PP-18-MTS

A CONCEPT TO INCREASE THE SENSITIVITY OF *STAPHYLOCOCCUS AUREUS* DETECTING SENSOR IN SKIN AND WOUNDS TO PREVENT HEALTHCARE ASSOCIATED INFECTIONS

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Background: Healthcare-associated infections (HAIs) are infections acquired by patients within healthcare facility stays, not present upon admission. HAIs annually impact millions of patients worldwide, leading to preventable illnesses, deaths, increased antibiotic resistance, prolonged hospital stays, and higher healthcare costs. Staphylococcus aureus (*S. aureus*) is a leading cause of HAIs, posing life-threatening risks. Microorganisms challenge efforts to maintain sterility during surgical procedures and on patient skin surfaces, despite stringent aseptic protocols. Even with standard precautions, contamination by HAIs through patients or healthcare personnel remains a serious threat. To address these challenges, leveraging medical technological advancements for detecting invading microorganisms, such as sensor systems, could enhance infection control measures during surgical procedures and patient care, ensuring safer healthcare environments.

Methodology: When developing a concept to increase the sensitivity of Staphylococcus aureus detecting sensor in skin and wounds, firstly the types of sensors to detect microorganisms were identified. Then the types of sensors available to detect *S. aureus* on skin and wound surfaces were identified.

Deliverables: Theoretical Concept is proposed to increase the sensitivity of WINDOW sensor which is a flexible, wireless device for detecting *S. aureus* through its DNase activity. This sensor uses a DNA hydrogel that dissolves in the presence of DNase, altering the capacitance of an interdigitated electrode. By integrating Near Field Communication (NFC) for wireless data transfer, the sensor provides real-time feedback via a smartphone. To improve the WINDOW sensor's sensitivity, several approaches can be taken such as Optimize Molecular Recognition, Enhance Physical/Chemical Properties and Advanced Data Processing. These improvements can increase the sensor's sensitivity, thus advancing chronic wound care and infection management.

Conclusion: Several obstacles must be overcome to achieve this higher sensitivity, though, including lack of experts in the field, inadequate technology resources, and the high expense of creating new sensors.

Keywords: Healthcare Associated Infections, Staphylococcus aureus, WINDOW sensor