Antimicrobial Stewardship Improvement Strategy for Isolation and Turnaround Time of Local Molecular Diagnostic Testing

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The decentralization of testing influences the timely reporting of Methicillin-Resistant *Staphylococcus aureus* (MRSA) and *Clostridioides difficile* infection (CDI). Localizing diagnostic molecular testing of MRSA & CDI, improved isolation turnaround time (TAT) and de-escalation of empiric therapy significantly.

BACKGROUND

Abstract:

- Diagnostic tests play a major role in the clinical care of patients, including detection of specific pathogens, determining appropriate therapy, monitoring response to therapy and disease surveillance. The availability of and access to single-step molecular cartridge-based tests and the place of service influences the timely reporting of Methicillin-Resistant *Staphylococcus aureus* (MRSA) and *Clostridioides difficile* infection (CDI). Localizing diagnostic molecular testing of MRSA & CDI, improved isolation turnaround time (TAT) and deescalated empiric therapy significantly.

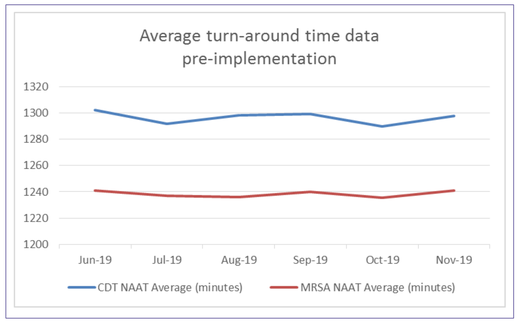

Figure 1: Before implementation of in-house NAAT

Background:

- Northwestern Medicine Lake Forest Hospital (LFH) sent specimens for CDI and MRSA PCR tests to a decentralized lab. MRSA and CDT were batch tested (2x/day) using the same methodology on BD Max.
- Results were reported between 15 hours and 72 hours (Figure 1).
- Patients being ruled out for CDI would remain in empiric Contact Precautions until the decentralized lab resulted the test and would often be discharged beforehand.
- Patients being ruled out for MRSA (e.g. pneumonia) were empirically treated until a negative result would allow de-escalation of therapy.
- ASP and IP presented their case for local testing to laboratory leadership and required several rounds of approval (5/19).

METHODS

Test methodology proposed and its purpose: Automated, rapid NAAT to detect MRSA and toxin gene sequences associated with toxin-producing C. difficile DNA; LFH Lab has a GeneXpert and requested that use of the Xpert *C. difficile* and MRSA panel be implemented.

Evidence-based clinical justification for in-house testing:

- Improved turnaround time
- Replace a send-out test (to decentralized lab)

How will the results of this test improve patient outcome or management?:

- **CDT**: A Contact Precautions order is automatically attached to the CDT order for empiric isolation. A faster TAT with an in-house test will improve management of these patients by discontinuing precautions for negative results sooner and saving on PPE costs.
- **MRSA**: A faster TAT with an in-house test will improve management of patients by placing them into appropriate isolation sooner and improve targeted antibiotic therapy.

Describe anticipated practice changes: Antimicrobial stewardship will benefit as rapid molecular testing in-house can help to avoid unnecessary empiric therapy that is often administered to patients during the time clinicians are waiting for lab results from a decentralized location.

Approved 5/2019 by Lab leadership, and after several months of validation studies, go-live for in-house testing began 12/1/19.

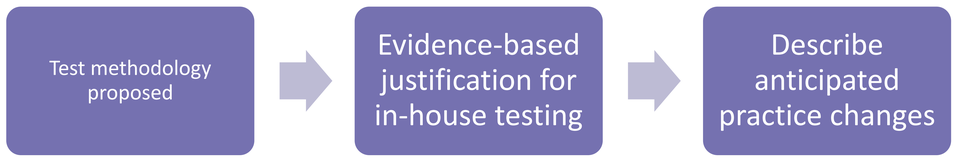

Figure 4: New Lab Proposal Process Map

RESULTS

- Through the implementation of in-house PCR, outcome metrics continue to trend positively
- Turnaround times from 794 MRSA tests and 332 CDTs were reviewed to allow comparison before and after implementation of in-house testing. The time from collection to result was evaluated and averaged for comparison, including weekends and holidays.
- Analysis of retrospective data revealed that decentralized MRSA & CDTs have longer turnaround times (average 21.1 hours) when compared to in-house facility testing (average 6.1 hours) (Figure 2). Patients in empiric isolation for CDI were removed from contact isolation and de-escalation of MRSA therapy occurred an average of 15 hours sooner.

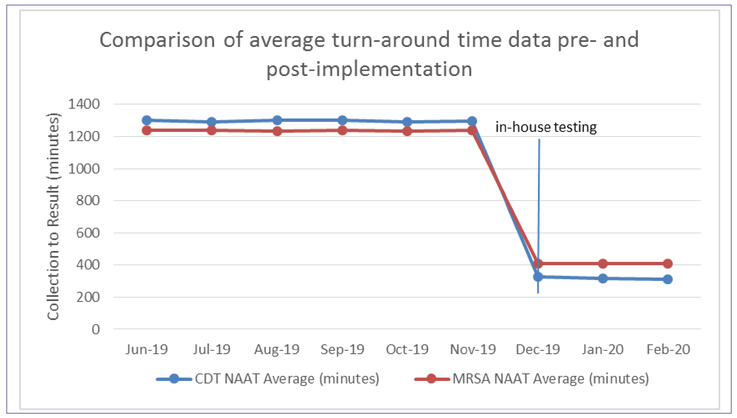

Figure 2: Average TAT after implementation of in-house NAAT

CONCLUSIONS

- The data demonstrates that TATs are markedly improved when testing is performed in the facility's own lab, thus allowing high-quality MRSA and CDI molecular diagnostics to continue to be provided to all patients in the region regardless of their location. Nasal colonization is used to rule out MRSA pneumonia in certain populations, therefore the faster diagnostic testing results translates to faster antibiotic specific treatment of the patient. This also affects cost and time of the patient in empiric CDI isolation. The mean cost associated with isolation ranges from $400–$2000 per positive-patient per day[3]. Converting from decentralized molecular diagnostics to in-house single-step molecular cartridge-based tests improves reliability and reduces variation in TAT due to issues with courier timing and de-centralized batching across two facilities. This builds high-reliability and optimizes resource utilization.

REFERENCE

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