Buttonhole Cannulation Technique: What You Need to Know to Develop and Maintain a Successful Buttonhole
What is the Buttonhole Technique?

• **Follow-the-Leader Technique**
  - Sites are pre-determined
  - Direction of needles pre-determined
  - Angle of insertion pre-determined

• **A way to standardize cannulation skills**
  - Must utilize expert cannulators
  - One cannulator for creation period
## The Buttonhole Technique - Research and Education

<table>
<thead>
<tr>
<th>Year</th>
<th>Education</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Ball</td>
<td></td>
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<tr>
<td>2006</td>
<td>Ball</td>
<td>Marticorena et al.</td>
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<tr>
<td>2007</td>
<td>Ball et al.</td>
<td>Verhallen et al.</td>
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<td>2008</td>
<td>Doss et al.</td>
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<td>2009</td>
<td></td>
<td>Marticorena et al.; van Loon et al.</td>
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<tr>
<td>2010</td>
<td>Ball &amp; Mott; Ball; Birchennough et al.</td>
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<tr>
<td>2011</td>
<td>Donato-Moore</td>
<td>Chow et al.</td>
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</tbody>
</table>
Site Rotation vs. Buttonhole

Major differences between

Site Rotation and the

Buttonhole Technique
Site Rotation (Rope Ladder)

- Site rotation with every cannulation
- Cannulators independently determine the angle of entry
- Avoid scabs
- Three-point technique
- For fistulas or grafts
Buttonhole Technique

- Reuse same sites each treatment
- Uses blunt needles
- Scab removal required
- Must follow the track of the original cannulator
- Side-to-side technique
- For AV fistulas only
Important Concepts for Buttonhole Cannulation
Buttonhole

• Requires the same cannulator for creation

• Originator needs to show the angle of insertion to other cannulators

• Time to buttonhole completion:
  ~8-10 cannulations for people with good wound healing
  ~12-14 cannulations for people with slower/poor wound healing

• Consistency among the staff is key
Angles of Entry

- It is **not** 25 degrees for every fistula
- The angle of entry is based on the depth of the access
- Depth is determined by assessing the fistula with a tourniquet on, and feeling how deep below the surface of the skin the access is
- Before cannulating an AVF, you should already know the angle of insertion
Use of Tourniquets

- Tourniquets should be used on all AVFs regardless of age or size or development
  ~Firms the access
  ~Allows you to see it better
  ~Allows you to feel it better
- Place in the axilla area (armpit) lightly
  ~Displaces pressure along entire vein
  ~Prevents chance of infiltrate in thin-walled fistulas
No Tourniquet vs. Tourniquet

Plump it up!
Taut (tight) Skin Anchors the Vein in Place while Decreasing Pain

• Rope Ladder (site rotation)

• Buttonhole (constant site)
  two-point technique
Use of Anesthetics

• Should not be used long-term – 1-2 weeks max.
• Topical anesthetics should not be used on buttonhole sites
• **Do not** inject lidocaine down the tunnel
  ✓ not intradermal (improper drug route)
  ✓ causes vasoconstriction (changes the position of the entranceway)
Use of Sharp Needles

✓ Once you transition to blunt needles you NEVER go back to a sharp needle down the tunnel

✓ We now know that using sharps long-term is causing scarring to the tunnel, and should therefore be discouraged

✓ Use Best Demonstrated Practices
Aneurysms in Buttonholes

- Using sharps in the buttonhole when unable to advance the blunt needles – results in a small area being cannulated
- Weakens vessel wall and pressure of blood flow pushes weakened area out – this will not occur at the buttonhole site, but at the point where the needle enters the blood vessel
How to Know the Site is Ready

• This will be individual to each patient, but look for these things:
  ➢ Can you visualize a round hole?
  ➢ Does it look well-healed?
  ➢ Is there a decrease in resistance from day-to-day?

• Do not use excessive force when changing to blunt needles.

Components of the Buttonhole

- The creation of a tunnel between the surface of the skin and the blood vessel wall

- The development of an opening or door leading into the blood stream
Alignment Issues and What to do About Them (inability to transition)
Why You Meet Resistance

• Manipulating the needle

• Patient drinks excessively ("after the weekend" effect)

• Tourniquet vs. no tourniquet

• Patient with vomiting and diarrhea

**dashed line – correct tunnel position
solid line – displaced buttonhole tunnel
Best Demonstrated Practice

**Touch Cannulation Technique**

- Allows the needle to direct the needle down the buttonhole, and not the cannulator
- Hold the tubing with thumb and forefinger just behind the wings

Photo used with permission
Unsuccessful Cannulation

Unstable buttonhole sites due to:

Excess upper arm tissue...or excess skin.
Best Demonstrated Practice

Cushion Cannulation Technique

• Wheelchair cushion placed under the access arm as far up in the axilla area as possible
• Allows for better visualization – raises the arm up for the cannulator
• Stabilizes the arm and tissue
• Easier to maintain same entry of angle when using the buttonhole technique

Infections and What to do About Them
Why are Infection Rates so High?

- Dialysis patients are immunocompromised
- Their first line of defense is compromised
- Dialysis patients have more staph on their skin/nares than the general population
- Tunnels can harbor microorganisms
- Increased potential for colonization due to same site entry over and over again
- Lack of proper infection control practices
Infection: A Big Problem...

- Improper skin cleansing
- Improper scab removal
- Cutting the skin with a sharp needle
- Observe scab size

# Cannulation – Site Preparation

<table>
<thead>
<tr>
<th>Cleansing Agent</th>
<th>Contact Time</th>
<th>Cannulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betadine®</td>
<td>3 minutes</td>
<td>When dry</td>
</tr>
<tr>
<td>ExSept®</td>
<td>2 minutes</td>
<td>When dry</td>
</tr>
<tr>
<td>ChloraPrep®</td>
<td>30 seconds</td>
<td>When dry</td>
</tr>
<tr>
<td>Alcohol</td>
<td>60 seconds each site</td>
<td>Immediately after applying</td>
</tr>
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</table>

http://www.nwrenalnetwork.org/fist1st/cleanaccess.pdf
Patient’s Role - Infection Control

- CDC–Staph leading cause of infection in dialysis
- Infection is the second leading cause of death in dialysis
- Reduces excess staph
- Make it an expectation in your facility
Do’s and Don’ts of Scab Removal

• **Don’t** flip the scab off with the needle you will use for cannulation – this contaminates the needle.
• **Don’t** use a sterile needle – you could cut the patient’s skin.
• **Don’t** let patients pick off their scabs with their fingernails.
• **Don’t** stick through scabs.

• **Do** use either:
  ~ scab-lifting device
  ~ soak two 2 x 2s with NS or alcohol-based gel
  ~ place a warm, moist washcloth over sites
  ~ stretch skin around scab in opposite directions
  ~ have patient tape alcohol squares over sites prior to dialysis
  ~ aseptic tweezers
Types of Infections Reported

- **Staph aureus**
  - septic arthritis
  - endocarditis
  - mitral valve replacement
- **Staph epidermidis**
- **Staph lugdunensis**
  - coagulase-negative staph
  - endocarditis
  - vegetation on pulmonary valve
- **MRSA**
- **Clostridium perfringens**

1. Marticorena et al., 2006
2. Arduino (CDC) personal correspondence, 2008
3. van Loon et al., 2009
Best Demonstrated Practice

2-Step Skin Cleaning Protocol for the Buttonhole Technique

• The patient should wash their arm immediately before the cannulation procedure.

• **Step 1**: Cleanse the needle sites prior to scab removal with an antimicrobial agent

• Remove the scabs

• **Step 2**: Re-prep the needle sites with an antimicrobial agent

• Cannulate
# Two-Step Cleaning Protocol for Buttonhole Sites

Prior to Cannulation to Prevent Infections

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Rationale</th>
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<tr>
<td>1. Have the patient wash their access arm before coming to their dialysis chair.</td>
<td>1. Dialysis patients have more staph on their skin than those without kidney failure. <em>Staph aureus</em> is the leading cause of infection in dialysis patients.</td>
</tr>
<tr>
<td>2. Using your facility’s antimicrobial agent, cleanse the buttonhole sites, using a circular rubbing motion.</td>
<td>2. Pre-cleaning buttonhole sites will continue to reduce <em>Staph aureus</em> and help to prevent infection.</td>
</tr>
<tr>
<td>3. Remove the scabs from the buttonhole sites using an appropriate technique.</td>
<td>3. Scabs contain <em>Staph aureus</em> as well as the skin. See attached guide for “Dos &amp; Don’ts of Scab Removal.”</td>
</tr>
<tr>
<td>4. Using your facility’s antimicrobial agent, cleanse the buttonhole sites and leave on according to the manufacturer’s recommendation.</td>
<td>4. KDOQI™ 2006 Vascular Access Guidelines states to follow manufacturer’s guidelines for correct contact time. See attached guide “Preparing the Vascular Access for Cannulation.”</td>
</tr>
<tr>
<td>5. Cannulate per facility policy while maintaining sterility of the needles.</td>
<td>5. Contaminated needles and improper needle insertion can lead to tunnel infections and/or sepsis.</td>
</tr>
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</table>

Infection: A Bigger Problem...

Tunnel/Systemic

• Contaminated needle
• Improper cannulation of the track
• Observe the large scabs

Down the Tunnel

Staff unable to cannulate

~Not following the originator’s angle of entry.

~Not holding the skin taut every cannulation

~Creates pockets that can allow bacteria and blood to collect, which can cause a tunnel infection.
Hubbing - What’s This?

Photos: Stuart Mott
Preventing “Hubbing”

• Leave space between the hub and the skin to prevent the bowl effect called “hubbing”


Photo: Stuart Mott
Other Issues with the Buttonhole Technique
Excessive Bleeding

- Check for stenosis
- Evaluate anticoagulation
- Track being cut
- Sharp needles used long-term
- Flipping needles
- Poor muscle tone
Exercise to Improve Muscle Tone

Patients with poor muscle tone
• excessive bleeding
• infiltrations
• difficulty with cannulation

Try exercise
• Research indicates exercise aids in vessel dilation (Oder et al., 2003)
Why a Single Cannulator?

~prevents cone-shaped tunnels that lead to oozing up the tunnel

~prevents the creation of larger-than-normal scabs (brick-colored line A vs. B)
Protecting Established Buttonhole Sites
Hospitalizations, Procedures, or Traveling

- Tunnels can be ruined if healthcare professionals are unfamiliar with the Buttonhole Technique.

- If your patient is hospitalized, having a procedure, or traveling and the professional does not know how to access a buttonhole, tell them to rotate sites using sharp needles, staying $\frac{3}{4}$ of an inch away from the front of the buttonhole tunnels.
Buttonhole Technique Issues

Need to know before cannulating:

• Developed buttonholes use blunt needles
• Direction of the buttonholes
• Angle of insertion
• How to remove scabs
• Never flip needles in buttonhole sites
I AM A DIALYSIS PATIENT WITH AN AV FISTULA.

I USE THE BUTTONHOLE TECHNIQUE FOR INSERTING MY NEEDLES.

NAME_____________________________

Dialysis Facility Name ________________________________

Facility Phone Number (_____) _________________________
# Buttonhole Cannulation Skills Checklist

**Employee Name/Title:** ________________________________ **Date:** ____________

**Unit Name:** _______________________________________

**Evaluator’s Name:** __________________________________

**Rating Definitions:**

**Expert:** Teaches others; **Independent:** Performs without coaching or supervision; **Novice:** Performs with coaching (Action Plan required); **Not Met:** Currently unable to perform even with coaching (Action Plan required)

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In Closing...Consistency Rules

All staff need to do the same things:

✓ Use tourniquet in the axilla area every time to “Plump It Up”!!

✓ Use a two-point, rather than a three-point technique to anchor the vein in place

✓ Use the originator’s angle of entry – remember, it’s Follow-the-Leader

✓ Let the needle guide the needle down the track – don’t direct it
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For additional information, please visit the 5-Diamond Patient Safety Program website at http://www.5diamondpatientsafety.org.

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