Abstract #210

Safety and Performance of a Pharmacist-Driven Nasal MRSA PCR Protocol for De-escalation of Empiric Vancomycin for Suspected Pneumonia at an Academic Medical Center

Stanford MEDICINE | Stanford Antimicrobial Safety and Sustainability Program

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Background

Nasal MRSA screening has been identified as a diagnostic tool to rule out pulmonary MRSA infections. Several studies have shown that anti-MRSA antibiotics can be safely discontinued in patients with a negative result on nasal screening, reducing the duration of vancomycin treatment with no evidence of adverse clinical outcomes. However, current literature is limited in terms of numbers and diversity of patient populations.

Objective

Describe real-world impact, clinical and safety outcomes, of a pharmacist-driven MRSA nasal PCR protocol for de-escalation of anti-MRSA therapy in CAP, HAP, and VAP. We have included a wide range of acutely ill patients including medical, surgical, critically ill, and immunocompromised at Stanford Health Care.

Methods

This was an observational cohort study of adult patients who received vancomycin for empiric pneumonia before (PRE) vs after (POST) implementation of a pharmacist-driven nasal MRSA PCR testing protocol (between 05/01/2017 - 08/31/2017 (PRE-PCR) and 5/7/2018 - 12/31/2019 (POST-PCR). The primary outcome measure was duration of vancomycin administration. Secondary outcomes included time to vancomycin discontinuation, frequency of restarting vancomycin for empiric pneumonia within 7 days, acute kidney injury (defined as “injury” or worse by RIFLE criteria), 30- and 90-day mortality, hospital LOS, MRSA respiratory cultures, and cost avoidance.

Statistical analysis

Data were analyzed using SPSS 26.0 (IBM SPSS Statistics, IBM Corporation) software. Categorical variables were analyzed by chi-square or Fisher’s exact test when appropriate. Continuous variables were analyzed by Student’s t test or Mann-Whitney U test. Continuous data were presented as the medians (interquartile ranges). Vancomycin duration was described using Kaplan–Meier analysis and log rank test. P values < 0.05 were considered statistically significant.

Results

Table 1. Baseline Characteristics

	Pre-PCR (n=116)	Post-PCR (n=494)	P value
Age, median (IQR), years	69 (59-78)	66 (56-76)	0.28
Male, n (%)	72 (62%)	294 (60%)	0.26
Weight, median (IQR), kg	67 (57-85)	78 (64-92)	0.35
Body mass index, median (IQR), kg/m^2	23.7 (22-28)	28.5 (25-33)	0.08
Indication for vancomycin, n (%)			**0.03**
CAP	75 (65%)	281 (57%)	
HAP	24 (21%)	161 (33%)	
VAP	17 (15%)	52 (11%)	
Infectious Diseases consultation, n (%)	18 (16%)	109 (22%)	0.12
Treatment team, n (%)			0.94
BMT	2 (2%)	8 (2%)	
Hematology	5 (4%)	24 (5%)	
ICU	56 (48%)	218 (44%)	
Medicine	32 (28%)	145 (29%)	
Oncology	6 (5%)	37 (7%)	
Solid organ transplant	10 (9%)	35 (7%)	
Surgery	5 (4%)	27 (5%)	
Immunocompromised, n (%)	44 (37%)	191 (41%)	0.92

- 813 patients were screened during the study period. 203 (25%) were excluded: 146 (18%) were excluded for a non-pulmonary or undifferentiated source of infection

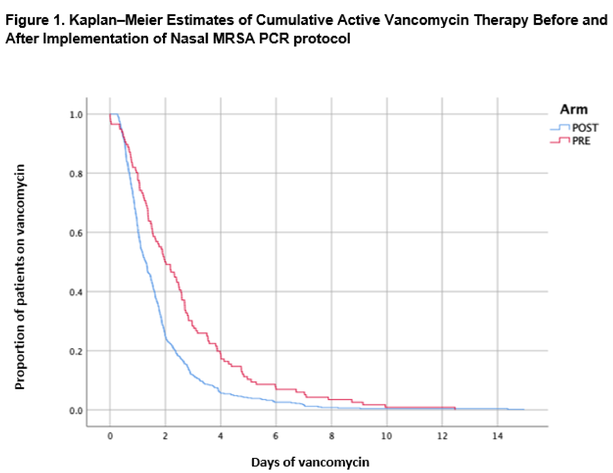
Table 2. Secondary Outcomes

	Pre-PCR (n=116)	Post-PCR (n=494)	P value
No serum vancomycin measurements, n (%)	34 (29%)	278 (56%)	**<0.0001**
Vancomycin restarted within 7 days for suspected pneumonia, n (%)	4 (3.4%)	31 (6.3%)	0.28
MRSA in respiratory culture within 7d of vancomycin initiation	3 (2.6%)	7 (1.4%)†	0.41
Hospital length of stay, median (IQR), days	8.5 (4.9-21.0)	9.8 (4.9-18.9)	0.84
30-day mortality, n (%)	26 (22%)	98 (19.8%)	0.54
90-day mortality, n (%)	28 (24.1%)	120 (24.3%)	1.00
Nephrotoxicity‡, n (%)	16 (13.8%)	43 (8.7%)	0.10

† 1 patient with negative MRSA PCR but culture-confirmed MRSA pneumonia 4 days later

‡ Nephrotoxicity, defined by a RIFLE category of injury or worse

Figure 1. Kaplan–Meier Estimates of Cumulative Active Vancomycin Therapy Before and After Implementation of Nasal MRSA PCR protocol



Log-rank test **p <0.0005**. Median 1.29 days (95% CI 1.13-1.45) vs 1.98 days (95% CI 1.49-2.46) in POST vs PRE group

Subset analysis of vancomycin therapy duration

- Similar findings in immunocompromised (2 vs 1.6 days, p<0.05) and ICU patients (2.5 vs 1.5 days, p<0.01) in the Pre-PCR compared to the Post-PCR group

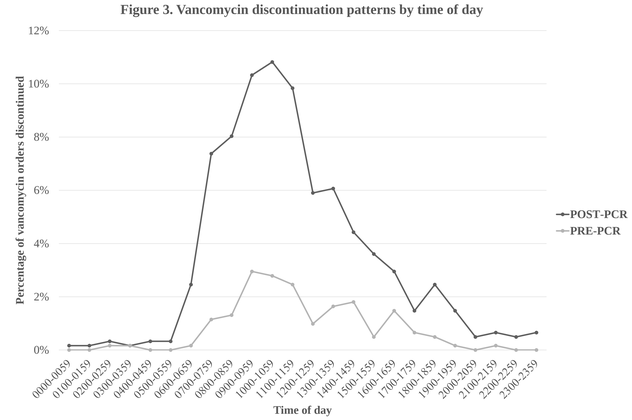
Time to vancomycin de-escalation (if negative MRSA nasal PCR): 15 hours (95% CI 13-16)

- 70% stopped within 24 hours of therapy
- 58% stopped before any serum vancomycin measurements taken

Cost avoidance associated with vancomycin levels and doses

- Median reduction of 1 vancomycin serum measurement and 1.5 vancomycin doses per PCR, with an estimated cost savings of $59.50 per PCR performed
- With approximately 400 PCR tests per year at our institution, this corresponds to ~$23,800 annual cost avoidance on vancomycin acquisition cost and levels

Figure 2. Vancomycin discontinuation patterns



Conclusions

- Pharmacist-driven MRSA nasal PCR testing is effective and safe in facilitating the early de-escalation of empiric vancomycin used for pneumonia treatment in a diverse population including critically ill and immunocompromised patients.
- Laboratory test result time and communication of results should be aligned with maximal decision-making activities.
- We estimated cost avoidance over $23,000 annually in an institution with an 18% exclusion rate for inappropriately ordered PCR tests and a 70% vancomycin discontinuation rate in those with a negative PCR

References

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