Clinical surveillance and rapid diagnostic testing to aid with antimicrobial stewardship

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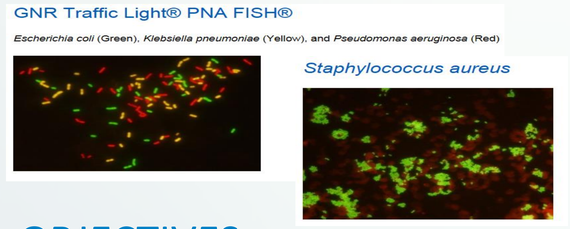
INTRODUCTION

- Clinical decision support technology is becoming increasingly common to help facilitate optimal antimicrobial stewardship practices. This technology often takes antiquated manual processes and transforms them into more efficient clinical activities.
- Rapid diagnostic testing can greatly decrease the amount time it takes for microbiology to identify the organism, thus allowing pharmacy the opportunity to tailor the patient's antibiotics within 24 hours of a positive culture. However, the information gained from this type of testing is only as valuable as the program in place to perform the necessary interventions with the results.
- Combining an effective clinical surveillance system with the use of rapid diagnostic testing can lead to a streamlined approach to identify patients for possible intervention, as well as open communication among the pharmacy staff.

Figure 1



OBJECTIVES

1. **Optimize the use of rapid diagnostic testing**
2. **Use surveillance technology to drive an efficient process to quickly act upon rapid diagnostic results.**

METHODS

- The antimicrobial stewardship committee deployed the use of rapid diagnostic testing (PNA FISH®) (See Figure 1) and a clinical surveillance system (Sentri7®).
- Pharmacy worked closely with the microbiology department to develop how the PNA FISH® results would be reported. It was determined that free text could be added to the reported results that include local antibiogram statistics, as well as suggested actions to perform with the results (See Figure 2).
- A real-time alert was then constructed within Sentri7® to find patients with a PNA FISH® result (See Figure 3). Once a PNA FISH® result and suggested action are generated, a pharmacist reviews pertinent patient clinical information and determines if a change in therapy is needed.
- The change in therapy is then documented as an intervention within Sentri7®. If no change was made, a follow-up is entered within Sentri7® to continue to follow the patient for final culture results (See Figure 4). This allows the pharmacist to monitor these patients throughout the stay.

Figure 2

Suspected Organism (by in situ hybridization)	Comment
Coagulase-negative *staphylococci*	**Comment:** Likely contaminant in most patients. **Recommendation:** No treatment required unless judged clinically significant. If deemed high-risk, interim therapy with VANCOMYCIN. Change to nafcillin or cefazolin if susceptible to oxacillin. **Note: Oral antibiotics should not be used to treat staphylococcus bacteremia.**
Klebsiella pneumonia	**Recommendation:** De-escalate from broad-spectrum or anti-pseudomonal antibiotics. Consider ampicillin/sulbactam (85% susceptible at THAM), cefazolin (95% susceptible at THAM), ceftriaxone (95% susceptible at THAM).
Pseudomonas aeruginosa	**Recommendation:** Anti-pseudomonal antibiotic; consider piperacillin/tazobactam (94% susceptible at THAM) PLUS tobramycin (94% susceptible at THAM) until final susceptibilities are available.
Escherichia coli	**Recommendation:** De-escalate from broad-spectrum or anti-pseudomonal antibiotics; consider ceftriaxone (90% susceptible at THAM).
Staphylococcus aureus	**Comment:** 59% of THAM isolates are MRSA **Recommendation:** Interim therapy with vancomycin. Change to nafcillin or cefazolin if susceptible to oxacillin. **Note: Oral antibiotics should not be used to treat staphylococcus bacteremia.**
Enterococcus faecalis	**Comment:** Most THAM isolates are susceptible to ampicillin. **Recommendation:** Interim therapy with ampicillin.
Enterococcus spp. NOT *Enterococcus faecalis*	**Comment:** Likely Enterococcus faecium. Most THAM isolates are resistant to vancomycin and ampicillin. **Recommendation:** Infectious Disease Consultation for therapy guidance.

Figure 3

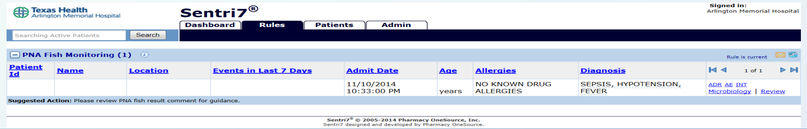
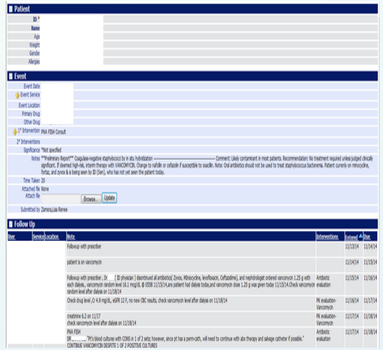


Figure 4



RESULTS

- The implementation of clinical decision support technology led to improved efficiencies related to antimicrobial stewardship clinical activities. This particular combination of technologies led to a streamlined approach for guiding empiric antimicrobial therapy.
- The suggested action within the PNA FISH® resulted in consistent recommendations made by clinical staff.
- The identification and documentation within Sentri7® provided a mechanism to track recommendations and follow-up on patients where susceptibilities were needed prior to intervention.
- These technology changes, in addition to the other antimicrobial stewardship initiatives currently deployed, were responsible for a decrease in antibiotic costs over the past three years.
- From 2011 to 2014, the average antibiotic cost per patient day decreased from $9.69 to $7.67.

CONCLUSIONS

- The addition of PNA FISH® for rapid detection was targeted as a component of the antimicrobial stewardship program. Due to staffing challenges, a need was identified to help optimize the use of PNA FISH®.
- Sentri7® helped drive an efficient process to quickly act, document, and follow the PNA FISH® results. The antimicrobial stewardship team is exploring using Sentri7® real time email notifications to optimize the process even further.
- This technology also provided a mechanism for efficient completion of antibiotic evaluation and decreased the risk of missed opportunities associated with a labor intensive, manual process.
- The software provided the clinical pharmacists with accurate, real-time information that could be used to make decisions and initiate appropriate interventions to effectively impact the patient's care.

REFERENCES

Food & Drug Administration Consumer Health Information. *(2013, June).* *FDA Acts to Prevent More Drug Shortages.* Available at http://www.fda.gov/downloads/ForConsumers/ConsumerUpdates/UCM373003.pdf.

Institute for Safe Medication Practices. *(2010, September 23).* *Drug shortages: National survey reveals high level of frustration, low level of safety.* ISMP Medication Safety Alert! Available at

ASHP Current Drug Shortages. *Accessed (2014, May 1).* Available at

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