Vascular Access in Pediatrics

- Challenges
  - Vascular access: One of the most common & invasive procedures experienced in a hospital setting
  - Difficult to obtain in patients with obesity, chronic illnesses requiring frequent PIV insertions, dehydration, peripheral edema, or in patients with no visible or palpable veins
  - PIV failure rates may be as high as 25%

(Arbique et al., 2014, Meyer et al., 2014)

- The number of pediatric patients with advanced disease and chronic health conditions requiring central venous access devices (CVADs) has been increasing
- Complexity in caring for different types of CVADs
- Patients at risk for catheter-associated bloodstream infections (CLABSI) which can cost an average of $25,000 - $45,000 per incident

(Beerman, 2009)
Vascular Access
Use of Ultrasound-guided technology for PIV access

- Training should include:
  - Theoretical knowledge – Ultrasound physics & manipulation of image
  - Vein anatomy, topographical anatomy, and common anatomical variants
  - Practical supervision – a minimum of 25 supervised line insertions
  - Primary preceptor
  - Logbook/documentation of attempts
  - Formalized assessment, accreditation, & validations

(Murphy & Arnold, 2011)

- Improves nurses’ clinical practice, patient health care outcomes, and patients’ quality of life
- Reduces supply costs
- Improves patient satisfaction
- Thought to be superior to traditional landmark techniques for patients with difficult venous access
- Requires good hand-eye coordination
- Provides clear visualization of vein presence, diameter, patency, direction, and the vein’s relation to surrounding structures

(Arbique, Bordelon, Dragoo, & Huckaby, 2014)

- Few studies available for use of ultrasound for PIV access in children (with varying results)
- One study found improved overall success rates by 16% when using ultrasound for venous access instead of traditional landmarks, but results were not significantly different in children with difficult access (P = .208)
- Avelar, Peterlini, & Pedreira conducted a prospective, randomized controlled trial of 392 PIV insertions - evaluating ultrasound vs traditional landmarks. No significant difference (P = .025) was found for either method. Infiltration was higher in the ultrasound group (P = .025).
- Child’s cooperation is necessary for success with ultrasound

(Avelar, Peterlini, & Pedreira, 2015)
Background - Vascular Access Team exists at the Main Campus of Texas Children’s Hospital
- Ultrasound – guided PIVs, CVC/ PAC Dressing changes, Line troubleshooting, Site Assessments, Education, etc.
- 7 days/ week + night shift coverage
- Enhances quality of care & impacts patient satisfaction

Background - Texas Children’s Hospital West Campus
Houston’s 1st community hospital designed specifically for children
March 2011
- 12 bed Emergency Center
- 24 bed acute care inpatient unit
- Operating Rooms
- Cancer/ Hematology Clinic & Ambulatory Infusion Center
- 13 Ambulatory Subspecialty Clinics
- PT / OT / ST
- Radiology services

Background
- Nurses in Infusion Center & Hematology/ Oncology (HemOnc) Clinic experienced in taking care of pediatric HemOnc patients
- HemOnc patients often have CVC, PAC, or PICC lines
- Nurses NOT proficient in “old school” PIV placement upon hire
- By nature of role in Infusion Center, there was a need for PIV skill acquisition
**Background – Campus Growth**

**Campus Growth**
- July 2011 ➞ Dedicated HemOnc provider in clinic & 1st patient to receive chemo in the infusion center (Vincristine)
- Sept 2011 ➞ Second full time HemOnc provider added
- Nov 2011 ➞ First patient admitted to 3 West inpatient acute care floor for chemotherapy regimen
- Progressively, more & more HemOnc patients being admitted to 3 West

**Background – Campus Growth**

**Campus Growth**
- 3 West: 24 Bed Acute Care floor
  - Nurses from a variety of medical/ surgical/ pediatric backgrounds
  - Lack of wide-spread knowledge in the care of CVC, PAC, PICC
  - Lack of knowledge in the care of HemOnc patients

**Methods**

To gain/ improve vascular access skills:
- 8 Hour Advanced CVC Line Troubleshooting Class
  - Nurses went to TCH Main Campus & shadowed experienced vascular access nurses (VAT)
  - Dressing Changes
  - CVC/ PAC/ PICC line Troubleshooting (de-clotting)
  - Line repairs / Pulling PICC lines
  - Ultrasound-guided PIV placement
Pathway/ Criterion Checklists completed
Methods

Infusion Center & Cancer/ Hematology Nurses began using new skills with success in their clinical practice. Patients aware of the expertise available (Ultrasound-guided PIV placement) began ASKING for the service at all points of entry.

- EC, inpatient unit, pathology
- Activity outside of work area manually tracked by nurses.

Methods

- "VAT Nurse of the Day" calendar
- Calendar sent to the inpatient & EC areas to provide point of contact for staff needing assistance with CVC/ PICC/ PAC
- Quickly expanded areas of distribution based on high demand - OR/PACU, Lab, PICU, Ambulatory, Radiology

Methods

- Encouragement & Support required for Infusion & Hematology / Oncology Nurses
- Performing VAT Skills throughout organization – on TOP of their patient care in the clinic
- Recognition & acknowledgement for “wins” in patient care
- Celebration of advanced skills & expertise
- On-going education provided in "Critical Comps" by TCH Main Campus VAT Leadership
- In-services provided on equipment
- Direct access to TCH Main Campus VAT via phone
- Text Resources provided (Infusion Nurses Society)
Methods

To expand access to trained personnel:

• Education provided to selected night shift nurses in EC/PICU
• VAT Pathway/ Criterion Checklists completed

Methods

• Education on PAC care & CVC line care provided to all areas of the hospital
• Annual Critical Competencies
• PRN Skills Sessions
• Policy & Procedures reviewed

Challenges

• Clinic staff performing vascular access skills “on demand” in all areas of organization – on top of their clinic roles (morale boosting needed!)
• Perception of dedicated VAT Team by staff in other areas of organization
  - Difference between VAT Team
  - Often a sense of “urgency” when requesting VAT (esp. from pathology)
• Varying competency level/skill of nurses (hand-eye coordination for U/S)
• Arriving to areas requesting help to find lack of preparation by unit staff
• Gaps exist for nights & weekends
“Wins”

Staff satisfaction:

- Expanding their skill sets
- “Saving the day” with the Ultrasound
- Helping patients – providing sense of comfort & expertise in the care being provided

“Wins”

Competencies Strengthened:

- Negotiation
- Collaboration
- Time Management
- Team Building
- Coaching/Mentoring
- Advocacy
- Communication
- Crucial Conversations
- Delegation
- Education
- Adaptability

Results

# VAT Requests / Month
Aug 2013 - present
Results


Results

<table>
<thead>
<tr>
<th>PIVs</th>
<th>Methodology</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>760</td>
<td>Ultrasound</td>
<td>84% 1st stick</td>
</tr>
<tr>
<td>1132</td>
<td>Traditional</td>
<td>90% 1st stick</td>
</tr>
<tr>
<td>1478</td>
<td>Mix of Ultrasound &amp; Traditional</td>
<td>89% 1st stick</td>
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</tbody>
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Results

Success:
- 1.6 FTE APPROVED for a VAT Nurse (dedicated) FY2016 budget !
- Plan to engage new FTE with responding to VAT calls, rounding on patients, quality improvement (CLABSI rounds)
Continued Growth
Texas Children's Hospital West Campus
- 26 bed Emergency Center
- 28 acute care beds (2 West & 3 West)
- 18 acute care beds (includes Special Isolation beds)
- 16 bed PICU – will soon be expanding to 20 beds
- 4 Operating Rooms
- ~25 Ambulatory Subspecialty Clinics
- PT / OT / ST / Sports Medicine
- Radiology services

Best Practice
Vascular Resource Nurses
- Experts vital for education and monitoring
- Serve as consultants & advisors for the primary care team
- Contribute to performance improvement
- Effective partners for the health care system – contributing to patient satisfaction, decreasing lengths of stays, and improving the skills of nurses
- Serving as patient advocate: early assessments, daily review of lines, clinical evals of new IV products, membership in committees involving nursing practice, infection prevention, and difficult access issues

Goals
Goals for the dedicated VAT Nurse:
- 1st responder for vascular access needs throughout the organization
- Daily rounding for patients with CVC, PICC, PAC
- Education for patients, families, clinical staff
- CLABSI Champion, Quality Improvement
References


