At the conclusion of this presentation, the participant will be able to:

1. Explain how the Buttonhole Cannulation Technique differs from Site Rotation Technique for AV fistula cannulation.
2. Describe how to determine the correct angle of insertion for AV fistula cannulation.
3. Discuss how patient care staff can reduce the incidence of infection of buttonhole sites.

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

Identification of Candidates

- Patients with limited access sites
  - A. Short segment
  - B. Large aneurysms
- Difficult cannulation
  - A. Excess skin
  - B. Excess tissue
  - C. Multiple sticks required
- Home therapies

Non-Suitable Candidates?

- Research shows that patients with poor hygiene:
  - are more prone to vascular access infections than those with good hygiene
  - had a significantly higher concentration of *S. aureus* on the skin of the vascular access site after application of antiseptic than patients with good hygiene
- Thin subcutaneous tissue; valvular heart disease; immunosuppression; prosthetic materials
- Patients who pick their scabs

1. Kaplowitz et al., July & Dec 1988
2. Sutherland & Mills 2010
Major Differences in Techniques

- Change sites each time
- Sharps always used
- Scabs are avoided
- Each cannulator determines site, angle of entry, and direction of arterial needle
- Uses a 3-point skin stretching technique
- AV fistulas or grafts
- Reuse same sites
- Create with sharps, then change to blunts
- Scabs are removed
- Site, angle of entry, and direction of needle predetermined by the originator
- Uses a 2-point skin stretching technique
- AV fistulas only

SITE ROTATION  BUTTONHOLE

Fistula Cannulation

- Site rotation

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

An Actual Buttonhole Site

Important Concepts for Buttonhole Cannulation

To Make the Best Buttonholes...

- 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 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

KNOW THE ANGLE OF INSERTION BEFORE CANNULATING

![Angle Diagram](image)

**Use of Anesthetics**

- Should not be used long-term: 1-2 weeks max.
- Topical anesthetics should **NOT** be used on buttonhole sites
  - EMLA: Directions for use (DFU) states “use on intact skin only”
  - Ethyl Chloride: DFU – “do not use on broken skin”

**Use of Tourniquets**

- Tourniquets should **ALWAYS** be used on all AVFs regardless of the age of the access, size, or skill set of cannulator
- Will not be able to successfully enter the AVF if half the staff uses a tourniquet and the other half does not – entranceway will be in a different position

**Use of Anesthetics – Cryotherapy**

Newest research out of India:

Cryotherapy or ice massage
- Place ice chips in a glove
- Ten minutes before cannulation time, have patient massage the webbing between the thumb and forefinger of the **non-access** hand with the ice glove
- This will numb the entire access arm for cannulation

**Taut (tight) Skin Anchors the Vein in Place while Decreasing Pain**

- Rope Ladder (site rotation)

![Three-Point Technique](image)

- Buttonhole (constant site)

![Two-Point Technique](image)

**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 vessel flap site.

How to Get the Blunt Needle in When Alignment is Off

- 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.

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.

When You Meet Resistance at Just One Site

- Problem with the arterial buttonhole site.
- Problem with the venous buttonhole site.

**Dashed line = correct tunnel position**
**Solid line = displaced buttonhole tunnel**
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

The Cone-Shaped Tunnel
Careful creation of the buttonholes:
- 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)
- Prevents multiple tunnels that can harbor bacteria

Infection: A Big Problem...
- Improper skin cleansing
- Improper scab removal
- Cutting the skin with a sharp needle
- Observe scab size

Localized Infection: A Big Problem...

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>Chloraprep®</td>
<td>30 seconds</td>
<td>When dry</td>
</tr>
<tr>
<td>Alcohol</td>
<td>30 seconds²</td>
<td>When dry</td>
</tr>
</tbody>
</table>

1. CDC recommended skin cleaning preparations
2. WHO, 2008

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
- Don’t use a sterile needle
- Don’t let patients pick off scabs with their fingernails
- Don’t stick through scabs
- Don’t dig scabs out
- Don’t use reusable materials to remove scabs (i.e., facial sponges or bath scrubbies)
- Do use either:
  - scab-lifting devices
  - 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 non-reusable tweezers

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.

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

Hubbing - What’s This?

- Creates a cave-like entranceway of buttonhole exit site
- Inability to remove scab completely can cause infection
- Could contaminate the needle as you touch skin that could not be cleaned

Infection: A Bigger Problem…

Tunnel/Systemic

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

Preventing “Hubbing”

- Leave space between the hub and the skin to prevent the bowl effect called “hubbing”
- Have approximately 1/8 inch of the needle showing

Buttonhole and Clots

- The Buttonhole Technique does not cause accesses to clot
- Clots form because staff are not using the 2-finger hold technique when removing needles
- The tunnel then has a complete clot that forms and is very hard to remove
- The blood pump can pull the clot into the arterial tubing where it lodges in the header of the dialyzer, which could affect adequacy
- Clots can harbor bacteria, increasing risk for infection

Topical Antimicrobial Use?

**The Debate…**

Yes – Use
- Prevent colonization of the tunnel?
- Prevent exit site infections?

No – Don’t Use
- Cause resistant organisms?

**The Buttonhole Research…**


Alternative – Wear a Mask

- Dialysis patients have more staph on their skin and in their nares than the general population.¹
- If you have staph in your nose, just breathing on the access site may be a source of infection.
- Should we mask staff and patients when buttonholing?
- Should we culture everyone?

Wearing a Mask

**RIGHT**

**WRONG**

Monitor Staff Competencies

Buttonhole Cannulation Skills Checklist

<table>
<thead>
<tr>
<th>Employee Name/Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor Name</td>
<td></td>
</tr>
</tbody>
</table>

Rating Definitions:
- Expert: Teaches others, instructs in more than 1 supervisees. Minor: Performs with minimal supervision. Major: Performs with minimal training. Minor: Currently unable to perform even with coaching. (Action Plan Required)

<table>
<thead>
<tr>
<th>Criteria/Performance Indicator</th>
<th>Expert</th>
<th>Independent</th>
<th>Minor</th>
<th>Not at</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishing a Buttonhole Site with Sharpy Needles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannulating a Buttonhole with Sharpy Needles</td>
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</tbody>
</table>

http://www.fistulafirst.org/pdfs/Buttonhole_Cannulation_Skills_Checklist_3_09.pdf

In Summary…

- Buttonhole Technique is an effective method of needle insertion when done correctly.
- Good assessment skills, meticulous cleaning, and attention to detail will result in long-term buttonhole sites without complications.
- It is necessary to review your cannulation practice, and eliminate poor technique.
- Standardization of cannulation technique is necessary; periodic competency reviews should be required.
Questions?

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Buttonhole Resources:
- www.fistulafirst.org - National Cannulation Video;
  Change Concept #8 – Cannulation Training
- www.mwrenalnetwork.org/QI/QI.htm
- www.5diamondpatientsafety.org/