The Importance of ESD use in the Securement of Central Lines

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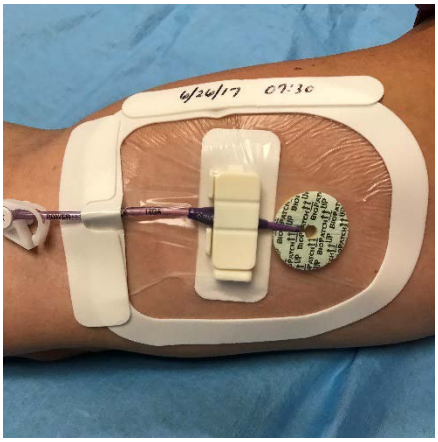
Engineered securement devices, known as ESDs, are recommended for use by the Infusion Nurses Society Infusion Therapy Standards of Practice (Gorski, et al, 2016) for central line stabilization. Citing an article published in the Journal of Vascular Interventional Radiology, the Centers for Disease Control states that when a patient has a PICC or other type of central catheter, it is important to "Use a sutureless securement device to reduce the risk of infection for intravascular catheters" (Yamamoto, et al, 2002). Currently, there is a wide variety of engineered securement devices for stabilizing PICCs and other central catheters on the market. The common factor among these devices is that they eliminate the need for sutures for catheter stabilization. While many perform this task well, there are other factors which must be considered when choosing an appropriate engineered securement device for a specific patient population.

Dislodgement, or movement, of central intravenous catheters can cause distal venous tip migration (Macklin, et al, 2015). Because the central catheter cannot be used if the distal tip has moved out of the lower third of the superior vena cava, migration of the distal catheter tip out of the prime location can lead to a delay in treatment while the catheter is evaluated and, if possible, distal tip location is reestablished. Movement greater than 5mm-15mm can be enough to cause dislocation of the catheter tip, leading to x-ray verification of catheter tip location and, potentially, costly removal and replacement of the catheter.

Appropriate PICC line securement consists of securing the catheter wings with an active mechanical securement device (aka, active catheter securement) and covering the insertion site area with a bordered bio-occlusive dressing (aka, insertion site protection). These are two distinct and separate functions that help to maintain the catheter. It is important for engineered securement devices to achieve several different objectives. The device must actively secure the portion of the catheter that the catheter manufactures intended for securement, the catheter wings. The device must also comfortably adhere to the patient's skin, help to prevent catheter movement/ migration and the risk of infection. One product, Clik-FIX™, has come to our attention as being highly effective in minimizing micro-pistoning, thereby reducing the risk of blood stream infection. This ESD actively secures the wings of central catheter in a locking mechanism specifically designed to reduce catheter movement. This locking mechanism is attached to a soft adhesive pad which is placed on the patient's skin to reduce or prevent movement of the distal tip of the central catheter from the lower third of the superior vena cava.



Clik-FIX PICC Securement

Use of an ESD that helps diminishes the movement of the distal tip of the catheter is therefore of primary importance in attempting to prevent central catheter dislodgement.

Insertion site infection of central intravenous catheters is an ongoing risk.

Although site cleaning is standard practice when placing central catheters and when performing sterile dressing changes, the vast majority of the microflora on the surface of skin is replenished every 18 hours (Macklin, et al, 2015). Micropistoning can force *Staphylococcus epidermidis* from the skin surface into the insertion site, which can lead to insertion site infection. Additionally, normal patient movement and catheter maintenance can cause micropistoning of a central catheter, moving the microflora into the insertion site, where microbes can travel extraluminally along the catheter and seed, potentially leading to blood stream infection. The use of an engineered securement device, or ESD, is an essential part of reducing catheter pistoning. There are many securement devices on the market, but not all specifically address the issue of catheter pistoning. Therefore, a critical aspect of attempting to avoid infection in patients with a central catheter is to choose an ESD that is shown to significantly reduce catheter pistoning.

Additionally, difficulty in maintaining strict sterile technique while performing sterile dressing changes can lead to insertion site contamination, which can result in infection. Some engineered securement devices can be difficult to apply while adhering to sterile technique (Cordovani, et al, 2013). Ease of use of an engineered securement device, or ESD, is another important factor to consider in the effort to decrease the risk of microbial contamination of the central catheter and of the insertion site during sterile dressing changes (Macklin, et al, 2015). An ESD that does not require excessive handling or force to open, close, and safely attach the device to the catheter helps the practitioner to maintain sterile technique and reduce inadvertent tugging on the catheter. Ensuring that sterile technique is used while performing dressing and ESD changes for the non-cooperative patient can be challenging. Elderly patients with dementia or other cognitive challenges often become confused or anxious during these procedures. The ease of placement provided by Clik-Fix allows the nurse to properly place the device and maintain sterile technique while performing dressing and device changes. This reduction in potential contamination may also help to prevent insertion site as well as blood stream infections.

Central line associated blood stream infections, also known as CLABSI, can occur in patients who have central intravenous catheters. When healthcare givers do not comply with the CDC recommended central line maintenance bundle, research shows that there can be an increase in the incidence of CLABSI (Sandoval, 2015). When central lines are not secured properly, micropistoning can occur. Micropistoning, which is the repeated movement of a portion of the catheter into and out of the vein, has been shown in some cases to cause damage to the intima and result in phlebitis or infection (Earhart, 2014). The reduction in pistoning decreases irritation to the intima, which can help prevent the development of phlebitis or infection in the patient with a central catheter. The risk of venous thrombus production at the insertion site due to catheter movement after the initial placement can be impacted by the efficacy of the engineered securement device used to stabilize the central catheter (Gorski, et al, 2016). The catheter insertion site is a wound that the body attempts to heal. Catheter movement at the insertion site causes an inflammatory response in the body's attempt to reduce friction so that healing of the insertion site can occur. Platelets attach to the venous intima in an attempt to heal the injury caused at the site of the catheter penetration into the vein. Platelets gather to close the hole in the vein, leading to the formation of venous thrombus at the insertion site (Macklin, et al, 2015). Proper use of an approved engineered securement device helps to reduce catheter movement, thereby reducing the risk of phlebitis or infection (Ullman, et al, 2015). The Joint Commission states that the proper use of an effective engineered securement device is a crucial part of preventing catheter pistoning (Improving, 2016). Minimizing manipulation of the engineered securement device, or ESD, can decrease movement of catheter at insertion site, leading to decreased chances of infection and of thrombus formation.

Among nurses caring for elderly patients it has become apparent that there are several important challenges that should be considered (Coulter, 2016). One of the intrinsic factors encountered by the nurse caring for the geriatric patient is the fact that many elderly adults have thin, fragile, dry skin which tears easily (Rayner, et al, 2015). Malnutrition and dehydration, two reasons the patient may need intravenous fluids, can also contribute to the fragility of the patient's skin (McNichol, et al, 2013). In addition, certain extrinsic factors contribute to skin tears among elderly residents. These risk factors include device removal, dressing removal, and repeated taping (McNichol, et al, 2013). The ease of device removal without the increased risk

of inflicting skin damage makes Clik-Fix an attractive alternative among this high-risk population.

The interruption of skin integrity upon removal of engineered securement devices used to stabilize central intravenous catheters is not to be taken lightly. Geriatric, neonatal, and pediatric patients are at increased risk of sustaining skin tears, known as medical adhesive related skin injuries, or MARSI, when central vascular access devices are secured near the insertion site using products with strong medical adhesives, especially when these products are used in ways other than those specifically described by manufacturers (Broadhurst, et al, 2016). Incorrect use of engineered securement devices may include failure of the practitioner to properly prepare the skin surface for the introduction of a strong medical adhesive. In cases where this additional step is not performed, this type of adhesive can be very difficult to remove later, even with the help of alcohol or adhesive removal wipes. This difficulty in removal has led some healthcare givers to pull the device to remove it from the unprepared skin, resulting in skin injuries such as skin tears (Hitchcock, et al, 2015). Use of an engineered securement device with moderate adhesion does not require the extra step of preparing the skin with a specialty skin preparation solution. The moderate adhesive provides stabilization for the central vascular access device without introducing the additional risk to skin integrity that is seen with a strong medical adhesive. By utilizing a moderate adhesive engineered securement device it is possible to achieve catheter stabilization while protecting skin integrity in all patients, particularly in those patients who are at a higher risk of experiencing skin injuries.

MARSI, or medical adhesive related skin injury, is a recently defined category of skin injury (Yates, et al, 2017). A reduction in the instances of skin injuries associated with the use of medical adhesives is a goal for all areas of health care.

When considering the use of an Engineered Stabilization to secure PICC lines, it is important to review how well the device will help to prevent catheter complications.

- Does the ESD actively secure the wings of the catheter?
- Is the ESD designed to help prevent catheter pistoning and migration?
- Is the ESD easy to place? How much do you need to handle the catheter to place it in the device?
- Is the ESD easy to remove? Does opening of the device create any upward or downward pressures that could jolt the catheter?
- Is the adhesive portion of the ESD secure yet easy on the patient?

Clik-FIX is a new alternative ESD that helps to minimize movement related complications and is easy on the patient's skin.

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