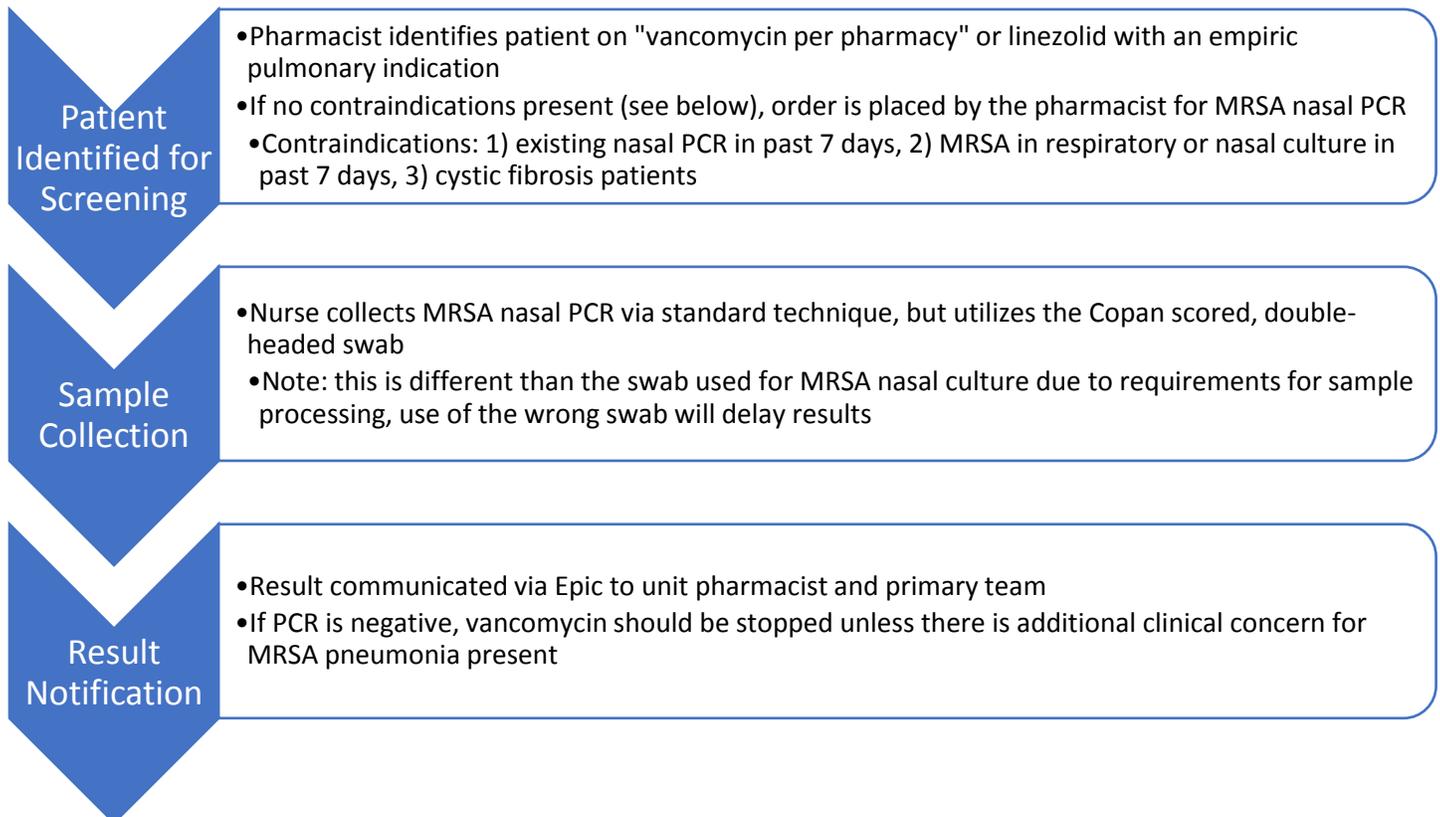


## MRSA Nasal Screening with PCR for Early De-Escalation of Empiric Vancomycin/Linezolid in the Treatment of Suspected Pneumonia



**Figure 1.** Protocol for the use of MRSA nasal PCR screening for early de-escalation of vancomycin in patients on broad-spectrum antibiotics for the empiric treatment of pneumonia. The protocol is keyed off the appropriate indication denoted for vancomycin when ordering "per pharmacy" in Epic, so providers must be aware to choose the pulmonary indication if pneumonia is suspected in order to obtain MRSA nasal PCR promptly.

### **Provider's Role:**

1. To trigger the protocol for a nasal MRSA PCR test, select "**empiric**" "**pulmonary**" under the Epic order questions
  - Note: only pharmacists have access to the nasal MRSA PCR lab order. The nasal PCR will result within hours, whereas the nasal culture may take >2 days
2. Follow-up on nasal PCR results personally. Pharmacists will likely bring up results on rounds but do not cover 100% of hospital teams.

**Purpose:**

To provide guidance on proper utilization of MRSA nasal screening with PCR for the early de-escalation of vancomycin in the treatment of patients on empiric, broad-spectrum antibiotic therapy for the treatment of patients with pneumonia and interpretation of the results.

**Background:**

Pneumonia remains one of the most common infectious processes and can be a severe complication of hospital admission. Hospitalized patients, especially those on mechanical ventilation, and patients with high health-care contact are at higher risk for infection with multi-drug resistant organisms such as MRSA, but this remains a less common cause of pneumonia, even in these populations.<sup>1</sup> Empiric antibiotic regimens for the treatment of a suspected pneumonia in these patients typically includes coverage of MRSA with an agent such as vancomycin,<sup>2</sup> but it can be difficult to narrow coverage in a timely manner, or even at all, as sputum cultures can take several days to finalize and cultures often cannot be obtained.

Multiple studies have shown that MRSA pneumonia is highly unlikely in the absence of detectable MRSA in the nares, with a negative predictive value consistently >98% across multiple studies, particularly with PCR.<sup>3-5</sup> Compared to culture, PCR also offers more rapid turn-around time, as results can be available within hours, and is less affected by preceding anti-MRSA antibiotic administration as it detects genetic material rather than viable organisms.<sup>6-8</sup> Other 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.<sup>9-11</sup> If MRSA PCR is obtained at the time empiric therapy is started, it is possible that all but the first dose of anti-MRSA therapy in patients with suspected pneumonia can be avoided, reducing the exposure to broad-spectrum antibiotics and the risk of adverse drug effects such as renal injury, especially given the recent evidence of excess risk with the combination of vancomycin and piperacillin/tazobactam.<sup>12</sup> The Stanford Antibiotic Safety and Sustainability Program has included MRSA nasal screening with PCR in the institutional guidelines for management of hospital-acquired and ventilator-associated pneumonia,<sup>13</sup> and this test is now available via a pharmacist-driven protocol (Figure 1).

**Explanation of Protocol and Interpretation of Results:**

In this protocol, patients started on empiric vancomycin for the treatment of suspected or confirmed pneumonia caused by a multi-drug resistant organism will be automatically tested for MRSA via nasal swab PCR if certain conditions are met. First, to simplify case identification, only vancomycin ordered “per pharmacy” with an indication of a suspected pulmonary source will undergo MRSA PCR screening. If there are no contraindications present (see Figure 1), then the PCR will be ordered by the unit pharmacist. Results will be conveyed to the unit pharmacist and the primary team. If the PCR is negative, it is recommended that the empiric vancomycin be stopped unless there are clinical features present that suggest MRSA as an etiology, such as necrotizing pneumonia, but the ultimate decision to stop anti-MRSA therapy will be left to the primary physicians. Positive results cannot be used to guide

therapy as a positive PCR in this setting has a predictive value of only 30% for MRSA pneumonia.<sup>3-5</sup> It is more likely to represent nasal colonization in the setting of a pneumonia caused by a different organism rather than true MRSA pneumonia, but the decision to de-escalate therapy should be made based on respiratory cultures and clinical status in this situation. As noted above, it is estimated from prior studies that exposure to empiric vancomycin can be reduced by as much as 48 hours if vancomycin is promptly stopped in patients with a negative PCR and use of this early discontinuation protocol is also likely to lead to reductions in pharmacist time spent on adjustments of vancomycin dosage and utilization of vancomycin serum levels.<sup>9-11</sup>

### State-Mandated MRSA Screening:

It should be noted that this MRSA PCR test is separate from the MRSA screening mandated by the State of California in SB 1058, which requires screening with MRSA in certain patients considered to be at high-risk for colonization and/or infection.<sup>14</sup> The state-mandated screening is done by nursing and is performed with MRSA culture from a nasal swab as the results are not time-sensitive. MRSA screening with PCR may be performed at the same time as the state-mandated screening as the PCR results will return much faster but is not intended to replace it. By law, patients screened in accordance with state regulations must be informed of positive results.<sup>14</sup> As the PCR screening is considered a stewardship intervention and is not to be used in place of state-mandated screening, a positive PCR result is not required to be conveyed to the patient, though providers may certainly do so.

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