Emergency Medicine Research: A Review of Resident Research Session #2

June 17, 2021

ashp

Relevant Financial Relationship Disclosure

No one in control of the content of this activity has a relevant financial relationship (RFR) with an ineligible company.

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pharmacists advancing healthcare

Presenters

- Mary O'Keefe, Pharm.D., PGY-2 Emergency Medicine Pharmacy Resident, Froedert and the Medical College of Wisconsin
- Casey L. Boyer, Pharm.D., PGY-2 Emergency Medicine Pharmacy Resident, Grady Health System
- Monique Payne-Cardona, Pharm.D., BCPS, PGY2 Emergency Medicine Pharmacy Resident, Boston Medical Center Health System
- Gideon Berdahl, Pharm.D., PGY-1 Pharmacy Resident, Boston Medical Center Health System
- Monica E. Coupe, Pharm.D., PGY-1/MS Health-System Pharmacy Administration and Leadership Resident, OhioHealth Grant Medical Center
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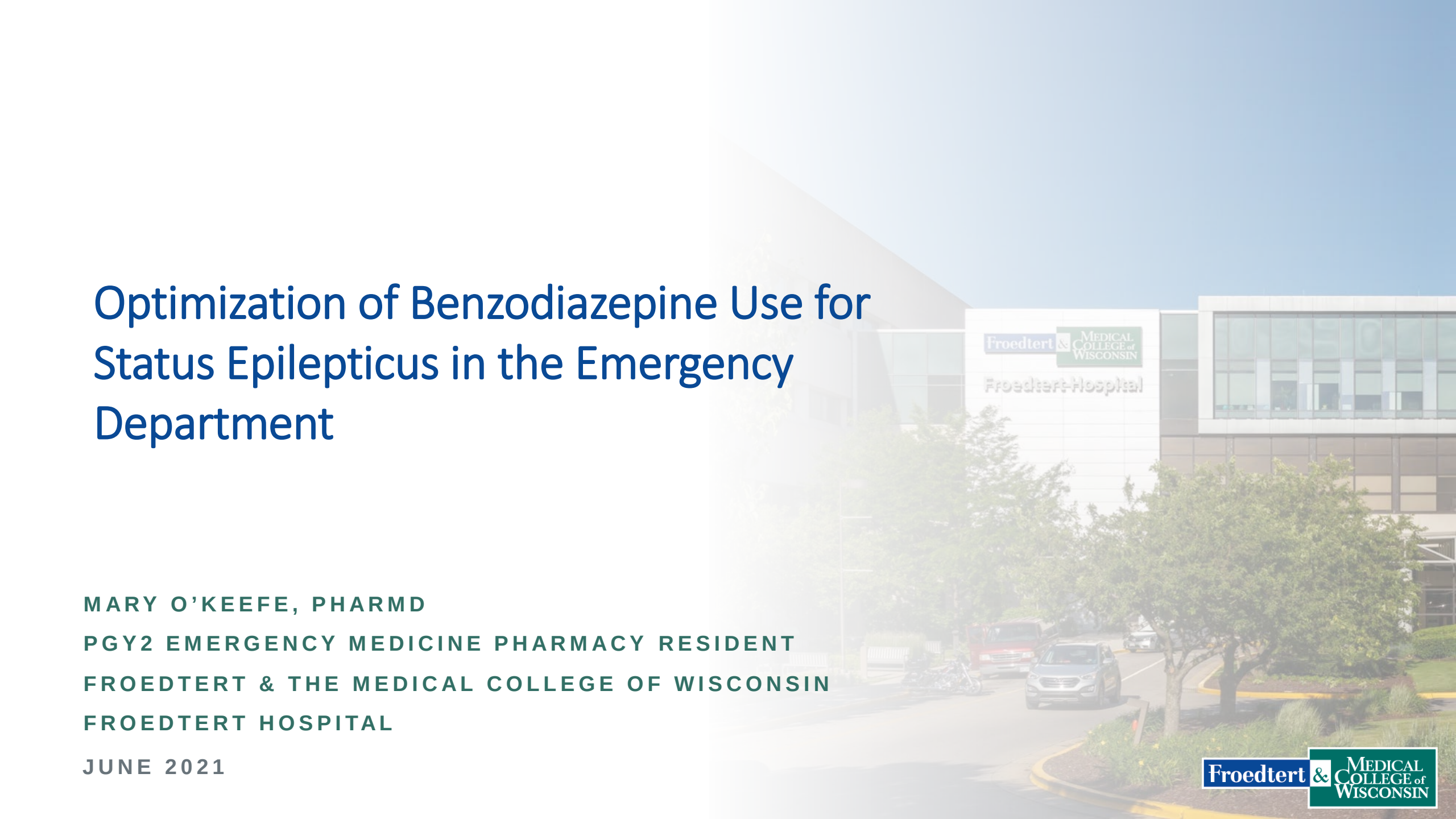
Optimization of Benzodiazepine Use for Status Epilepticus in the Emergency Department



MARY O'KEEFE, PHARMD

PGY2 EMERGENCY MEDICINE PHARMACY RESIDENT

FROEDTERT & THE MEDICAL COLLEGE OF WISCONSIN

FROEDTERT HOSPITAL

JUNE 2021

Background

- **Benzodiazepines** (BZDs) = first-line therapy for management SE
- Under-dosing occurs due to the suspected risk of adverse effects
- Multiple studies have shown only **~30%** of BZD doses reach the guideline recommendations

Guideline recommended BZD agents, route, & dosing		
Intramuscular (IM) Midazolam • 10 mg [5 mg if <40 kg]	Intravenous (IV) Lorazepam • 0.1 mg/kg [max 4 mg] • May repeat	IV Diazepam • 0.15-0.2 mg/kg [max 10 mg] • May repeat

Methods

Design: Single-center retrospective cohort study

Location: Froedtert Hospital Emergency Department (ED)

Study Period: 1/1/2013 - 6/1/2020

Primary Outcome	Incidence of treatment escalation • Intubation or intubation attempt OR • Need for second line medication with documentation of continued seizure activity
Secondary Outcomes	• Hospital length of stay (LOS) • Intensive care unit (ICU) LOS • Ventilator-dependent days (VDD) • Adverse Events

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Inclusion Criteria

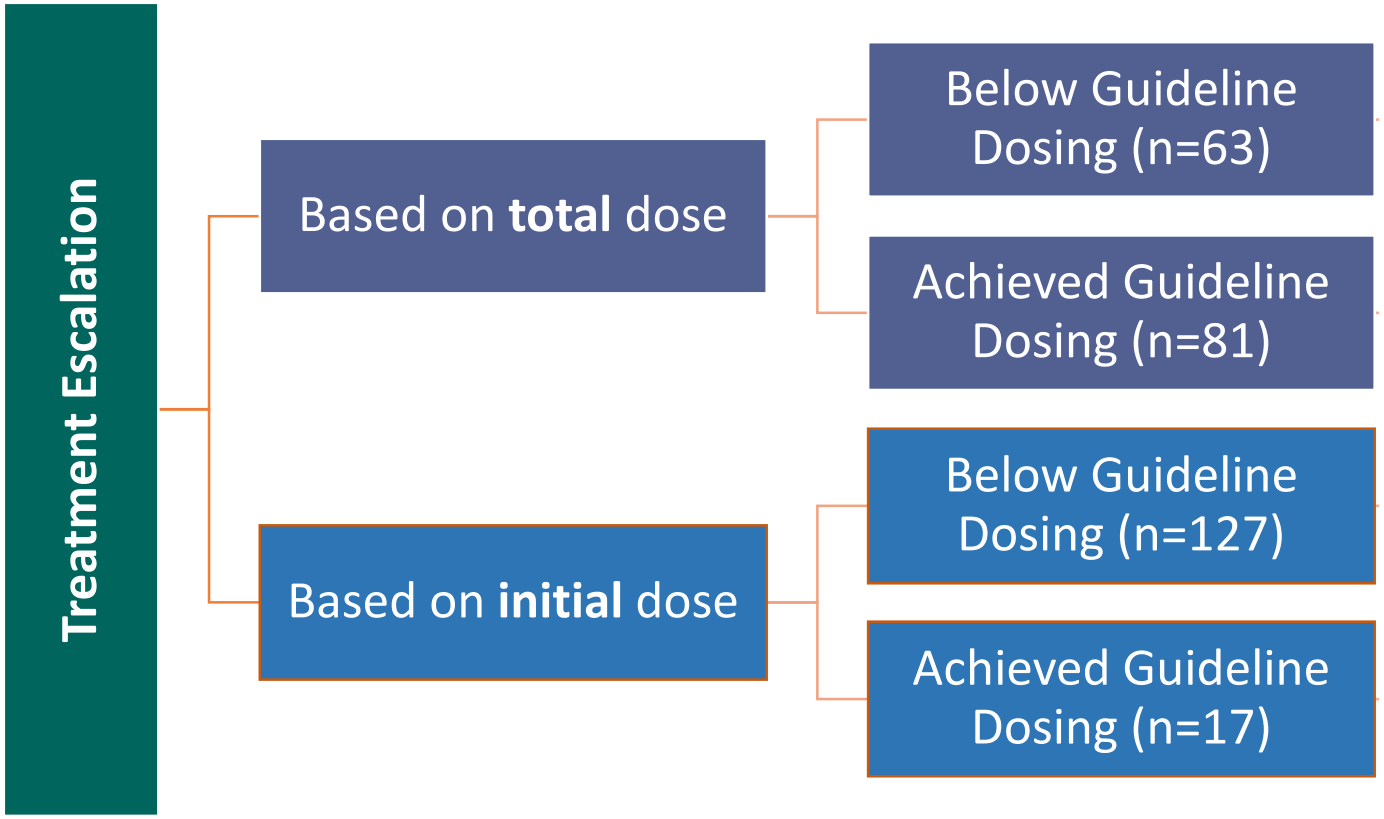
- 18 years or older
- Diagnosed with SE
- Received a BZD as initial therapy (pre-hospital or in the ED)

Exclusion Criteria

- Pregnancy
- Incomplete medical record or transfer from another institution with unknown BZD product, dose, route, or timing
- Receipt of non-BZD as initial treatment
- History of or current pseudo-seizure
- Seizure activity related to traumatic brain injury within 7 days
- Seizure activity related to alcohol withdrawal
- Chronic ventilation prior to presentation

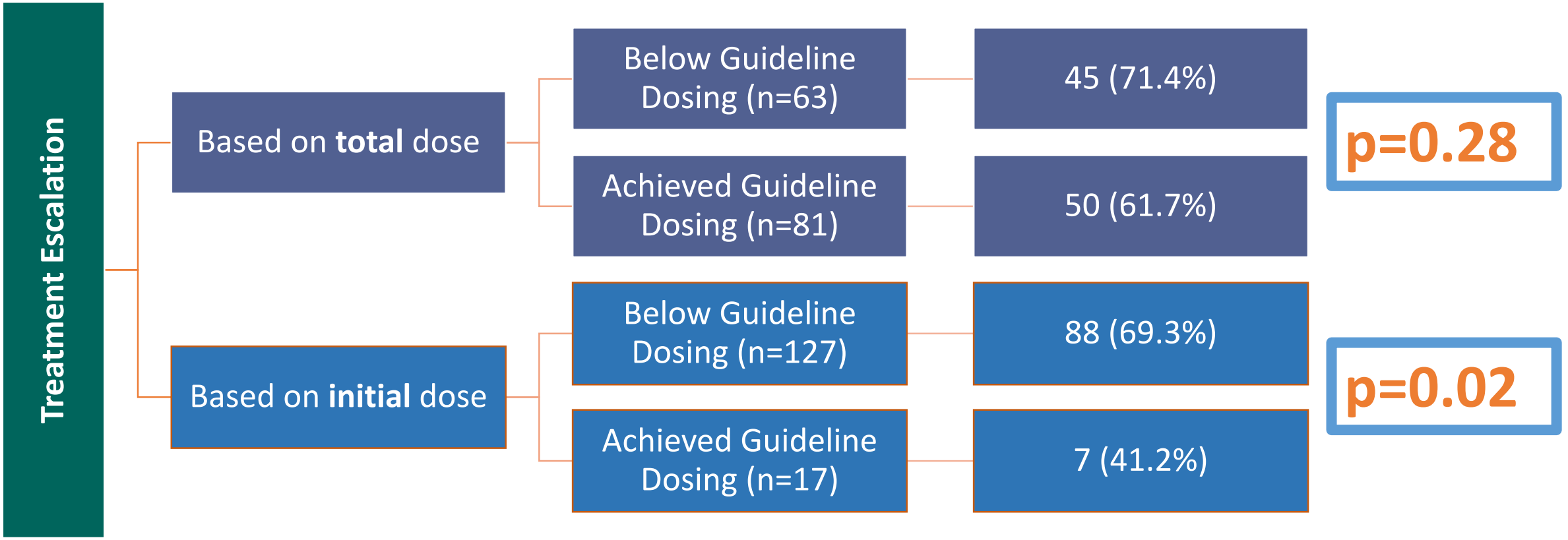
Results

Primary Outcome



Results

Primary Outcome



Results

Secondary Outcomes

	Based on **total dose**			Based on **initial dose**		
	Below	Achieved		Below	Achieved	
	Days (mean, +/- STD)		**p-value**	Days (mean, +/- STD)		**p-value**
Hospital LOS	6.90 (8.25)	7.41 (9.10)	**0.844**	7.72 (9.10)	3.12 (2.36)	**0.043**
ICU LOS	3.53 (3.85)	3.43 (3.75)	**0.848**	3.71 (3.90)	1.40 (1.07)	**0.009**
VDD	1.52 (3.23)	1.54 (2.22)	**0.281**	1.65 (2.83)	0.62 (1.11)	**0.084**

Results

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VDD	1.52 (3.23)	1.54 (2.22)	**0.281**	1.65 (2.83)	0.62 (1.11)	**0.084**

Difference in **adverse events** (Below vs. Achieved guideline dosing) for total and initial dose comparisons **were not significant** [p>0.05]

Based on initial dose comparison, the *below* guideline dosing group required **more repeated BZD doses** versus the *achieved* dosing group [p< 0.001]

Conclusions

Initial BZD dosing comparison:

- Below guideline recommended doses were ***significantly more likely*** to require treatment escalation and had ***longer*** hospital & ICU LOS

Total BZD dosing comparison:

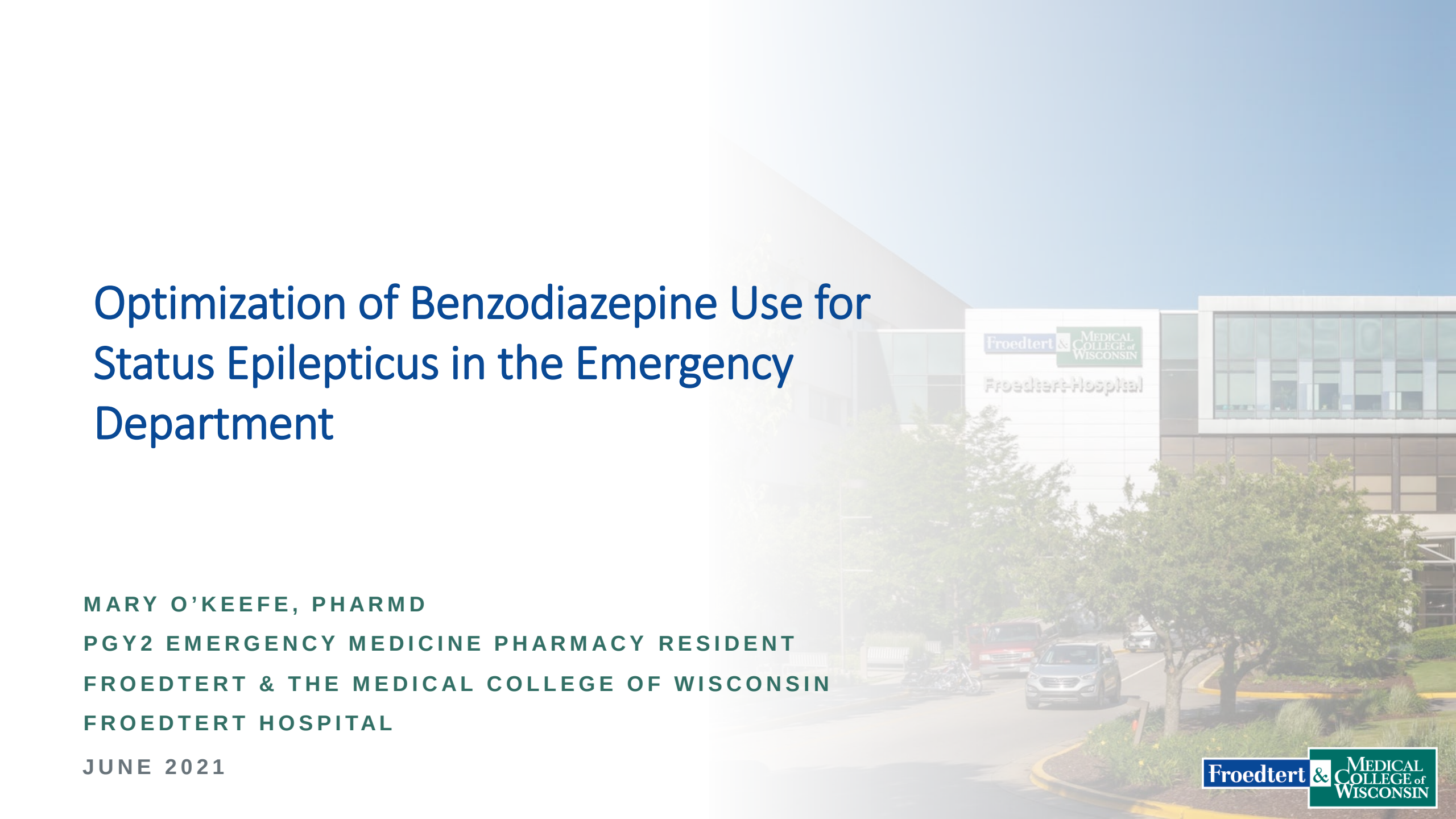
- *No differences* in primary or secondary outcomes for below guideline recommendations versus achieved guideline dosing

No differences between the groups with regards to adverse events

Limitations:

- Single center, retrospective review
- Inconsistent & subjective documentation

Optimization of Benzodiazepine Use for Status Epilepticus in the Emergency Department



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JUNE 2021

Comparison of Diltiazem Dosing on Successful Rate Control or Cardioversion in the Emergency Department

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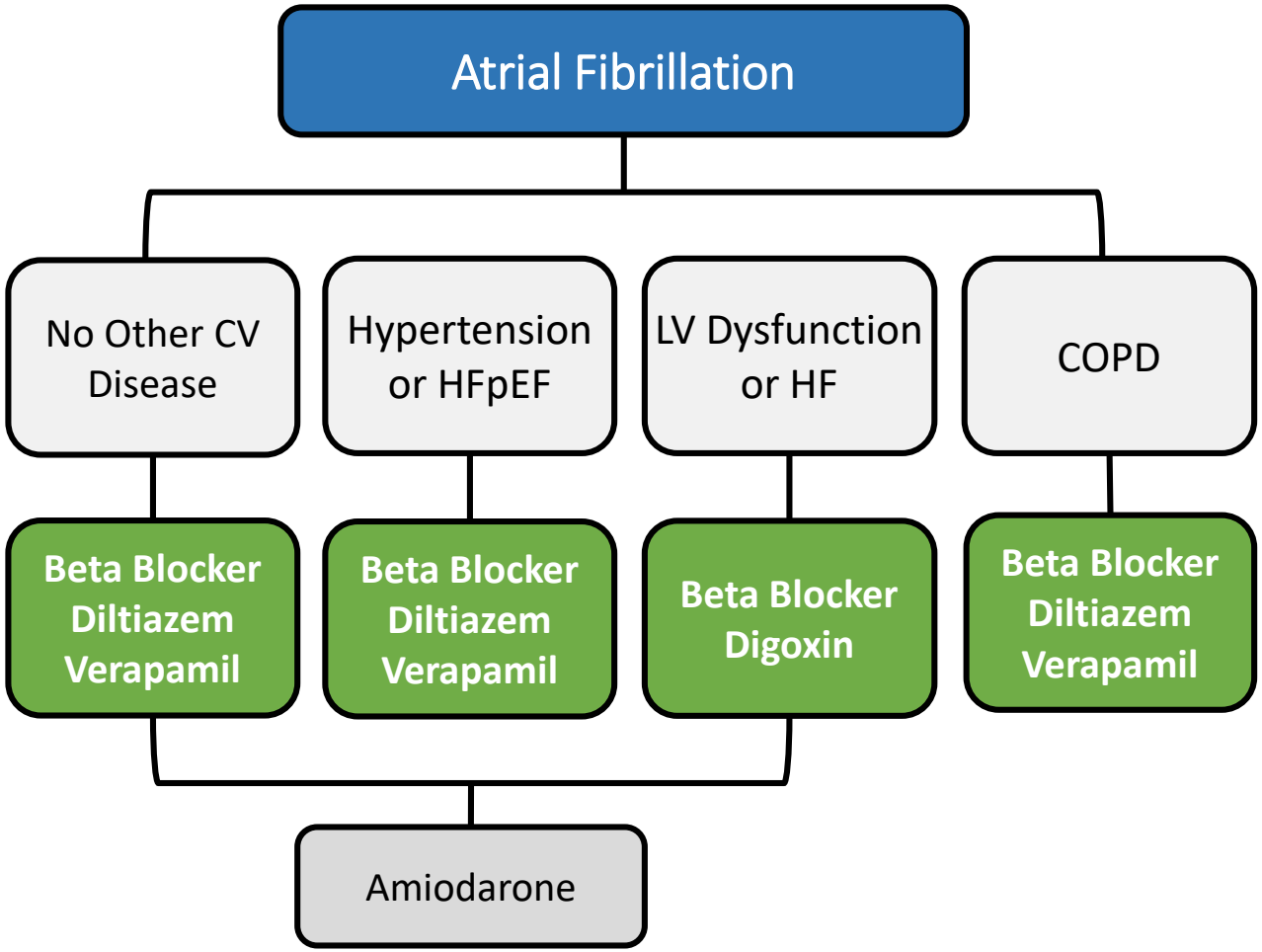
PGY2 Emergency Medicine Pharmacy Resident

Grady Health System – Atlanta, GA

Background



- Atrial fibrillation guidelines recommend non-DHP CCBs as a first-line option in rate control
- Non-DHP CCBs are commonly used for rate control/pharmacologic cardioversion of other supraventricular arrhythmias
- Diltiazem is an ideal agent provided as an initial bolus of 0.25 mg/kg IV

non-DHP = non-dihydropyridine; CCBs = calcium channel blockers

January CT, Wann S, Alpert JS, et al. *J Am Coll Cardiol*. 2014;64(21):2246-80.

Current Literature in Diltiazem Dosing

	Lee et al. (2011)	Ross et al. (2016)	Gasbarro et al. (2019)
Study Design	Retrospective chart review (N=180)	Retrospective chart review (N=456)	Retrospective observational study (N=97)
Study Cohorts	Low dose (≤0.2 mg/kg) Standard dose (>0.2 to ≤0.3 mg/kg) High dose (>0.3 mg/kg)	Weight-based dose (0.2-0.3 mg/kg) Standard dose (10 mg)	"On-label" dosing "Off-label" dosing
Results	***Therapeutic response in the low (70.5%), standard (77.1%) and high dose (77.8%) groups did not differ significantly (p=0.615)***	***Treatment success in the weight-based (68.7%) and standard (60.8%) group did not differ significantly (p=0.082)***	"On-label" dosing: 14% ***Patients with "off-label" dosing required additional rate control (41% v. 7%, p <0.04)***

Ross AL, O'Sullivan DM, Drescher MJ, Krawczynski MA. *J Emerg Med*. 2016;51(4):440-446.

Gasbarro NM, DiDomenico RJ. *Am J Health Syst Pharm*. 2019;76(4):214-220.

Lee J, Kim K, Lee CC, et al. *Am J Emerg Med*. 2011;29(8):849-54.

Purpose

Opportunity

- Diltiazem is often prescribed at doses less than the FDA-approved labeling of 0.25 mg/kg IV for acute ventricular rate control in the Grady Emergency Department

Purpose

- To compare the safety and efficacy of diltiazem doses administered for supraventricular arrhythmia treatment

Study Methods

Study Design	Single-center, retrospective medical record review
Study Duration	October 1, 2019 to October 7, 2020
Data Collection	Epic EHR
Data Review	Emory Institutional Review Board

EMR = electronic health record

Patient Population

Inclusion Criteria

-Age ≥18 years

-Acute supraventricular arrhythmia with HR ≥120 bpm

-Received initial IV diltiazem bolus in the emergency department

Exclusion Criteria

-Received any rate/rhythm controlling agents* or electrical cardioversion prior to diltiazem

-Insufficient chart documentation of vital signs and medication administration

-No weight recorded within 6 months before or after encounter

-Pregnant or incarcerated

*except adenosine

Study Endpoints

Primary Outcome

- Successful treatment within 30 minutes (as composite outcome of rate control or cardioversion):
  - **Rate control:** HR <100 bpm or reduction of ≥ 20% from baseline
  - **Cardioversion:** resultant normal sinus rhythm

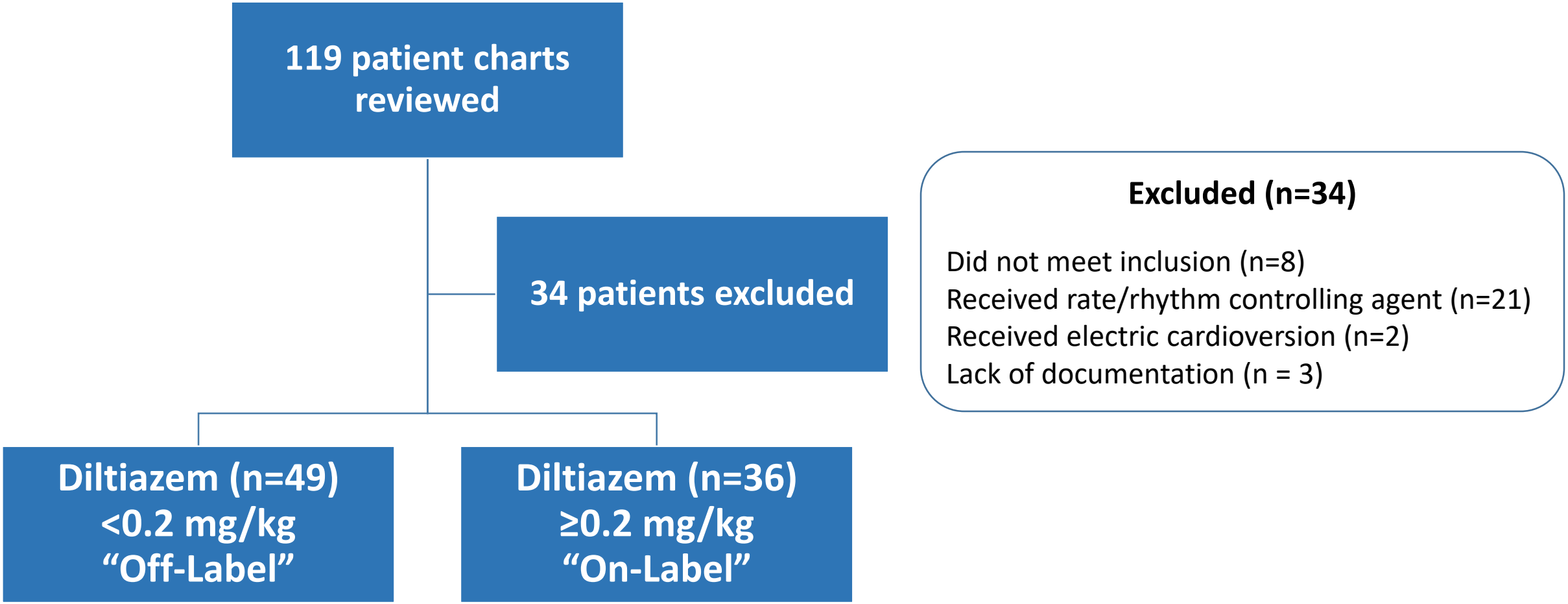
Secondary Outcomes

- Sustained heart rate response within 2 hours
- Need for additional diltiazem bolus within 2 hours
- Additional rate/rhythm controlling agents required within 2 hours
- Incidence of hypotension (SBP <90mmHg and/or >20% reduction in baseline SBP)

Statistical Analysis

- SAS v.9.4 utilized for data analysis
- Patients stratified into two groups:
    - **Off-Label:** Diltiazem <0.2 mg/kg
    - **On-Label:** Diltiazem ≥0.2 mg/kg
- T-test for continuous variables
- Chi-square or Fisher's exact test for dichotomous variables

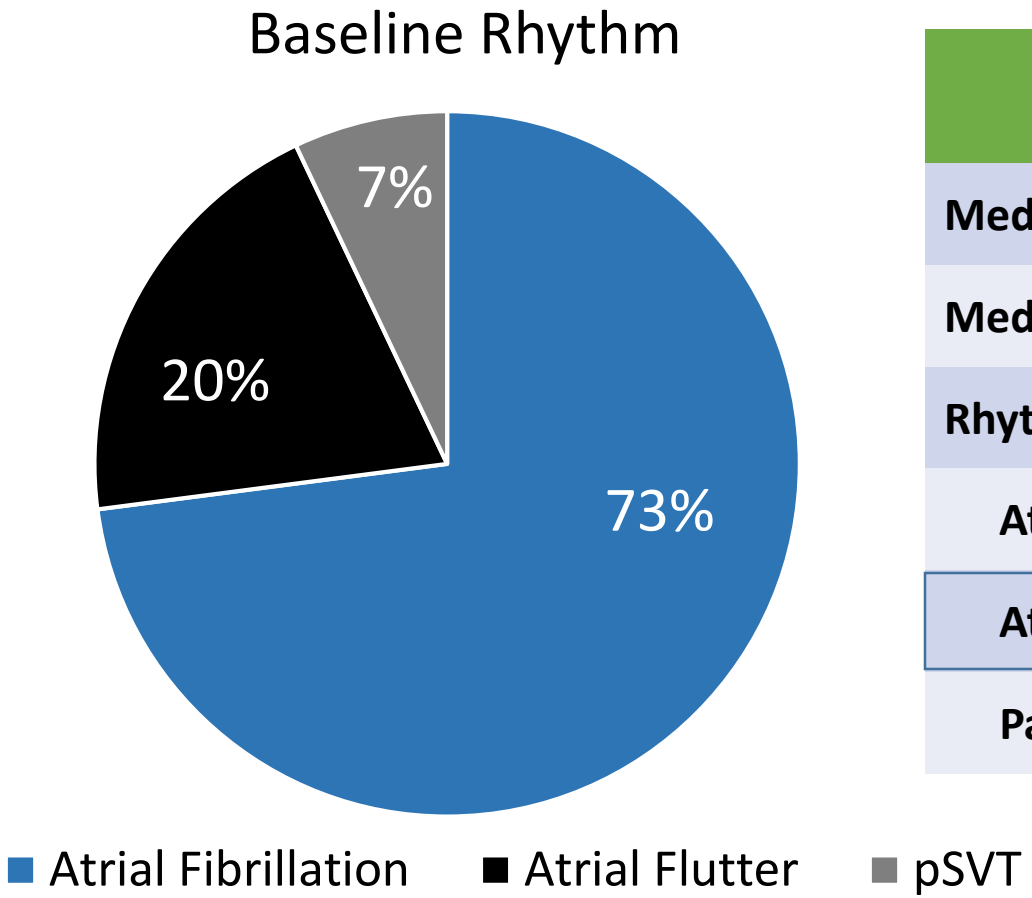
Results


119 patient charts reviewed
34 patients excluded
Excluded (n=34)
Did not meet inclusion (n=8)
Received rate/rhythm controlling agent (n=21)
Received electric cardioversion (n=2)
Lack of documentation (n = 3)
Diltiazem (n=49)
<0.2 mg/kg
"Off-Label"
Diltiazem (n=36)
≥0.2 mg/kg
"On-Label"

Baseline Demographics

Characteristic	<0.2 mg/kg (n=49) Off-Label	≥0.2 mg/kg (n=36) On-Label	P-value
Median Age [IQR], years	61 [58, 71]	61 [55, 65.5]	0.27
Female, n (%)	28 (57.1)	7 (19.4)	0.0005
Race, n(%)			
Black	36 (73.5)	29 (80.6)	0.10
White	12 (24.5)	7 (19.4)	
Median BMI [IQR], kg/m^2	32.1 [25.8, 38.6]	26.9 [22.8, 30.4]	0.0181
Comorbidities, n(%)			
Hypertension	43 (87.8)	32 (88.9)	1.00
Afib/Aflutter	22 (44.9)	16 (44.4)	0.97
Heart Failure	20 (40.8)	6 (16.7)	0.0170
Home Medications, n(%)			
Beta Blocker	24 (49.0)	14 (38.9)	0.36
Non-DHP CCB	5 (10.2)	3 (8.3)	1.00
Antiarrhythmic	4 (8.2)	2 (5.6)	1.00

Baseline Hemodynamics



	<0.2 mg/kg (n=49) Off-Label	≥0.2 mg/kg (n=36) On-Label
Median HR [IQR], bpm	149 [135, 163]	149 [137, 162]
Median SBP [IQR], mmHg	134 [121, 148]	136 [116, 152]
Rhythm, n(%)		
Atrial Fibrillation	37 (75.5)	25 (69.4)
Atrial Flutter	7 (14.3)	10 (27.8)
Paroxysmal SVT	5 (10.2)	1 (2.8)

Diltiazem Dosing

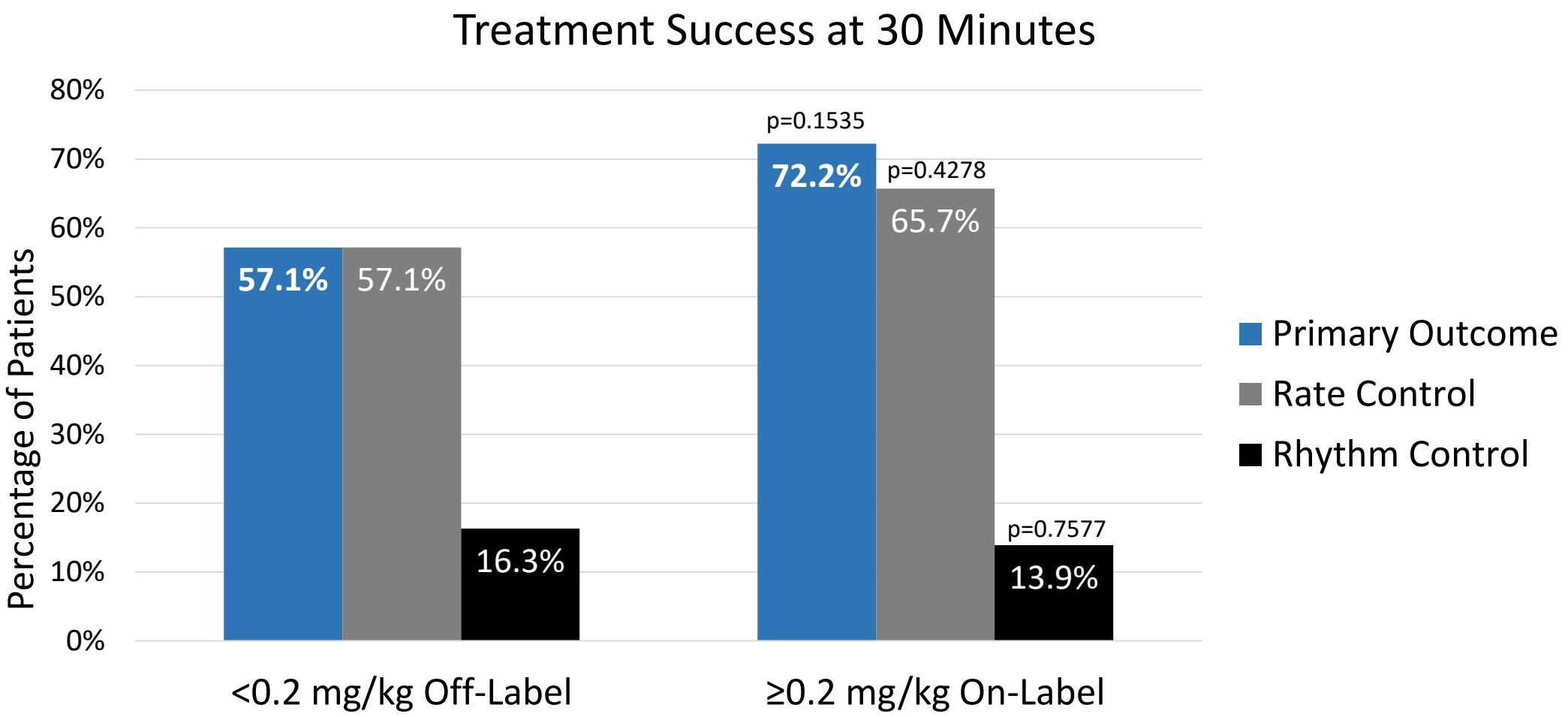
<0.2 mg/kg (Off-Label)

Average Dose (mg): 12.9 mg
Average Dose (mg/kg): 0.14 mg/kg
Mode: 10 mg
Range: 5 – 35 mg

≥0.2 mg/kg (On-Label)

Average Dose (mg): 21.4 mg
Average Dose (mg/kg): 0.25 mg/kg
Mode: 20 mg
Range: 10 – 38 mg

Primary Outcome



Secondary Outcomes

	<0.2 mg/kg	≥0.2 mg/kg	P-value
Sustained HR Response, n(%)	14 (50.0)	11 (47.8)	NS
Additional Diltiazem Bolus, n(%)	23 (46.9)	13 (36.1)	0.3182
Additional Rate Controlling Agents, n(%)	6 (12.2)	2 (5.6)	NS
Hypotension, n(%)	11 (22.4)	7 (20.0)	0.7874

Discussion

- Diltiazem is often administered doses less than the FDA-labeled dosing
- There was no statistically significant difference in treatment success between patients that received off-label vs. on-label dosing of diltiazem
- Patients that received <0.2 mg/kg diltiazem did not require a statistically significant different amount of additional doses and other rate controlling medications
- There was no difference in the rates of hypotension between the dosing regimens
- This study was not adequately powered to detect differences, and larger randomized studies are warranted

Limitations

- Retrospective design
- Inaccurate/incomplete nursing documentation
- Hemodynamic measurements at one point in time
- Confounding variables

Conclusion

Diltiazem doses of at least 0.2 mg/kg resulted similar rates of treatment success without increasing the risk for hypotension

Questions?

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Boston Medical Center
HEALTH SYSTEM

Optimizing the Treatment of Congestive Heart Failure Exacerbations in the Emergency Department

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PGY1 Pharmacy Resident

Monique Payne-Cardona, PharmD, BCPS
PGY2 Emergency Medicine Pharmacy Resident

BACKGROUND

Congestive heart failure (CHF) exacerbations have led to ~1 million emergency department (ED) visits and 980,000 annual hospitalizations nationwide[1]

Majority of patients require intravenous (IV) diuretic therapy to achieve euvolemia and provide symptom relief[2]

To monitor diuretic response, practice guidelines suggest serial assessment of urine output (UOP), vital signs, and body weight[3]

1. Circ Heart Fail. 2018 Dec;11(12):e004873.
2. Am Heart J. 2018 Sep;203:95-100.
3. Circulation. 2013 Oct 15;128(16):e240-327.

BACKGROUND

At **Boston Medical Center**, ED baseline data observed:

- ~65 CHF exacerbations present to the ED each month
- 93% admittance rate (national average is 82%)
- Inpatient length of stay (LOS) is 8.7 days (national average is 2-6 days)
- Less than 50% of diuretic orders utilize high-dose diuretic strategy
- UOP was monitored in less than 20% of CHF patients

BACKGROUND

DOSE TRIAL[4]

Quicker diuresis and resolution of symptoms when using 2.5x the patient's total home daily diuretic dose

ROSE-AHF TRIAL[5]

Urine sodium levels (≤60 mmol/L) post-diuretic dose are associated with longer hospital LOS

4. Am J Card. 2015;116(3):400-5.
5. Clin Cardiol. 2020;43(1):43-9.

OBJECTIVE

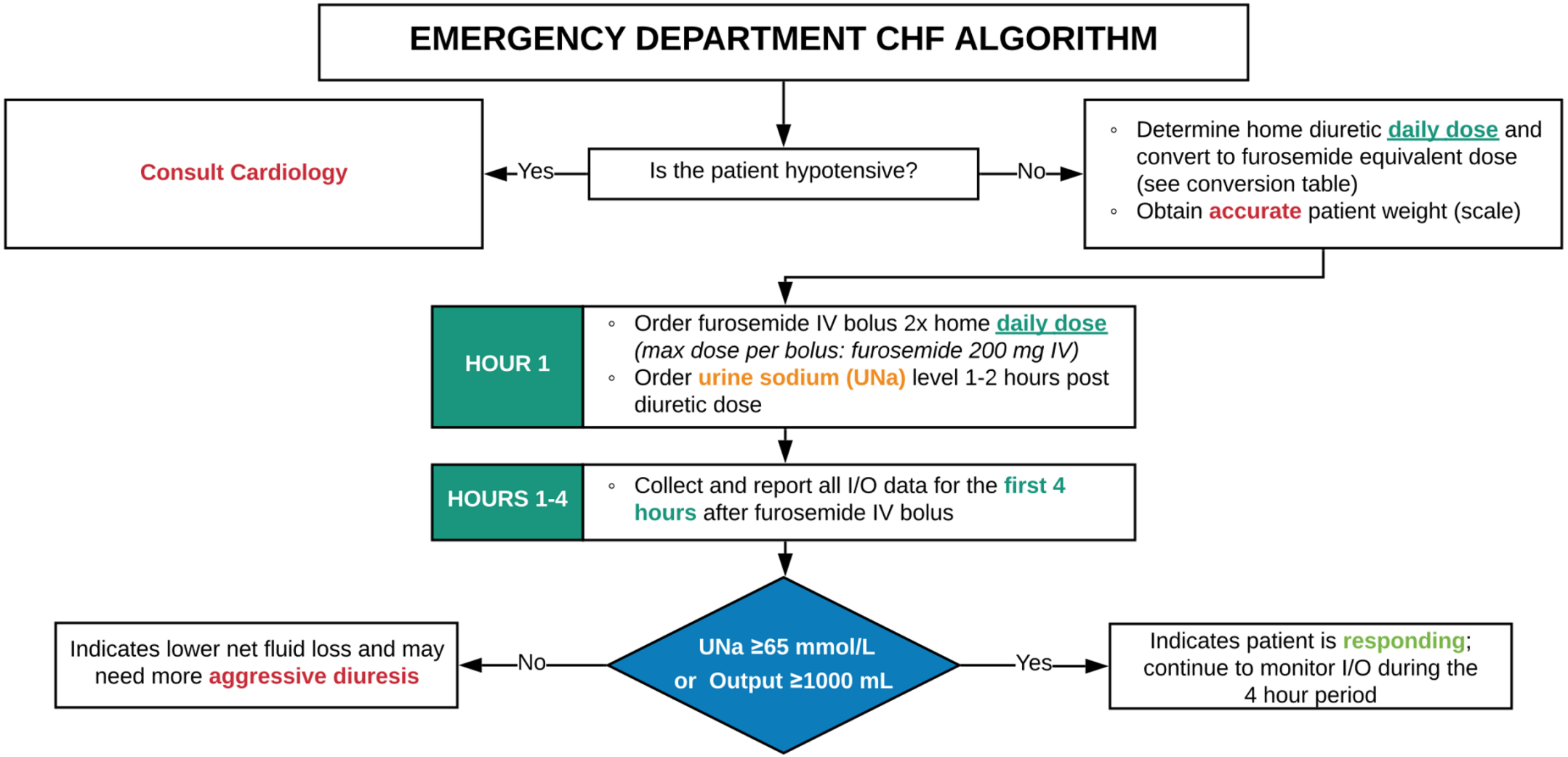
Reduce hospital LOS for CHF exacerbations by at least one day by May 31st, 2021 through the optimization of CHF management in the ED

Baseline (Oct 2019-Dec 2019)
PDSA Cycles (Oct 2020-May 2021)

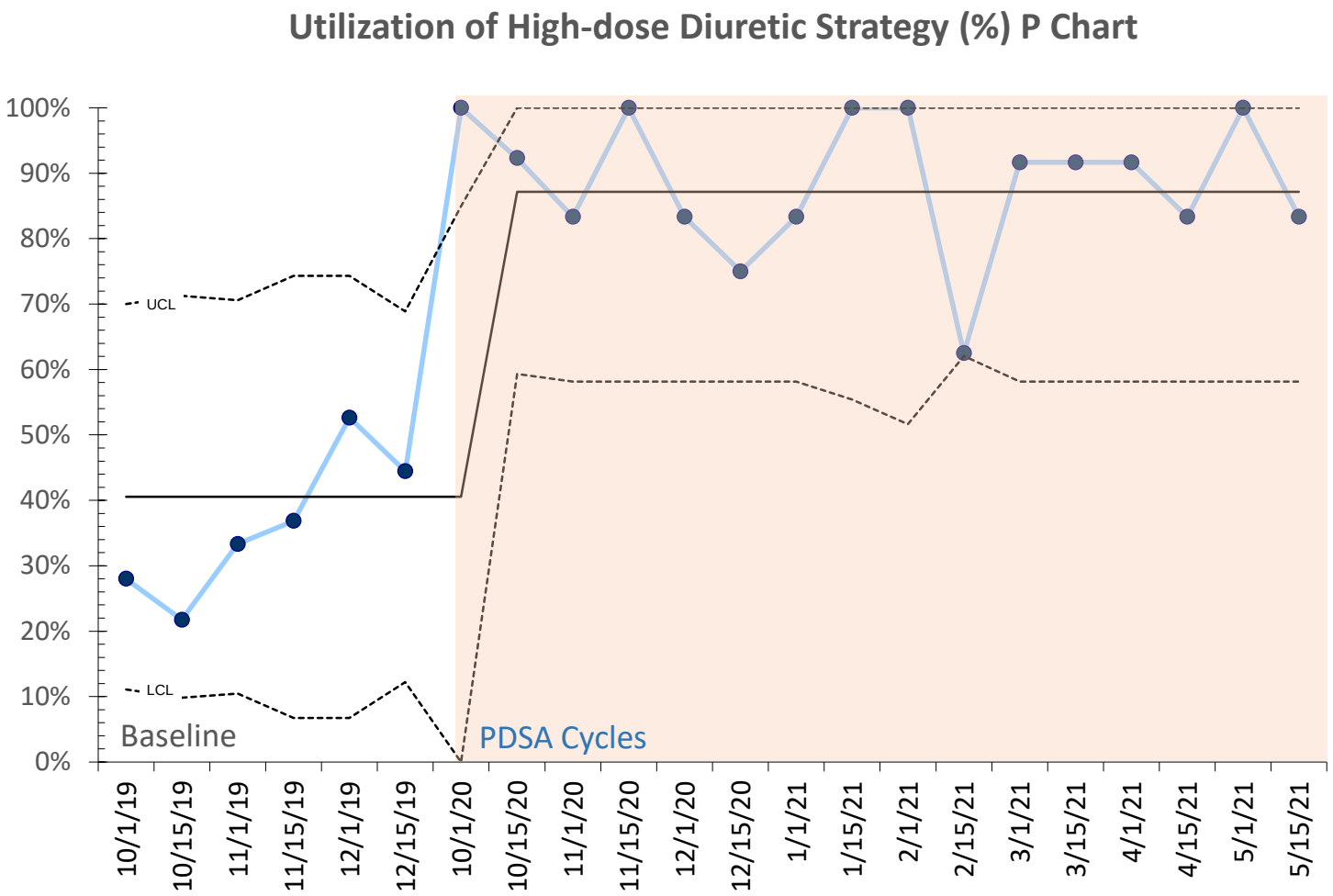
METHODS

- Quality improvement project performed at a 496-bed urban, academic level I trauma center
- A multidisciplinary task force with relevant stakeholders was organized in October 2020 to standardize ED CHF exacerbation management
  - ED CHF Management Algorithm was developed as the key PDSA cycle
- Effective **diuresis** was defined as:
  - **UOP of ≥1,000 mL** within the first 4 hours
  - **UNa level of ≥65 mmol/L** at 1-2 hours post-diuretic
- Appropriate **IV diuretic dosing** was based on the high-dose strategy utilized in the DOSE trial, but modified from 2.5 times to **2 times the total home daily diuretic dose** to reduce the likelihood for acute kidney injury

RESULTS


EMERGENCY DEPARTMENT CHF ALGORITHM
Is the patient hypotensive?
Yes
Consult Cardiology
No
Determine home diuretic daily dose and convert to furosemide equivalent dose (see conversion table)
Obtain accurate patient weight (scale)
HOUR 1
Order furosemide IV bolus 2x home daily dose (max dose per bolus: furosemide 200 mg IV)
Order urine sodium (UNa) level 1-2 hours post diuretic dose
HOURS 1-4
Collect and report all I/O data for the first 4 hours after furosemide IV bolus
UNa ≥65 mmol/L or Output ≥1000 mL
No
Indicates lower net fluid loss and may need more aggressive diuresis
Yes
Indicates patient is responding; continue to monitor I/O during the 4 hour period

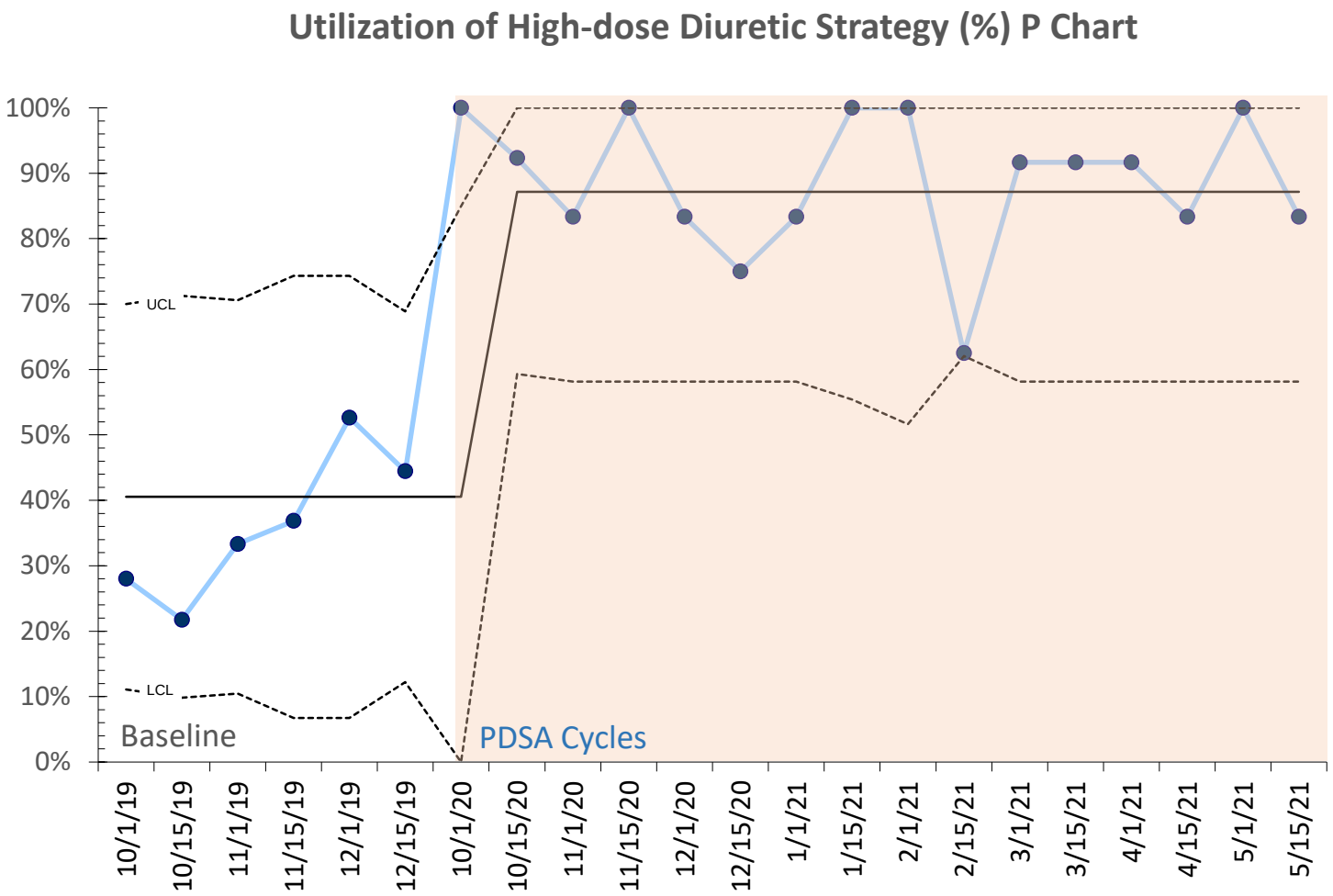
RESULTS



High-Dose Diuretic Strategy

- Dose of IV furosemide is equivalent to 2x total home daily diuretic dose
- Maximum of furosemide 200 mg IV per dose (or diuretic equivalent)

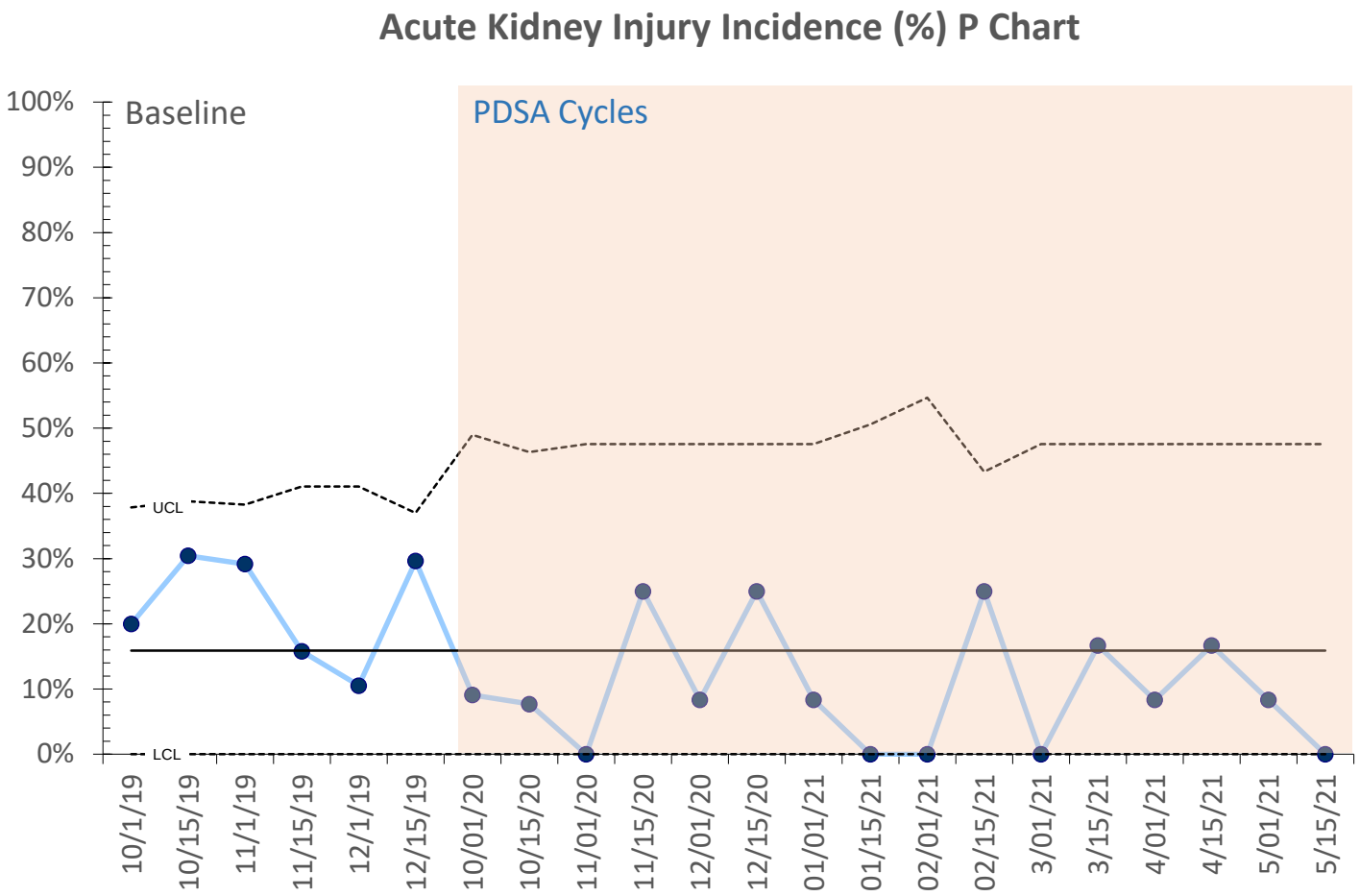
RESULTS



PDSA Cycles

- Removed diuretics from auto-verify
- Pharmacists intervened on diuretic orders
- Pop-up alert for maximum dose changed from furosemide 150 mg IV to 201 mg
- Implementation of ED CHF algorithm

RESULTS



Acute Kidney Injury (AKI)

- Rise is serum creatinine ≥0.3 mg/dL in the first 72 hours post-diuretic administration

RESULTS

- No significant difference in hospital LOS was observed
- Utilization of the high-dose diuretic strategy increased to a mean compliance rate of 92%
- Despite higher diuretic doses, the incidence of AKI did not increase
- Monitoring Parameters:
  - UOP
    - Documentation increased to a mean of 80%
    - Volume was inconsistently charted and/or not serially documented
  - UNa
    - In UNa levels ≥65 mmol/L, the mean UOP within 4 hours was 1,424 mL (n=42)
    - For UNa levels collected *incorrectly* there was no clear correlation with UOP

LIMITATIONS

- Compliance with the algorithm
  - Relies on every member of the healthcare team working to fulfill their unique roles
  - Not P&T approved – algorithm is a recommendation not an institutional policy
  - Transitions between phases of care while patients are moving through the algorithm
- Inconsistency of algorithm parameter collection
  - UOP monitoring and documenting
  - UNa level collection

CONCLUSION

Standardization of CHF exacerbation management led to a more uniformed approach in the ED

The multidisciplinary task force allowed for frequent assessment and reassessment of current practices to ensure the best practices for patients

Boston Medical Center
HEALTH SYSTEM

Optimizing the Treatment of Congestive Heart Failure Exacerbations in the Emergency Department

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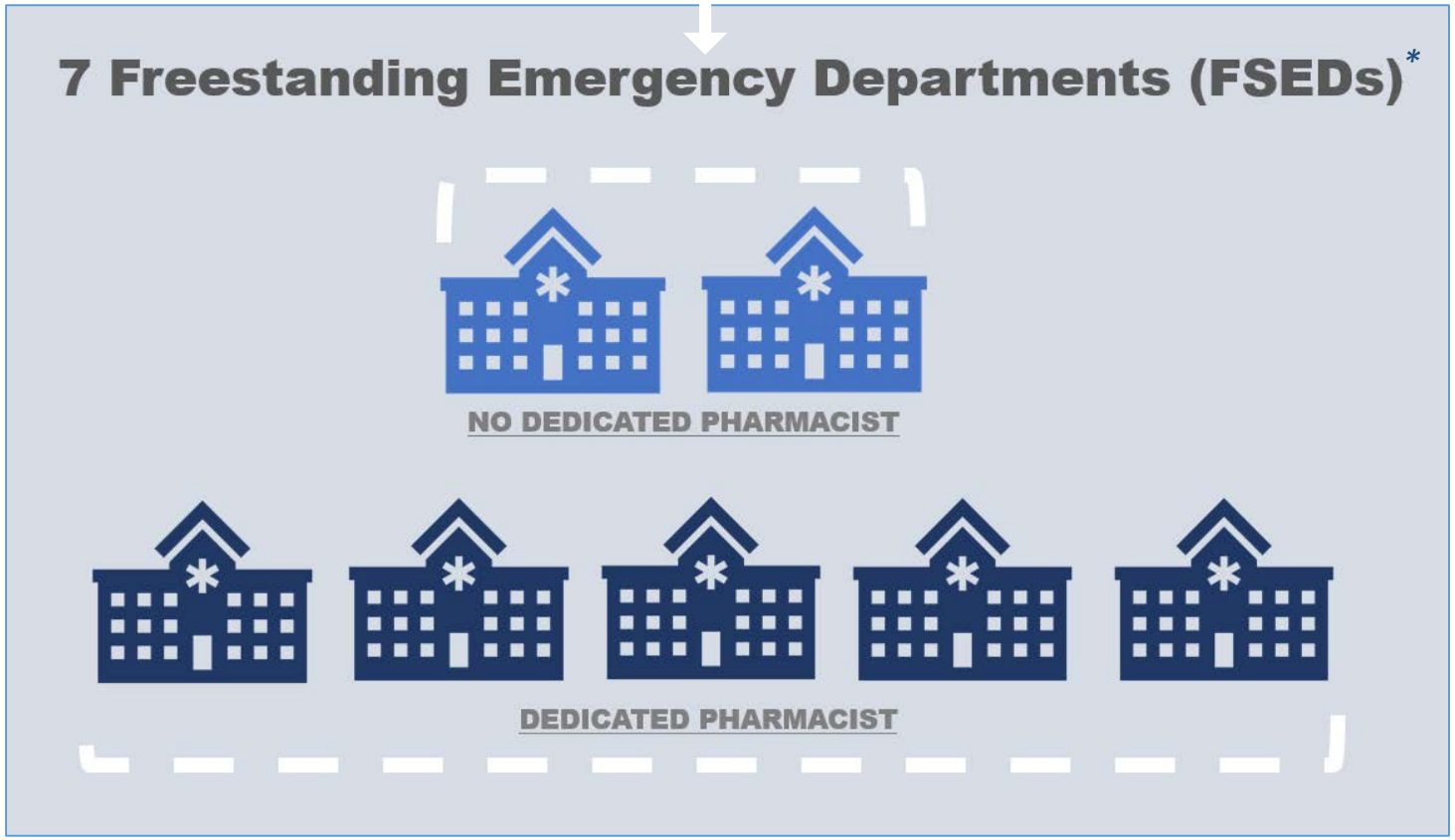
Pharmacist management of positive culture results after discharge

- **Monica E. Coupe, PharmD**
- OhioHealth Grant Medical Center, Columbus, Ohio
- PGY-1/MS Health-System Pharmacy Administration and Leadership Resident

Author of this presentation has nothing to disclose

Location

OhioHealth



** At the time of study*

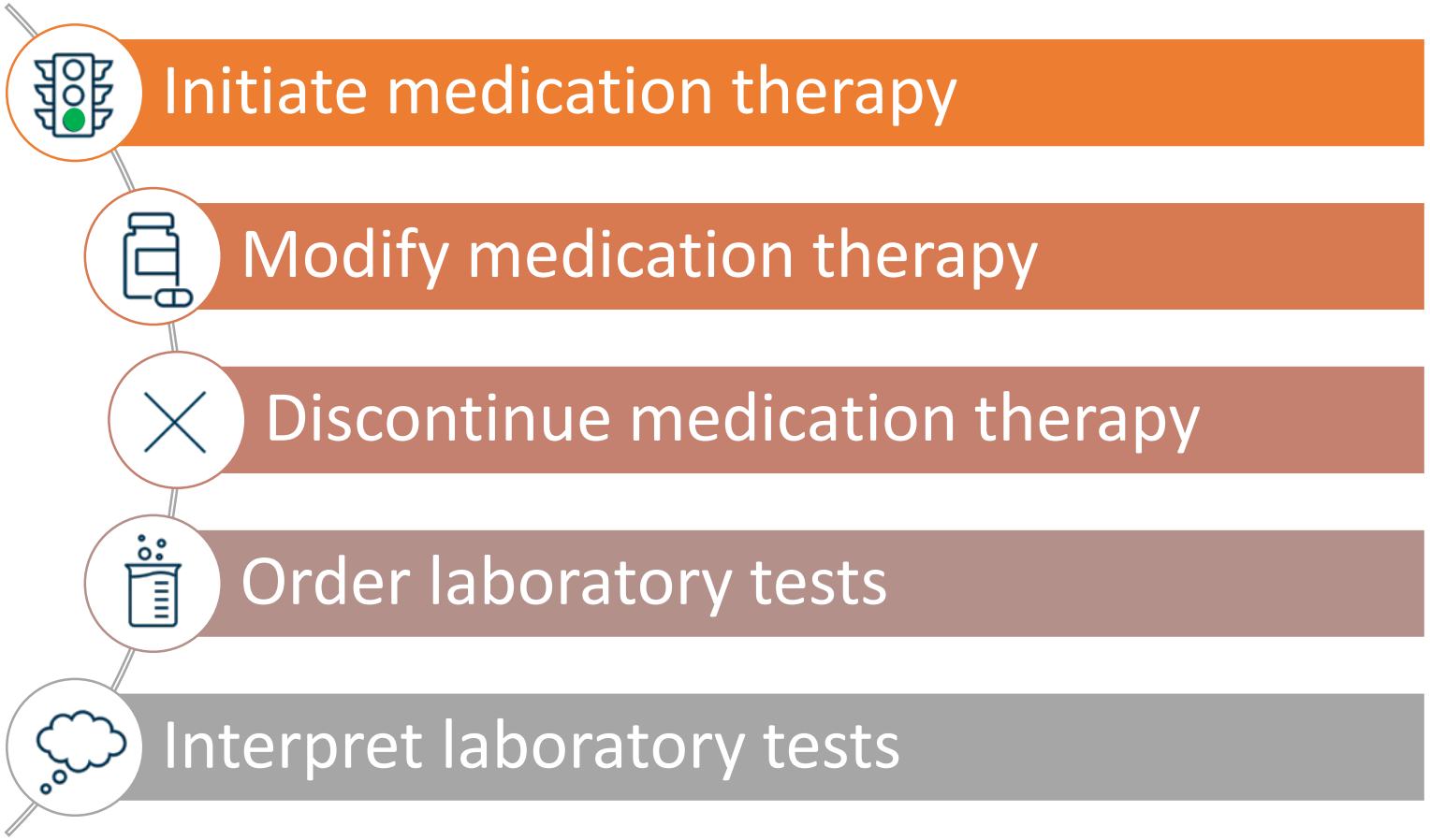
FSEDs

- Patients frequently receive culture results after discharge

Culture Results

Consult agreements allow pharmacists to directly interpret cultures, sensitivities, and patient information to **independently** manage and prescribe antibiotic therapy

Pharmacist's Scope

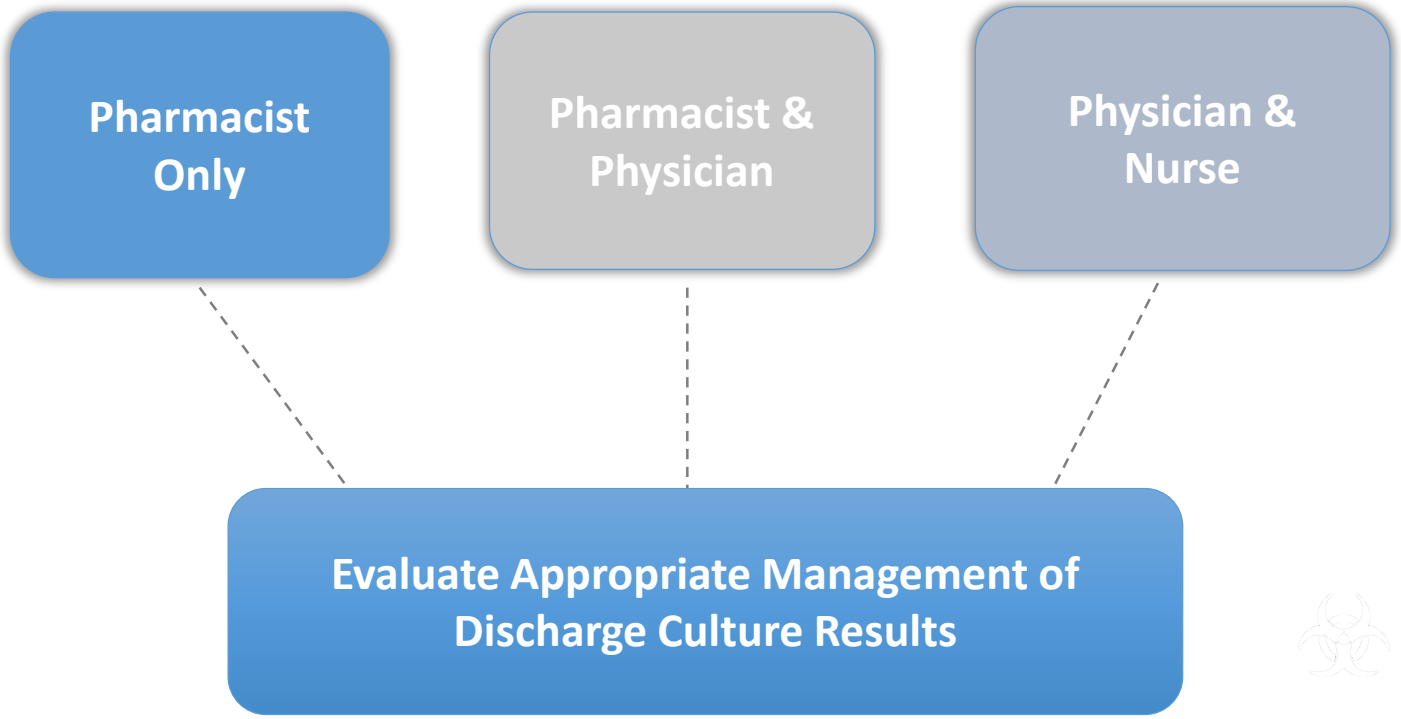


OhioHealth

Centers for Disease Control and Prevention. Advancing Team-Based Care. 2017.

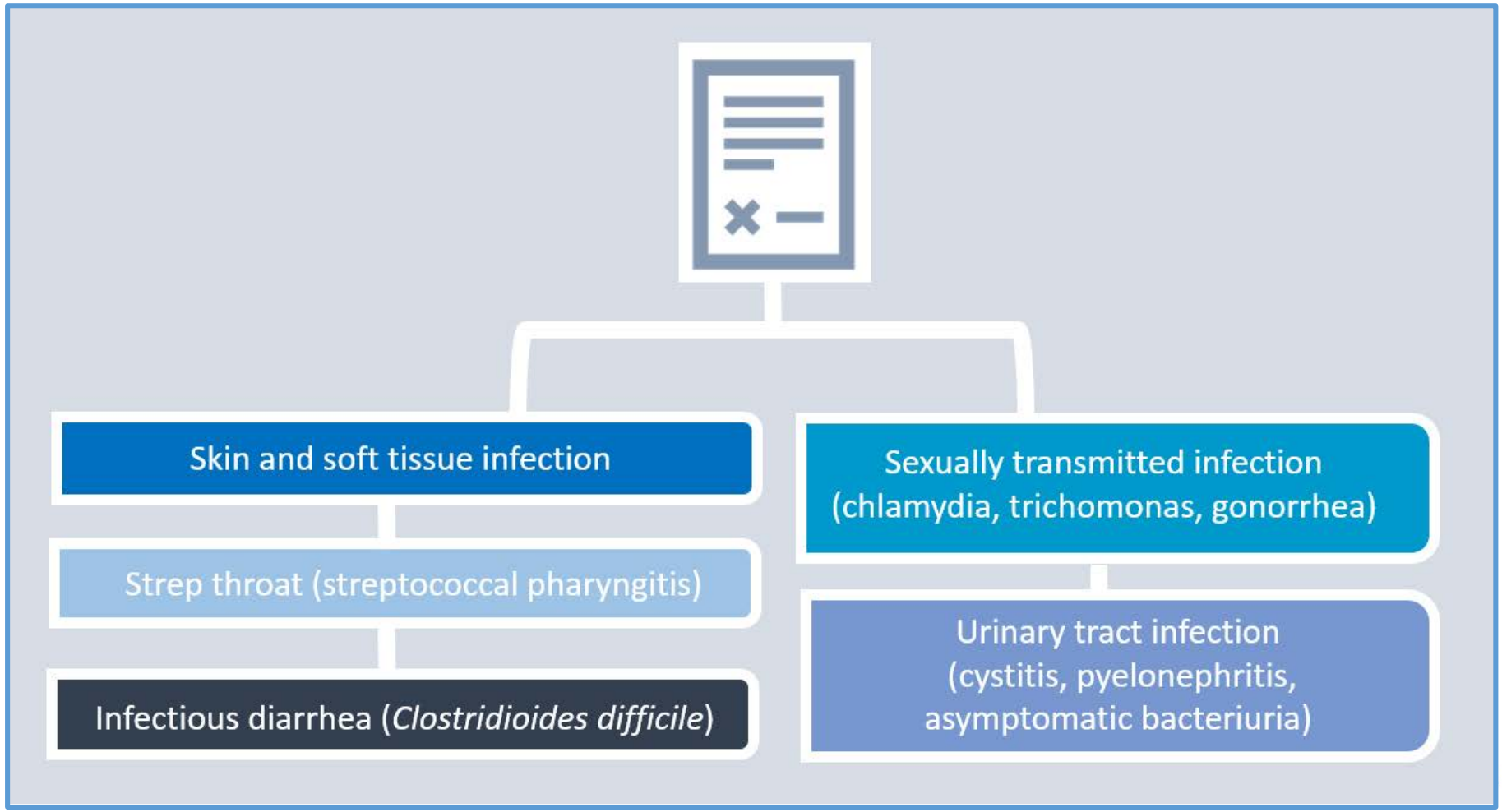
FSED Pharmacist Intervention

Primary Aim

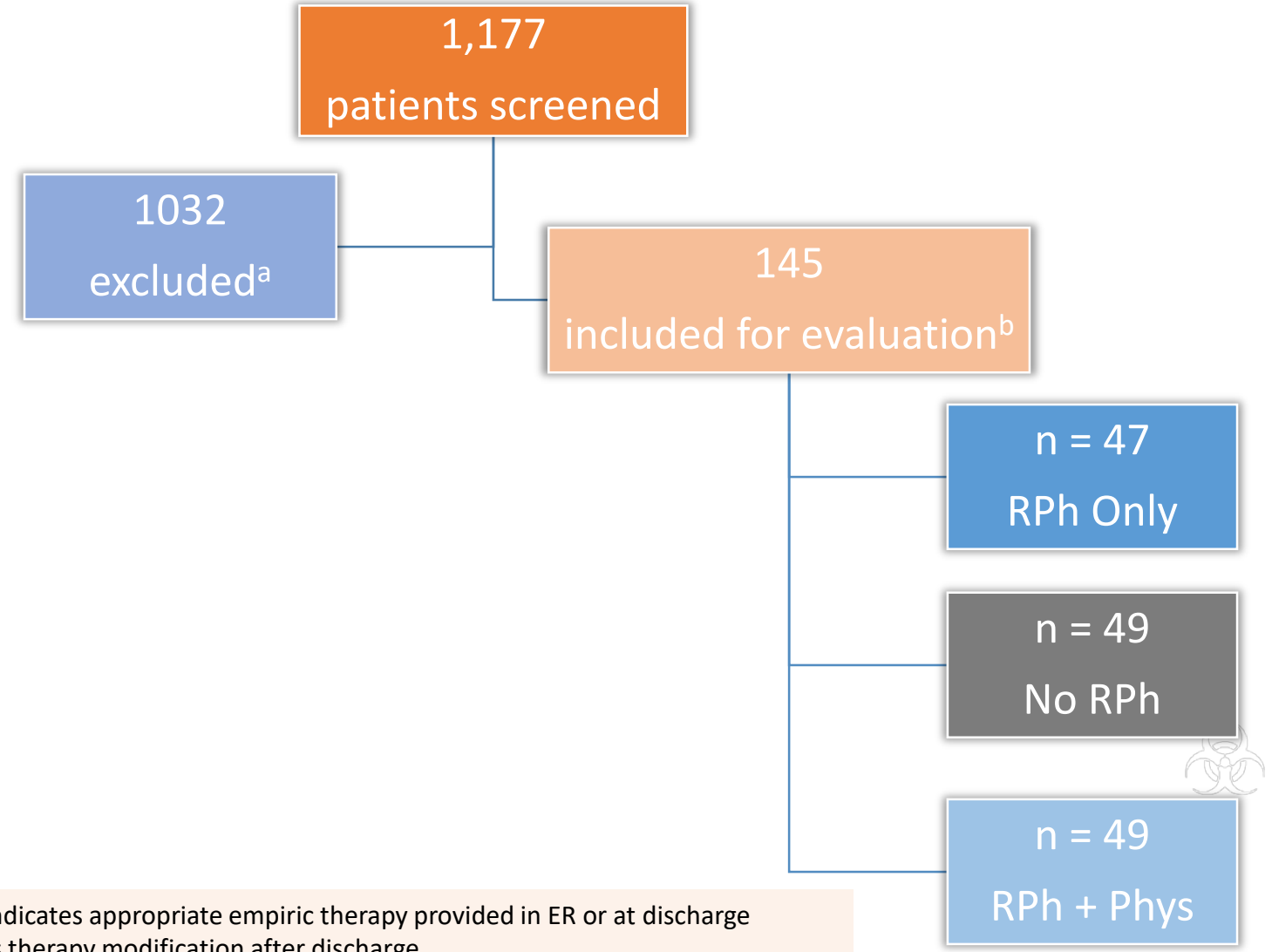


OhioHealth

Inclusion


Skin and soft tissue infection
Strep throat (streptococcal pharyngitis)
Infectious diarrhea (*Clostridioides difficile*)
Sexually transmitted infection (chlamydia, trichomonas, gonorrhea)
Urinary tract infection (cystitis, pyelonephritis, asymptomatic bacteriuria)

Inclusion



a. Culture result indicates appropriate empiric therapy provided in ER or at discharge
b. Patient requires therapy modification after discharge

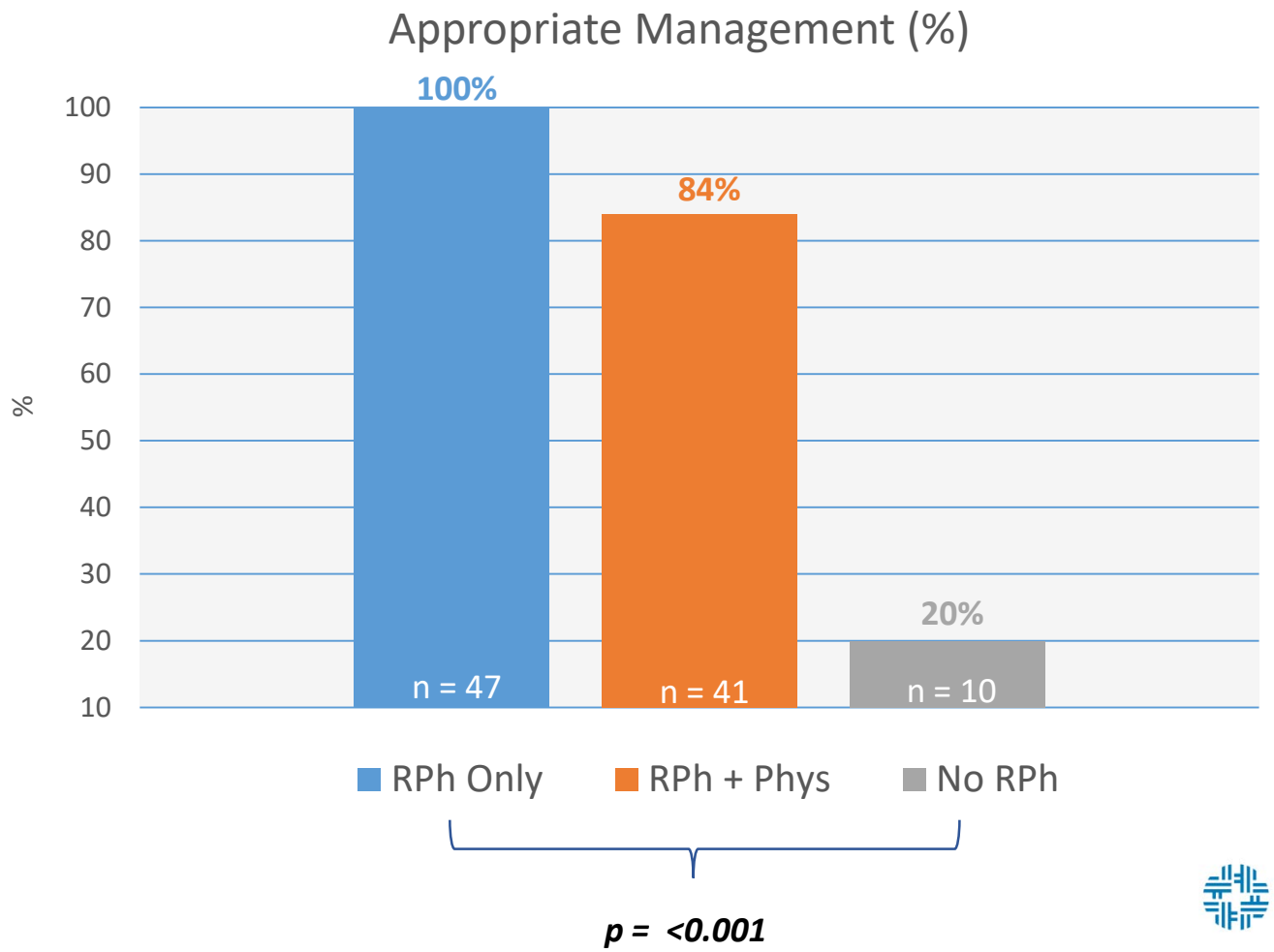
Analysis

Compare: percentages of appropriately managed culture results after discharge from FSEDs

Analyze: potential cost-benefit of pharmacists' ability to bill for their clinical services

Assess: appropriate disease state management between the three standards of care

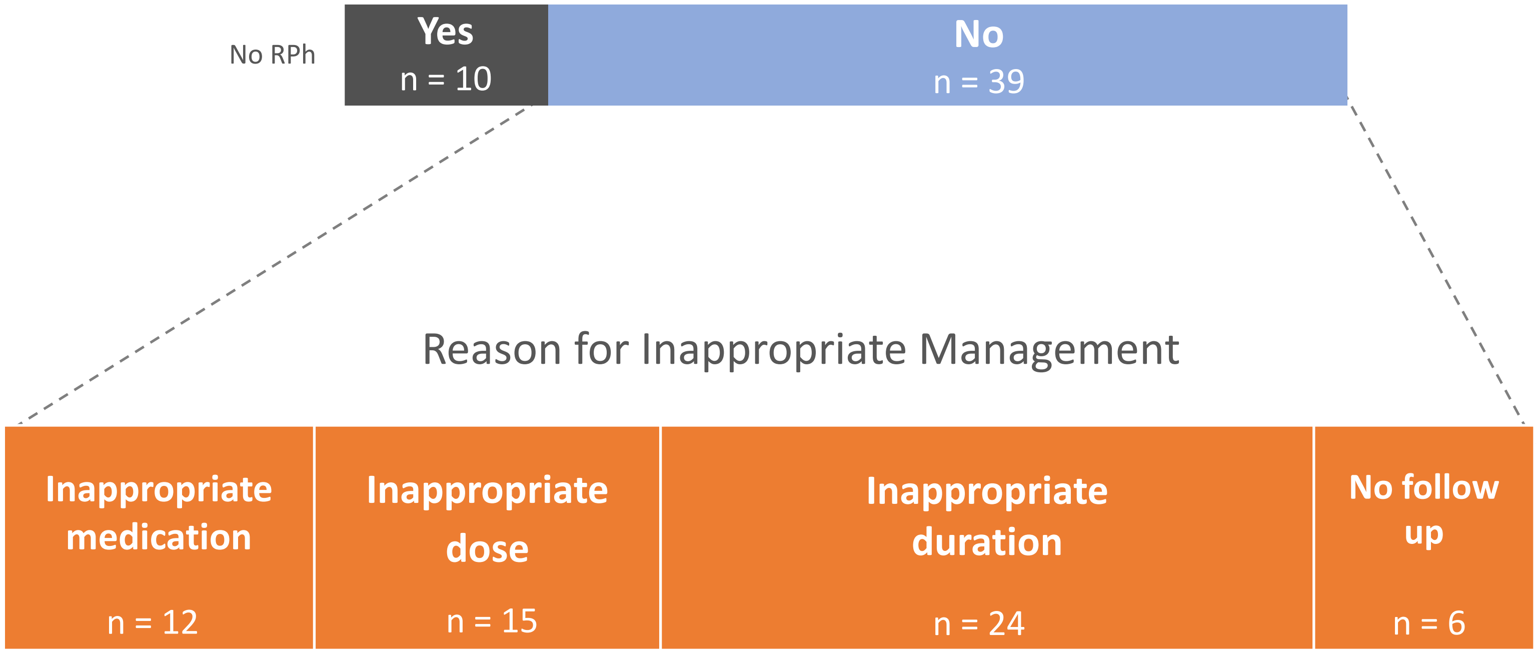
Primary Outcome



OhioHealth

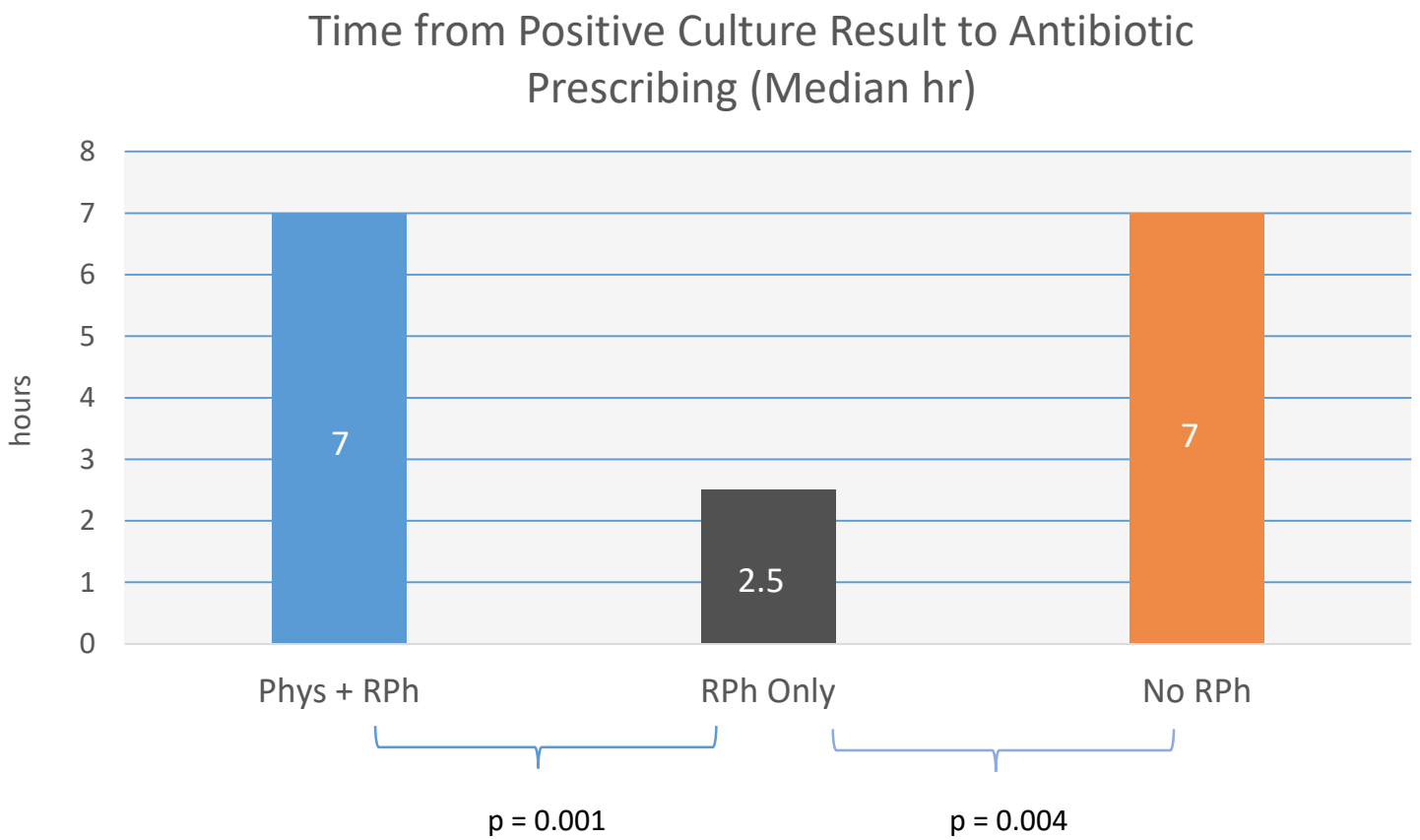
Primary Outcome

Background
Intervention
Aims
Methods
Data Analysis
Results
Limitations
Future Direction
Conclusion



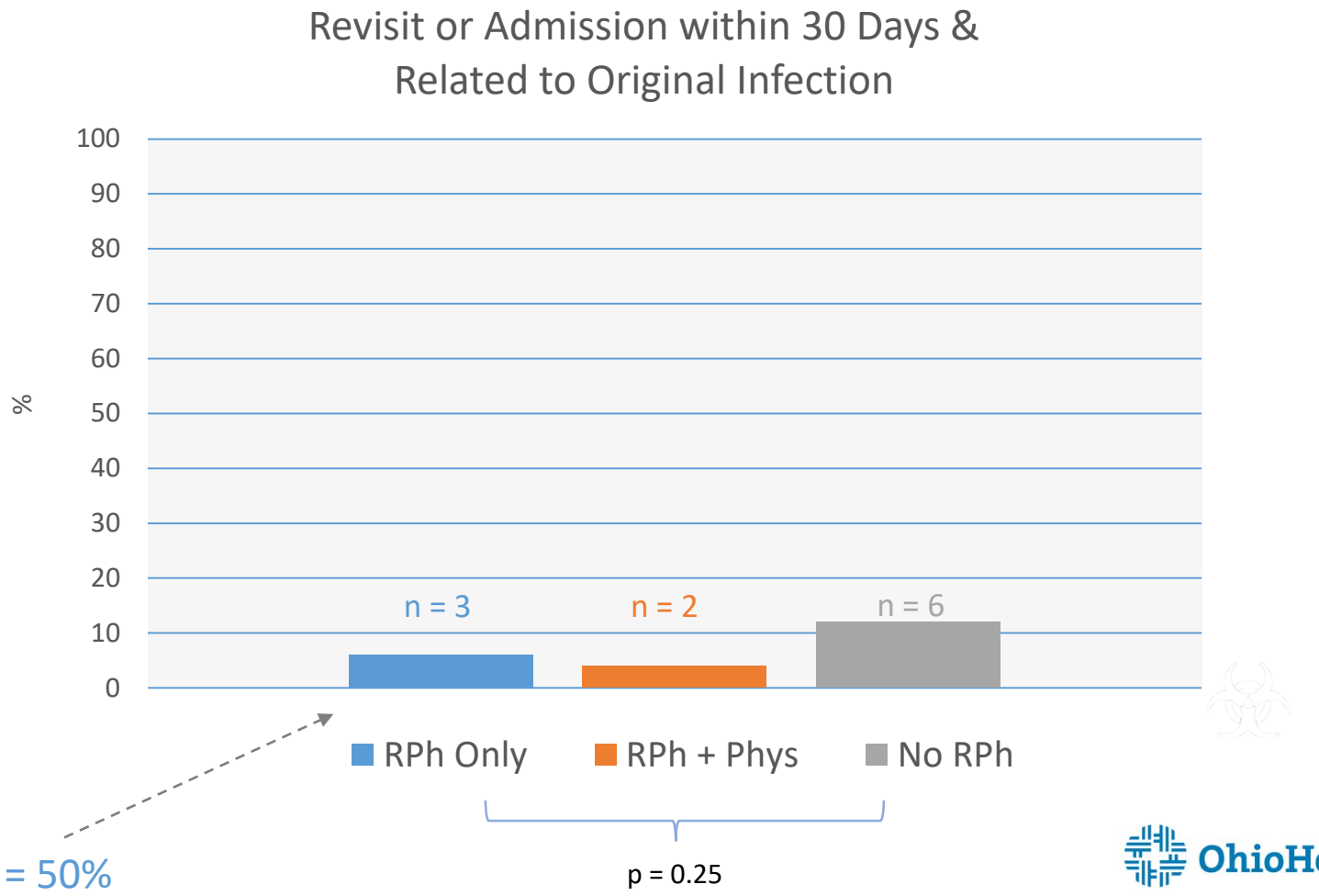
OhioHealth

Secondary Outcome



OhioHealth

Secondary Outcome



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Cost-Benefit Analysis

Annualized Costs of Study Intervention	Current State	Level 1 Billing *Recommendation*	Level 1 & 3 Billing *Future Recommendation*
Intervention Cost - *Pharmacist Time ($57/hr)*	**$11,741**	**$11,741**	**$11,741**
Intervention Benefit - *Reimbursement of Service*	**$0**	**$36,901**	**$51,449**
Net Monetary Benefit	**($11,741)**	**$25,160**	**$39,708**
Benefit-Cost Ratio	**0**	**3.14**	**4.38**

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Limitations

- Lean pharmacist team
- Small study population
- Unparalleled study groups

Conclusion

- Independent pharmacist management leads to:
  - Significantly improved culture management
  - Faster follow-up
  - 50% reduction in revisits or admissions*

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** Related to original infection*

Questions?

Characterization of alteplase use in cardiac arrest within a community hospital network

Primary investigator: Krista Dumkow, PharmD, BCPS
Krista.Dumkow@adventhealth.com
Co-investigators: James Priano, PharmD, BCPS; Emily To, PharmD, BCCCP
AdventHealth Orlando

Background

- Incidence of cardiac arrest due to massive pulmonary embolism (PE): 5-13%
- Alteplase - intravenous thrombolytic agent to rapidly activate fibrinolysis and resolve clots
  - Restore pulmonary perfusion and improve hemodynamics
- Current recommendations
  - Cardiac arrest associated with PE: 50 mg bolus over 2 minutes and continue CPR for 15 minutes (off-label)
  - Hemodynamically unstable with a high risk, massive PE: 100 mg over 2-hours

Sharifi M, et al. *Am J Emerg Med.* 2016;34(10):1963-1967
Activase (alteplase) [prescribing information] San Francisco, CA: Genentech; February 2018.

Methods

- Retrospective chart review September 10, 2014 – August 28, 2020
- Assessed appropriateness of alteplase initiation for adult patients in cardiac arrest
  - Dosing
  - ROSC
  - Mortality

•Inclusion criteria

- Patients greater than 18 years of age who received alteplase during cardiac arrest

Exclusion criteria

- Patients who received alteplase for indications other than suspected or confirmed PE or STEMI

Conclusion

Patient Demographics n = 74

Age, y, median (IQR)	55 (42-70)
Weight, kg, median (IQR)	90.7 (79.4-113.4)
Male gender, n (%)	40 (54)
History of: Stroke, n (%) Hypertension, n (%) Anticoagulation, n (%) DVT/PE, n (%)	 1 (1.4) 37 (50) 15 (20.3) 17 (22.9)

Presentation Demographics

Arrest location, n (%) Out of hospital ED Inpatient	 34 (46) 15 (20) 25 (34)
Initial arrest rhythm, n (%) PEA Asystole VF VT	 50 (68) 11 (15) 12 (16) 1 (1)
Indication for alteplase, n (%) Suspected PE Confirmed PE STEMI	 49 (66) 21 (28) 4 (6)

Results – tPA dosing

Alteplase dosing	n (%)
15 mg single dose	1 (1.4)
50 mg single dose	39 (52.7)
50 mg two doses	12 (16.2)
50 mg three doses	1 (1.4)
60 mg single dose	1 (1.4)
100 mg single dose	19 (25.7)
100 mg plus 50 mg doses	1 (1.4)

Differences by dose, 50 mg vs. 100 mg		
Weight	99.6 kg vs. 111 kg	p = 0.215
Pre-tPA CPR duration	26.3 min vs. 19.4 min	p = 0.065
Confirmed PE	73.5% vs 26.5%	p = 0.164

Results – ROSC, mortality, and ADRs

Variable effect on achieving ROSC		
Arrest Location		p = 0.235
50 mg vs 100 mg tPA dose	42.3% vs. 52.6%	p = 0.591
Suspected vs. Confirmed PE	30.8% vs. 81.8%	p < 0.001

Mortality and ADRs	n (%)
Overall mortality	70 (94.6)
Overall achieved ROSC	34 (45.9)
Mortality of those achieving ROSC	30 (88.2)
Bleeding events Major Minor	 7 (9.5) 4 (5.4)

Conclusion

- Patients with a confirmed pulmonary embolism were 2.6 times more likely to achieve ROSC post-tPA administration during cardiac arrest

Patient weight or dose of tPA administered did not appear to impact ROSC

Dosing strategies not consistent across hospital network

Characterization of alteplase use in cardiac arrest within a community hospital network

Primary investigator: Krista Dumkow, PharmD, BCPS
Krista.Dumkow@adventhealth.com
Co-investigators: James Priano, PharmD, BCPS; Emily To, PharmD, BCCCP
AdventHealth Orlando

Rocuronium Dosing in Rapid Sequence Intubation in Obese Patients

ASHP Emergency Medicine SAG Resident Research Webinar 2021

Presenter: Amanda Lewandowski, PharmD | PGY-1 Pharmacy Resident
Co-Authors: Alaa Sulh, PharmD; Michael Cirone, MD; Mary Hormese, PharmD, BCPS; Marc McDowell, PharmD, BCPS

Site: Advocate Christ Medical Center

AdvocateAuroraHealth

Background

Approximately 1/3 of adults in the United States are obese

Incidence of difficult intubations

- Normal patients 6%
- Obese patients 10 – 15%

Predictors of difficult airways

- Obstructive sleep apnea
- Advanced age
- Male
- Short neck
- Facial trauma
- Facial anomaly
- Beards/facial hair

Patanwala A, et al. *Emerg Med J* 2017;0:1-5.
Shiga T, et al. *Anesthesiology*. 2005;103:429–37
Juvin P, et al. Anesth Analg. 2003;97:595–600
Brodsky JB, et al. Can J Anaesth. 2000 Aug; 47(8):730-9

Rocuronium

- Pharmacokinetics
  - Distribution
    - Vd: 0.22 – 0.26 L/kg
  - Protein binding
    - 30%
  - Low lipophilicity
    - Binds tightly to antagonize receptors

Ankam JA et al. *BJA Education.* 2004 Feb; 4(1):2-7
Meyoff CS, et al. *Anesth Analg.* 2009;109:787-92

Dosing Strategies of Rocuronium

- Package Insert Dosing: 0.6 – 1.2mg/kg

- Currently, dosing remains dependent on practitioner preference

- Dosing can be based on
  - Total body weight (TBW)
  - Ideal body weight (IBW)
  - Lean body weight (LBW)
  - Adjusted body weight (aBW)

Evaluation of Rocuronium Dosing in Rapid Sequence Intubation Based on Ideal Body Weight vs. Non-Ideal Body Weight in Obese Patients: A Prospective, Observational Study

Advocate Christ Medical Center

788
Licensed beds

44,279
Discharges in FY18

> 120,000
ED visits in FY20

SERVICES INCLUDE:

- 24 hour ED Pharmacist coverage (as of Dec. 2020)
- Level I Trauma Center
- Tertiary community teaching institution
- Comprehensive Stroke Center
- Level III Neonatal Intensive Care Unit
- 8 Intensive Care Units
- 83 Medical Specialties

Study Objective

To evaluate the use of ideal body weight versus total body weight dosing of rocuronium in obese patients for rapid sequence intubation in the emergency department

Study Design

Approved by Advocate Aurora Institutional Review Board (IRB)

Study Design

- Single-center, prospective observational, non-inferiority

Study Recruitment

- December 2018 – May 2021

Inclusion/ Exclusion Criteria

Inclusion Criteria:

- Intubated in the Emergency Department at Advocate Christ Medical Center
- Use of rocuronium
- Obese: TBW > 30% of IBW
  or BMI >30

Exclusion Criteria:

- Age <18 years
- Known neuromuscular disease
- Allergy or sensitivity to study drug
- Concomitant use of medications known to interfere with neuromuscular transmission

Outcomes

Primary Endpoint

- Optimal intubation conditions

Secondary Endpoint

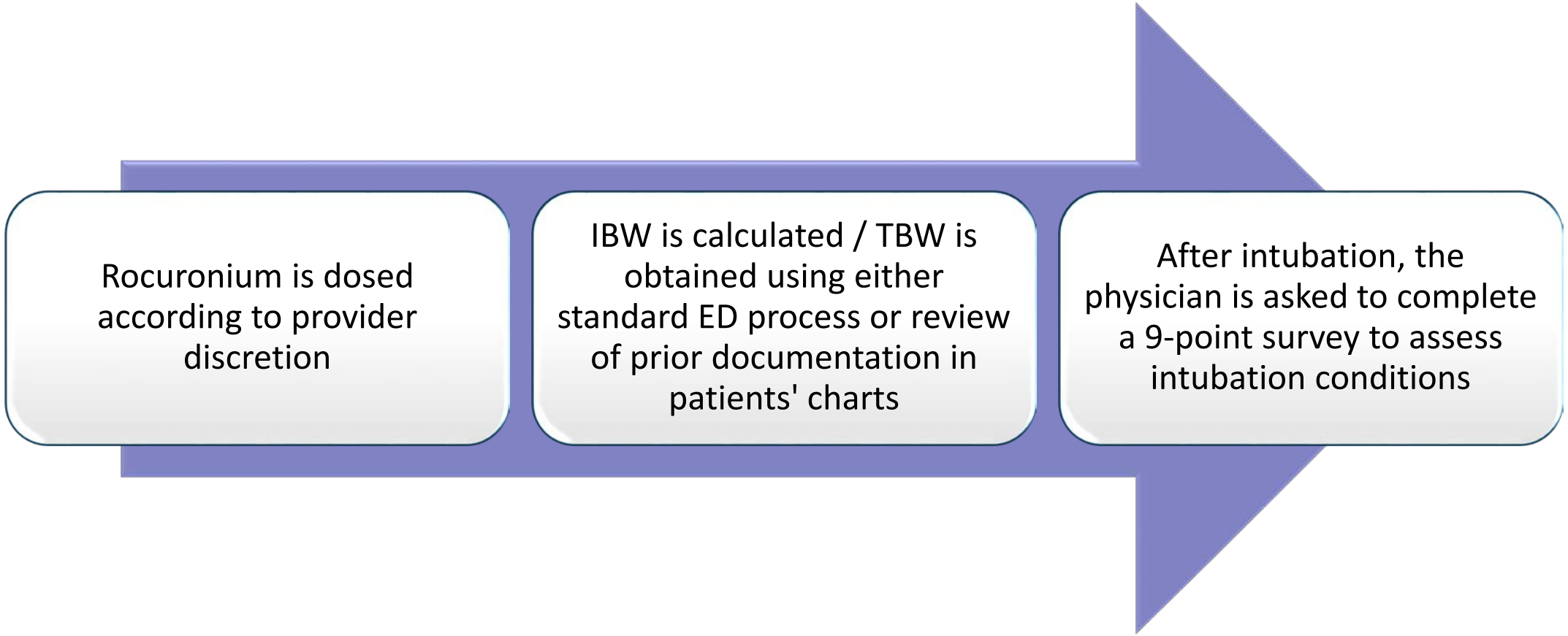
Efficacy:

- Duration of paralysis

Safety:

- Incidence of post-intubation hypertension
- Incidence of post-intubation tachycardia

Intervention



Methods: Statistical Analysis

Primary Outcome

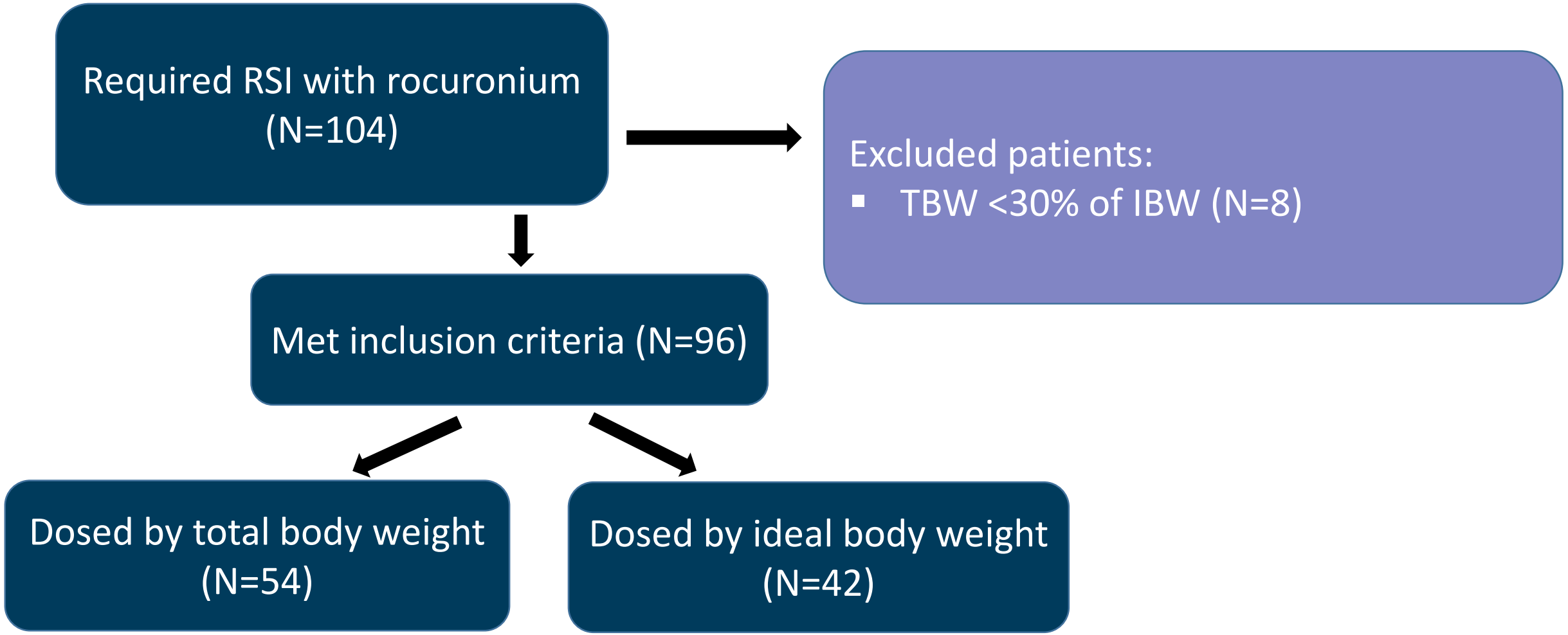
- Non-inferiority analysis resulted in an estimated subject sample size of 90
- Based on 97% in each group of “excellent conditions” with an 80% power
- Non-inferiority margin set at 12% difference
- Farrington-Manning method used for non-inferiority analysis

Descriptive Statistics

- Calculated for all variables, presented overall and by group using mean $\pm$ SD for continuous variables and count/percentages for categorical variables
- Chi-Square or Fisher’s: comparison between groups for categorical data
- Student’s t-tests: comparison between groups for continuous data

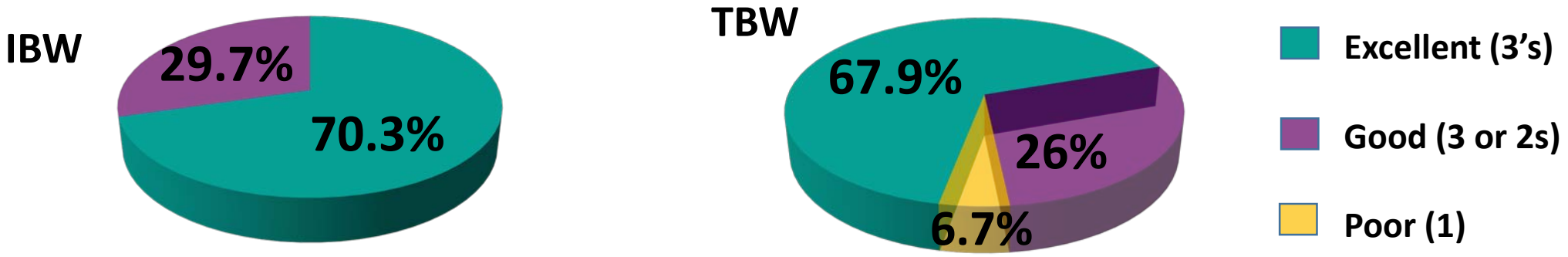
All tests two-tailed and p-values of 0.05 statistically significant

Patient Enrollment



Primary Outcome

Optimal Intubation Conditions



Non – Inferiority Analysis

Relative Risk	Limit [90% CI]	p-Value
1.05	0.88 [0.75-1.40]	0.19

First Pass Success

TBW N [%]	IBW N [%]	p-Value
49 [92.5%]	31 [83.8%]	0.2

Secondary Outcome

Duration of paralysis: Time to muscle recovery (min) [IQR]

TBW [N = 49]	IBW [N = 33]	P-Value
71 [57-96]	**43** [40 – 60]	**<0.01**

Incidence of Post-Intubation Hypertension

TBW	IBW	P-Value
43.4%	27.0%	0.11

Incidence of Post-Intubation Tachycardia

TBW	IBW	P-Value
35.9%	37.8%	0.85

Results

Results	TBW N = 53 [%]	IBW N = 37 [%]	P-Value
Intubating physician • PGY1 • PGY2 • PGY3 • Attending	 12 [22.6%] 13 [24.5%] 22 [41.5%] 6 [11.3%]	 7 [18.9%] 8 [21.6%] 17 [46.0%] 5 [13.5%]	0.94

Results	TBW N = 53	IBW N = 37	P-Value
Average rocuronium dose (mg)	100 [90-100]	70 [60-84.5]	**<0.01**
Complications	4 [7.6%]	3 [8.1%]	1.00
Sedation Difficulty	7 [13.2%]	2 [5.7%]	0.26

Study Analysis

Strengths:

- Prospective
- Appropriately powered statistical significance

Limitations:

- Observational, single-centered study design
- Differences in intubating physicians' level of training
- Total body weight may have been based on estimated weight
- Retrospective chart review for missing data
- Dosing classification of IBW/TBW interpreted based on dose
- Duration of paralysis based on subjective nature of observation

- Ideal body weight dosing of rocuronium is non-inferior to total body weight dosing in obese patients that require rapid sequence intubation in the emergency department
- This study suggests that there is no difference in optimal intubation conditions between the two dosing strategies
- Follow up superiority studies are required with a larger patient population to determine if there is a difference in optimal intubation conditions between IBW and TBW dosing

Rocuronium Dosing in Rapid Sequence Intubation in Obese Patients

ASHP Emergency Medicine SAG Resident Research Webinar 2021

Presenter: Amanda Lewandowski, PharmD | PGY-1 Pharmacy Resident
Co-Authors: Alaa Sulh, PharmD; Michael Cirone, MD; Mary Hormese, PharmD, BCPS; Marc McDowell, PharmD, BCPS

Contact Information: amanda.Lewandowski@aah.org

AdvocateAuroraHealth

Evaluation of Emergency Medicine Pharmacist-facilitated Sexually Transmitted Infection Microbiologic Test Follow-up in Patients Discharged from the Emergency Department

- Maribel Llamas Rangel, PharmD
- Maribel.llamas7@gmail.com
- PGY1 Pharmacy Resident
- The MetroHealth System
- Cleveland, Ohio

*Neither I or the contributing investigators have financial or nonfinancial relationships to disclose.

Sexually Transmitted Infections (STIs) Background

- •STIs such as *Chlamydia trachomatis*, *Neisseria gonorrhea* and/or *Trichomonas vaginalis* affects 1 in 5 individuals costing the healthcare system nearly $16 billion in direct medical costs
- •Ohio was ranked 20th for most reported cases for chlamydia and 13th for most reported gonorrhea cases.
- •Due to the increase rates, STIs are being seen frequently in emergency departments (ED) and management in the ED may be challenging due to diagnostic tests can take several days to result
- Previous literature has demonstrated the importance EMP post discharge test monitoring and surveillance by significantly reducing time to follow up

MetroHealth

Centers for Disease Control and Prevention. Sexually transmitted disease surveillance 2018. Atlanta: US Department of Health and Human Services; 2015 [cited 2021 Mar 7]. At A Glance (cdc.gov)

Study Purpose

To assess the impact on time to patient notification, documented treatment, and/or STI-related visits following EMP implementation on culture follow-up

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Study Design

Quality Improvement, randomized retrospective chart review

- Physician group: June 1st, 2019 to September 31st, 2019
- Pharmacist group: June 1st, 2020 to September 31st, 2020

Inclusion

- Patients ≥ 16 years old
- Patients discharged from MetroHealth Medical center emergency departments
- Patients with positive tests for *Chlamydia trachomatis*, *Neisseria gonorrhea* and/or *Trichomonas vaginalis*

Exclusion

- Admitted to the hospital
- Patients who had a positive *Chlamydia trachomatis*, *Neisseria gonorrhea* and/or *Trichomonas vaginalis* test result within 3 months
- If follow up occurred by a physician in the pharmacist group
- If follow up occurred by a pharmacist in the physician group

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Objectives

Primary Objective

- Identify if follow-up of a positive test was completed when comparing EMP-facilitated STI review to pre-implementation phase

Secondary Objective

- Evaluate impact of EMP- facilitated STI review process on time from positive test result to first patient outreach, time to documented treatment, documented oral treatment, and repeat visits within 30-days

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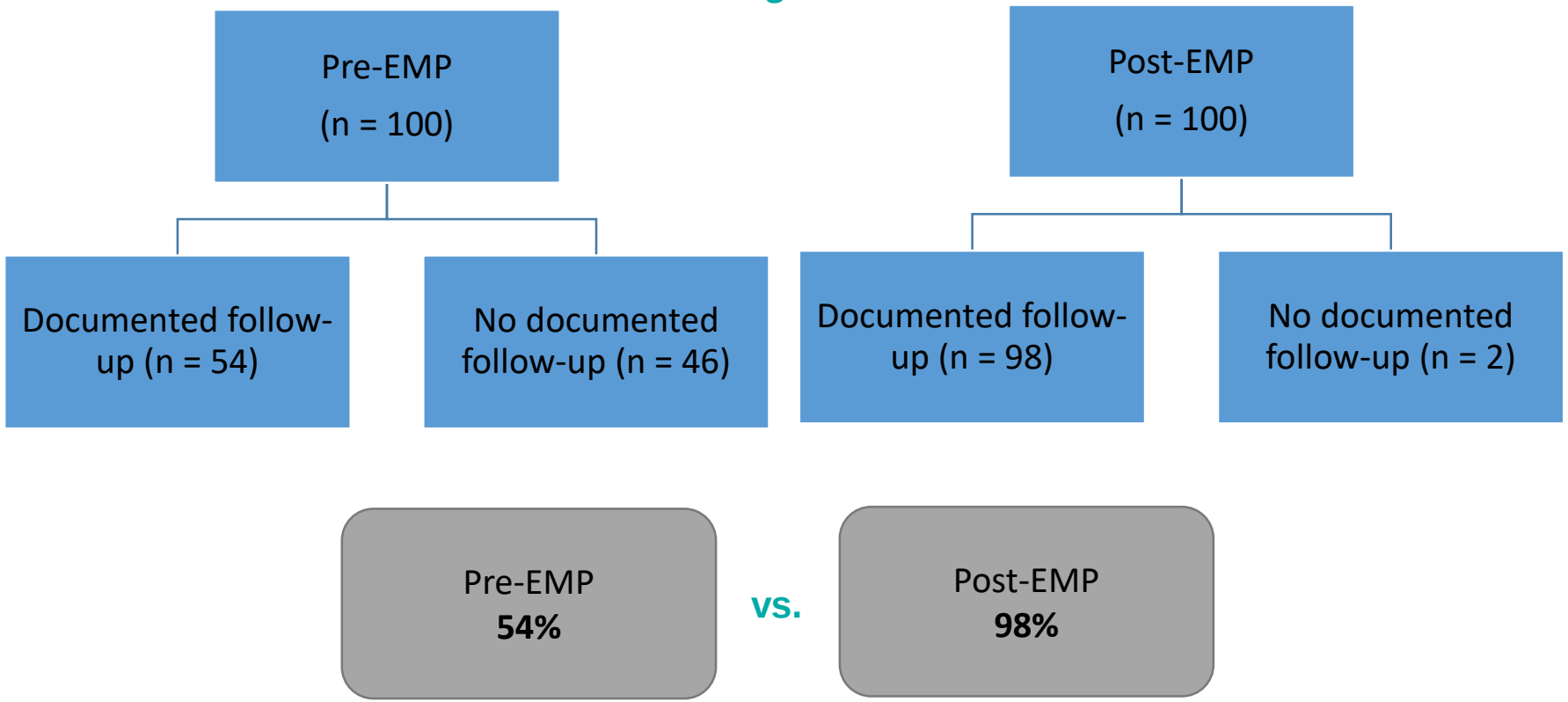
STUDY RESULTS

Primary Objective - Results

Percentage of patients who received documented verbal follow-up for untreated *Chlamydia trachomatis*, *Neisseria gonorrhea* and/or *Trichomonas vaginalis*



P value < 0.001

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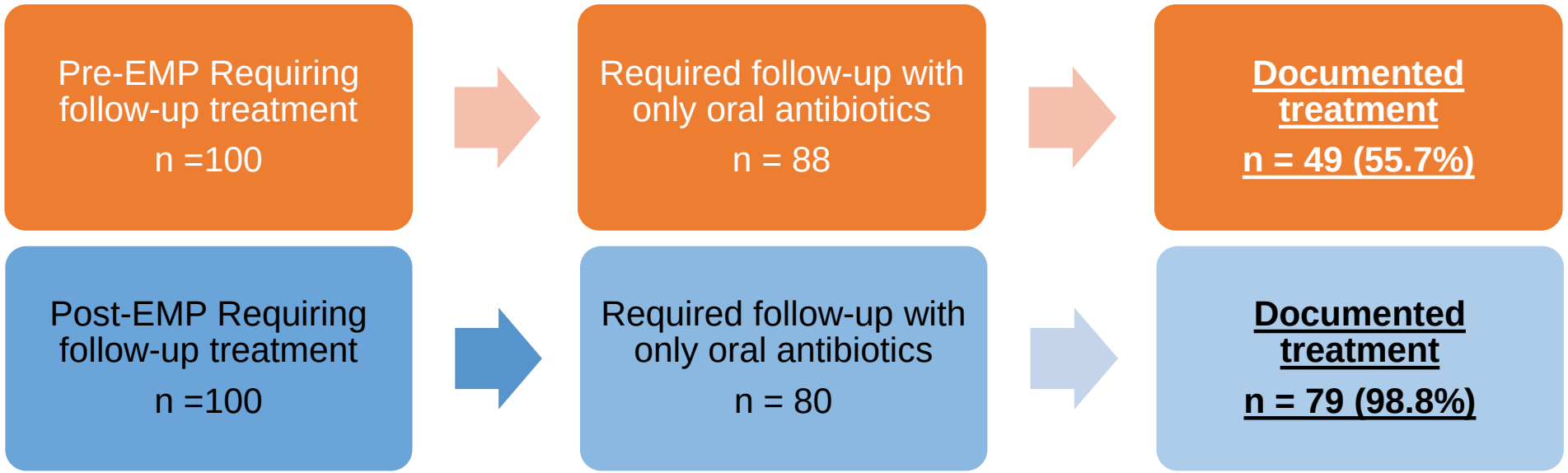
Documented Oral Treatment



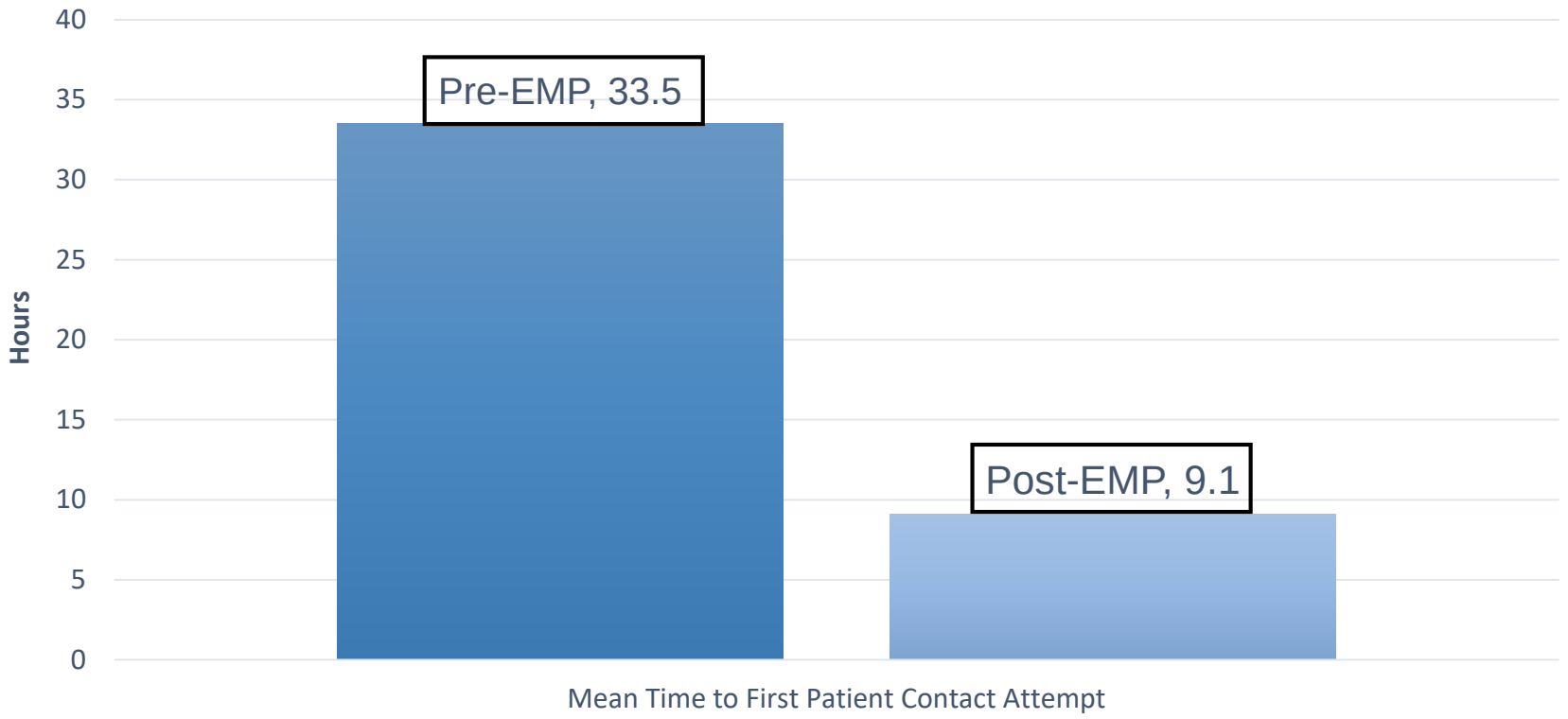
Pre-EMP
55.7%

vs.

Post-EMP
98.8%

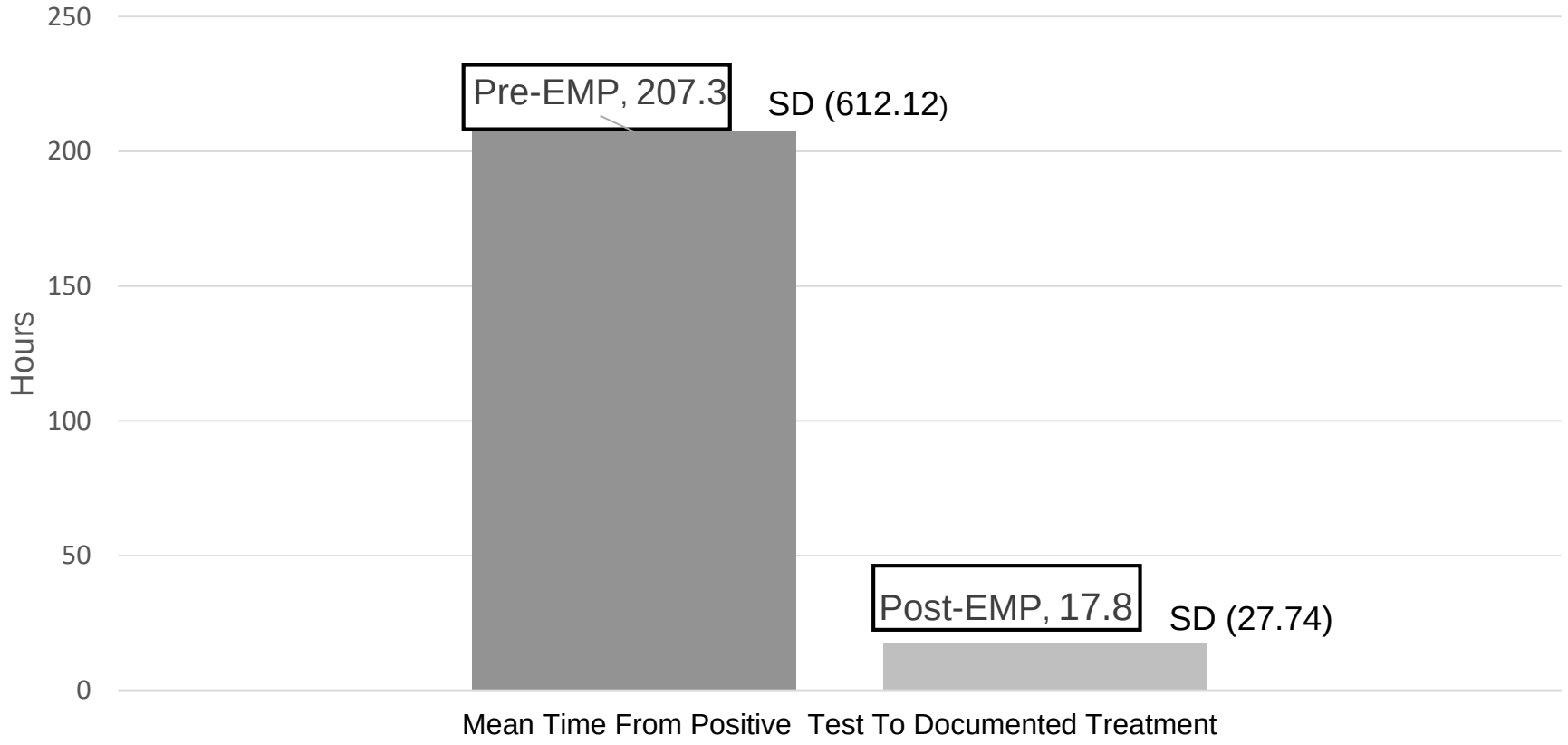
P value < 0.001

Time From Positive Test to First Documented Patient Outreach



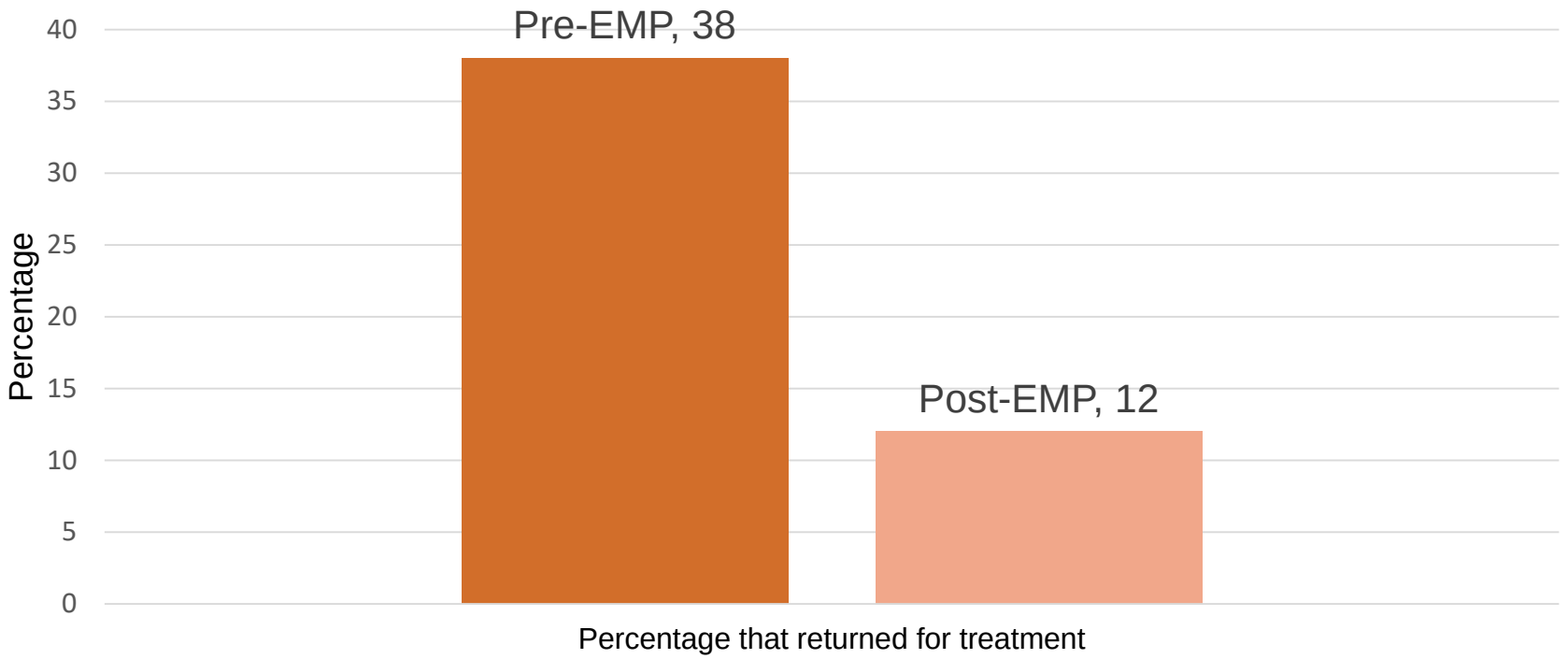
P value = 0.002
Δ = 24.4h (72.8%)

Time From Positive Test to Documented Treatment



P value = 0.072
Δ = 189.5h (91.4%)

Return to ED or Outside Provider for Oral Treatment Within 30 days



Pre-EMP **38%** vs Post-EMP **12%**

P value = 0.001

Conclusions

Primary Objective

- Resulted in more patients with positive tests for *Chlamydia trachomatis*, *Neisseria gonorrhea* and/or *Trichomonas vaginalis* receiving follow-up

Secondary Objective

- Significantly reduced time from test result to patient outreach
- Significantly fewer STI-related repeat visits within 30 days for patients with positive *Chlamydia trachomatis* and/or *Trichomonas vaginalis* results

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Discussion

Strengths	Limitations
Balanced groups	Relied on follow-up being documented by provider in electronic medical record
Appropriate statistical analysis	Small study population size
Compared to a control group	Single-centered
Randomized	

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QUESTIONS

Thank you for attending!

- No CE credit is offered for this activity.
- Please send any remaining questions to sections@ashp.org

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