To Heparinize or Not to Heparinize
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**Background**

Most children admitted to an acute health care facility require placement of a peripheral intravenous (IV) device for medication and/or fluid administration. Maintaining patency of a “non-infusing” peripheral IV (peripheral intravenous infusion device, or PIID) is extremely important to continue administration of intermittent IV medications, minimize the number of IV catheter placements and decrease the cost of supplies associated with multiple IV placements. Since the 1980s, numerous studies and systematic reviews have shown that the use of normal saline flushes is equivalent to the use of heparin flushes to maintain patency of PIID’s (Cook et al., 1998; Goode et al., 1991; Mitsiou et al., 2008). Most of the studies have been completed using adult populations. One of the first studies evaluating saline flush use in the pediatric population began in 1988. (Lombardi et al., 1988). Due to the side effects related to heparin use, it is important to evaluate the use of normal saline flushes as an alternative to heparin flushes to maintain PIID patency in the pediatric population.

**PICO Question**

In the medical surgical young children and adolescent population does a ten unit heparin flush given at intervals through a non-infusing peripheral IV increase the length of patency compared with normal saline?

**Clinical Trigger**

EBP review undertaken because the use of heparin flushes is the current standard in our institution for PIID’s irrespective of patient age, diagnosis, or gauge of catheters. Current literature suggests the efficacy of saline flushes to maintain the patency of an intermittent IV access site for children of all ages, including neonates, using catheters of 24 gauge and larger. Heparin is a medication that can cause:
- Allergic reactions, hemorrhage, thrombocytopenia.
- Pain at the injection site during infusion of the flush.
- Incompatibility with certain medications, thus requiring the use of the SASH (saline, med, saline, heparin) procedure to mitigate this effect
- Increased cost due to actual cost of heparin and nursing time.

**Synthesis of Evidence**

- **Use of normal saline as an intermittent flush in PIID’s is as effective as heparin flush for maintaining patency of the device** (Leduc, 1997; Mitsiou et al., 2008; Randolph et al., 1997; Shaw et al., 2003; Thamlitkul et al., 2006). (Level 1)
- **Use of heparin as an intermittent flush in peripheral IV catheters leads to more incidences of phlebitis** (Lombardi et al., 1988; Tripathi et al., 2008). (Level 1)

**Evidence Search**

Databases searched for this review included: CINAHL, Pub Med, Ovid. Reviewed web sites included AHRO, Joanne Briggs, National Institute of Health, and Elsevier Health. Fifteen articles related to the PICO question were reviewed. Publication dates ranged from 1988-2008. Reviewed articles included: systematic reviews, meta-analyses, randomized controlled trials, quasi-experimental trials and descriptive studies.

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<th>Summary of Findings</th>
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<td><strong>Use of normal saline</strong> as an intermittent flush in peripheral IV catheters is more efficient when positive pressure technique is used with the flush (Beecroft et al., 1997; Gyr, 1995; Kleiber et al., 1993; LeDuc, 1997; Tang et al., 2001). (Level 1)</td>
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<td><strong>Use of heparin as an intermittent flush in peripheral IV catheters leads to more incidences of phlebitis</strong> (Lombardi et al., 1988; Tripathi et al., 2008). (Level 1)</td>
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**Recommendations**

- Saline flush is as efficacious as heparin flush for maintaining patency in PIID’s of young children and adolescents with catheter gauges of 24 and larger.
- When saline flush is used rather than heparin, the technique of positive pressure displacement is important. This technique involves injecting the last 0.1 mL of saline while simultaneously removing the syringe tip or closing the white side clamp on a T-connector to create positive pressure.
- Saline flushes may be administered every 6 to 12 hours for optimal catheter maintenance.
- Amount of the saline flush used to maintain patency each time administered may range between 0.6 mL – 3.0 mL.
- Policies and procedures at the institution need to be changed to reflect use of saline flush rather than heparin flush to maintain patency of PIID’s.

**Literature Cited**

Available upon request.

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