

## How Do You Prevent Indented Buttonhole Sites?

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**Q:** In our dialysis facility, we have noticed that over a period of time, buttonhole sites start developing a widening and a bowl-like indentation at the entrance. We are having difficulty removing the scabs completely due to the scab forming in the bowl. Is there anything that can be done to prevent this?

**A:** The buttonhole technique has been utilized for more than a decade in the United States, but the number of patients with AV fistulas using the technique is still unknown. In 2007, the Fistula First Breakthrough Initiative (FFBI) did a nationwide survey to identify how many facilities were cannulating using the buttonhole technique, and what, if any, complications they were experiencing. Twenty-eight percent of the facilities using this technique indicated they had at least one infection (Centers for Medicare & Medicaid Services, 2008). It should be noted that the voluntary survey limitations included the inability to quantify the number of complications, whether they occurred in the same or multiple individuals, and over what period of time they occurred. Published research has also identified infection as a concern with buttonhole cannulation (Doss, Schiller, & Moran, 2008; Marticorena et al., 2006; van Loon, Goovaerts, Kessels, van der Sande, & Tordoir, 2009; Verhallen, Kooistra, & Van Jaarsveld, 2007).

Important factors to consider about the buttonhole technique are the risks for infection and skin breakdown, which could be potentially higher because of entering the skin at the same point every treatment. Infections occur-

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ring in buttonholes are now mimicking catheters – exit site, tunnel, and bloodstream infections, rather than site rotation of AV fistulas and grafts. Jaber (2005) discusses bacterial infections caused by catheters in patients on hemodialysis and identifies the most frequent cause of catheter-related bloodstream infection is from the colonization of the cutaneous catheter tract with skin flora. Since our patients have more *S. aureus* on their skin (Kaplowitz, Comstock, Landwehr, Dalton, & Mayhall, 1988) and now have a “permanent” tunnel down to the blood vessel wall, we could expect to see an increased risk of tunnel and/or bloodstream infections if proper cleaning technique is not used. A few research studies have incorporated the use of antibacterial ointments to the exit sites and have seen a reduction in exit site infections in their buttonhole population (Marticorena et al., 2006; Nesrallah, Cuerden, Wong, & Pierratos, 2010).

The experience you have described is not unique to your facility. The authors have received reports of this occurrence from around the country. Because this technique does not require rotating cannulation sites, the constant pressure exerted by the needle hub pushing up against the skin with repeated cannulations can cause the mouth of the buttonhole site to enlarge. As cannulation continues, further deterioration of the entrance to the buttonhole sites occurs, creating a concave area (see Figure 1). This phenomenon is known as “hubbing.” The term hubbing is derived from the needle hub actually becoming buried in the entrance to the tunnel and cannot be

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**Figure 1**

This illustrates the concave area, “hubbing,” caused by advancing the hub into the buttonhole.



**Note:** Photo by Stuart Mott.

**Figure 2**

The hub of the needle is inserted into the buttonhole, leading to the development of “hubbing.”



**Note:** Photo by Stuart Mott.

**Figure 3**

This image demonstrates correct needle placement with approximately 1/16 inch of the needle exposed, preventing the hub from entering the buttonhole that can lead to the development of “hubbing.”



**Note:** Photo by Stuart Mott.

seen (see Figure 2). Potential problems associated with hubbing may include:

- Inability to remove the scabs completely.
- Inability to clean the entrance site thoroughly.
- Increased trauma at the entrance of the buttonhole sites.
- Breakdown of the epithelial lining of the buttonhole tunnel.

In the buttonhole technique, it is imperative to remove scabs completely before inserting needles down the tunnel because they can harbor *S. aureus* from the patient's skin (Ball, 2006). The biggest problem with hubbing is that scab formation occurs at the bottom of the concave area (bowl) and becomes very hard to remove completely. Patient care staff report they have to dig the scab out using either a scab lifting device or sharp needle, or leave remnants of the scab behind. This increased trauma around the entrance sight could cause a break in the epithelial lining, allowing a niche for bacteria. In addition, if the scabs cannot be fully removed, then cleaning around the entrance of the sites is also incomplete, and could allow introduction of bacteria down the tunnel and into the blood stream, causing either a tunnel infection or bacteremia.

### Implications for Nephrology Nursing

What does that mean for nephrology nurses? First and foremost, we need to prevent hubbing from occurring. When inserting needles into the buttonhole tunnels, make

sure to leave approximately 1/16” of the needle exposed, which will prevent the hub of the needle from touching the entrance sites (see Figure 3).

But what about those patients who are currently experiencing hubbing? If there is a real problem with removing the scabs completely, then relocation of the buttonhole sites would be prudent. If it is not feasible to relocate the sites, then you need to remember these important points:

- Be meticulous about preparing skin for needle insertion by following the manufacturer's recommendation about the proper contact time for access disinfection.
- Be diligent about complete removal of the scab without traumatizing the exit site by digging with tweezers, needles, or scab-lifting devices.

Nephrology nurses should complete a thorough assessment of the buttonhole sites, specifically looking for hubbing. Hubbing is not the only cause of infection in buttonholes, but by paying particular attention to the occurrence of this phenomenon, we can reduce one aspect of infection when utilizing the buttonhole technique.

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