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Research Article

Effectiveness of the Class VI Internal Chemical Indicator Strip on Steam Sterilization of Sodium Chloride Infusion

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ABSTRACT

Steam sterilization which utilizes the autoclave is an effective and fast method of sterilization. The purpose of sterilization is to provide sterile products, material and medical equipment. All goods which have been sterilized must have a sterility assurance. Sterility testing can be done based on the usage combination of mechanical, chemical and biological indicators as sterilization parameters. The purpose of this research was to find out the effectiveness of the Class VI Internal Chemical indicator strip on steam sterilization of sodium chloride infusion. This research is a laboratory experiment with procedural stages of this research includes formulation of the NaCl 0.9 % infuses, the application of class VI Internal Chemical indicator strip in the steam sterilization process and evaluation of the NaCl 0.9 % infuse which includes sterility testing. The timings of sterilization used were 5, 7, 9, 10.5, 12, 13.5 and 15 min. The results show that class VI internal chemical indicator strip shows intended color change after 12 min of sterilization. The results of the sterility test on the sodium chloride 0.9 % infuse has no microbial growth starting from sterilization time 10.5 min onwards. The class VI internal chemical indicator strip is effective with 12 min of steam sterilization at 121 °C.

Keywords: Class VI Internal Chemical Indicator Strip, Steam Sterilization, Sodium chloride 0.9 % infusion

INTRODUCTION

Steam sterilization which utilizes the autoclave is an effective and fast method of sterilization. The purpose of sterilization is to ensure sterile products, material and medical equipment, and not only for producing sterile goods. All goods which have been sterilized must have a sterility assurance[1-3]. Sterility testing can be done based on the usage combination of mechanical, chemical and biological indicators as sterilization parameters[2]. Upon usage of the equipment, we initially have to validate and state that the equipment is utilizable. This can be done by the usage of chemical strip indicator[2,4]. There are two types of chemical indicators, which are the external chemical indicator and internal chemical indicator. The chemical indicator uses a sensitive chemical compound to assess physical conditions such as temperature throughout the sterilization process. The internal chemical indicator should be placed in each sterilization pack to ensure that the sterilization agent penetrates the packaging and truly reaches the instruments within the package. An external chemical indicator is used when the internal chemical indicators could not be observed from outside the package. These indicators change colour after being exposed to a certain temperature. Due to this, the chemical indicator can verify that temperature is achieved and the sterilization process is successful[4-6]. The advantages of the chemical indicator are that it can give immediate information whether an object has undergone sterilization and whether the parameters or conditions required for sterilization is achieved[3]. Besides that, the chemical indicator can indicate specific information on each packaging. The disadvantage of the chemical indicator is that it cannot assure a sterile condition, but can only indicate that if an object has undergone sterility conditions in a sterilization process cycle[4,5]. William A. Rutala, 1996, has conducted a research by comparing four types of biological indicator and five types of chemical indicators for steam sterilization at 121 °C to monitor the effectiveness of sterilization. The results show that after 48 h of incubation, the conventional biological indicators Attest 1262, Proof Plus, Assert and Biosign each showing 100 %, 95 %, 88 % and 93 % percentage of spores alive after 5 min of sterilization, 0 %, 0 %, 0 % and 8 % percentage of spores alive after 10 min of sterilization and all 0 % percentage of spores alive after 15 min of sterilization. After 3 h of incubation, the Attest 1292 Rapid Readout biological indicator shows 100 %, 72 % and 0 % of fluorosence after 5, 10 and 15 min of sterilization respectively. The chemical indicators Comply, Propper, Chemdi, Sterigage and Thermalog S respectively showed sterilization failure rate of 100 % each after 5 min of sterilization, 0 %, 0 %, 0 %, 92 % and 100 % after 10 min of sterilization and 0 %, 0 %, 0 %, 3 % and 27 % after 15 min of sterilization[7]. Based on the above matters, the effectiveness of the usage of the class VI internal chemical indicator strip in steam sterilization will be conducted to obtain a good and reliable sterilization process.

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