Use of MRSA PCR to Reduce Vancomycin for Pneumonia: Evaluation of a Phased-Implementation Approach within Intermountain Healthcare

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Disclosure

Neither myself nor any co-investigators have any disclosures relevant to this presentation.
Background

Available Knowledge

• MRSA nasal PCR is an evidence-based strategy to reduce anti-MRSA therapy in patients being treated for pneumonia

• A negative MRSA nasal PCR has high negative predictive value for MRSA pneumonia

• Studies evaluating pharmacy-driven interventions using MRSA PCR in pneumonia are single-center evaluations

• Implementation of MRSA PCR in clinical practice in a large health system has not been studied
Methods

Intervention

• Retrospective evaluation of the implementation of a system-wide MRSA PCR protocol

Phase I: Pre-Implementation – Usual Care
July-December 2017

Phase II: Automatic Order for MRSA PCR incorporated into opt-in pneumonia clinical decision support
January-July 2018

Phase III: Approval of pharmacy-initiated MRSA PCR ordering protocol
August 2018-January 2019

Phase IV: System-wide implementation of protocol within Intermountain Healthcare’s pharmacy services
February-September 2019
Methods

Study of the Intervention

• Inclusion criteria – All patients ≥ 18 years of age receiving vancomycin or linezolid for an indication of pneumonia
  o Patients were identified using electronic health record antibiotic indication data

• Exclusion criteria – One hospital at which the protocol had been tested for ~ 12 months prior to system-wide implementation
Methods

Measures

• Primary Outcome – % of eligible patients with a nasal MRSA PCR ordered within 24 hours of initiating anti-MRSA antibiotics

• Secondary Outcome – % of eligible patients receiving more than 24 hours of anti-MRSA therapy for pneumonia
Methods

Analysis

• Statistical Process Control design to describe adoption and impact of MRSA PCR during four phases of implementation
• Primary and secondary variables were analyzed using Chi-squared test with Bonferonni correction
• p<0.05 considered statistically significant
Results – MRSA PCR Ordered within 24 hours

P-Chart

MRSA PCR ordered within 24 hours of first dose of anti-MRSA therapy

UCL 67%
CL 55%
LCL 42%

P<0.0001

Automatic order set
Results – MRSA PCR Ordered within 24 hours

P-Chart

MRSA PCR ordered within 24 hours of first dose of anti-MRSA therapy

Automatic order set

Approval of pharmacy driven protocol

P<0.0001
Results – MRSA PCR Ordered within 24 hours

P-Chart

- Automatic order set
- Approval of pharmacy driven protocol
- Implementation of pharmacy protocol at all hospitals

MRSA PCR ordered within 24 hours of first dose of anti-MRSA therapy

- LCL: 42%
- CL: 55%
- UCL: 67%

P-values:
- P<0.0001
- P<0.0001
- P<0.0001

MRSA PCR ordered within 24 hours of first dose of anti-MRSA therapy

- Jan-18: 65%
- Feb-18: 65%
- Mar-18: 65%
- Apr-18: 52%
- May-18: 65%
- Jun-18: 78%
- Jul-18: 87%
- Aug-18: 87%
- Sep-18: 76%
- Oct-18: 65%
- Nov-18: 65%
- Dec-18: 55%
- Jan-19: 70%
- Feb-19: 70%
- Mar-19: 81%
- Apr-19: 92%
- May-19: 92%
- Jun-19: 92%
- Jul-19: 92%
- Aug-19: 92%
- Sep-19: 92%
Results – Anti-MRSA Therapy Duration > 24 hours

P-Chart

Anti-MRSA Therapy Duration Greater than 24 Hours

UCL 56% 55%
CL 44%
LCL 31%

P=0.28

Automatic order set

P=0.28
Results – Anti-MRSA Therapy Duration > 24 hours

P-Chart

Anti-MRSA Therapy Duration Greater than 24 Hours

Automatic order set

Approval pharmacy driven of protocol

P=0.28

P=0.005
Results – Anti-MRSA Therapy Duration > 24 hours

P-Chart

Anti-MRSA Therapy Duration Greater than 24 Hours

- LCL: 31%
- CL: 44%
- UCL: 56%

P-values:
- P=0.28
- P=0.005
- P=0.05
- P=<0.0001

Improvement timeline:
- Automatic order set
- Approval pharmacy driven of protocol
- Implementation of pharmacy protocol at all hospitals
Discussion

Summary

• Phased-implementation of a multi-faceted approach to MRSA nasal PCR significantly increased MRSA PCR orders in anti-MRSA therapy given for pneumonia and was associated with a decrease in length of anti-MRSA therapy
Discussion

Interpretation

• MRSA PCR orders increased with both pre-checked MRSA PCR on order set and pharmacy driven protocol
• Overall implementation decreased anti-MRSA therapy continued for > 24 hours
• Data is in line with previously published studies
• Impact on patients and costs potentially significant
Discussion

Strengths/Limitations

• Strengths – studied implementation of MRSA PCR in a wide range of institutions, including small rural facilities, as well as large tertiary centers
• Study only included hospitals from one health system, in a relatively limited geographic area
• Lack of data for clinical outcomes and length of stay
• No “unintended consequences” safety data
Application

How can we use this information to help bolster Antimicrobial Stewardship efforts within Intermountain Healthcare

- MRSA PCR has a high negative predictive value for MRSA pneumonia
- Ensure that pharmacists are following through on negative MRSA PCR and recommending discontinuation of vancomycin/linezolid when used for pneumonia
- Educate physicians and LIPs about the appropriate use of MRSA PCR (in future will we be using for other indications?)
Group Discussion

How can we improve discontinuation of anti-MRSA therapy for pneumonia in the setting of a negative MRSA PCR?

What barriers are there to fully utilizing this process to stop unnecessary antibiotics?
Questions?

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Study Team/Acknowledgements

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