- The primary outcome was 30-day Major Cardiac Adverse Event (MACE), defined as the occurrence of acute myocardial infarction (AMI), coronary revascularization by percutaneous coronary intervention (PCI), coronary artery bypass graft surgery (CABG) and all-cause mortality during the 30-day follow-up period.
- testing cohort.

Discussions

- Among adult patients with stable SVT in the ED, an elevated troponin assay was associated with a significantly increased risk of 30-day MACE.
- These patients may be at higher risk for poor short-term cardiac outcomes than previously recognized, even after successful cardiac conversion.

Results

MACE Primary and Secondary Outcomes Corresponding to Troponin Status

Event	Overall (n=459)	Non-Elevated Troponin (n=349)	Elevated Troponin (n=110)	p-value
Any 30-day MACE, n (%)	47 (10.2)	16 (4.6)	31 (28.2)	<0.001
Acute myocardial infarction, n (%)	20 (4.4)	2 (0.6)	18 (16.4)	<0.001
Percutaneous coronary intervention, n (%)	19 (4.1)	10 (2.9)	9 (8.2)	0.015
Coronary artery bypass graft, n (%)	1 (0.2)	0 (0)	1 (0.9)	0.075
All-cause mortality (n, %)	18 (3.9)	5 (1.4)	13 (11.8)	<0.001
Time to first MACE (days), mean (± standard deviation)	5.1±7.8	6.6±9.2	4.7±7.5	0.548
SVT relapse in ED, n (%)	61 (13.8)	39 (11.6)	22 (20.8)	0.017
Electrical cardioversion, n (%)	45 (9.9)	30 (8.7)	15 (13.6)	0.126
ED visit length of stay (hours), mean ± standard deviation	62.00±1226.55	79.50±1406.66	6.50±4.91	0.587
Hospital admission, n (%)	171 (37.3)	99 (28.4)	72 (65.5)	<0.001
ICU admission, n (%)	40 (8.7)	18 (5.2)	22 (20.0)	<0.001
Hospital length of stay (days), mean ± standard deviation	1.89±4.05	1.37±3.68	3.55±4.72	<0.001
72-hour return to ED for any reason, n (%)	10 (2.2)	10 (2.9)	0 (0)	0.072
30-day return to ED for SVT, n (%)	49 (10.7)	37 (10.6)	12 (10.9)	0.927

Logistic Regression Analysis

Variable	Odds Ratio (95% CI)	p-value
Troponin	8.80 (2.21 - 35.01)	0.002
Age	1.04 (0.99 - 1.09)	0.109
Male gender	0.97 (0.28 - 3.41)	0.960
Hispanic ethnicity	0.31 (0.03 - 3.57)	0.346
Tobacco use	3.62 (0.99 - 13.16)	0.051
Diabetes mellitus	2.47 (0.99 - 13.16)	0.051
Hypertension	1.34 (0.34 - 5.24)	0.674
Coronary artery disease	1.89 (0.40 - 8.87)	0.417
Congestive heart failure	0.19 (0.04 - 0.96)	0.045
Cirrhosis	15.32 (1.49 - 157.43)	0.022
Chronic kidney disease	1.28 (0.22 - 7.60)	0.787
Cancer	0.56 (0.14 - 2.21)	0.407
Mean arterial pressure	1 (0.98 - 1.03)	0.912
Body mass index	0.92 (0.84 - 1.01)	0.087
B-type natriuretic peptide	1.00 (1.00 -1.00)	0.985

Prognostic value of high-sensitivity cardiac troponin in patients with chronic kidney disease presenting with chest pain in the emergency department

Eric H Chou, MD, ChingFang Tiffany Tzeng, MD, MPH, Andrew Shedd, MD, Toral Bhakta, DO, Dahlia Hassani, MD
Dept. of Emergency Medicine, Baylor Scott & White All Saints Medical Center, Fort Worth, TX

Background

- High-sensitivity cardiac troponin (hs-cTn) are the biomarkers of choice for diagnosing AMI but are often nonspecifically increased in patients with renal dysfunction.
- **There is limited evidence regarding the performance of hs-cTn assays among patients with renal dysfunction presenting with chest pain in US population.**

Study Aim

- To investigate **the prognostic value of troponin to predict 6-week major adverse cardiac events (MACE) in adult patients who had renal dysfunction and presented with chest pain** in the ED.

Method

- A retrospective, multicenter, cohort study conducted in BSW EDs throughout North Texas.
- All adult patients (age ≥ 18 years) who presented with chest discomfort/pain and chronic kidney disease (CKD) stage 3 or 4 in the ED between January 1, 2022 and December 31, 2023 were eligible for inclusion. Patients who had ST-segment elevation MI, did not have a troponin collected, or had significant missing data were excluded.
- The primary outcome was 6-week Major Cardiac Adverse Event (MACE), defined as the occurrence of acute myocardial infarction (AMI), coronary revascularization by percutaneous coronary intervention (PCI), coronary artery bypass graft surgery (CABG) and all-cause mortality during the 6-week follow-up period.

Discussions

- Among adult patients with chest pain and CKD stage 3 and 4 in the ED, **an elevated troponin assay was associated with a significantly increased risk of 6-week MACE.**
- Among patients with **first troponin above 59 ng/L, delta troponin change ratio was positively correlated with 6-week MACE.**
- Further studies should be warranted to investigate the performance of the hs-cTn in predicting the MACE of these populations

Results

MACE Primary and Secondary Outcomes Corresponding to Troponin Status

Event	Overall (n=932)	Non-Elevated Troponin (n=811)	Elevated Troponin (n=121)	p-value
Any 6-week MACE, n (%)	22 (2.4)	13 (1.6)	9 (7.4)	<0.001
Acute myocardial infarction, n (%)	4 (0.4)	2 (0.3)	2 (1.7)	0.027
Percutaneous coronary intervention, n (%)	13 (1.4)	7 (0.9)	6 (5.0)	<0.001
Coronary artery bypass graft, n (%)	4 (0.4)	1 (0.1)	3 (2.5)	<0.001
All-cause mortality (n, %)	7 (0.8)	5 (0.6)	2 (1.7)	0.218
Any 6-month MACE, n (%)	47 (5.0)	30 (3.7)	17 (14.1)	<0.001
Acute myocardial infarction, n (%)	14 (1.5)	7 (0.9)	7 (5.8)	<0.001
Percutaneous coronary intervention, n (%)	21 (1.3)	14 (1.7)	7 (5.8)	0.005
Coronary artery bypass graft, n (%)	6 (0.6)	3 (0.4)	3 (2.5)	0.007
All-cause mortality (n, %)	17 (1.8)	10 (1.2)	7 (5.8)	<0.001
ICU admission, n (%)	8 (0.9)	5 (0.6)	3 (2.5)	0.038
30-day ED return, n (%)	151 (16.2)	119 (14.7)	32 (26.5)	0.001

Triple Interventions to Minimize Left Without Being Seen
--- Introducing A Novel Protocol for Quality Improvement Projects

Jessica Kirby, Heidi Knowles, Charles Huggins, Devin Sandlin, Nathan Hoot, James d'Etienne, Jud Bryant, Sudhakar Karlapudi, Julie Moore,, Victoria Feather, Hao Wang

Introduction

- ❖ Left without being seen (LWBS) is a quality care metric associated with patient-centered outcomes.
- ❖ Factors affecting LWBS are complex, and interventions targeted at specific factors obtain diverse effects.
- ❖ We aim to develop a novel protocol suitable for universal quality improvement (QI) projects.
- ❖ We report this protocol by showing its use in our LWBS QI project. We used various artificial intelligence and machine learning (AI/ML) algorithms to identify specific factors affecting LWBS, implemented triple interventions specifically targeted on such factors, and compared daily LWBS rate changes before and after the intervention.

Methods

- ❖ This Novel protocol includes five steps:
  Step 1: Recognize the task
  Step 2: Identify factors affecting above task
  Step 3: Determine the priority of factors and feasibility
  Step 4: Implement interventions on priority factors
  Step 5: Evaluate performance
- ❖ A single urban Emergency Department (ED) daily throughput data from March 1, 2019, to February 28, 2023, was used for AI/ML model prediction.
- ❖ Model performance including accuracy, recall, precision, f1 score, and area under the receiver operating characteristics (AUC) were reported.
- ❖ The top 5 factors affecting LWBS were identified by AI/ML feature important function.
- ❖ Triple interventions were implemented:
  1. Rapid triaging
  2. Direct bedding approach – "Pull to Full"
  3. Reducing boarding time

Methods (cont.)

- ❖ The average daily LWBS rate was compared before (March 1, 2019-February 28, 2023) and after (March 1, 2023-February 29, 2024) the intervention.
- ❖ Since this study includes ED throughput metrics across different COVID-19 phases (i.e., pre COVID-19, COVID-19 pandemic, and post COVID-19 phases), a sensitivity analysis was conducted to avoid the influence of patient volume during the COVID-19 pandemic phase. Data was further divided into pre COVID-19 phase (March 1, 2019 to February 29, 2020) and post COVID-19 phase (March 1, 2023 to February 29, 2024). ED throughput metrics were again analyzed to determine the effects of triple interventions.

Results

From March 1, 2019, to February 29, 2024, a total of 1,827 daily metric reports were recorded, consisting of 1,461 reports before the intervention and 366 reports after the intervention.

Table 1. ED Daily volume and admission comparisons (Before and After the Intervention)

	Before the Intervention (n=1,461)	After the intervention (n=366)	P value
Days --- n (%)			0.941
Weekday	1,043 (79.92)	262 (20.08)	
Weekend	418 (80.08)	104 (19.92)	
Daily Volume --- n			
Mean (SD)	326 (42)	355 (36)	<0.001
Median (IQR)	326 (298-355)	358 (330-381)	<0.001
Daily Admission --- n			
Mean (SD)	79 (11)	80 (12)	0.0299
Median (IQR)	80 (72-87)	81 (71-89)	0.0613

Two models were built to predict the daily LWBS rate (<3% versus ≥3%), including XGBoost and random forest. The performance accuracies of the model predictions were quite similar.
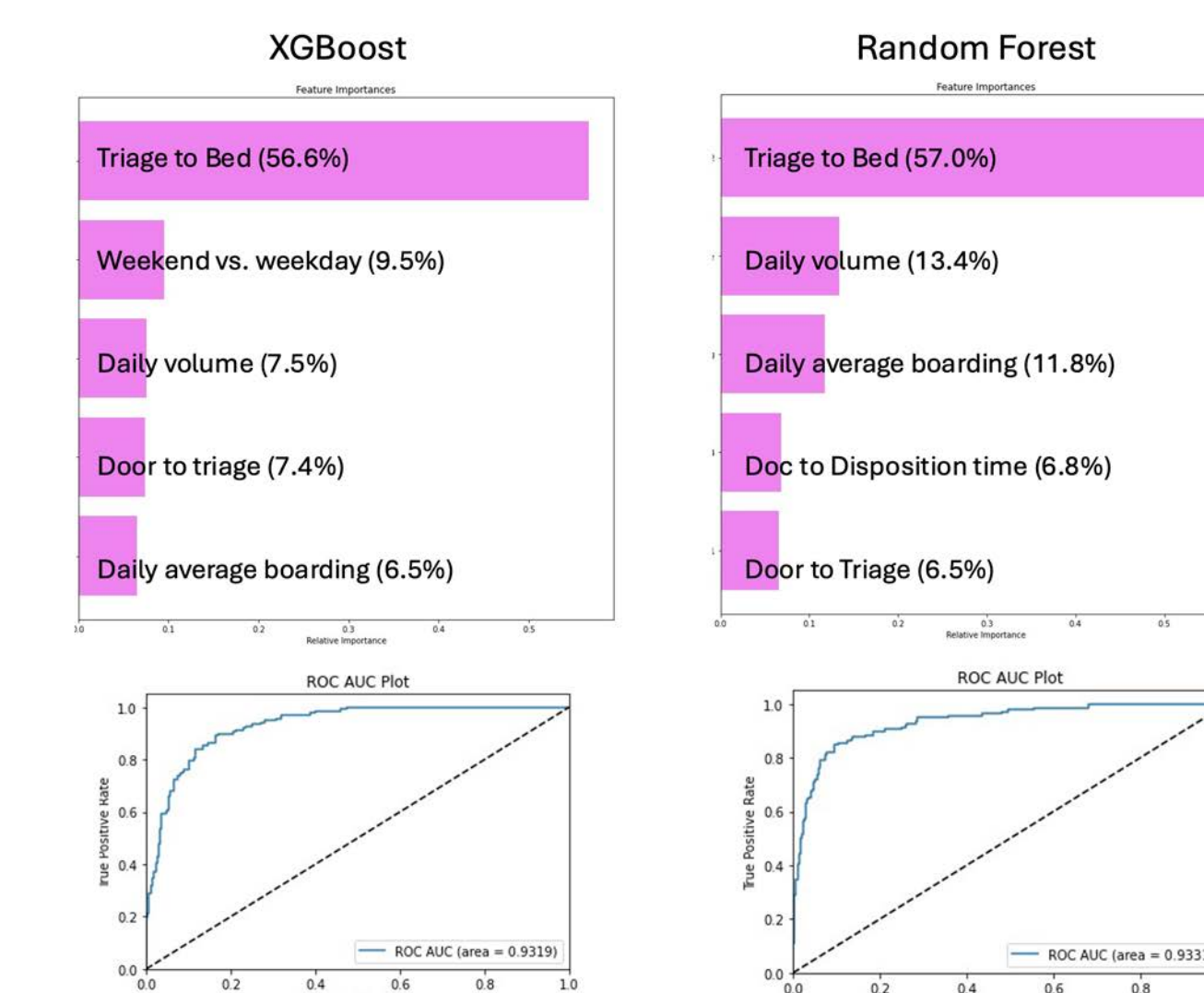
Results (cont.)

Figure 1. Performance accuracy comparisons among two ML algorithms and their top 5 features
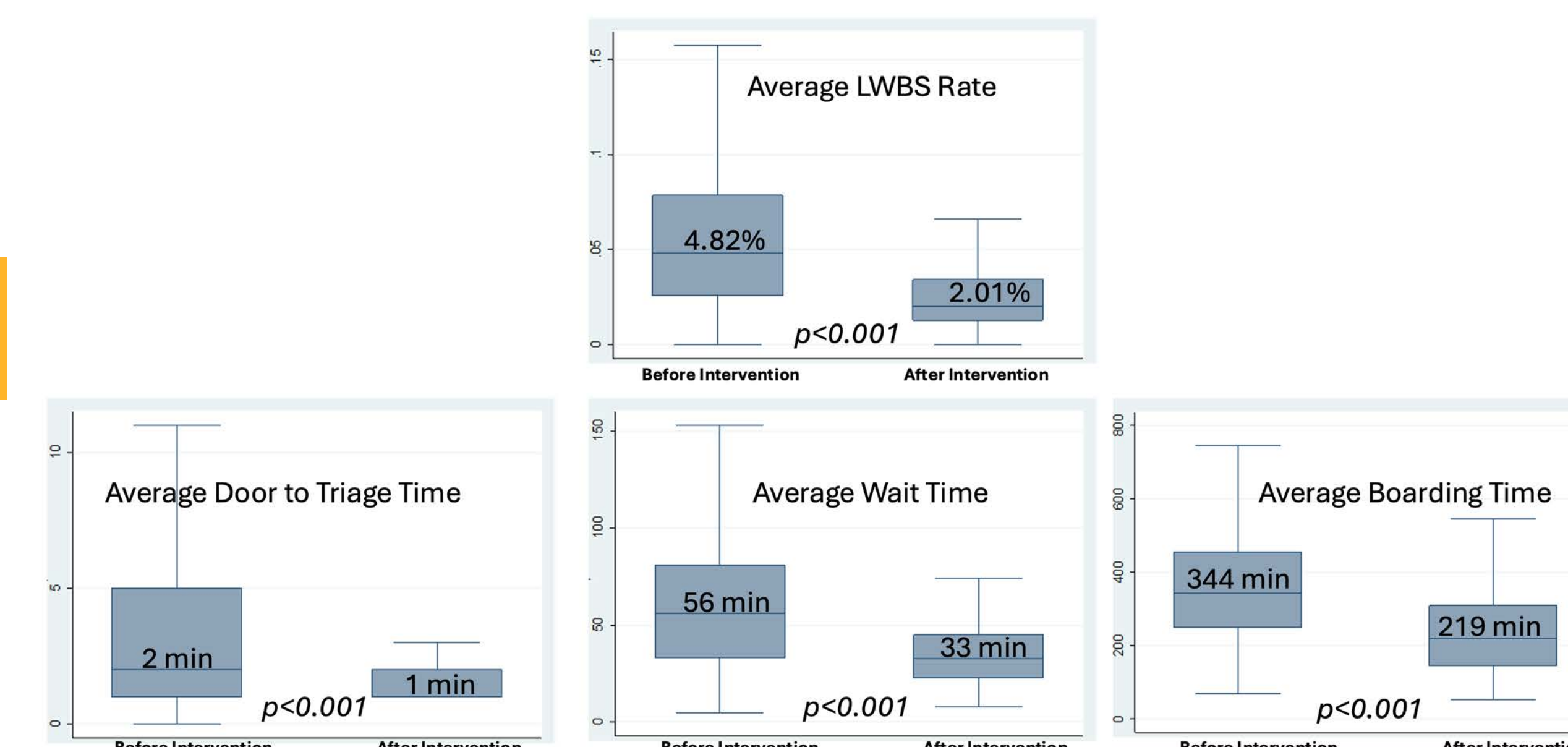

Figure 2. Main throughput metrics comparisons before and after the triple interventions by using box plots.

Conclusions

- ❖ AI/Machine Learning approaches can identify common factors highly related to LWBS with favorable performance.
- ❖ Triple interventions targeted on these factors can **reduce the daily LWBS rate over 50%**, indicating the efficiency of ED operational management.
- ❖ This study can serve as a foundation to develop a novel protocol suitable for implementing quality improvement projects.

Using Natural Language Processing in Emergency Medicine Health Service Research ---A Systematic Review and Meta-analysis

Hao Wang, Naomi Alanis, Laura Haygood, Thomas K. Swoboda, Nathan Hoot, Daniel Phillips, Heidi Knowles, Sara Ann Stinson, Prachi Mehta, Usha Sambamoorthi

Introduction

❖ Natural Language Processing (NLP) represents one of the adjunct technologies within artificial intelligence and machine learning (AI/ML), creating structure out of unstructured data. The goal of NLP is to enable computers to investigate and reason using human languages as input.

❖ Electronic health records (EHR) contain data that can be categorized into structured and unstructured forms. Before applying NLP to unstructured EHR data, it is essential to evaluate its performance.

❖ As the healthcare industry increasingly relies on technology, it becomes imperative to understand nuances of NLP in the context of Emergency Medicine (EM). Therefore, this study aims to assess the performance of employing NLP to identify and categorize unstructured data within the EM setting.

Methods

❖ We systematically searched publications related to EM research and NLP across databases including MEDLINE, EmBase, Scopus, CENTRAL, and ProQuest's Dissertations and Theses.

❖ Independent reviewers screened, reviewed, and evaluated article quality and bias. We utilized the Critical Appraisal Skills Program (CASP) diagnostic checklist tool for studies 'quality assessment.

❖ NLP usage was categorized into syndromic surveillance, radiologic interpretation, and identification of specific diseases/events/syndromes, with respective sensitivity analysis reported.

❖ Performance metrics for NLP usage were calculated and the overall area under the summary of receiver operating characteristic curve (SROC) was determined. We utilized likelihood ratios (LR) to calculate post-test probability using a Bayes nomogram via a Fagan plot. Sensitivity analysis was also conducted.

Results

Overall, this meta-analysis included 27 studies with 179,109 patients and 9,025 images. It consisted of 4 studies involving 23,707 patients focused on syndromic surveillance, 12 studies covering 155,402 patients targeting diseases/events/syndromes recognition, and 11 studies involving 9,025 images concentrating on radiology interpretations.

Figure 1. PRISMA Flow Diagram: Using NLP in Emergency Medicine Research
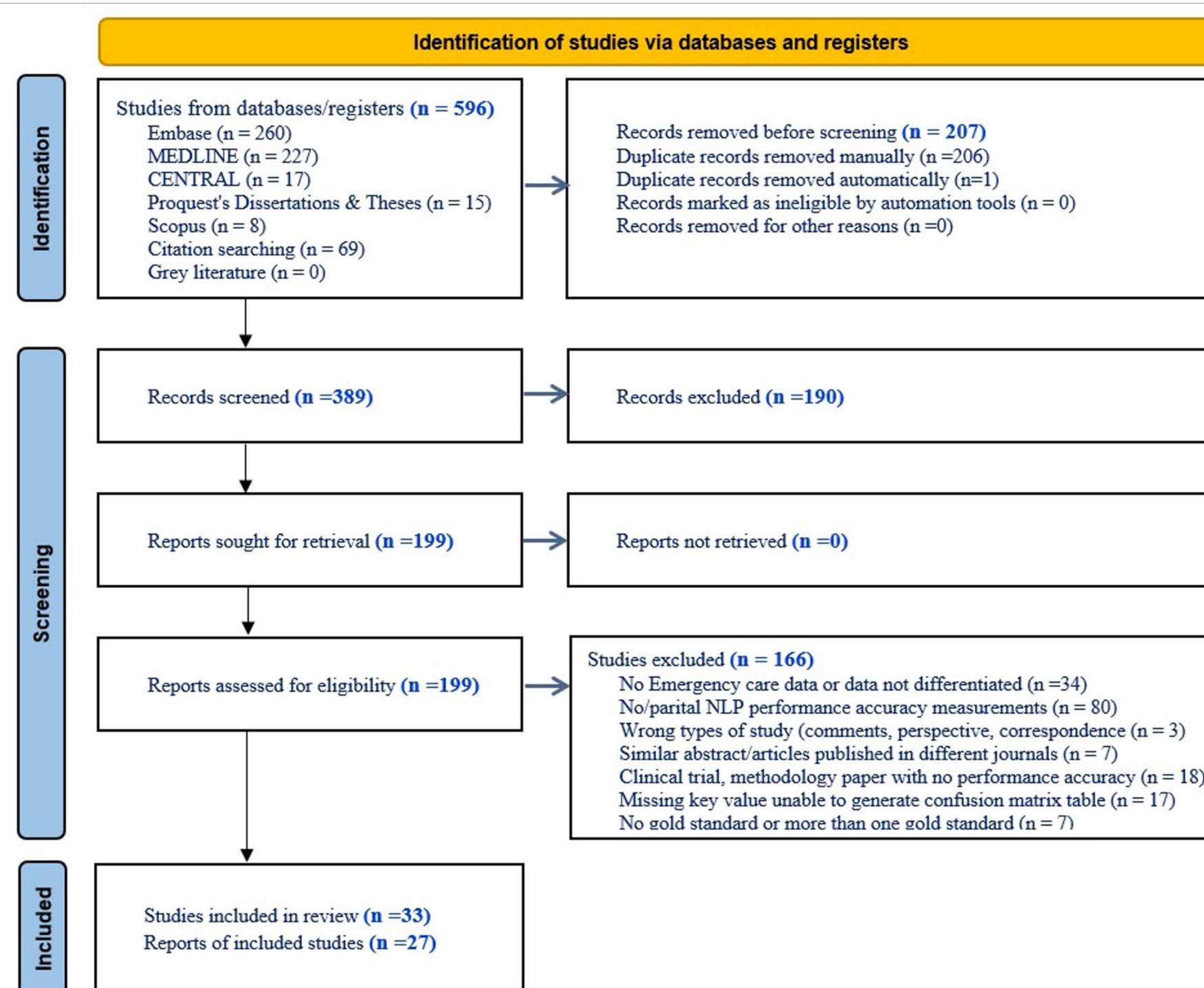

Table 1. Performance of natural language processing in Emergency Medicine

	Sensitivity (recall)	Specificity	PPV (precision)	NPV	LR(+)	LR(-)
Overall	0.87 [0.82-0.91]	0.95 [0.92-0.97]	0.18 [0.18-0.18]	1.00 [1.00-1.00]	17.4 [10.3-29.5]	0.13 [0.09-0.19]
Subgroup						
Syndromic surveillance	0.73 [0.51-0.87]	0.96 [0.82-0.99]	0.85 [0.84-0.85]	0.99 [0.99-0.99]	16.3 [3.7-72.6]	0.29 [0.14-0.57]
Radiology interpretation	0.93 [0.90-0.94]	0.96 [0.92-0.98]	0.82 [0.81-0.83]	0.99 [0.99-1.00]	20.8 [11.3-38.2]	0.08 [0.06-0.10]
Identifying diseases/ events/syndromes	0.86 [0.79-0.91]	0.94 [0.86-0.98]	0.13 [0.13-0.13]	1.00 [1.00-1.00]	14.5 [5.9-35.6]	0.15 [0.09-0.23]

Results (cont.)

Figure 2. Performance (Recall and Precision) of using NLP in Emergency Medicine Research
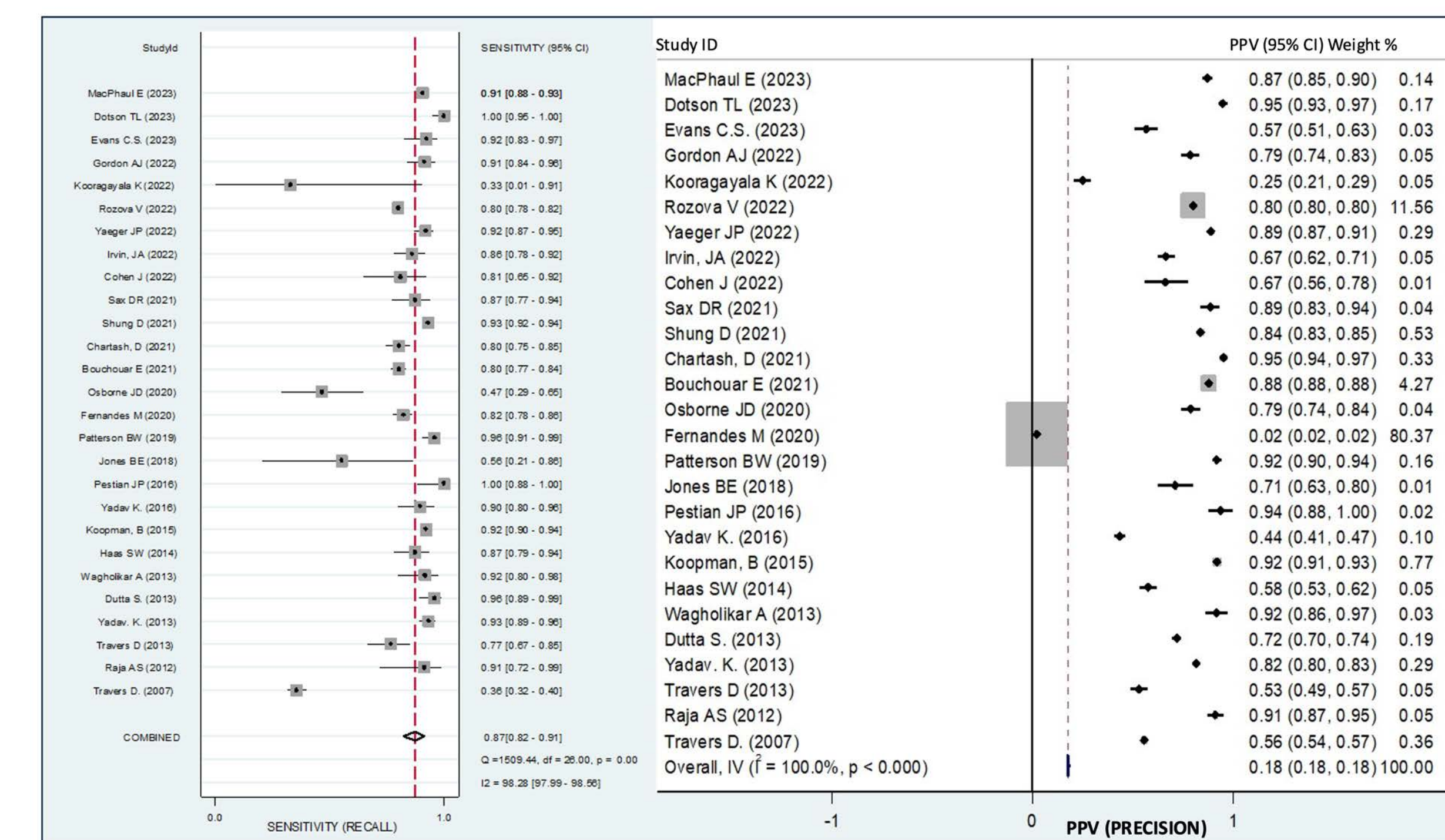

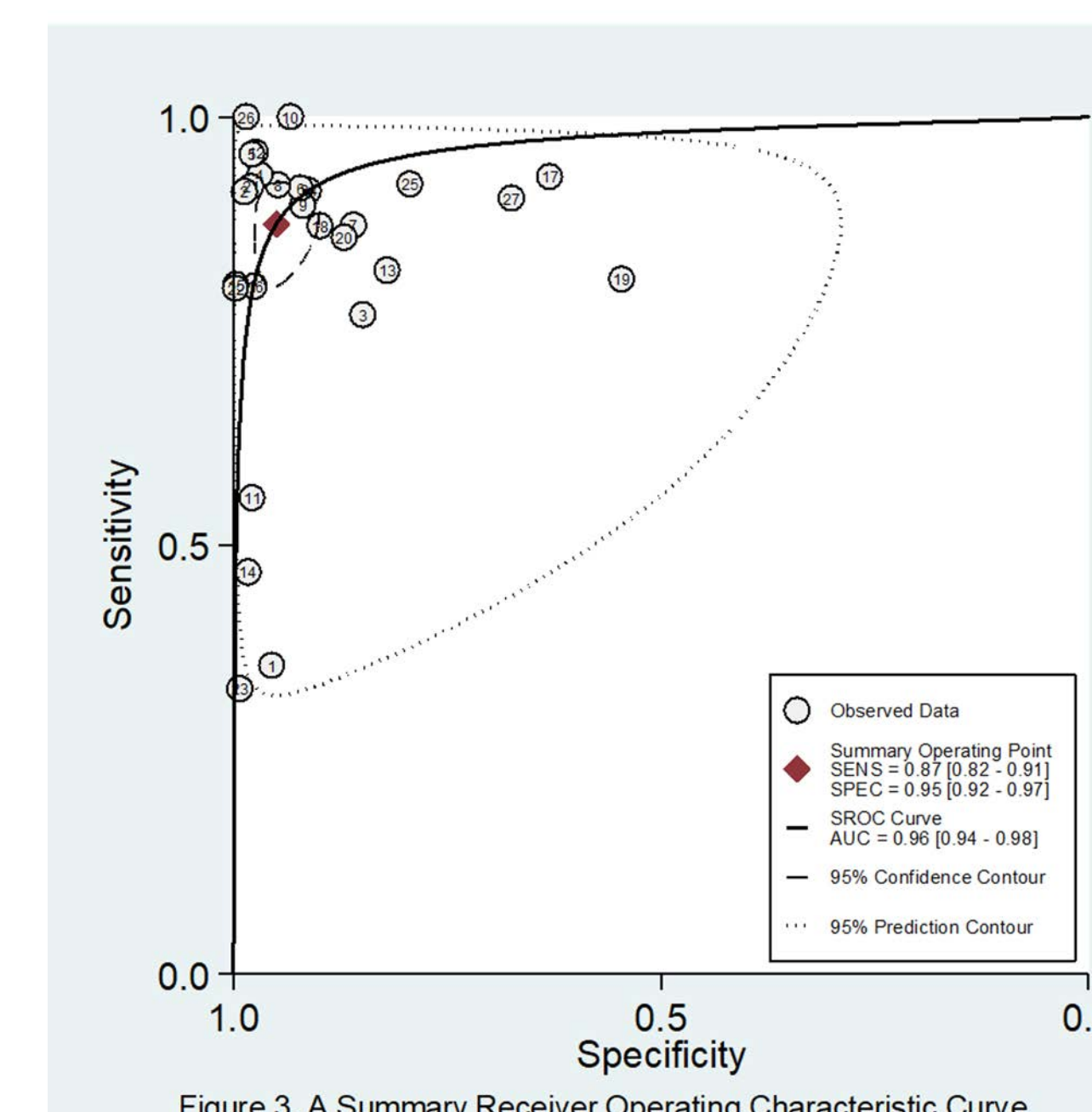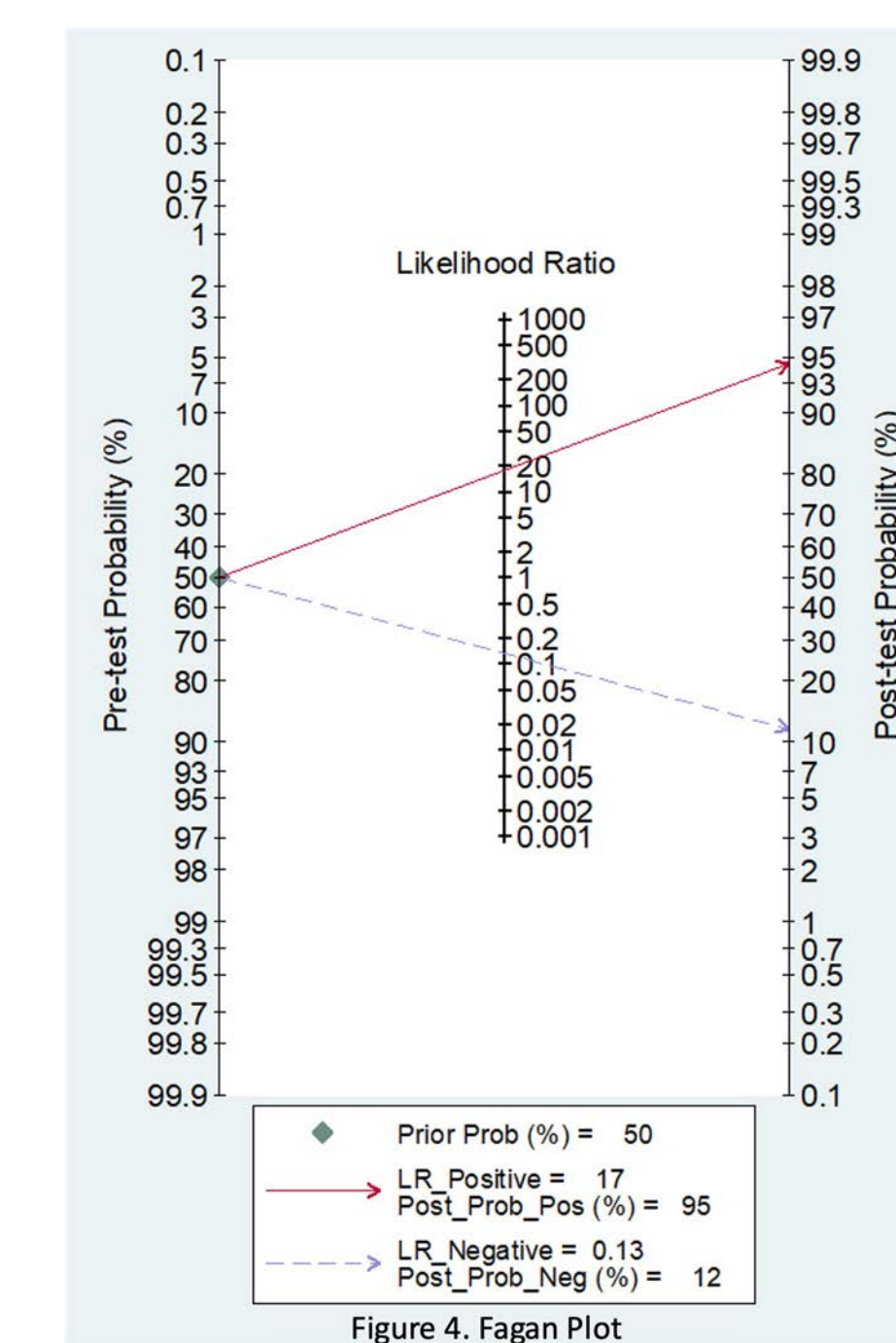Figure 3. A Summary Receiver Operating Characteristic Curve

Figure 4. Fagan Plot

Conclusions

❖ This analysis revealed a generally favorable performance accuracy in using NLP within EM research, particularly in the realm of radiologic interpretation.

❖ We advocate for the adoption of NLP-based research to augment EM healthcare management.

Right Treatment Right Time: Patient Follow-Up Data

Jaquez, C., Momoh, D.,Lakamp, E., Scarborough, J.H., McCown, J., Reamy, N., Mehaffey, D., Alanis, N., DeMoss, D., & d'Etienne, J.

Introduction

- Medication for opioid use disorder (MOUD) is important for treatment and recovery from opioid use disorder (OUD)

- Low barrier access to M OUD through emergency departments (ED) is demonstrated to be safe, effective, and increase retention in treatment.

- RTRT uses an integrated network which includes the ED, a bridge clinic, urgent care center (UCC), psychiatry, community, and street medicine clinics. RTRT provides screening, buprenorphine, naloxone distribution, with transition to long-term treatment providing a low barrier to MOUD.

Methods

- All eligible adult ED patients able to participate in care were screened for OUD using the opioid risk tool (ORT) and clinician review. Clinically appropriate patients were offered MOUD in the ED.

- All OUD patients were referred to the bridge clinic for subsequent care, delayed initiation, care coordination, and peer support.

- Patients could also self-refer or be referred by community partners. Access to care is 24/7 through the ED, Bridge Clinic, and UCC.

- RTRT is staffed with a director, case manager, and peer navigator. Medical staff provide clinical care and prescriptions.

- "Bridge" patients are provided wrap-around services, peer support, medical care and prescriptions until accepting referral is arranged.
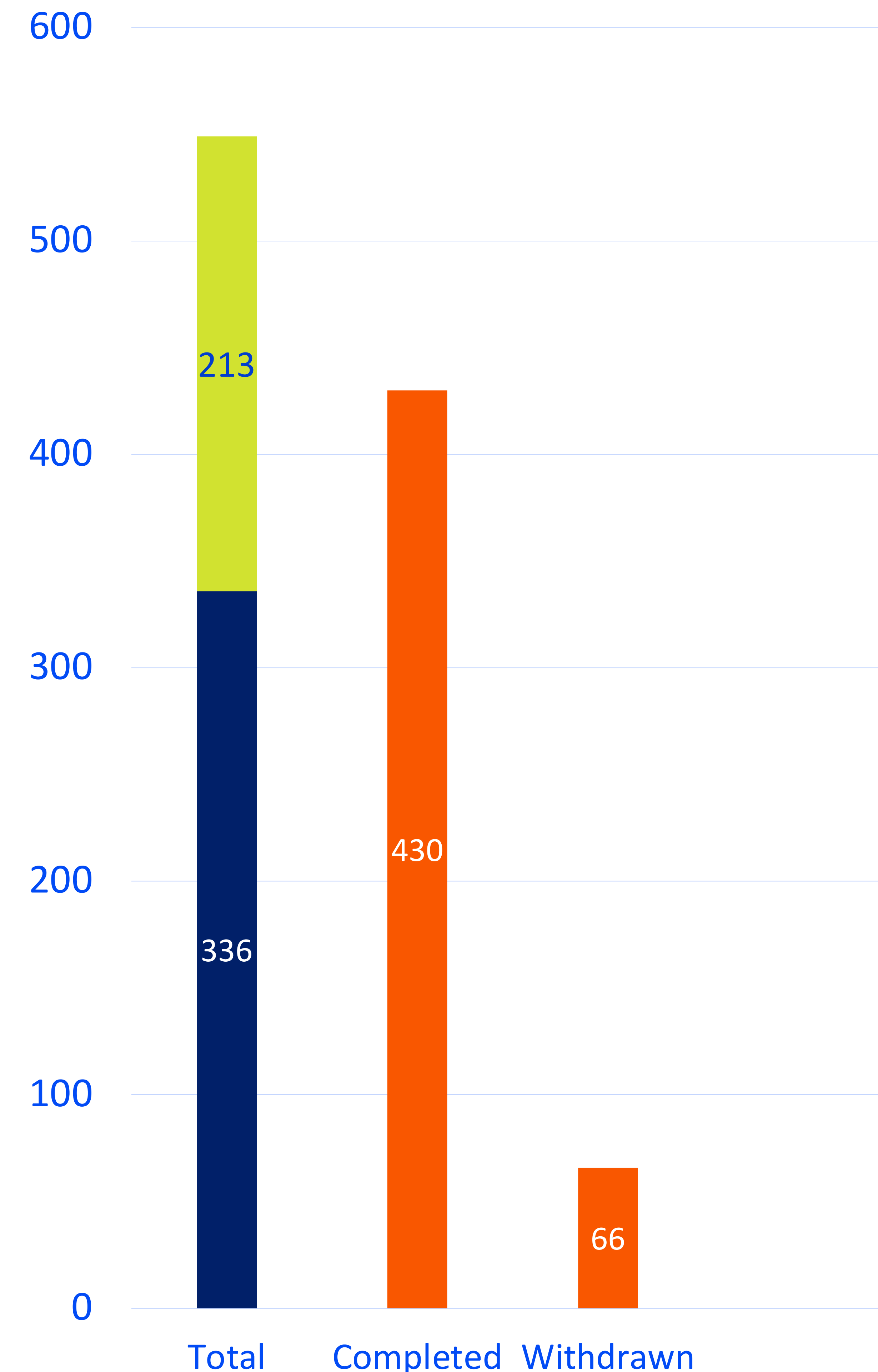
Outcomes

- Between 1/1/2023 and 12/6/23, a total of 549 patients were enrolled in the Bridge Clinic

- 336 patients were male and 213 patients were female

- A total of 430 (78%) patients completed at least one follow up

- A total of 66 (12%) patients withdrew from the program

References

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2. D'Onofrio G, O'Connor PG, Pantalon MV, Chawarski MC, Busch SH, Owens PH, et al. Emergency department-initiated buprenorphine/naloxone treatment for opioid dependence: a randomized clinical trial. JAMA. 2015;313(16):1636-44.

3. D'Onofrio G, Chawarski MC, O'Connor PG, Pantalon MV, Busch SH, Owens PH, et al. Emergency Department-Initiated Buprenorphine for Opioid Dependence with Continuation in Primary Care: Outcomes During and After Intervention. J Gen Intern Med. 2017;32(6):660-6.

4. Webster LR, Webster RM. Predicting aberrant behaviors in opioid-treated patients: preliminary validation of the Opioid Risk Tool. Pain Med. 2005;6(6):432-42.

5. Timko C, Schultz NR, Cucciare MA, Vittorio L, Garrison-Diehn C. Retention in medication-assisted treatment for opiate dependence: A systematic review. J Addict Dis. 2016;35(1):22-35.

Bridge Clinic Follow Up

Stacked/grouped bar chart. Total: 336 (male) + 213 (female). Completed: 430. Withdrawn: 66.

Unveiling Must Know ECG Artifacts:
A Case of Pulse Tapping Artifact Mimicking STEMI

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History of Presenting Illness

A 64-year-old male with a history of coronary artery disease (CAD) and end stage renal disease (ESRD) presented to the ED for dyspnea requesting dialysis. An ECG performed on arrival displays bizarre ST elevation in the high lateral leads (I & aVL) with reciprocal ST depression in the inferior leads (II & III). A thorough history did not reveal symptoms consistent with acute cardiac ischemia, although the patient reported mild chest discomfort and shortness of breath, which was similar to prior episodes of volume overload. The absence of clear symptoms of acute coronary syndrome and the peculiar ST segment abnormalities led to consideration of alternative causes of STE rather than ST elevation myocardial infarction (STEMI).

Emergency Department (ED) Arrival 12-lead ECG
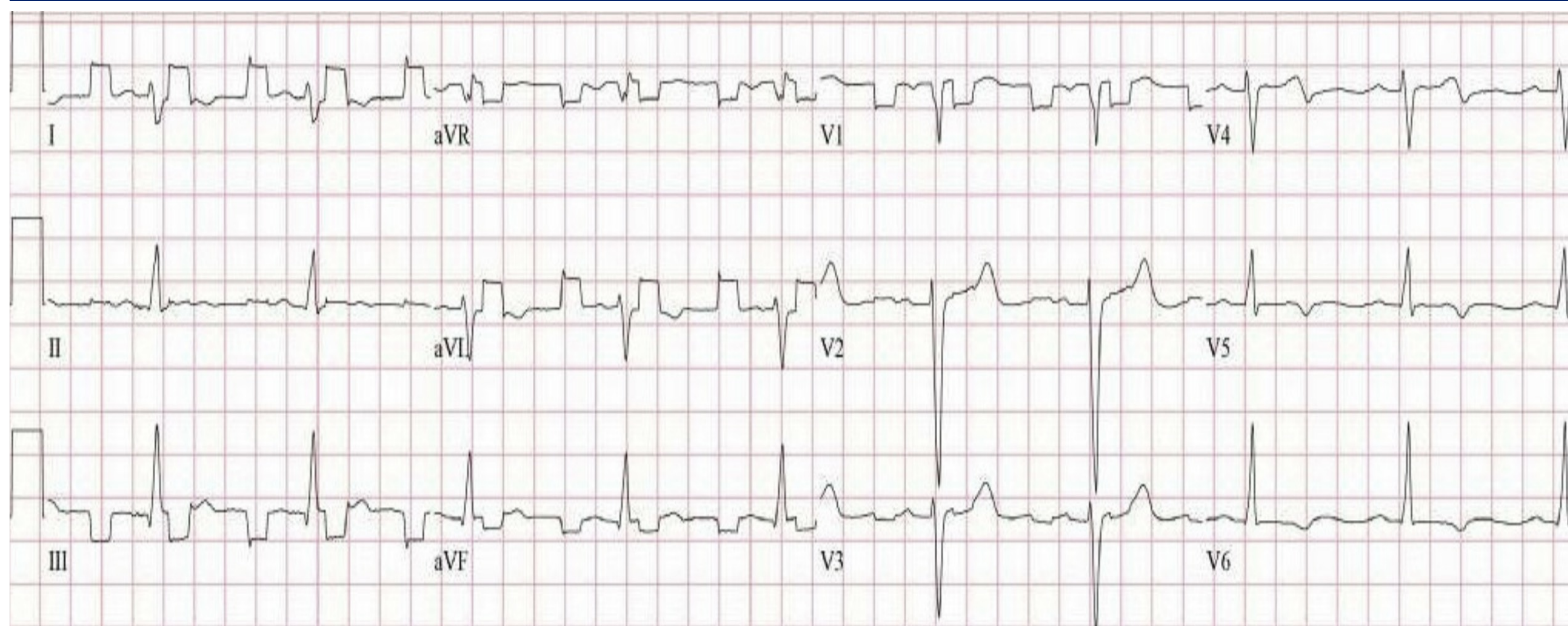
Introduction

• Emergency ECGs are an essential diagnostic tool in acute care medicine, crucial for identifying a range of life-threatening conditions such as STEMI and acute hyperkalemia.

• Accurate ECG interpretation and expertise is critical, especially in differentiating STEMI from the many other reasons for new ST segment elevation.

• This case delves into an instance where an ECG initially suggested STEMI in an ESRD patient. However, the peculiar ST segment abnormalities and incongruence with presenting symptoms led to the identification of arterial pulse tapping artifact, attributed to an improperly placed ECG lead over his arteriovenous (AV) fistula.

• We focus on pulse tapping artifact's role in ECG misinterpretation and the significance of precise lead placement.

Discussion

• There are at least 18 well described conditions that can cause ST elevation, making differentiation and pattern recognition challenging.

• Awareness of ECG artifacts that mimic time sensitive diagnoses like STEMI enhance patient care by preventing mismanagement and the anchoring bias that may occur when rushing to the cath lab.

• Pulse tapping artifact occurs when an ECG lead is placed near an AV fistula or large artery, where mechanical pulsation from turbulent blood flow can mimic electrical activity by the ECG machine.

• Proper lead placement away from the AV fistula or large pulsatile arteries and careful ECG interpretation in context of the clinical presentation are important steps in distinguishing these artifacts from genuine cardiac events.

Conclusion

• It is important for emergency physicians to be able to distinguish between ECG evidence of acute occlusion MI (including STEMI) and its many mimics, including ECG artifacts like arterial pulse tapping.

• Failure to consider the many causes of STE and skillfully correlate ECG findings with symptoms could lead to false positive cath lab activation in ESRD patients who frequently have some chest discomfort and chronically elevated troponin measurements.

• Proper ECG lead placement and a comprehensive understanding of potential artifacts are essential for accurate diagnosis, thereby improving patient outcomes and avoiding unnecessary interventions.

Reference:
Ganessane E, et al. **Electrocardiogram Can Record Mechanical Activity Too!** J Emerg Med. 2024 Jan;66(1):e41-e44. Epub 2023 Jul 24. PMID: 37867038

Use of a Vertical Flow Model to Combat Boarding and Improve Throughput

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Previous Model

- Triage model with 12-hour coverage by Advanced Practice Providers (APPs).
- Primary focus on Fast-Track (FT) patients and order placement.
- Emergency Department (ED) RNs and Radiology staff execute orders alongside other triage responsibilities.
- Limited patient re-evaluations or discharges from Triage, resulting in a high level of Left Before Treatment Completion (LBTC) due to increased boarding and decreased bed availability.
- Significant patient dissatisfaction rising from full evaluations but lack of follow-up and result communication.

Addition of Vertical Care

- Reallocated a section of the former clerical staffing zone within the ED waiting room.
- Transformed this space into three Vertical Care rooms furnished with recliners, requiring minimal construction expenditure.
- Relocated APPs from the Triage area to the Vertical Care area.
- APPs now evaluate patients for FT patient status and determine suitable diagnostic procedures in a more secluded environment.
- Revised RN staffing to offer coverage for both diagnostic procedures and disposition management for lower acuity cases in this area.
- Transitioned triage to the previously validated Pivot[1] process, using fewer criteria to establish acuity to streamline the triage process and save time.
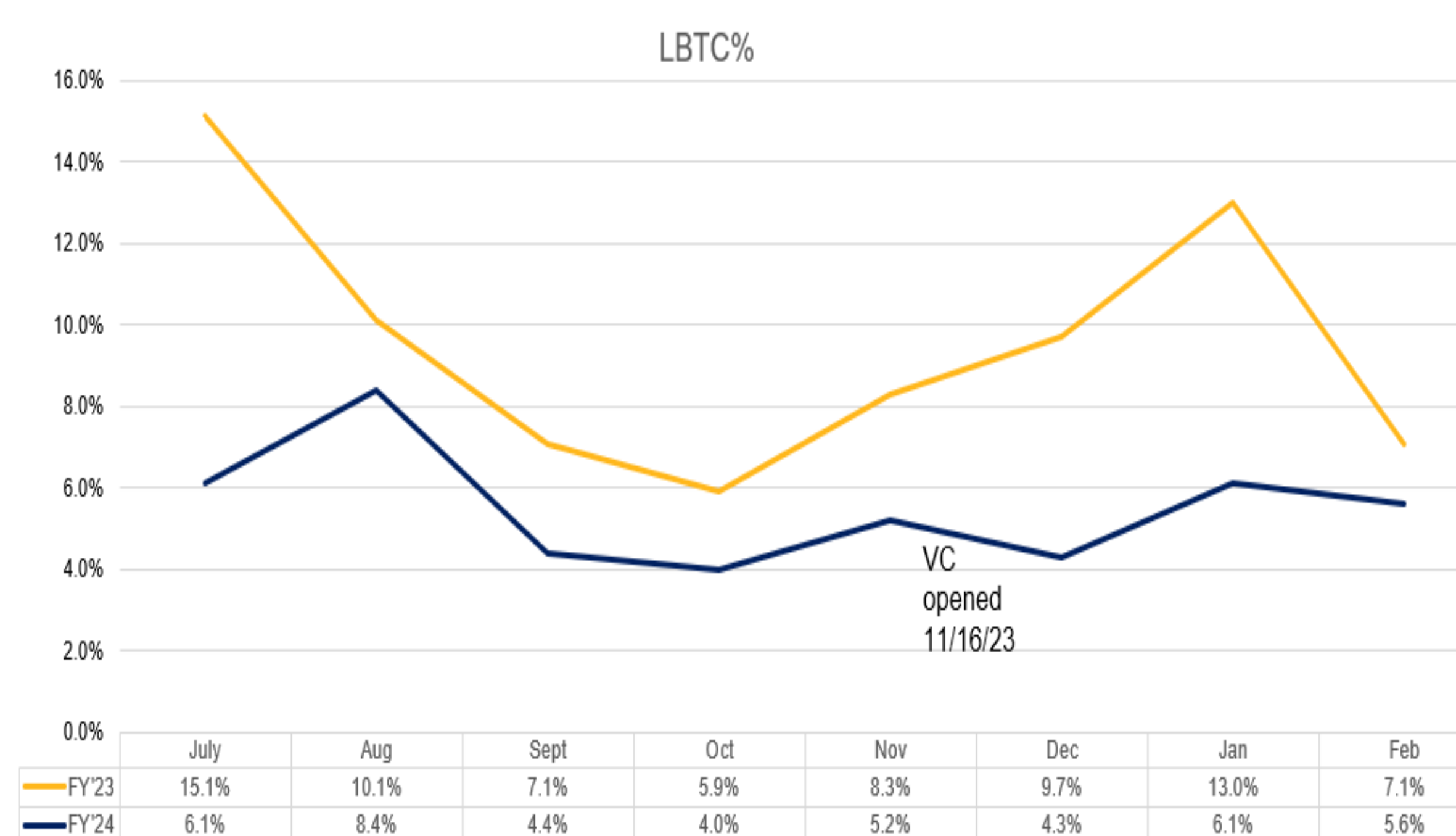
Provider Process

- Flexibility is key for Vertical Care operations.
- During days with lower acuity, the focus may primarily be on assessing and managing FT patients and those with Level 4/5 acuity.
- On days with higher acuity and increased boarding, there may be a need to bring higher acuity patients back into the Vertical Care workflow for reassessment and review of completed diagnostic procedures and disposition plans.
- Evaluate the total Length of Stay (LOS), Leave Without Being Seen (LWOBS), and Left Before Treatment Complete (LBTC) rates both before and after implementation.

Results

- Despite a 13% increase in daily volume, the rate of LBTC decreased from 10% to 5%.

- The LOS for discharged patients decreased by 15 minutes.

- The LOS for all patients decreased by 30 minutes.

- Overall patient satisfaction improved.

Results

LBTC%	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
FY'23	15.1%	10.1%	7.1%	5.9%	8.3%	9.7%	13.0%	7.1%
FY'24	6.1%	8.4%	4.4%	4.0%	5.2%	4.3%	6.1%	5.6%

VC opened 11/16/23

Further Considerations

- In the upcoming year, staffing adjustments will entail adding MD shifts in Vertical Care on specific days instead of APP shifts. A comparison will be made between the overall LOS and LBTC rates on MD versus APP shifts.
- Considering the high level of provider burnout in this area, it may be necessary to explore shorter shifts to address the intense stress and workload.
- First Provider Time has increased from 5 minutes to 25 minutes due to the transition from Triage to Vertical Care. This process will need reassessment as streamlining occurs with RN staffing and the pivot process.

References:
1. Christensen M, Rosenberg M, Mahon E, Pineda S, Rojas E, Soque V, Johansen ML. Pivot Nursing: An Alternative to Traditional ED Triage. J Emerg Nurs. 2016 Sep;42(5):395-9. doi: 10.1016/j.jen.2015.07.014. Epub 2016 Mar 11. PMID: 26972370.