Diagnostic performance of the Sputum Gram Stain in predicting sputum culture results for critically ill pediatric patients with pneumonia.
Pediatr Neonatol. 2020 Aug;61(4):420-425

Background & Objectives: The sputum Gram stain is an inexpensive, rapid, and convenient laboratory method that predicts the bacterial pathogens in patients with pneumonia. This study aimed to evaluate the diagnostic performance of this method in predicting sputum culture results for critically ill pediatric patients.
Methods: : From June 2008 to June 2018, patients with pneumonia with an endotracheal or a tracheostomy tube in place in the Pediatric Intensive Care Unit at Changhua Christian Hospital were enrolled retrospectively. Sputum was collected from each patient via the artificial airway for Gram stain and culture evaluations of bacterial pathogens. Mixed culture results were excluded. A successful prediction was defined as a match of the sputum Gram stain and culture results.

ACADEMIC P.E.A.R.L.S

Pediatric **E**vidence **A**nd **R**esearch **L**earning **S**nippet

Sputum Gram Stain in predicting the organism in severe pneumonia in PICU settings

Results
•A total of 622 records were reviewed, of which 542 were analyzed.
• **Haemophilus influenzae, Pseudomonas aeruginosa, and Streptococcus pneumoniae were the three most common pathogens found.**
•**The overall prediction success rate of the sputum Gram stain was 59.23%.**
• The sensitivity of the method in predicting gram-negative bacilli (GNB), gram negative cocci (GNC), and gram-positive cocci (GPC) was 0.45, 0.67, and 0.61, respectively. Its specificity in predicting GNB, GNC, and GPC was 0.87, 0.98, and 0.87, respectively. Its positive likelihood ratio in predicting GNB, GNC, and GPC was 3.46, 33.50, and 4.69, respectively.
•**The highest prediction success rate among all pathogens was for GNC**.

Conclusions: The sputum Gram stain had high specificity and relatively low sensitivity in predicting the bacterial pathogens in critically ill pediatric patients. Its high specificity in predicting sputum culture results means that clinicians can confidently use sputum Gram stain results to guide their antibiotic choice for treatment.

Key message: Sputum Gram stain can help in early diagnosis and guiding antibiotic therapy in severe pneumonia children.

EXPERT COMMENT

"**Sputum microscopy and culture has been routinely done in adults with pneumonia. In pediatric population due to difficulty in collecting sputum and getting good quality sample, this modality is not much utilized. Though in Severe bacterial pneumonia in PICU, gram stain of sputum is a relatively cheap, easily available test. If it reveals any organism than it has good specificity and treatment can be focused accordingly. More studies need to be done, to validate this finding.**"

DR SATYEN GYANI
DNB(Pediatrics),FNB(Pediatrics Intensive Care)
Pulse Hospital, Bhilai.

With warm regards,

DR MANINDER S DHALIWAL

Editor – Academic Pearls
pedpearls@gmail.com

DR. PIYUSH GUPTA
IAP NATIONAL
PRESIDENT 2021

DR BAKUL JAYANT PAREKH
IAP PRESIDENT 2020

DR REMESH KUMAR R.
IAP PRESIDENT 2022

DR G.V. BASAVARAJA
HON. SECRETARY
GEN. 2021 – 22

Reference
Huang WY, Lee MS, Lin LM, Liu YC. Diagnostic performance of the Sputum Gram Stain in predicting sputum culture results for critically ill pediatric patients with pneumonia. Pediatr Neonatol. 2020 Aug;61(4):420-425. doi: 10.1016/j.pedneo.2020.03.014. Epub 2020 Apr 4.