Intravenous Therapy
BACK TO THE BASICS
Objectives

- Explore the history of IV therapy
- Discuss standards of care
- Review Organizations
- Review materials and devices used
- How to improve care
Early History

- Intravenous therapy started in 1492
- 1628 Intravenous injection of dogs
- 1667 Fatal transfusion of animal blood to humans
- 1687 Banning of animal to human transfusions
19th century

- 1818 human to human transfusion
- 1821 complications due to coagulation
- 1831 Cholera Epidemic
19th century

- 1834 treatment of hemorrhage in childbirth
- 1860's advances regarding infections
- 1889 gloves were introduced
20th Century -

- 1901 Blood groups discovered
- 1910 sterilization of equipment
- 1915 anticoagulation of blood
- 1923 IV fluids and drugs sterilized
1930s nutritional support and equipment

1940’s- WW 2 increased need for transfusions

1940’s nurses began inserting PIV’s
  Mass General Hospital – Ada Plumer administered IV therapies

1941 Rh factor was discovered
1945 Plastic cannula

1952 Subclavian puncture

1980's Implanted ports

1980's Infusion Nursing roles- inserting PICCs
21st century

- Power Injectable lines
- Infusion Pumps
- Ultrasound Guide PIV Insertion
- Mid thigh femoral catheters
Organizations

- 1972 the formation of American Association of IV Nurses
  - 1973 changed to national Intravenous Therapy Association
  - 1987 renamed the Intravenous Nurses Society
  - 2001 Infusion Nurses Society

- 1985 the Bay Area Vascular Access Committee
  - 1987 Bay Area Vascular Access Network
  - 1990 became National Association of Vascular Access Networks
  - 2003 became Association for Vascular Access
Intravenous Catheters

- Feather quills
- Metal needles required cleaning and sharpening
- 1945 plastic cannula- cutdowns
- 1950 over the needle catheters
- 1968 longer term catheters
- 1970’s Broviac catheter and Hickman catheter
- 1980’s implanted ports and PICCs
Intravenous Tubing

- First tubings were feather quills used in 1658
- Animal veins were used as tubing
- In the 19th century began using rubber tubing's
- 1950's plastic tubing
Guidelines

- 1980 Infusion Nursing Standards
- 1987 Centers for Disease Control and Prevention
- 2002 CDC Guidelines infection prevention
- 2006 Institute for Healthcare Improvement
INS Standards

- INS standards
  - 1980
  - 1982
  - 1990
  - 1998
  - 2006
  - 2011
  - 2016
Many of us remember “preparing the tape”
No, we do not want to go back that far
Tubings
The INS standards recommend tubing changes every 96 hours however this recommendation is for tubing continuously connect to the patient.

S 84 II C - “avoid disconnecting primary continuous administration sets”

S84 Standard III – Primary intermittent infusions set should be changed every 24 hours
- Tubing changes continuous
  - Early 1970s every 24 hours
  - 72 hours
  - 96 hours
No, we do not want to go back this far!
In the study a *Capping Intravenous Tubing and Disinfecting Intravenous Ports Reduce Risks of Infection*, a practice that contributed to the risk of Health Care Associated Infections (HAIs) was found:

“failure to place a sterile cap on the end of a reusable intravenous (IV) administration set that has been removed from a primary administration set, saline lock, or IV catheter hub, with the tubing left hanging between uses.”
SAFE PRACTICE RECOMMENDATIONS:

The ISMP recommendations

covering the exposed end of IV tubing used for intermittent infusions with a sterile cap between uses

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3086084/
Protecting the IV tubing when disconnecting intermittent IV tubing
Disinfecting Caps
SAFE PRACTICE RECOMMENDATIONS:

The ISMP recommends

- disinfecting the port before connecting tubing or a syringe to the port.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3086084/
While these disinfecting caps are useful, we need to try to find ways to encourage the practice of scrubbing the nubs each and every time.

INS Standards of 2016  40. Flushing and Locking , Standard 40 the practice criteria still states

“Perform disinfection of connection surfaces (ie, needled connectors, injection ports) before flushing and locking procedure
Standard 34 states to

“vigorous mechanical scrub”

It further states

“scrub times range form 5 to 60 seconds”
We need to promote the practice of scrubbing the hubs
I SAVE THAT LINE
Follow these principles when inserting, using and maintaining any vascular access device.

IMPLEMENT INSERTION, CARE AND MAINTENANCE BUNDLES
- Minimize intraluminal and extraluminal contamination risk.

CRUPULOUS HAND HYGIENE
- Before and after contact with any vascular access device.

ALWAYS DISINFECT NEEDLELESS CONNECTORS
- Prior to each access for solution and medication administration, flushing or tubing changes.

Ein Preservation
- Assess for best device and insertion site to reduce risk of complications, such as thrombus formation, infection, or dislodgement.

SURE PATENCY
- Flush all lines following institution policy. If blood return is lacking or sluggish, take measures to restore patency.

Protect the Patient | Educate the Clinician | Save the Line
For more information, contact the Association for Vascular Access
www.avahan.org or call 877-4AV-HAAS
Dressings
Chlorhexidine-impregnated dressing

The CDC Guidelines recommend the use of a chlorhexidine-impregnated sponge dressing for temporary short term catheters when adherence to basic preventative measures has been unsuccessful.

CDC Guidelines, 2011, pg 14. Category 1
The updated 2017 CDC Guideline:

Most studies of C-I dressings did not use other CDC-recommended interventions that have become routine practice or part of CLABSI prevention bundles (such as use of alcoholic chlorhexidine for skin preparation).

https://www.cdc.gov/infectioncontrol/guidelines/bsi/c-i-dressings/considerations.html
Gloves
In a study it was found that

“Bacterial contaminants were cultured from 73 of 90 (81.1%) glove pairs sampled across all ICUs. Contamination rates of glove samples from the BICU, SICU and MICU were 66.7%, 86.7% and 90.0% respectively.”
Are the gloves being used causing harm??

Are they clean??

How many surfaces have the gloves touch before they come in contact with the patient dressing or IV tubing??
It is not merely the procedure of placing a PIV that is important but what is being infused.

The article “Accepted but Unacceptable: Peripheral IV Cather Failure statics

- 300 million peripheral catheters a year sold in the US
- IV catheter failure rates between 35% and 50%
- Even in facilities with dedicated IV teams the failure rate was as high as 63%
Site change recommendation have changed:
- 24 hours
- 48 hours
- 72 HOURS
- 96 HOURS
- Clinically indicated
From: The Michigan Appropriateness Guide for Intravenous Catheters (MAGIC): Results From a Multispecialty Panel Using the RAND/UCLA Appropriateness Method
Michigan Appropriateness Guide for Intravenous Catheters (MAGIC)


<table>
<thead>
<tr>
<th>Device Type</th>
<th>Proposed Duration of Infusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤1 d</td>
</tr>
<tr>
<td>Peripheral IV catheter</td>
<td>No preference between peripheral IV and US-guided peripheral IV catheter for use ≤30 d</td>
</tr>
<tr>
<td>Ultrasound-guided peripheral IV catheter</td>
<td>Ultrasound-guided peripheral IV catheter preferred to peripheral IV catheter if proposed duration is 6-14 d</td>
</tr>
<tr>
<td>Central venous catheter</td>
<td>Central venous catheter preferred in critically ill patients or if hemodynamic monitoring is needed for ≥14 d</td>
</tr>
<tr>
<td>Midline catheter</td>
<td>Midline catheter preferred to PICC if proposed duration is ≤14 d</td>
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<tr>
<td>PICC</td>
<td>PICC preferred to midline catheter if proposed duration of infusion is ≤10 d</td>
</tr>
<tr>
<td>Tunneled catheter</td>
<td>PICC preferred to tunneled catheter and ports for infusion ≥30 d</td>
</tr>
</tbody>
</table>

**Figure Legend:**

Venous access device recommendations for infusion of peripherally compatible infusate. IV = intravenous; PICC = peripherally inserted central catheter; US = ultrasonography.
Peripheral IVs are not always the correct choice.
With the growing practice of using Ultrasound guidance of PIVs we need to be cautious as this placed catheters deeper and this can make early complications more difficult to recognize
How many different medications is the patient receiving and how many PIVs have they already had?
Numerous PIV insertions to avoid central line infections

Increasing number of Difficult Intravascular Vascular Access Patients

- Numerous IV medications
  - Antibiotics
  - Magnesium
  - Potassium
  - Pain medications
Changes of the INS Standards and removal of pH

- Some declared pH did not matter

- PIV infection rising

- Number of times that PIVs are started

- Increasing number of Difficult Intravascular Vascular Access Patients
What we can do

- Collaborate with all nurses so that complications are immediately addressed.

- Provide education posters in rooms to remind nurses scrub the hub.

- Educate nurses of the proper maintenance of intact dressing tubing and cleaning of needless connector.

- In facilities that have vascular access teams, consider developing champions on each floor and shift who can support the staff when the IV team members are not available.
Plan vascular access device usage with early assessment of needs

Participate in daily rounding to assess treatment plan

Minimize risk of infections
  ▶ Scrub hubs
  ▶ Use clean gloves
  ▶ Hand hygiene immediately before touching the patient
  ▶ Properly dating and changing tubing
Conclusion

- Care should be collaborative and multidisciplinary
- Improve the use of the choices you have
- Always work for the best interest of the patient.
While many different devices have been developed and are frequently used, from caps covers to new dressing to chlorohexidine medicated dressing and sponges, they may be ineffective if we do not get back to the basics.
Properly changing IV tubing at 24 hours for intermittent and 96 for continuous

Discourage the practice of disconnecting IV tubing and educate staff the disconnected tubing become interment and to change every 24 hours

Find ways to encourage staff to properly scrub the hubs each and every time they are accessed
Determine the best device for the patient:

- One patient
- One device
- One treatment


Journal of Infusion Nursing, Infusion Therapy Standards of Practice, January/February 2016, Volume 39,Number 1S


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