CENTRAL venous access devices (CVAD) are a vital medical device, used commonly across various acute care settings (Ullman, Marsh, Mihala, Cooke, & Rickard, 2015). Central to maintaining CVAD functionality are clinical practices aimed at preventing complications such as infection (chlorohexidine and alcohol antisepsis, chlorohexidine impregnated dressings) or dislodgement (sutures, medical grade glue and securement devices).

However, the application and reapplication of devices and antiseptics can result in significant skin irritation and injury surrounding the CVAD site, causing patient discomfort and potentially CVAD dysfunction.

Using established consensus methods a group of skin and wound care, and vascular access experts have developed an evidence based algorithm to classify CVAD-associated skin impairment (CASI) and provide clinicians with expert advice on treatment options (see Figure on next page) (Broadhurst, Moureau, & Ullman, 2017).

Building on evidence related to medical adhesive-related skin injuries (McNichol, Lund, Rosen, & Gray, 2013) CASI is defined as the “occurrence of drainage, erythema, and/or other manifestation of cutaneous abnormality, including but not limited to vesicle, bulla, erosion or tear, at a CVAD site in the underlying area of a dressing, which persists 30 minutes or more after removal of the dressing.” (Broadhurst et al., 2017, p. 213).

There are four types of CASI including:
1. Exit-site infection;
2. Skin injury (skin stripping, skin tears or tension blister) where the skin layers are removed or separated due to tension or force applied during removal of adhesive tape or dressings;
3. Skin irritation (irritant or allergic contact dermatitis) due to application of chemical irritant); and
4. Non-infections weeping or oozing (clear amber, pink or red, or cloudy or milky)

Applying the CASI algorithm: An example

Tony, an 18yo man, was discharged from intensive care yesterday.

Three days ago he was involved in a motor vehicle accident and sustained a closed head injury, lacerated spleen, and a fractured right femur. He has a CVAD in his right subclavian being used for maintenance fluid, pain relief and antibiotics. Overnight his central line site ‘is itching’.

Soon after handover Tony calls you because his central line site ‘is itching’. You note that there is a red rash under the dressing which is circumscribed by the area immediately under the dressing. Tony says this happened in intensive care and they said it would go away. He also confesses to scratching at the previous dressing because it was itching.

What complication is Tony experiencing and what will you do next?

Using the CASI algorithm you assess that Tony probably has skin irritation due to the chlorhexidine antiseptic. You decide that at the next dressing change you would ensure the antiseptic is allowed to dry completely, and apply a skin barrier film to provide some skin protection. You tell Tony to let you know if the itchiness continues and to refrain from scratching at the dressing. You make detailed notes in Tony’s medical record to alert your colleagues especially regarding the possibility of a developing allergic reaction to chlorhexidine and the possible need to modify the dressing regimen to prevent further skin damage.

REFERENCES


CVAD–Associated Skin Impairment (CASI) Algorithm

1. Assess Patient
2. Protect Skin and Provide Comfort

**If Exit Site Infection is Suspected:**
- Culture site and draw blood cultures
- Collaborate with practitioner; may need to remove catheter
- Topical antiseptic agent† (based on culture results) or consider non-CHG antimicrobial dressing
- If there is no resolution with topical therapy or it is accompanied by purulent drainage, start systemic antibiotics
- If exit site infection is suspected, consider cauterizing exuberant granulation tissue at site of long-term CVAD

**Dressing Usage Guide for CVAD Skin Impairment Management**

<table>
<thead>
<tr>
<th>Dressing*</th>
<th>Skin Injury (e.g., tear/blister)</th>
<th>Skin Irritation</th>
<th>Drainage</th>
<th>Able to see site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-adherent non-woven gauze** (if skin intact or topical agent applied)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Transparent film</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Absorbent clear acrylic</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hydrocolloid (do not apply directly on CVAD exit site)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Foam (silicone or low-tack)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Alginate (also has hemostatic properties)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Skin glue (2-octylcyanoacrylate alcohol-free topical bandage) + Cover Dressing</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Antimicrobial dressing†**</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

* Confirm compatibility with dressing and catheter

** Does not provide a microbial barrier
*** Assess manufacturer's contraindications.

---

**Fig. 1 – Reaction to CHG w/ Alcohol**

- Try CHG w/o alcohol
- No improvement?
- Try Povidone Iodine
- No Improvement?
- Try sterile normal saline

**Fig. 2 – Open Application Test**

1. Apply product to forearm
2. Monitor for 30–60 min.
3. Reassess in 3–4 days for signs of dermatitis

---

The CASI article is open-access (creative common license) and available at [http://journals.lww.com/jwocnonline/](http://journals.lww.com/jwocnonline/)

Fulltext/2017/05000/Management_of_Central_Venous_Access.2.aspx