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# PATHOGENICITY AND VIRULENCE OF *STAPHYLOCOCCUS AUREUS*

Mihail Rulevschi, Dmitri Iunac

“Nicolae Testemitanu” State University of Medicine and Pharmacy, Republic of Moldova

## Summary

**Introduction.** *Staphylococcus aureus* is one of the most frequent worldwide causes of morbidity and mortality due to an infectious agent. This pathogen can cause a wide variety of diseases, ranging from moderately severe skin infections to fatal pneumonia and sepsis. Infections with *S. aureus*, particularly methicillin-resistant *S. aureus*, can result in increased mortality, morbidity, and economic loss, exerting pressure on healthcare systems around the world. To establish host infection, *S. aureus* manages a complex regulatory network to control virulence factor production in both temporal and host locations. The aim of the research is to identify and describe the pathogenicity and virulence factors of *S. aureus* strains.

**Material and methods.** Secondary study, narrative synthesis. Information was collected from international electronic databases, including Scopus, PubMed, Web of Science, and Google Scholar. 58 sources, the most current and recent publications on the pathogenicity and virulence factors of *S. aureus* strains were analyzed and studied. The reference period was the years 2019–2024. Research methods used: descriptive, analytical.

**Results.** The clinical importance of *S. aureus* is attributed to notable virulence factors, surface proteins, toxins, and enzymes as well as the rapid development of drug resistance. The most associated virulence factors with this microorganism are large numbers of toxins including hemolysins ( $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ), leukocidins (Panton-Valentine leukocidin; PVL, Luke/D), heat-stable staphylococcal enterotoxins (SEs), which cause the sporadic food-poisoning syndrome or foodborne outbreaks, exfoliative toxins (ETA and ETB), and the toxin of toxic shock syndrome-1 (TSST-1), which causes food poisoning, enterocolitis, scalded skin syndrome, and toxic shock. Nearly all strains of *S. aureus* secrete several extracellular enzymes which function is thought to be the disruption of host tissues and/or inactivation of host antimicrobial mechanisms. These exoenzymes include lipases, lecithinase, nucleases, proteases, hyaluronidase, and staphylokinase. The horizontal transfer of virulence genes has contributed to the emergence of contemporary virulent strains of methicillin-resistant *S. aureus* in hospital and community settings, the extent of which remains poorly understood. Biofilm is the most important factor that participates in pathogenesis by increasing resistance of the constituent microbes to antibiotics leading to a protected environment against the host's defenses.

**Conclusions.** Virulence factors are powerful predictors of pathogenic potential. *S. aureus* has developed a complex regulatory network to manage virulence factors production, allowing the pathogen to thrive in different environmental conditions. *S. aureus* has an arsenal of virulence factors that works co-ordinately together to establish host pathogenesis.

**Keywords:** *Staphylococcus aureus*, MRSA, biofilm, toxins, virulence, pathogenicity