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Medical MythBusters: Evaluating the Fastest Method for Utilizing Chlorhexidine Gluconate Applicators

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Introduction

Surgical site skin preparation is a fundamental aspect of sterile technique in surgery. Chlorhexidine gluconate-based solutions are often used to cleanse the surgical site [1-3]. Chlorhexidine gluconate is a bactericidal agent that works *via* membrane disruption [4]. In the operating room, chlorhexidine gluconate is most often applied using disposable applicators which contain a glass vial of chlorhexidine solution, that when broken, releases the solution onto an application sponge. This solution-soaked sponge is then applied to the surgical site.

Operating Room (OR) personnel may be familiar with the delay that occurs between activation of the applicator (pressing a tab to break the vial of solution) and saturation of the applicator sponge with chlorhexidine solution. Additionally, OR personnel often have methods for supposedly decreasing this delay. It is not uncommon to be told in the OR to shake or wave a chlorhexidine applicator in a certain manner to abbreviate this delay in sponge saturation. Oftentimes, those suggesting these methods believe strongly that their ways are the fastest; however, they lack scientific data to support these claims.

With OR costs being estimated at $37 USD per minute, minimizing this lost time by even small amounts would result in significant savings of both time and money when implemented on a large scale [5,6]. With the goal of both reducing the use of OR time, and addressing unsubstantiated dogmatic claims, we set out to determine a method for optimizing the use of chlorhexidine gluconate applicators.

Sixty 26 ml chlorhexidine gluconate applicators (Chloraprep, BD, Franklin Lakes, NJ) were divided into six groups. Each group underwent a different method of decreasing the time for activation. These six methods were determined through discussion with our institution's surgeons and perioperative staff. The six methods were a control (in which nothing was done to the applicator), an up-and-down shake, a side-to-side shake, dabbing the sponge applicator on a flat surface, poking the sponge applicator with cotton-tipped swabs, and applying a continuous squeeze to the applicator. The time between applicator activation and saturation of a 21 mm radius circle on the applicator sponge was recorded. On average, side-to-side shaking was the fastest method for time to sponge saturation. Compared with the control group, up-and-down shaking, side-to-side shaking and dabbing the sponge on a flat surface were each significantly faster than the control. Poking the sponge with the cotton-tipped applicator was the slowest method on average. Compared with the control group, the side-to-side method saved 17.9 seconds. When compared with the 'poke' method, side-to-side shaking reduced time to saturation by up to 27.5 seconds.

Conclusion

Our study conclude that side-to-side shaking was on average the fastest method for chlorhexidine gluconate applicator activation, with potential time savings of 27.5 seconds compared with the slowest tested method. Utilization of this technique could potentially save a single surgeon who performs 500 surgeries per year an estimated 3.75 hours and $8,325 USD. While this study was successful in its aim of identifying the optimal way to utilize a chlorhexidine applicator, it also addresses the need to empirically test dogmatic beliefs. This study is one of many potential studies that can evaluate the validity of similar claims in the OR, and in medicine as a whole. While these questions and beliefs may seem small and inconsequential, they impact the daily workflow of practitioners. As such, future studies should aim to address these practical questions.

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