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Kathryn Hogan
Henry Ford Health System, khogan3@hfhs.org

Beena Umar
Henry Ford Health System

Kathy Callahan
Henry Ford Health System, KCALLAH1@hfhs.org

Robert J. Tibbetts
Henry Ford Health System, rtibbet1@hfhs.org

Linoj Samuel
Henry Ford Health System, lsamuel2@hfhs.org

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Reducing Culture Reporting Errors in the Microbiology Laboratory

Kathryn Hogan MD, Beena Umar MD, Kathy Callahan MT ASCP, Robert Tibbetts PhD, Linoj Samuel PhD
Background

• Culture errors in microbiology laboratories, including Gram stain errors, can cause serious harm to patients if not recognized and amended

• To date, there are few papers that characterize the types of errors in microbiology laboratories

• There is scant research demonstrating the effects of interventions on microbiology lab errors

• This study aims to categorize the types of culture reporting errors found in a microbiology lab as well as document the error rates before and after interventions designed to reduce errors and eradicate a blame culture
Methods

• To increase the amount of errors reported, we moved from a self-reporting system to an automatic reporting system

• Errors were categorized into 5 different types:
  • Gram stains: misinterpretations
  • Identification: incorrect analysis
  • Set up labeling: incorrect patient labels on culture plates
  • Procedural: not following documented procedures
  • Miscellaneous: an organism followed criteria for a certain group, but was eventually identified as different
• Gram stain errors: some species (*Bacillus, Clostridium*) tend to over-decolorize and can be misinterpreted as Gram-negative

• Culture mis-IDs: Early growth of coagulase-negative *Staphylococcus* spp. can be misidentified as *Corynebacterium* spp.
Monitoring of errors

• Error rates were tracked according to technologist, and technologists were given real-time feedback by a manager
• Error rate was monitored in the daily quality management meeting
Changes Implemented

• In addition to daily error monitoring, policies were developed to reduce error rate

• Technologists attended a year-end review with a manager in order to improve their performance

• If a certain number of errors per month is reached, that technologist is required to undergo re-training by either a manager or senior technologist

• If a technologist fails to correct any error properly, they are also required to re-train
Error Rate Per Year

Year

Error Rate

2013
2014
2015
2016
2017
2018

0.06
0.05
0.04
0.03
0.02
0.01
0

p = 0.007
Results

- In 2013, we recorded 0.5 errors per 1,000 tests
- By 2018, we recorded only 0.1 errors per 1,000 tests
- This is an 80% decrease in errors per 1,000 tests
- The yearly culture volume from 2013 to 2018 increased by 32%
- The yearly error rate decreased from 0.05% per year to 0.01% per year, a statistically significant decrease (p=0.0007)
Conclusion

• This study supports the effectiveness of the changes implemented to decrease errors in culture reporting
• By tracking and correcting errors in real time, technologists were educated on error prevention
• Laboratory safety became a priority to all technologists in addition to managers through daily error prevention and monitoring
