Infiltration (also called extravasation) is a risk of intravenous (IV) administration therapy involving unintended leakage of solution from the IV into the tissue around the infusion site. Depending on the medication or solution, length of exposure and location, the resulting damage can be significant ranging from pain and inflammation to second or third-degree burns, ulcerations, necrosis, nerve or vascular injury, permanent scarring, disfigurement, and impaired loss of function of the affected extremity. Damage is more likely with solutions such as blood, vasoactive agents or vesicants (irritating drugs or solutions). Frequent, comprehensive, and documented monitoring of IV therapy is key to managing this risk.

**COMMON CLAIM THEMES**

- Neonatal, paediatric and critically ill patients.
- Irregular/infrequent IV site inspections.
- Rapid or bolus infusion.
- Delay in identification and/or treatment of IV infiltration.
- Erroneous pump settings and/or failure to set pump appropriately.
- Repeated attempts to initiate an IV.
- Inappropriate IV site selection.
- Reliance on IV infusion pump pressure alarms rather than visual inspection to detect high pressures/occlusion.
- Opaque dressings preventing viewing of IV sites.
- Insufficient charting practices (e.g. failure to document date of insertion, cannula size, status of IV, site observations).

**CASE STUDY 1**

During an admission to hospital for renal failure, an IV went interstitial in the patient’s hand during the administration of IV medications to lower serum potassium levels. Skin necrosis, compartment syndrome and extensive scarring resulted. While there appeared to be no mechanical problem with the IV, experts agreed that it was likely the initiation of the IV that caused weakness inside the vein resulting in the fluid leaking into the interstitial space – a known complication of IV therapy. The healing period was extensive with persistent scarring and skin sensitivity.

**CASE STUDY 2**

During the hospitalization of a patient with a large body mass index for a cardiac event, a percutaneous endoscopic gastrostomy (PEG) feeding tube was inserted for nutritional support. Unfortunately, the procedure was complicated by displacement of the PEG feeding tube from the stomach and feeds entered the peritoneal cavity over several days resulting in septic shock and sustained hypotension. When distension of the abdomen was observed by the family it was not immediately investigated. The patient suffered severe neurological injury as a result of prolonged septic shock. The patient died after remaining in a coma for several months. Case review determined inconsistencies in monitoring the PEG feeding tube placement by nurses and physicians.

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Failure to Identify/Manage Intravenous (IV) Infiltration

REFERENCES

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• ECRI Institute. (2013, February 22). Don’t call a plumber for this leaky faucet: Be wary of extravasation during CT contrast injection. Patient Safety E-lerts.


### Mitigation Strategies

#### Reliable Care Processes

**IV Insertion**
- Adopt guidelines for optimal peripheral IV cannula size and site selection (e.g. avoidance of hand veins; vicinity to joints; areas with existing skin breakdown; areas with limited feeling or compromised circulation), and methods for securing IVs (e.g. use of limb boards, transparent dressings).
- Adopt a vascular access protocol outlining the maximum number of IV attempts per practitioner and the hierarchy of practitioners (e.g. senior nursing staff on unit, IV team, anesthesia) and devices used to secure access (e.g. imaging or infrared devices, peripherally inserted central catheters, central lines).
- Consider development of an expert team to optimize IV insertion in neonatal and paediatric patients.

**Monitoring/Assessment**
- Ensure at least hourly (or more frequent for high-risk solutions and medications) visual (i.e. looking under the dressing) and tactile assessments of IV insertion sites and surrounding tissue including assessment for tenderness/pain, swelling/edema (including dependent areas such as under a patient’s limb), redness, moisture, drainage, bleeding, temperature (cool or warm), and blanching/mottling.
- Educate patients (as appropriate) and parents/family caregivers on the signs of IV infiltration.

**IV Solutions, Vesicants**
- Adopt standardized procedures for safe administration of hypertonic IV solutions and vesicants (including identification of those suitable for peripheral administration versus those requiring administration through a central line, appropriate dilution, and increased monitoring and documentation).

#### Management of Infiltration
- Adopt a standardized approach for identification and severity grading of IV infiltration.
- Adopt an IV infiltration management protocol including immediate steps (e.g. stopping infusion, aspiration of solution from catheter, elevation of limb, application of heat or cold), notification of most responsible practitioner, antidote administration, consultation with wound care service or plastic surgeon and enhanced monitoring.

#### Documentation
- Ensure complete and timely documentation of:
  - IV initialization including: date and time of insertion; site location; number and location of attempts; dressing used; reaction to flushing/fluid administration.
  - IV assessments performed, including integrity of the dressing and appearance of catheter insertion site and surrounding tissue (e.g. redness, moisture, drainage, bleeding, coolness/warmth, tenderness/pain, swelling, blanching/mottling).
- Ensure appropriate documentation of critical incidents/events involving IV infiltration including severity and responses taken.

#### Equipment and Technology
- Ensure appropriate supply, maintenance, and quality control for IV pumps.
- Ensure staff (including agency personnel) utilizing IV pumps have demonstrated competency/certification.
- Ensure a process for attending to IV pump alarms including:
  - Responsibilities for setting, changing, disabling and verifying they are functioning properly.

#### Measurement and Monitoring
- Implement formal strategies to help ensure consistent adherence to IV policies/practices (e.g. periodic chart/e-record audits, analysis of reported incidents/events, learning from medico-legal matters).