Peripheral IV Cannulation: Technology and Technique Driving Best Practices
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Abstract

Objectives

1. Outline three unintended outcomes of peripheral IV cannulation in hospitalized patients
2. Describe a conceptual framework which formalizes nurses' observations inclusive of product performance, in addition to patient and practice variables in healthcare-related research
3. Identify the link between Healthcare and Technology Synergy (HATS) and proactive technology development for peripheral IV cannulation
4. Issue a call to action for Comparative Effectiveness Research (CER) inclusive of differentiated technology, to drive evidence-based product use and practice in peripheral IV cannulation
<table>
<thead>
<tr>
<th>Documented Complication or Risk</th>
<th>Technique/Technology Risk or Cause</th>
<th>Potential Clinical Impact</th>
<th>Potential Financial Impact</th>
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</table>
| **Failed insertion attempts**   | • Bedside nurses lack of PIV education & experience  
• Differentiated technology to reduce risk historically limited  
• Utilizing the wrong catheter on wrong patient at the wrong time | • Reduced patient satisfaction  
• Vessel trauma  
• Delayed treatment  
• Long term impact on vessel health and availability of veins for chronic treatment (i.e. dialysis) | • Cost of added supplies  
• Catheters  
• Skin prep  
• Wasted drug  
• May increase drug  
• Human resources |
| **Exposure to blood borne pathogens via needlestick and splash** | • Needle stick injuries  
• Splash, splatter, or aerosolization during:  
  • Initial insertion of IV catheter  
  • Removal of needle  
  • Connection/ disconnection  
  • Catheter removal | • Physical impact of exposure  
• Injury  
• Medication side affects  
• Emotional impact of exposure  
• Internal  
• Family, Friends, Co-Workers | • Average cost associated with needle stick injuries is $51-$4,838  
• $1 Million or more related to lost work time/ disability payments for serious infections |
| **Other potential risks: Dwell beyond effective use of peripheral IV cannula** | • Failure to monitor  
• Failure to proactively take action to mitigate risk | • Infusion related complications affect quality of life, morbidity and mortality  
• Infiltration  
• Phlebitis  
• Extravasation  
• Infection | • Treatment expense  
• Increased length of stay  
• Supplementary treatment  
• Litigation expenses  
• 2.1% all injury claims from 1970 to 2001 related to PIV  
• Approx. 54% successful litigations  
• Settlements from $275-$10,050,000 |

**References:**
- Sugita, Hunter, Moureau, & Trick
- Tosini, O'Malley et al, Lee et al, Ansari, American Hospital Association
- Rickard, Doellman et al, Dychter et al
Innovation & Applied Practice

- Product development based on unmet needs of patients, clinicians, and healthcare systems
- HATS Framework
- Cross-collaboration between industry and clinicians to break down barriers to clinical practice improvements
  - Healthcare System Education
  - Standards & Guideline Development
- Evaluation of currently available, differentiated technology to reduce risks associated with PIV cannulation

The Healthcare and Technology Synergy (HATS) Framework

- Substantiates the combined performance effect between patient, product, and practice
- Validates Nurse’s observations inclusive of product performance
- Can facilitate design, implementation, and evaluation of Comparative Effectiveness Research to drive improvements in PIV cannulation outcomes

Model Adapted from ‘The Healthcare and Technology Synergy (HATS) Framework’ Chennecky, Zadiny, et al.
Technology: Driving Best Practice

Mitigating Risk - Failed 1st Attempts
1. Gives a visual indication that the needle (stylet) has entered the vein!
2. Gives a visual indication that the catheter tip is completely in the vein, the optimal time to advance the catheter off the needle reducing the risk of failed attempts up to 25% - Toshihiro, et al. 2010

Passive Needle-Stick Prevention
- Passive technology is proven to be more effective than active technology in the prevention of needle-stick injuries
- Passive technology also requires no physical action from the user...
- Passive technology eliminates the need for elaborate training...
- Which is important because healthcare workers work
  - long hours
  - night shift
  - and deal with emergent situations
- All of which have been known to increase the risk of needle-stick injuries...

Blood Borne Pathogen Prevention
- Without blood control, there is a risk of blood exposure during PIV Placement

First Flash of Blood
- Once the tip of the needle (stylet) enters the vein, blood travels through the hollow center to the flash chamber in the handle.

Second Flash of Blood
- Once the catheter enters the vein, blood travels along the flash back groove allowing the visualization of blood along the catheter.

Blood control safety valve

Minimizes the risk of blood exposure between needle removal and IV attachment for a cleaner dressing site and IV hub area
- Eliminates the requirements for external digital pressure, facilitating the use of both hands to complete the procedure

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Needlestick injuries/100,000 devices purchased
- Passive Device: 1.31
- Semiautomatic safety feature (push button): 2.54
- Manually sliding shield: 4.34

1. Nursing observations on peripheral IV cannulation product performance will be an integral element of nursing research (HATS)

2. Comparative Effective Research will drive use of differentiated peripheral IV cannula technology to best meet the clinical needs of our patients, and protect healthcare professionals

3. Bedside infusion therapy nurses will collaborate with industry-based infusion nurses to effectively measure product performance during product trials and evaluations

References:

- American Hospital Association “Pugliese & Salahuddin” 1999