How to Improve Gram Stain Competency by Core Laboratory Technologists.

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Background

Many microbiology laboratories have disappeared from hospitals as consolidation has taken place. This trend has cut cost but has left core laboratories (CL) in hospitals without the expertise to perform the most basic stat microbiology test: Gram stains on primary specimens. Gram stain competency impacts greatly treatment decisions.

In order to maintain proficient, CL participate in Gram stain proficiency testing (PT). The College of American Pathologists PT asks for:

- Gram staining (positive versus negative)
- Morphology (cocci, diplococci, cocci in clusters, coccobacilli, bacilli, branching filamentous).

In our 450 bed hospital, analysis of PT helped identify that there was a problem with interpretation of Gram stains.

Objective

Design and evaluate an internal program that would keep CL technologists proficient in Gram stain interpretation.

Methods

We collaborated with the laboratory where microbiology specimens are referred to so that they would provide bimonthly challenges that included 20 to 25 slides of 5 organisms (cultures or primary specimens).

Each CL technologist stains one slide and reads the slides from the 5 organisms. The technologists are asked to give the Gram staining characteristics and the morphology of each organism.

Results from the challenges are discussed by a supervisor with each tech. In addition, printed images from the challenges as well as other cases that have occurred in the hospital are presented at huddle to add microbiology knowledge.

Here we report the improvement in performance by CL technologists after 5 challenges.

Results

On the first two challenges 77-73% of techns read Gram staining correctly while morphology was read correctly by 56-53%. In addition, no tech had all answers correct.

By the fourth and fifth challenges, Gram staining was read correctly by 97-94% while morphology was read correctly by 76-73% and 6 of 21 techns answered all specimens correctly.

Of the challenges, 10 were Gram positive, 14 Gram negative and 1 a yeast. Eight cases were bacilli (Pseudomonas, Escherichia coli, Bacillus, Clostridium), 6 were diplococci (Neisseria, Moraxella, Streptococcus pneumoniae), 5 coccobacilli (Haemophilus), 4 cocci (Staphylococcus, Streptococcus), 1 branching bacilli (Propionibacterium acnes).

Definition of which samples require Gram staining before the specimen is sent to the microbiology laboratory has been emphasized. The CL performs Gram stains on cerebrospinal fluid, fluids from other sources such as pleura, peritoneal dialysis, and joints, and tissue samples that are ordered STAT such as wounds in which necrotizing fasciitis is in the differential diagnosis. Specimens that are not Gram stained in the CL include respiratory samples, urines or stool.

Based on feedback from CL techs we created a poster with the most frequent bacteria found in the different sample types that require STAT Gram staining.

Conclusions

We observed approximately 20% improvement when reading Gram stains by providing frequent challenges to CL techs and discussing the different features of the cases. CL techs are better at determining Gram staining properties of bacteria, while morphology still has room for improvement. However, there has been an increased motivation to perform the test for patients as the clinical importance of Gram stain results is emphasized during the huddle discussions.