Implementation of a Phlebitis Prevention Bundle on a Neurotrauma Critical Care Unit

Alexandra Del Barco, BSN, RN, PCCN, TCRN
Maranda Jackson-Parkin, PhD, CRNP-BC, ACNP, CCNS, CCRN-K, CNE
Katherine Fornili, DNP, MPH, RN, CARN, FIAAN
University of Maryland School of Nursing

Problem Statement

- Peripheral intravenous catheter (PIVC) associated phlebitis can lead to:
  - Increased healthcare costs
  - Prolonged lengths of stay
  - Additional treatments
  - Increased mortality & morbidity
- A Neurotrauma Critical Care (NTCC) unit identified 68 cases of registered nurse (RN) reported PIVC-phlebitis (M=4 per month)
  - **Emergency placed PIVCs** and **vesicants** were identified as high-risk factors for phlebitis
  - PIVCs placed in emergency settings accounted for **35% (n=24)**
  - **71% (n=48)** of PIVCs had received either hypertonic saline, vancomycin, or potassium chloride

Purpose of Project

- To implement and evaluate an evidence-based Phlebitis Prevention Bundle (PPB) including:
  - A practice change of **removal of emergency placed PIVCs** within 24 hours of admission
  - Education on assessment and documentation of phlebitis
  - Education of common vesicant medications

Process Goals:
- All RNs will remove emergency placed PIVCs within 24 hours of admission to the NTCC

Outcome Goals:
- Reduction in the monthly mean of phlebitis cases

Methods

Setting:
- 12 bed NTCC in an urban academic medical center

Inclusion Criteria:
- All patients admitted from the trauma admitting unit and operating room during project period

Exclusion Criteria:
- Ultrasound placed PIVCs, end of life patients

Interventions:
- Create PPB, RN education using PPB Education Handout, adherence and PIVC-phlebitis tracking

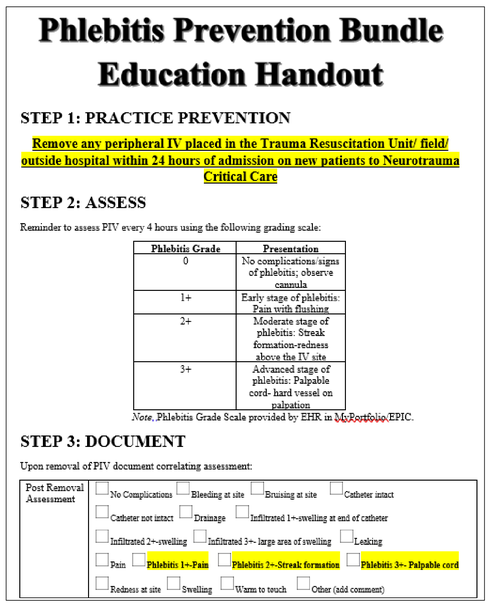
Implementation Strategies:
- Education, use of unit champions, incentives

Data Collection:
- RN education tracking, adherence audits, and nurse-reported phlebitis audits
- Total Patients Admitted: 74
- Total PIVCs removed for phlebitis: 40

Results

Table 1

Characteristics	n	%
Phlebitis grade		
Grade 1+	12	30%
Grade 2+	13	32.5%
Grade 3+	15	37.5%
Location		
LUE	16	40%
RUE	24	60%
Catheter gauge		
14G	1	2.5%
16G	3	7.5%
18G	14	35%
20G	23	57.5%
Vesicant		
None	10	21.7%
Unknown & other	24	52.2%
Known (Vancomycin, KCL, HTS)	12	26.1%
PIVC on admission		
Trauma admit	99	61.1%
OSH	35	21.6%
EMS	28	17.2%
Removed PIVC		
Trauma admit	86	58.5%
OSH	33	22.4%
EMS	28	19%



Phlebitis Prevention Bundle Education Handout

STEP 1: PRACTICE PREVENTION

Remove any peripheral IV placed in the Trauma Resuscitation Unit/ field/ outside hospital within 24 hours of admission on new patients to Neurotrauma Critical Care

STEP 2: ASSESS

Reminder to assess PIV every 4 hours using the following grading scale:

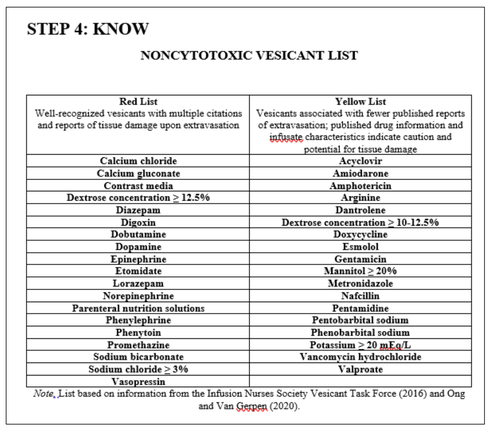
Phlebitis Grade	Presentation
0	No complications/signs of phlebitis; observe cannula
1+	Early stage of phlebitis: Pain with flushing
2+	Moderate stage of phlebitis: Streak formation-redness above the IV site
3+	Advanced stage of phlebitis: Palpable cord- hard vessel on palpation

Note, Phlebitis Grade Scale provided by EHR in MyPortfolio/EPIC.

STEP 3: DOCUMENT

Upon removal of PIV document correlating assessment:

Post Removal Assessment: ☐ No Complications ☐ Bleeding at site ☐ Bruising at site ☐ Catheter intact ☐ Catheter not intact ☐ Drainage ☐ Infiltrated 1+-swelling at end of catheter ☐ Infiltrated 2+-swelling ☐ Infiltrated 3+- large area of swelling ☐ Leaking ☐ Pain ☐ **Phlebitis 1+-Pain** ☐ **Phlebitis 2+-Streak formation** ☐ **Phlebitis 3+- Palpable cord** ☐ Redness at site ☐ Swelling ☐ Warm to touch ☐ Other (add comment)

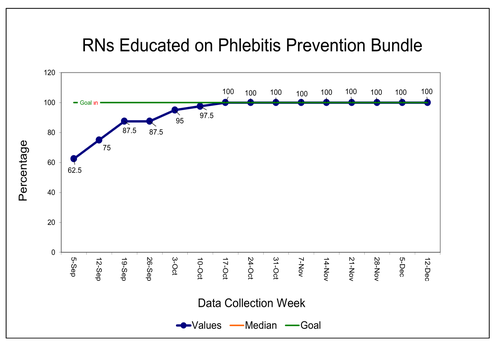


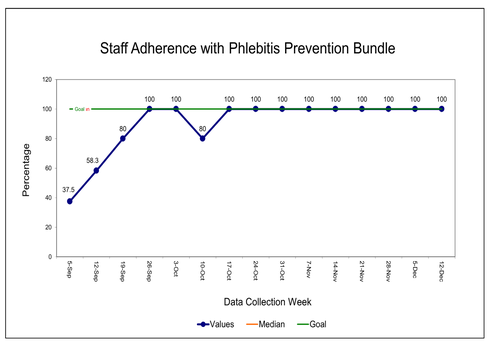
STEP 4: KNOW

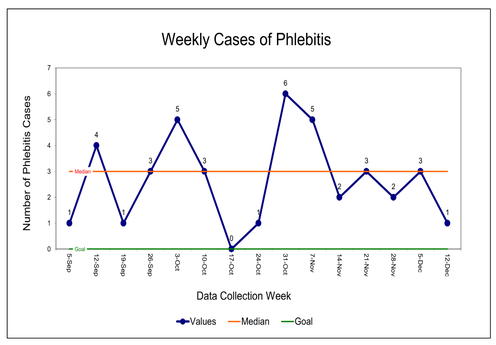
NONCYTOTOXIC VESICANT LIST

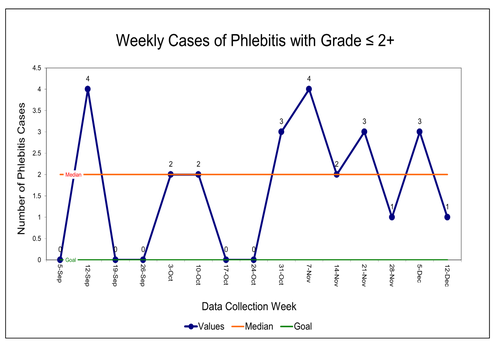
Red List Well-recognized vesicants with multiple citations and reports of tissue damage upon extravasation	Yellow List Vesicants associated with fewer published reports of extravasation; published drug information and infusate characteristics indicate caution and potential for tissue damage
Calcium chloride	Acyclovir
Calcium gluconate	Amiodarone
Contrast media	Amphotericin
Dextrose concentration ≥ 12.5%	Arginine
Diazepam	Dantrolene
Digoxin	Dextrose concentration ≥ 10-12.5%
Dobutamine	Doxycycline
Dopamine	Esmolol
Epinephrine	Gentamicin
Etomidate	Mannitol ≥ 20%
Lorazepam	Metronidazole
Norepinephrine	Nafcillin
Parenteral nutrition solutions	Pentamidine
Phenylephrine	Pentobarbital sodium
Phenytoin	Phenobarbital sodium
Promethazine	Potassium ≥ 20 mEq/L
Sodium bicarbonate	Vancomycin hydrochloride
Sodium chloride ≥ 3%	Valproate
Vasopressin	

Note, List based on information from the Infusion Nurses Society Vesicant Task Force (2016) and Ong and Van Gerpen (2020).









Discussion

PPB Adherence
- Complete adherence was achieved within 4 weeks despite partial RN education
- Reasons for missed adherence included short staffed shifts, acuity, and difficult intravenous access

Phlebitis
- Over the 3-month period, the mean of phlebitis cases reported increased to 13
- Early grade phlebitis (≤2+) accounted for 62.5% of cases

Outcome: PPB may lead to a significant decrease in late grade phlebitis and increased RN-reporting consistent with literature supporting the use of bundles in preventing phlebitis

Results were limited by documentation, nursing staff underreporting, short staffing, small sample size, and subjectivity of phlebitis grading

Conclusions

Implications for practice
- PPB is a feasible and sustainable if effectively implemented. It can lead to increased RN awareness and reporting therefore improving the quality of care

Sustainability and Spread
- Process changes: Hospital-wide implementation of PPB
- Structural changes: inclusion of the PPB in the EHR and hospital policy

References

Full reference list available with QR code

Acknowledgements

Special thanks to the following individuals for their continued support and guidance throughout this project:
- Karen McQuillan, MS, RN, CNS-BC, CCRN, CNRN, FAAN
- Brad Antlitz, BSN, RN, NTCC Nurse Manager
- Samantha Adams, MSN, RN, Senior Clinical Nurse II
- Tiffany Coleman RN, CCRN, Lead Champion
- Dr. Ronald Rabinowitz, Chief of Infectious Diseases