Gram Stain-Guided Antibiotic Therapy in Patients With VAP

ANTIMICROBIAL RESISTANCE

The increase of multidrug-resistant (MDR) organisms in ICUs is a well-recognised threat. Due to a lack of development of new pharmaceutical agents, there are now only a few antibiotics that are effective against these organisms. The World Health Organization (WHO) has also highlighted the need to develop a global action plan to address antimicrobial resistance and optimise the use of antibiotic agents.

Patients admitted to the ICU are among the largest consumers of antibiotics within a healthcare system, as these patients are at a high risk of infection. In particular, ventilator-associated pneumonia (VAP) is a complication that requires the use of antibiotics in nearly 10% of patients undergoing mechanical ventilation. The 2016 clinical practice guidelines by the Infectious Disease Society of America and American Thoracic Society recommend coverage for both methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa.* But the excessive use of broad-spectrum antibiotic agents could further accelerate the emergence of antimicrobial-resistant organisms. It is thus important to reduce the unnecessary use of broad-spectrum antibiotic agents for VAP.

In a randomised clinical trial with 206 patients with VAP, researchers investigated whether gram stain-guided antibiotic therapy restricted the administration of broad-spectrum antibiotic agents without any detrimental effects on the patient.

The study was conducted in intensive care units of 12 tertiary referral hospitals in Japan. Patients aged 15 years or older with a VAP diagnosis and a modified Clinical Pulmonary Infection Score of 5 or higher were included in the study. Patients were randomised to receive gram stain-guided antibiotic therapy or guideline-based antibiotic therapy.

The study's primary outcome was the clinical response rate - defined as completion of antibiotic therapy within 14 days, improvement or lack of progression of baseline radiographic findings, resolution of signs and symptoms of pneumonia, and lack of antibiotic agent re-administration, with a noninferiority margin of 20%. Secondary outcomes included the proportions of antpseudomonal agents and anti–methicillin-resistant *Staphylococcus aureus* (MRSA) agents as initial antibiotic therapies; 28-day mortality, ICU-free days, ventilator-free days; and adverse events.

Findings of the study showed that in patients with VAP in the ICU, the clinical response to gram stain–guided antibiotic therapy was non-inferior to that of guideline-based antibiotic therapy. Gram stain–guided antibiotic therapy reduced the use of antipseudomonal agents and anti–methicillin-resistant *Staphylococcus aureus* agents. Clinical response occurred in 76.7% of patients in the gram stain–guided group and 71.8% of patients in the guideline-based group. The 28-day cumulative incidence of mortality was 13.6% in the gram stain–guided group and 17.5% in the guideline-based group. No significant differences were observed between the groups on ICU-free days, ventilator-free days, and adverse events.

These findings suggest that gram staining can be used in the ICU to reduce the spread of multidrug-resistant pathogens.

Source: JAMA

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