Residency Project Pearls 2019

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Evaluating the impact of medication-assisted treatment for alcohol use disorder on hospitalization rates in a veteran population

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Disclosures

- This speaker, and this speaker's preceptor, do not have any actual or potential conflicts of interest in relation to this presentation and this presentation does not reflect the views of the Veterans Health Administration.

Learning Objectives for Pharmacists

- Discuss the results of a retrospective chart review on the use of medication assisted treatment for alcohol use disorder on rehospitalization rates in a veteran population.

Captain James A. Lovell Federal Health Care Center (FHCC)

- Located in North Chicago, Illinois
- Established October 1, 2010
- Partnership between the US Department of Veterans Affairs and the Department of Defense (DoD)
- West Campus: medical and surgical care, medical specialties, mental health services, community living center
- East Campus: serves Navy military members and recruits
- Service 40,000 Navy recruits and 67,000 eligible military/retiree beneficiaries each year
- 3 community-based outpatient clinics (CBOCs)

Substance Use Disorder Treatment Services at FHCC

- **SARP (Substance Abuse Rehabilitation Program)**
  - Eligibility: Active Duty members + TRICARE beneficiaries
  - Outpatient treatment program using 12-step multidisciplinary treatment approach
  - Up to 8-weeks
- **ATP (Addiction Treatment Program)**
  - Eligibility: Veterans with substance use disorders
  - 3 levels of care: residential, outpatient, and aftercare
  - Residential: Building 11 (B11): 39-beds

Background

Alcohol use disorder is a significant issue among veterans

42% of veterans with SUD were readmitted within one year of discharge

MAT for AUD in private programs: 24%

MAT for AUD within the VA: 20.5%

a. Alcohol Use Disorder		
i. Pharmacotherapy		
5.	For patients with moderate-severe alcohol use disorder, we recommend offering one of the following medications: ▪ Acamprosate ▪ Disulfiram ▪ Naltrexone- oral or extended release ▪ Topiramate	Strong For
6.	For patients with moderate-severe alcohol use disorder for whom first-line pharmacotherapy is contraindicated or ineffective, we suggest offering gabapentin.	Weak For

MAT = medication assisted treatment
SUD = substance use disorder
AUD = alcohol use disorder

Psychiatric Services. 2000 Dec;51(12):1568-9
J Addict Med. 2011;5:21-27
Psychiatric Services. 2010 Apr;61(4):393-8
VA/DoD: Management of substance use disorders; version 3.0. Washington, DC; 2015

Which of the following medications are recommended by the VA/DoD guidelines for the treatment of alcohol use disorder?

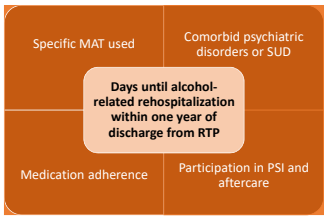
A. Naltrexone
B. Acamprosate
C. Baclofen
D. A and B

Purpose

To evaluate the impact of MAT for AUD in patients enrolled in a residential addiction treatment program on alcohol-related readmission rates

Study Objectives & Outcomes

To compare the time from initial discharge from RTP to alcohol-related rehospitalization for veterans initiated on MAT vs. veterans not initiated on MAT for alcohol use disorder.



RTP = residential treatment program
MAT = medication assisted treatment
PSI = psychosocial interventions
SUD = substance use disorder

Study Design

- Retrospective chart review
- All RTP consults screened between time of Jan 1st, 2014 to Feb 28th, 2018
- Subjects separated into two cohorts:
  - Cohort 1: MAT group
  - Cohort 2: no MAT group

- **Inclusion Criteria**
  - Veterans admitted to RTP at FHCC 18 years or older
  - Treated for AUD per DSM-V diagnosis in RTP
- **Exclusion Criteria**
  - Veterans not completing RTP
  - Use of listed inclusion medications for primary indication other than AUD

MAT = medication assisted treatment
RTP = residential treatment program
AUD = alcohol use disorder
DSM-V = Diagnostic and Statistical Manual of Mental Disorders

Statistical Outcomes & Analyses

Primary Outcome	Secondary Outcomes
Days until alcohol-related hospitalization within one year of discharge from RTP	• Specific MAT utilized • Comorbid psychiatric disorders • Medication adherence • Participation in psychosocial interventions and aftercare
Kaplan–Meier survival analysis and log-rank test, with and without adjusting for confounding variables (Cox analysis)	Continuous variables: Cox proportional-hazards regression Descriptive statistics: frequencies and percentages

MAT = medication assisted treatment
RTP = residential treatment program

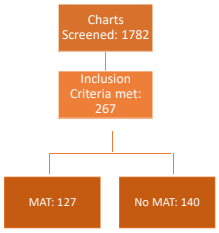
Statistical Outcomes & Analyses

Power = 80%

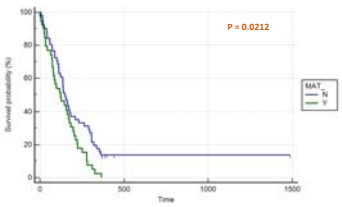
- Sample size = 280 patients (140 in each group)
- Alpha = 0.05
- Effect size = 0.3
- P-value for significance: < 0.05

Patient Demographics

Demographic	Total
Age, years (avg)	48
Race, % (n)	
White	54.3 (145)
African American	42.7 (114)
Hispanic	3.0 (8)
Gender, % (n)	
Male	95.9 (256)
Female	4.1 (11)
Concomitant Psychiatric condition, % (n)	
Bipolar Disorder	12.4 (33)
Depression	25.5 (68)
PTSD	32.2 (86)
Schizophrenia	2.6 (7)
Concomitant SUD, % (n)	
Benzodiazepine/sedative	1.5 (4)
Cocaine	47.2 (126)
Methamphetamines	1.5 (4)
Opioids	9.4 (25)



Results: Primary Outcome



MAT?	Rehospitalized % (n)	HR (95% CI)
Yes	43.3 (39)	0.6123 (0.3668 to 0.9221)
No	56.7 (51)	1.6331 (1.0845 to 2.7264)

Figure 1. Days to rehospitalization within one year of discharge from RTP

MAT = medication assisted treatment
RTP = residential treatment program

Results: Secondary Outcomes

Covariate	P-value	95% CI
Aftercare	**0.0002**	0.2391 to 0.6430
Concurrent Psych Disorder	0.9996	0.5045 to 1.9829
Other SUD	0.3721	0.4961 to 1.3000
Bipolar	0.9432	0.4574 to 2.3194
Depression	0.0680	0.3009 to 1.0438
PTSD	0.7284	0.6052 to 2.0512
Schizophrenia	0.4153	0.5167 to 4.9491

	N	Mean	Median	SD
MPR	125	0.272	0.180	0.2394

- Only participation in aftercare showed a statistically significant effect on rehospitalization rates
- P-value for Cox regression analysis:

p = 0.0016

Results: secondary outcomes

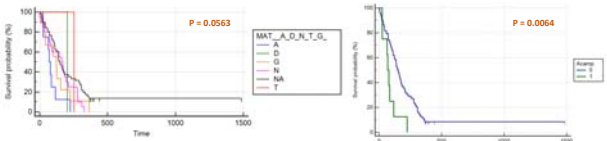


Figure 2. All MAT and days to rehospitalization within one year of discharge

Figure 3. Acamprosate use and days to rehospitalization within one year of discharge

Discussion

- 2015 VA/DoD guidelines recommend use of MAT for AUD in conjunction with PSI (strong for)
- Results from this study support guideline recommendations for the use of MAT for AUD and shows that MAT can decrease rehospitalization rates
- Secondary outcomes show that presence of aftercare in combination with MAT had a statistically significant effect on rehospitalization rate
- Acamprosate was the only MAT to show statistical significance in terms of prolonging days to rehospitalization for AUD

MAT = medication assisted treatment
PSI = psychosocial intervention
AUD = alcohol use disorder

Limitations

- Retrospective chart review
- Limited to one facility
- Veterans only
- Restrictive time period
- Difficult to separate success of MAT from other psychotherapies
- Difficult to assess frequency of aftercare outside the VA

Conclusions

- Medication assisted treatment for alcohol use disorder is strongly recommended by updated VA/DoD guidelines
- MAT should be used with psychosocial interventions for the best outcomes
- Guideline-recommended first line pharmacotherapy treatments include: naltrexone, acamprosate, disulfiram, and topiramate;
  - Gabapentin is second line
- This retrospective chart review supported results from previous trials indicating benefit of MAT for AUD
- More studies need to be conducted to assess the individual benefit of each medication in reducing rehospitalization rates for AUD

Which of the following conditions can further complicate the successful treatment of alcohol use disorder?

A. Hypertension
B. Post Traumatic Stress Disorder
C. Polysubstance Abuse Disorder
D. B and C

Acknowledgements

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  - Adam Dilich, PharmD, BCPP
  - Shaiza Khan, PharmD, BCPS
  - John Pasciak, PharmD

References

- Humphreys K, Weingardt KR. Assessing readmission to substance abuse treatment as an indicator of outcome and program performance. *Psychiatric Services*. 2000 Dec;51(12):1568-9.
- Knudsen HK, Abraham AJ, Roman PM. Adoption and implementation of medications in addiction treatment programs. *J Addict Med*. 2011;5:21-27
- Harris AH, Kivlahan DR, Bowe T, et al. "Pharmacotherapy of alcohol use disorders in the Veterans Health Administration." *Psychiatric Services*. 2010 Apr;61(4):392-8.
- US Department of Veterans Affairs. VA/DoD Clinical Practice Guideline: Management of substance use disorders; version 3.0. Washington, DC, 2015.

Does Switching from Ticagrelor to Clopidogrel Increase MACE Events?

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Disclosures

- Neither myself or Dr. Taylor Chuich have any financial or commercial interests to disclose

Learning Objective for Pharmacists

Recognize the incidence of MACE events and factors which may affect MACE events when switching from ticagrelor to clopidogrel based on a 12-hour loading dose protocol

P2Y12 Inhibitors: Ticagrelor vs. Clopidogrel

	Ticagrelor	Clopidogrel
Platelet Inhibition	Reversible	Irreversible
Pro-Drug	No	Yes
Inhibition of Platelet Aggregation (IPA) Peak Effect	180 mg IPA ~88% at 2 hours post	300 (22%) vs. 600 mg (38%) 2 hours post
Maximum Level of Platelet Inhibition	93%	58%
Time to Maximum Level of Platelet Inhibition	2 hours	8 hours
Duration of IPA	3 days post discontinuation	5 days post discontinuation

Gurbel PA, Bliden KP, Butler K, et al. Randomized double-blind assessment of the ONSET and OFFSET of the antiplatelet effects of ticagrelor versus clopidogrel in patients with stable coronary artery disease: the ONSET/OFFSET study. Circulation. 2009;119(25):2577-83.

Why would patients be switched?

- Cost
- Bleeding
- Side Effect Profile
- Drug interactions
- Efficacy

Given the pharmacokinetic and pharmacodynamic profile of clopidogrel and ticagrelor, which is a limitation and concern when switching from ticagrelor?

A. Inhibition of platelet aggregation peak effect with clopidogrel occurs faster than ticagrelor, within 2 hours after dose
B. Clopidogrel is a pro- drug and provides reversible platelet inhibition
C. Ticagrelor changes the conformation of the binding site for clopidogrel
D. Clopidogrel provides faster, greater, and more consistent P2Y12 inhibition

Randomized double-blind assessment of the ONSET and OFFSET of the antiplatelet effects of ticagrelor *versus* clopidogrel in patients with stable coronary artery disease.

The ONSET/OFFSET study

Gurbel PA, Bliden KP, Butler K, et al. Randomized double-blind assessment of the ONSET and OFFSET of the antiplatelet effects of ticagrelor versus clopidogrel in patients with stable coronary artery disease: the ONSET/OFFSET study. Circulation. 2009;120(25):2577-85.

ONSET/OFFSET

Purpose

- Determine the onset and offset of the antiplatelet effect of ticagrelor compared with high-loading-dose clopidogrel and placebo in stable CAD patients

Methods

- 1:1:1 randomization to clopidogrel, ticagrelor, and placebo
- Loading dose of Ticagrelor 180mg or Clopidogrel 600mg followed by maintenance 12 hrs later x 6 weeks

Outcomes

- **Primary Outcome**
- Onset: IPA at 2 hours after the first dose
- Offset: Slope of IPA between 4 and 72 hours after the last dose

Gurbel PA, Bliden KP, Butler K, et al. Randomized double-blind assessment of the ONSET and OFFSET of the antiplatelet effects of ticagrelor versus clopidogrel in patients with stable coronary artery disease: the ONSET/OFFSET study. Circulation. 2009;120(25):2577-85.

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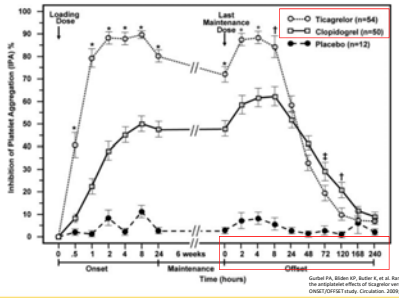
Results



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Pharmacodynamic Effects of Switching From Ticagrelor to Clopidogrel in Patients With Coronary Artery Disease: SWAP-4

Franchi F, Rollini F, Rivas rios J, et al. Pharmacodynamic Effects of Switching From Ticagrelor to Clopidogrel in Patients With Coronary Artery Disease: Results of the SWAP-4 Study. Circulation. 2018;137(23):2450-2452.

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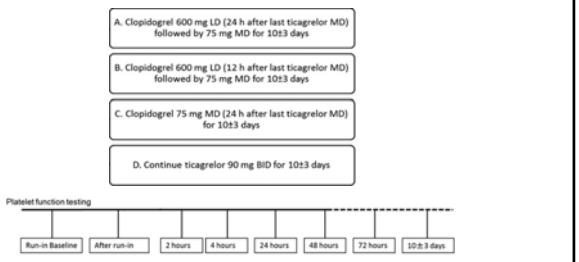
SWAP-4

Study	Population
Prospective, randomized, open-label, single-center study Assessed pharmacodynamic effects of switching from ticagrelor to clopidogrel in patients with CAD on ASA therapy	Inclusion: 1) angiographically documented CAD 2) clinically stable on maintenance therapy with aspirin and clopidogrel 3) age 18 -80 Exclusion: History of intracranial bleeding, hepatic impairment, active bleeding or propensity to bleed, hemodynamic instability

Franchi F, Rollini F, Rivas rios J, et al. Pharmacodynamic Effects of Switching From Ticagrelor to Clopidogrel in Patients With Coronary Artery Disease: Results of the SWAP-4 Study. Circulation. 2018;137(23):2450-2462

SWAP-4



Franchi F, Rollini F, Rivas rios J, et al. Pharmacodynamic Effects of Switching From Ticagrelor to Clopidogrel in Patients With Coronary Artery Disease: Results of the SWAP-4 Study. Circulation. 2018;137(23):2450-2462

Intervention- SWAP-4

Primary Endpoint

- Superiority of C-600 mg-24h versus C-75 mg-24h after switching from ticagrelor based on PRU levels at 48 hours

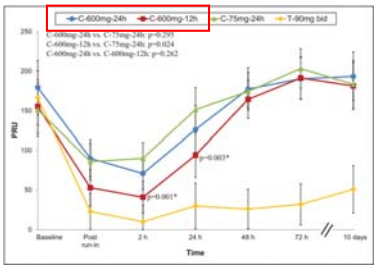
Secondary Endpoint

- Comparison of PRUs (other than the primary end point), maximal platelet aggregation, and maximal platelet aggregation in all 4 groups

Franchi F, Rollini F, Rivas rios J, et al. Pharmacodynamic Effects of Switching From Ticagrelor to Clopidogrel in Patients With Coronary Artery Disease: Results of the SWAP-4 Study. Circulation. 2018;137(23):2450-2462

SWAP- 4 PRU Results

Primary Outcome



Study Question

Does switching from ticagrelor to clopidogrel increase major adverse cardiovascular events?

Background- NMH Protocol

*Previous protocol recommended waiting 24 hours before first clopidogrel dose

Ticagrelor to Clopidogrel Switching		
Loading Dose	Maintenance Dose	Loading Dose
Ticagrelor 180 mg	Ticagrelor 90 mg Q 12 hrs (start 12 hours after loading dose)	Clopidogrel 600 mg x1 (load next AM, i.e. 12 hours after Ticagrelor dose) Then Clopidogrel 75 mg daily (start the next day)

Purpose of Study

- Our study aims to look at MACE events during de-escalation from ticagrelor to clopidogrel based on updated NMH protocol with 12 hour loading dose
- Our objective will be to determine if the current protocol dosing regimen based on the recent SWAP-4 trial is effective and safe in terms of MACE events

Northwestern Memorial Hospital

- 894- bed academic medical center
- Primary teaching affiliate of Northwestern University Feinberg School of Medicine
- U.S. News Ranking
  - #7 Cardiology
  - #10 Best Hospital Honor Roll

Methodology

Design	Inclusion Criteria
• Retrospective Cohort (August 2016-November 2018) • 1 arm- switching from ticagrelor to clopidogrel following NMH protocol for P2Y12 switching	• Age ≥ 18 years • Treated with PCI during hospitalization and switched from ticagrelor to clopidogrel during the same hospitalization • Patients who were previously stented and switched from ticagrelor to clopidogrel during subsequent admission

Exclusion Criteria

- History of intracranial bleeding
- Hepatic impairment
- Active bleeding or propensity to bleed
- Platelet count <80
- Hgb <10 g/dL
- Pregnant patients
- Oral anticoagulation
- 3rd degree AV block during hospitalization
- CYP 3A4 inhibitors
- CYP 3A4 inducers
- EGFR <30mL/min

Primary and Secondary Outcomes

Primary Outcome: Descriptive

- MACE Events up to 1 year: cardiac mortality, non-fatal MI, coronary revascularization

Secondary Outcome: Chi- Square

- Bleeding as defined by the GUSTO criteria
  - Severe or Life-threatening
  - Moderate
  - Mild
- All Cause Mortality

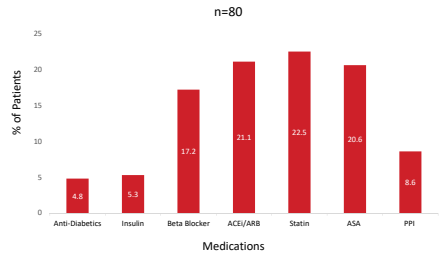
*Statistics run on SPSS

Results- Demographics

Characteristics	n=80
Age (y)	64
Men n (%)	52 (65)
BMI (kg/m2)	29.7
Race (%)	
White	60.8
African American	27.6
Other	11.6

Characteristics	n=80 n(%)
HTN	61 (76)
Dyslipidemia	49 (61.3)
Smoking Hx	34 (42.5)
PAD	24 (30)
Diabetes	20 (25)
HF	19 (23.8)
Previous PCI	18 (22.5)
CKD	17 (21.3)
Previous CABG	11 (13.8)
Previous stroke	4 (5)

Medications Prior to LHC



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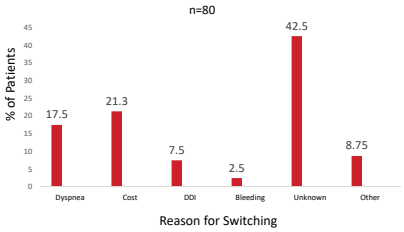
Common Reasons for Switching



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Major Adverse Cardiovascular Events

Primary Outcomes

Outcome	n (%)
MACE Event	17 (21.3)
Cardiac Mortality	3 (3.75)
Non-Fatal MI	6 (7.5)
Coronary Revascularization	8 (10)
No Event	63 (78.7)

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Results

Treatment Data	MACE n=17	Non-MACE n=63	p -value
Appropriately loaded with clopidogrel 600mg n(%)	13(76.5)	56(88)	0.234
Average days between P2Y12 switching	15.7	43.6	0.285
Average time between last ticagrelor dose and first clopidogrel dose (hours)	13	14	0.519

Secondary Outcomes

Outcome	MACE n=17 n(%)	Non-MACE n=63 n(%)	p-value
Bleeding Event	1 (25)	3(75)	1.0
All Cause Mortality	3(75)	1(25)	--

Limitations

- MACE events may have occurred at outside hospital (OSH) and not documented at NMH
- If switch occurred outpatient or at OSH, appropriate time was not documented from last dose
- Searching through patient's chart for MACE events when it was not appropriately documented may have caused it to be missed
- Bleeding events may have been missed based on search through chart

Conclusions

- Average time between ticagrelor and clopidogrel dose was not statistically significant between patients who had a MACE event and those who did not
- Days from initiation of ticagrelor to start of clopidogrel was not statistically significant between patients who had a MACE event and those who did not
- Secondary outcomes of bleeding and all cause mortality were not statistically significant between patients with MACE events and no MACE event
- Future direction will be to compare MACE events with switching before implementation of new protocol with 24hrs vs. 12hrs

Evaluation of Antibiotic Prescribing and Time to Administration in Febrile Neonates in the Emergency Department

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Disclosure

Myself and my mentors have no actual or potential conflicts of interest in relation to this activity.

Learning Objectives for Pharmacists

1. Discuss the pathophysiology and management of late-onset neonatal sepsis presenting from the community
2. Describe the barriers to timely administration of appropriate antibiotics in late-onset sepsis and interventions to optimize care

What are the common organisms of concern in patients with late-onset neonatal sepsis presenting from the community?

A. MRSA, E. Coli, Listeria monocytogenes
B. Group B streptococcus, E. Coli, Enterobacter species
C. Group B streptococcus, Listeria monocytogenes, E. Coli
D. Group B streptococcus, E. Coli, MRSA

What is the goal time to antimicrobial administration in patients presenting with neonatal sepsis?

A. 120 minutes
B. 90 minutes
C. 60 minutes
D. 30 minutes

Background

- Febrile neonates have significant risk of serious bacterial infections
  - Incidence: 10-20%
  - Mortality: 10%
- Lack clinical signs and symptoms of infection
- Goal time to antibiotics: ≤ 60 minutes

Sharieff et al. The Journal of Emergency Medicine, Vol. 21, No. 1, pp. 1–6, 2001
Shin et al. J Korean Med Sci 2009; 24: 844-8
Weiss et al. Crit Care Med. 2014 Nov;42(11):2409-17

Background

- Jain et al.
  - Evaluated febrile neonates in 36 pediatric emergency departments (ED) in the US
  - 83% of patients received recommended management
- Two studies found a decrease in time to antibiotic administration in febrile neonates post protocol implementation

	PRE PROTOCOL	POST PROTOCOL
Cohen et al	97 minutes	64 minutes
Sharieff et al	142 minutes	102 minutes

Jain et al. Pediatrics 2014;133:187–195
Cohen et al. Pediatr Emerg Care. 2016 November; 32(11): 739–745
Sharieff et al. The Journal of Emergency Medicine, Vol. 21, No. 1, pp. 1–6, 2001

Neonatal Sepsis

Early-onset

- Within 72 hours of postnatal age
  - **Up to 7 days*
- Vertical transmission

COMMON PATHOGENS

- Group B *Streptococcus*
- *Escherichia coli*
- *Listeria monocytogenes*

Late-onset

- Beyond 72 hours of postnatal age
  - **After 7 days*
- Horizontal transmission

COMMON PATHOGENS

- *Coagulase-negative Staphylococcus*
- *MSSA/MRSA*
- *Listeria monocytogenes*
- *Group B Streptococcus*
- *Escherichia coli*
- *Enterobacter species*
- *Klebsiella species*

Sharma D, et al. *J of Mat-Fet & Neonat Med.* 2017;31(12):1646-1659
McPherson C, Liviskie C, Zeller B, Nelson M, Newland J. *Neonatal Network.* 2018;37(2):116-123

Neonatal Sepsis

Antimicrobial therapy

Early-onset	Community Acquired Late-onset	Hospital Acquired Late-onset
• Ampicillin + gentamicin • Ampicillin + cefotaxime/ceftazidime	• Ampicillin + gentamicin • Ampicillin + cefotaxime/ceftazidime	• Vancomycin + gentamicin • Vancomycin + cefotaxime/ceftazidime

McPherson C, Liviskie C, Zeller B, Nelson M, Newland J. *Neonatal Network*. 2018;37(2):116-123.

Currently at UI Health ED

In the emergency department, time to antibiotic therapy and appropriateness of therapy have not been formally evaluated in this patient population

Pediatric antimicrobial stewardship sub-committee formation

Outcomes

Primary outcomes

- Determine which antibiotics are being ordered and administered to febrile neonates in the emergency department
- Determine the time (in minutes) to antibiotic administration from triage time

Secondary outcomes

- Evaluate appropriateness of empiric antibiotic regimens ordered and administered (drug, dose, route, frequency and order priority)
- Evaluate activity of empiric antibiotic regimen against isolated pathogens
- Identify potential barriers to timely and appropriate antibiotic therapy

Study Design

Retrospective chart review

Patient population: febrile neonates

Study period: 01/01/2012 – 09/30/2018

Sample size: 47 patients

Descriptive statistics

Patient Selection

Inclusion Criteria	Exclusion Criteria
• Patients aged ≤ 28 days who present to the UI Health ED with a fever • ICD 9 diagnosis codes: 780.6, 778.4, 780.60, 780.61 • ICD 10 diagnosis codes: P81.8, P81.9, R50	• Patients aged > 28 days • Patients who did not receive antibiotics during encounter

Data Collection

DEMOGRAPHICS

- Postnatal age
- Gestational age
- Sex
- Race
- Ethnicity
- Weight (kg)

RESULTS

- Temperature ≥ 38°C
- CSF components – WBC, RBC, protein and glucose
- Blood, urine, CSF culture
- Urinalysis – LE, WBC, nitrites
- CRP
- Herpes simplex virus PCR test

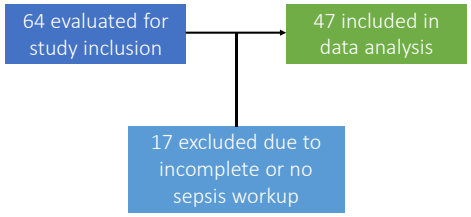
Data Collection

DATES & TIMES

- Registration
- Triage
- Temperature ≥ 38°C, if applicable
- Initial antimicrobials ordered
- Administered antimicrobial regimen
  - Verified by pharmacist
  - Administered
- Line placement
- Blood, urine, CSF cultures
- Urinalysis
- Respiratory viral panel
- CRP
- Herpes simplex virus PCR test
- Hospital admission, if applicable
- Nursing assessment

Results

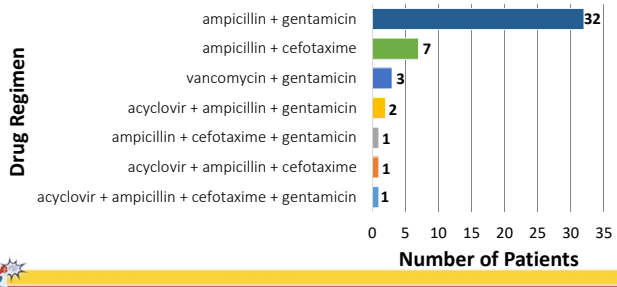
Enrollment



DEMOGRAPHICS, n=47	
Postnatal age, days (mean ± SD)	17.8 ± 8.4
Gestational age, weeks (mean ± SD)	39.3 ± 2.2
Sex, n (%)	
Female	22 (47)
Male	25 (53)
Race, n (%)	
African American	25 (53)
White	8 (17)
Other	14 (30)
Ethnicity, n (%)	
Hispanic or Latino	11 (23)
Non-Hispanic or Latino	36 (77)

Results: Primary Outcome

Combinations of antimicrobials administered



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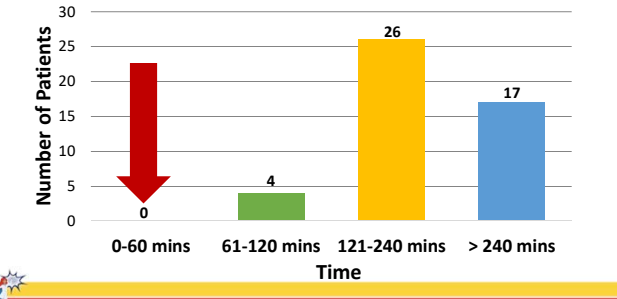
Results: Primary Outcome

Time to first antimicrobial administration



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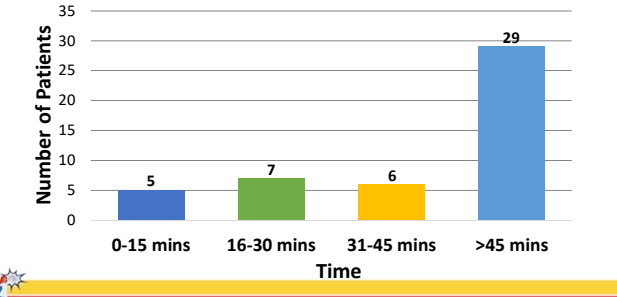
Results: Secondary Outcome

Time to first antimicrobial order



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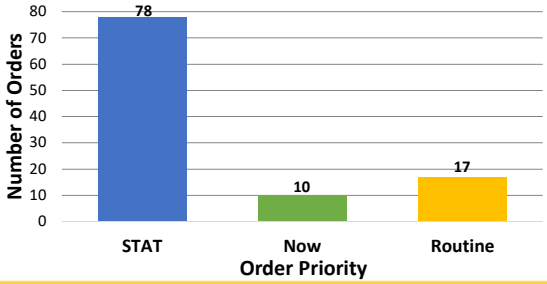
Results: Secondary Outcome

Order priority selected for initial regimen



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Results: Secondary Outcome

Doses ordered in initial regimen

± 10% error allowed for dose based on recommended dose

	Recommended Dose (mg/kg/dose)	Number of Patients with Appropriate Doses, n (%)
Acyclovir, n=8	20	5 (63)
Ampicillin, n=44	100	22 (50)
Ampicillin/sulbactam, n=1	33-50*	0
Cefotaxime, n=13	50	10 (77)
Ceftazidime, n=1	50	1 (100)
Gentamicin, n=36	5	31 (86)
Vancomycin, n=2	15	2 (100)

*Ampicillin/sulbactam dosing depends on gestational age

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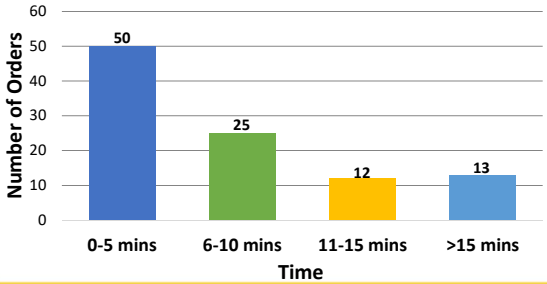
Results: Secondary Outcome

Time to pharmacist verification for administered orders



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Results

Number of positive cultures & organisms grown

Blood Culture Results n=44	
Positive, n	4
Organisms, n	
E. coli	2
Coagulase negative *staphylococcus*	1
Staphylococcus hominis	1

Urine Culture Results n=31	
Positive, n	8
Organisms, n	
E. coli	6
Klebsiella pneumoniae & Enterococcus	1
Staphylococcus aureus	1

CSF Culture Results n=29	
Positive, n	1
Organism, n	
E. coli	1

CSF – Cerebrospinal fluid

Conclusions

- The majority of antimicrobials administered in the UI Health ED for neonatal sepsis are ampicillin and gentamicin.
- Antimicrobial regimens being administered are appropriately covering typical organisms of concern in neonates.
- The time to first antimicrobial administration at UI Health is longer than the recommended 60 minutes in all collected cases.
- Potential barriers to timely antibiotic administration include delays in order entry and incorrect drug dosing on initial order entry.
- Prescribers are selecting STAT for the majority of initial regimen orders.

Potential Impact

Collect data and evaluate how UI Health is currently treating febrile neonates that present to the ED

↓

Targeted interventions to improve timeliness and appropriateness of antibiotics to high risk population

Interventions

Guideline	Order sets	Staff education
• Resource for all hospital staff • Increase awareness of patient risk and appropriate management • Improve time to first order entry	• Appropriate drug, dose and order priority selection • Improve initial dose accuracy	• Educate on current gaps in practice • Educate on guideline and order set

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What are the common organisms of concern in patients with late-onset neonatal sepsis presenting from the community?

A. MRSA, E. Coli, Listeria monocytogenes
B. Group B streptococcus, E. Coli, Enterobacter species
C. Group B streptococcus, Listeria monocytogenes, E. Coli
D. Group B streptococcus, E. Coli, MRSA

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What is the goal time to antimicrobial administration in patients presenting with neonatal sepsis?

A. 120 minutes
B. 90 minutes
C. 60 minutes
D. 30 minutes

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Reference List

1. Sharieff, G., Hoecker, C. and Silva, P. (2001). Effects of a pediatric emergency department febrile infant protocol on time to antibiotic therapy. *The Journal of Emergency Medicine*, 21(1), pp.1-6.
2. Shin SH, Choi CW, Lee JA, et al. Risk factors for serious bacterial infection in febrile young infants in a community referral hospital. *J Korean Med Sci.* 2009;24(5):844-8.
3. Weiss SL, Fitzgerald JC, Balamuth F, et al. Delayed antimicrobial therapy increases mortality and organ dysfunction duration in pediatric sepsis. *Crit Care Med*. 2014;42(11):2409-17.
4. Jain S, Cheng J, Alpern ER, et al. Management of febrile neonates in US pediatric emergency departments. *Pediatrics*. 2014;133(2):187-95.
5. Cohen C, King A, Lin CP, Friedman GK, Monroe K, Kutny M. Protocol for Reducing Time to Antibiotics in Pediatric Patients Presenting to an Emergency Department With Fever and Neutropenia: Efficacy and Barriers. *Pediatr Emerg Care.* 2016;32(11):739-745.
6. American College of Critical Care Medicine Clinical Practice Parameters for Hemodynamic Support of Pediatric and Neonatal Septic Shock: Erratum. *Crit Care Med*. 2017;45(9):e993.

Questions?