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Reducing Culture Reporting Errors in the Microbiology Laboratory

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Background

- Culture errors in microbiology laboratories, including Gram stain errors, can cause serious harm to patients if not recognized and amended²
- To date, there are few papers that characterize the types of errors in microbiology laboratories^{1,3}
- There is scant research demonstrating the effects of interventions on microbiology lab errors²
- 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

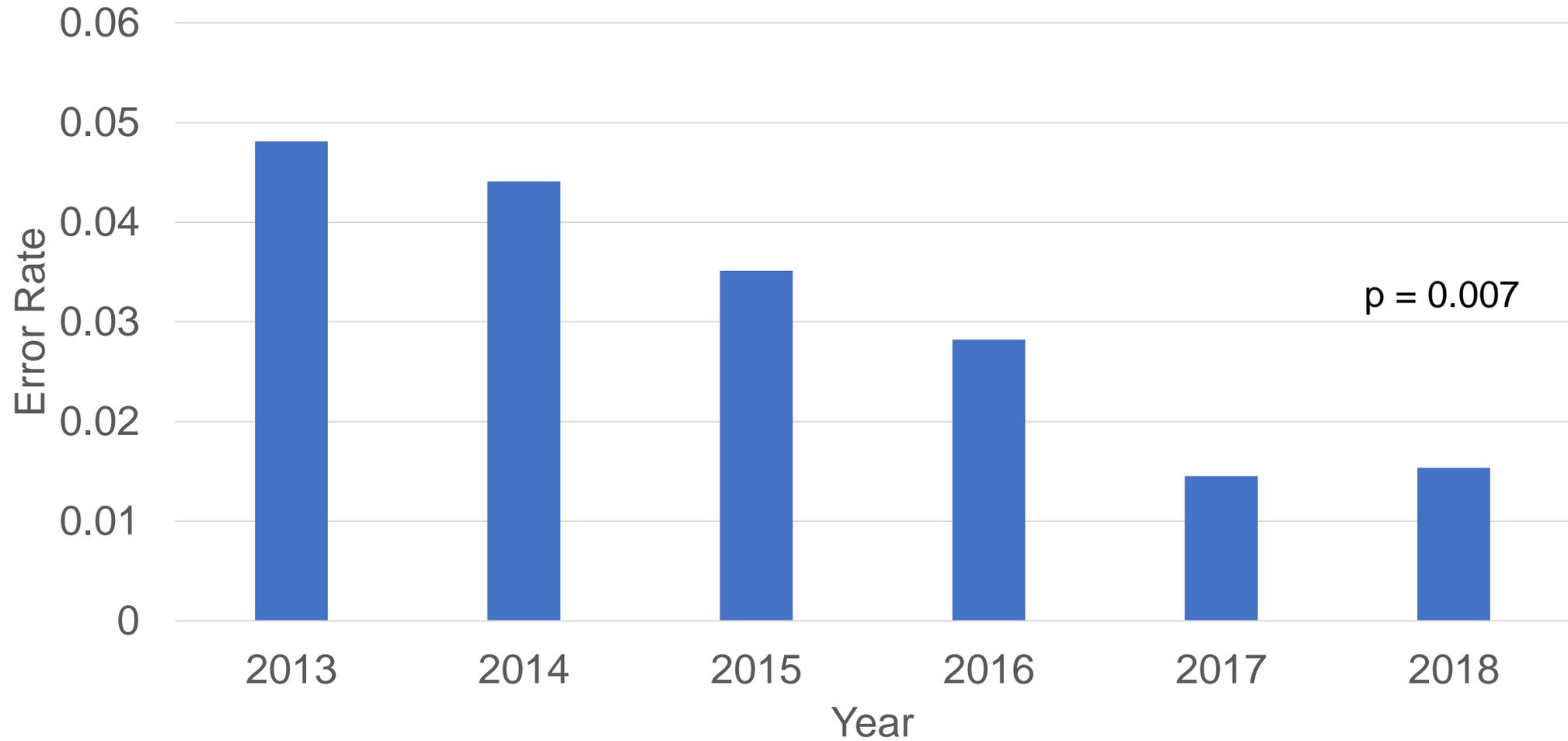
- Error rates were tracked according to technologist, and technologists were given real-time feedback by a manager
- Error rate was monitored in the daily quality management meeting



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



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

References

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3. Yuan S. et al. Clinical impact associated with corrected results in clinical microbiology testing. Journal of Clinical Microbiology 2005; 43(5):2188-2193.