Peripheral Intravenous Extravasation in Perioperative Pediatric Patients: A retrospective review

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Introduction

- Obtaining and maintaining intravenous access is of paramount importance during the perioperative period
- Peripheral IntraVenous Extravsation (PIVE) is the unintended leakage of intravenous fluid or medication into the tissue surrounding the site of infusion and can be associated with significant tissue injury (1)
- Incidence of PIVE has been reported to occur in 0.1% to 6.5% hospitalized patients (1) and may be higher due to insufficient documentation and under-reporting
- There is paucity of data for PIVE in the perioperative setting
- Determining the incidence of PIVE in the operating room and the characteristics of these patients are important first steps in reducing extravasation injury in pediatric surgical patients

Methods

- IRB approval was obtained for the retrospective review all peripheral venous extravasations (PIVE) in the OR and PACU from 1/1/15-1/1/17
- Extravasation was defined as swelling greater than 30% of the effected limb using CCHMC extravasation assessment tool (Figure 1)
- All reported extravasations are documented in EMR and evaluated by CCHMC vascular access team per hospital policy
- Extravasation (swelling > 30%) event led to assessment of the following patient characteristics:
  - Age of patient
  - ASA status
  - Location of PIV catheter
  - PIV catheter size
  - Number of attempts at cannulation
  - Utilization of ultrasound guidance for catheter placement
  - Size and grade of extravasation
- **Severe Harm** from extravasation was defined as absence of distal pulses, limb ischemia and/or injury leading to fasciotomy

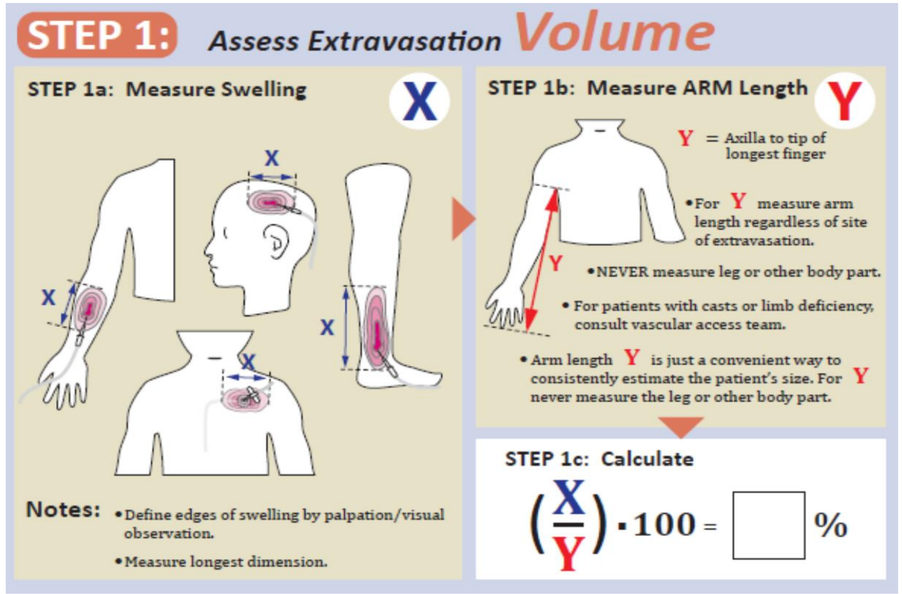
Results

- 60,678 peripheral venous catheters were in place in the OR during the study period
- n=45 cases of documented extravasation were identified
- Overall incidence of 0.7%
- Ultrasound had been utilized in 45% of cases (n=21)
- More than one attempt for catheter placement was required in 35% of cases (n=16)
- **Moderate** extravasation (swelling 30-59%) was noted in 76% of cases (n=34) and **severe** extravasation (swelling 60-100%) was noted in 24% of cases (n=11)
- No occurrences of **severe harm** were identified in any of the cases

Table 1. Demographic characteristics of patients with documented extravasation in the OR

Age of Patient	Number (%) of patients
Neonate (36-44 weeks GA)	1 (2%)
Infant (1-12 months)	7 (16%)
Child (1-12 years)	20 (44%)
Adolescent (12-18 years)	12 (27%)
Adult (greater than 18 years)	5 (11%)
ASA Status	
1	2 (4%)
2	9 (20%)
3	31 (69%)
4	3 (7%)
Location of PIV catheter	
Forearm	23 (51%)
Antecubital	11 (24%)
Hand	7 (16%)
Saphenous	4 (9%)
PIV catheter size	
16 gauge	1 (2%)
18 gauge	2 (4%)
20 gauge	10 (22%)
22 gauge	28 (62%)
24 gauge	4 (9%)

Figure 1. CCHMC Extravasation assessment tool



Discussion

- Extravasation of intravenous medication can be a medical emergency with permanent consequences if not recognized and treated in an appropriate manner (1)
- The overall incidence of PIVE in perioperative surgical patients was low and most extravasations were of moderate size
- Assessment of PIV sites can be challenging in pediatric surgical patients due to limited access and a desire to avoid disrupting surgical care
- We suggest careful and regular assessment of peripheral venous catheters to identify extravasation before it leads to permanent sequelae
- Future study is needed to determine specific risk factors for extravasation in this population

Reference

1. Paquette V, et al. Can J Hosp Pharm 2001;64(5):340-345