Bacterial transfer through needlefree connectors: Comparison of nine different devices

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INTRODUCTION

In 1991, the U.S. Occupational Safety and Health Administration encouraged healthcare facilities to ‘install engineering controls that make the environment healthier and safer for workers’ due to increased needlestick injuries among healthcare workers. In April 1992, the FDA issued a needlestick alert with strong encouragement for the replacement of hypodermic needles with needlefree systems or remounted needles that are mounted on a plunger system. The FDA indicated that there was no evidence that patient bloodstream infections had increased with the implementation of needlefree systems that had been cleared for marketing at that time. These included a protected needle device with an auxiliary barrel with a needle, a needle-free injection device, and a needle-free injection device with a needle.

Since then, numerous reports of increased bloodstream infection rates involving various needleless systems have been published. These reports accompanied the introduction of needlefree devices with a wide variety of designs and mechanical engineering features (Figure 1). It has been suggested that even though several outcomes of CBRS have been reported with the use of the early needleless systems, the use of the newer laser-assisted devices adds additional risk for bloodstream infection. However, multiple potential risk factors for catheter-related bloodstream infection related to needlefree device use have been identified, including use of septic technique, user competency, frequency of intermittency therapy per device during a single access, complex therapies, service delivery location, culture diversity, compliance with manufacturer’s instructions for use, and device design.

More recently several institutions have reported increases in catheter-related bloodstream infection rates with a fourth generation of positive fluid displacement systems that provide negative displacement features. These reports accompanied the introduction of septum-based needlefree systems that are intended to provide rapid access to the bloodstream while maintaining a closed sterile environment.

A systematic review including five randomized controlled trials has been conducted recently to determine the effect of the use of needleless closed systems, conventional closed systems or conventional open systems on catheter-related infections in hospitalized patients with intravascular catheters (Martell et al., 2005). It was concluded that there were no significant differences between using these new systems, but there is insufficient evidence to recommend the needleless closed systems. However, the reviewers also noted that the quality of the trials and the way they were reported were generally unsatisfactory. The ESR, an independent nonprofit health services research agency, concluded in a special report regarding the concerns of increased infection incidents in intravenous medicine, that the evidence is adequate to justify replacing or removing PFD LADs unless the facility experiences sustained increase of infection with LADs that there is not adequate data to justify replacing or removing PFD LADs.

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