
Managing extravasation incidents within a large healthcare organisation

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York Conference Centre

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Overview

- Definition & causes of extravasation
- Managing extravasation
- Safety improvement plan

Tissuing !!!! (in old money)



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- Infiltration {
 - Non-vesicant; redness, swelling and discomfort
- ExtraVasation {
 - Vesicant- cause blistering, tissue injury (severe), necrosis (tissue death)

Metronidazole

SODIUM CONTENT (mmol): 0

14mmol/100mL.⁽¹⁾⁽⁴⁾

OSMOLARITY / OSMOLALITY: 0

308-310mOsmol/L.^{(1b)(4)}

pH: 0

pH of 5.5 (range 4.5 to 7).^{(1b)(4)}

Phenytoin

SODIUM CONTENT (mmol): 0

Up to 1.1mmol per 5mL (undiluted).⁽¹⁾

OSMOLARITY / OSMOLALITY: 0

Osmolarity: 7642mOsmol/L (Epanutin undiluted).^(9a)

Osmolality: 312mOsmol/kg (500mg diluted in 100mL sodium chloride 0.9%).⁽⁴⁾

pH: 0

10 to 12.3 (undiluted).^{(1c-d)(4)(9a-c)}

10.4 (1g diluted in 100mL sodium chloride 0.9%).

[pH information](#)

Accidental leakage of a '**non-vesicant**' into surrounding tissue:

Can lead to compression of nerve and acuter limb compartment syndrome resulting in long term disability

Symptoms:

- *Coolness*
- *Leakage at site*
- *Swelling, tenderness*
- *Sluggish flow rate*
- *Absence of blood backflow*

Prompt Intervention:

- Emergent fasciotomy – Compartment Release
 - surgical therapy
 - decompression of the affected area
 - restore muscle perfusion, typically within 6 hours



Infiltration

Accidental leakage of a '**vesicant**' into surrounding tissue

These have the highest destructive powers.

Can cause permanent damage and tissue necrosis.

Occurs with medications that have high or low pH and mmol strength.

NON-CHEMOTHERAPEUTIC vesicant drugs include:	CHEMOTHERAPEUTIC vesicant drugs include:
<ul style="list-style-type: none"> • Sodium bicarbonate • Calcium chloride • Calcium gluceptate • Esmolol • Concentrated potassium chloride • Dopamine 	<ul style="list-style-type: none"> • Doxorubicin • Vinblastine • Vincristine • Mithramycin • Vinorelbine



Extravasation

Definition of extravasation

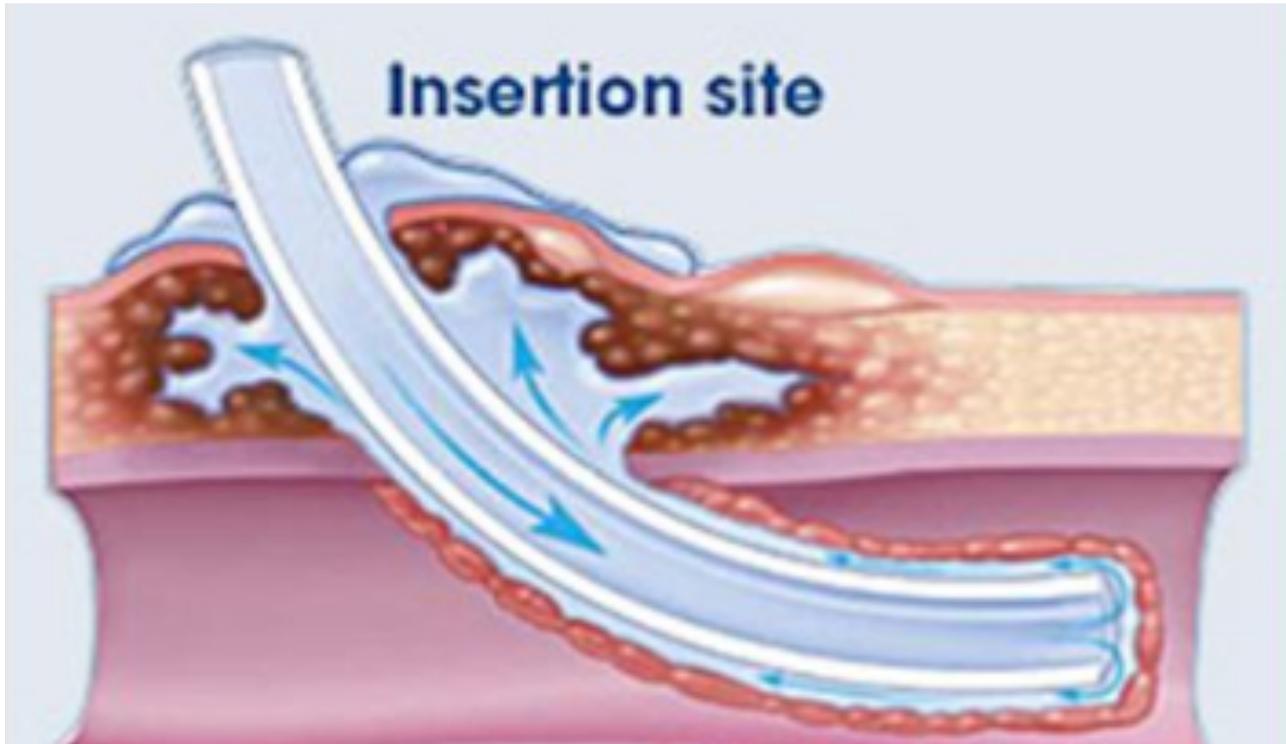
Extravasation is the accidental administration of a vesicant solution into the surrounding tissue during an intravenous infusion.



- Early signs and symptoms include pain, swelling and/or blistering.
- The solution administered can be **vesicant** or non-vesicant.
- Vesicants can cause tissue injury or destruction.

Causes of extravasation (1)

- Occlusion



Causes of extravasation (2)

- Catheter dislodges/punctures vein wall



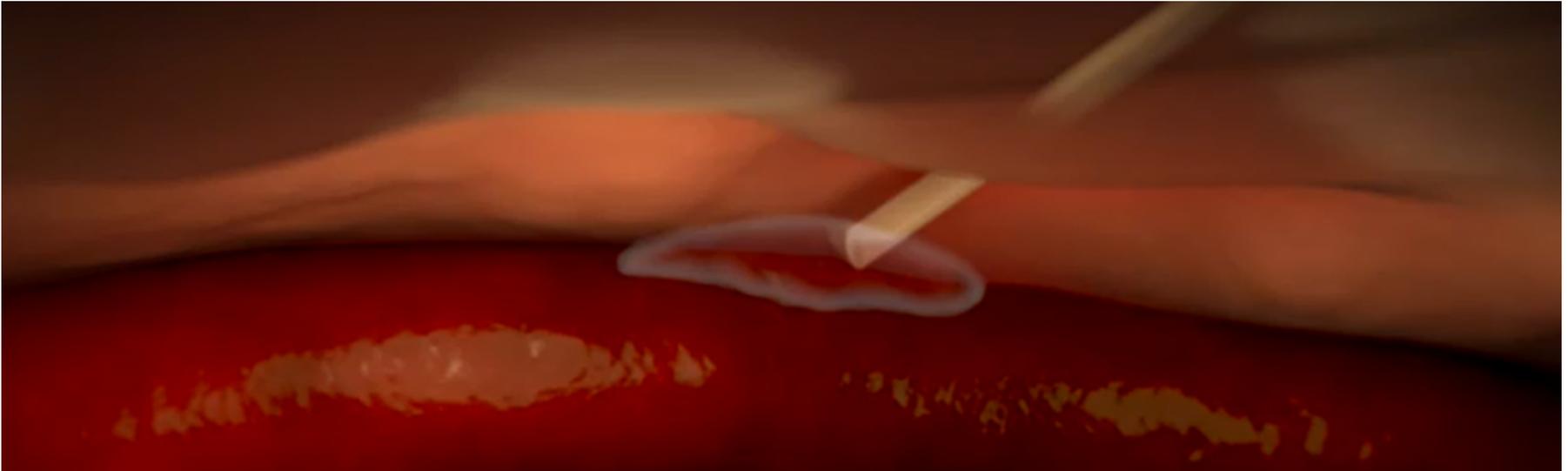
Causes of extravasation (3)

- Leakage through insertion site



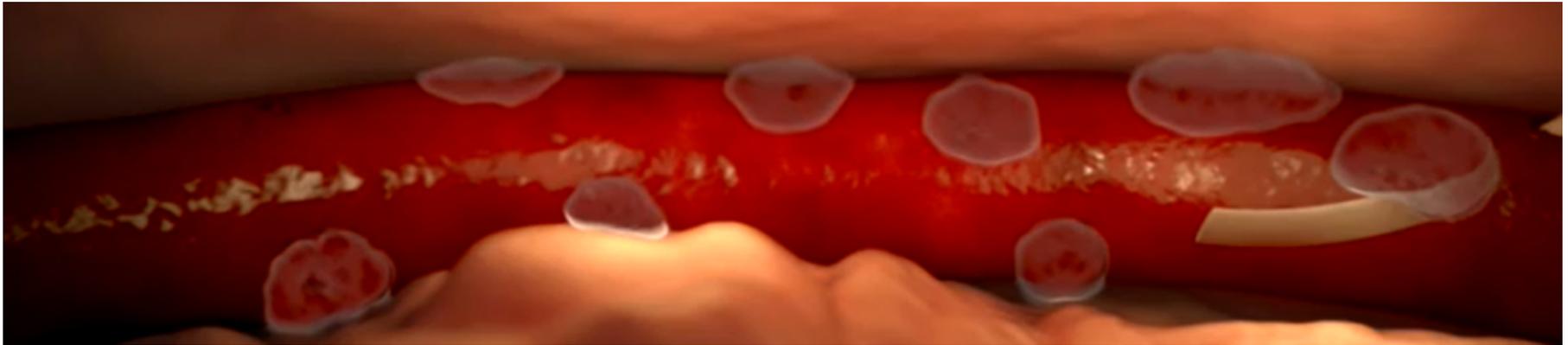
Causes of extravasation (4)

- Catheter backs out



Causes of extravasation (5)

- Increased vein porosity



Damage caused by extravasation



Safety Improvement Plan

Safety Improvement Plan

- Monitoring extravasation related incidents
- Prevention solutions
- Share best practice & benchmarking with other NHS Trusts

MDSO key roles



Patient Safety Alert

Stage Three: Directive

*Improving medical device
incident reporting
and learning*

20 March 2014

- Promoting safe use of medical devices;
- Improving quality of reporting;
- Identification and implementation of medical devices safety initiatives.

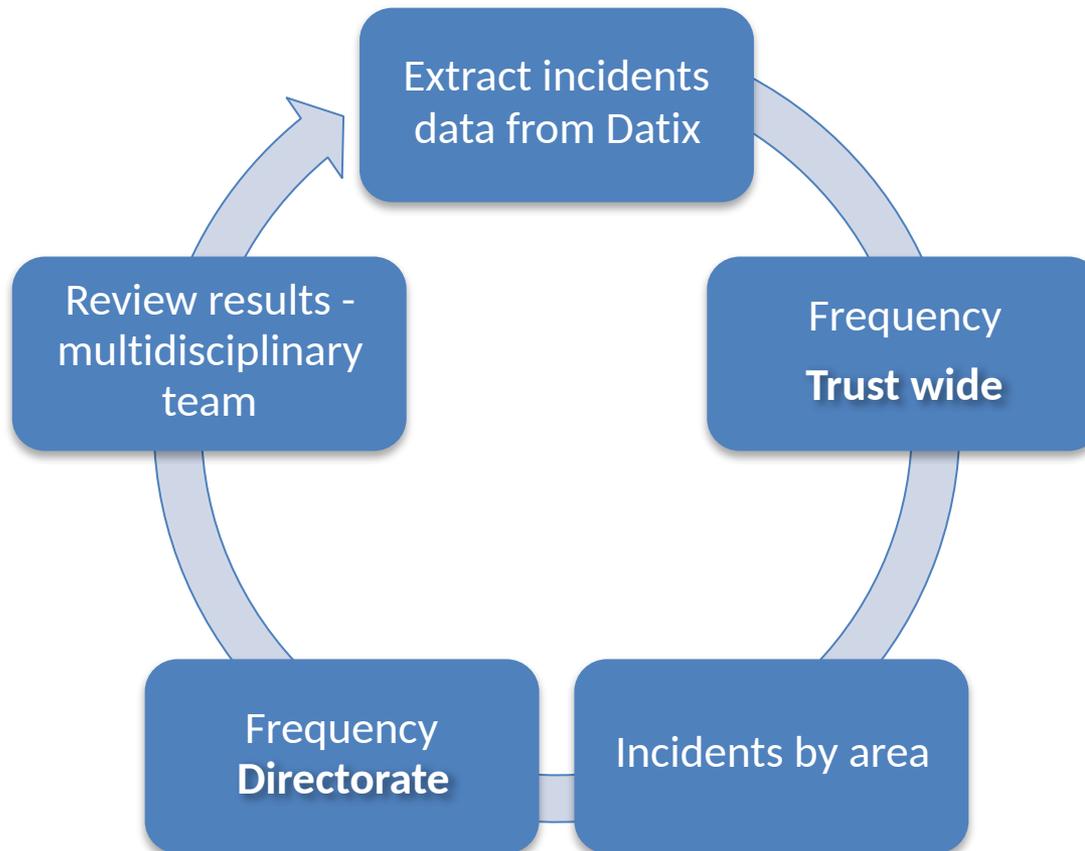
Extracting incidents data

Coding	
Category	<input type="text"/>
Subcategory	extravasa <input type="text"/>
Does the patient have learning disabilities or autism?	Extravasation (minor) Extravasation (significant)
Is this incident RIDDOR reportable?	<input type="text"/>
Did this involve a chemo/SACT drug and or affect chemo/SACT patient care?	<input type="text"/>

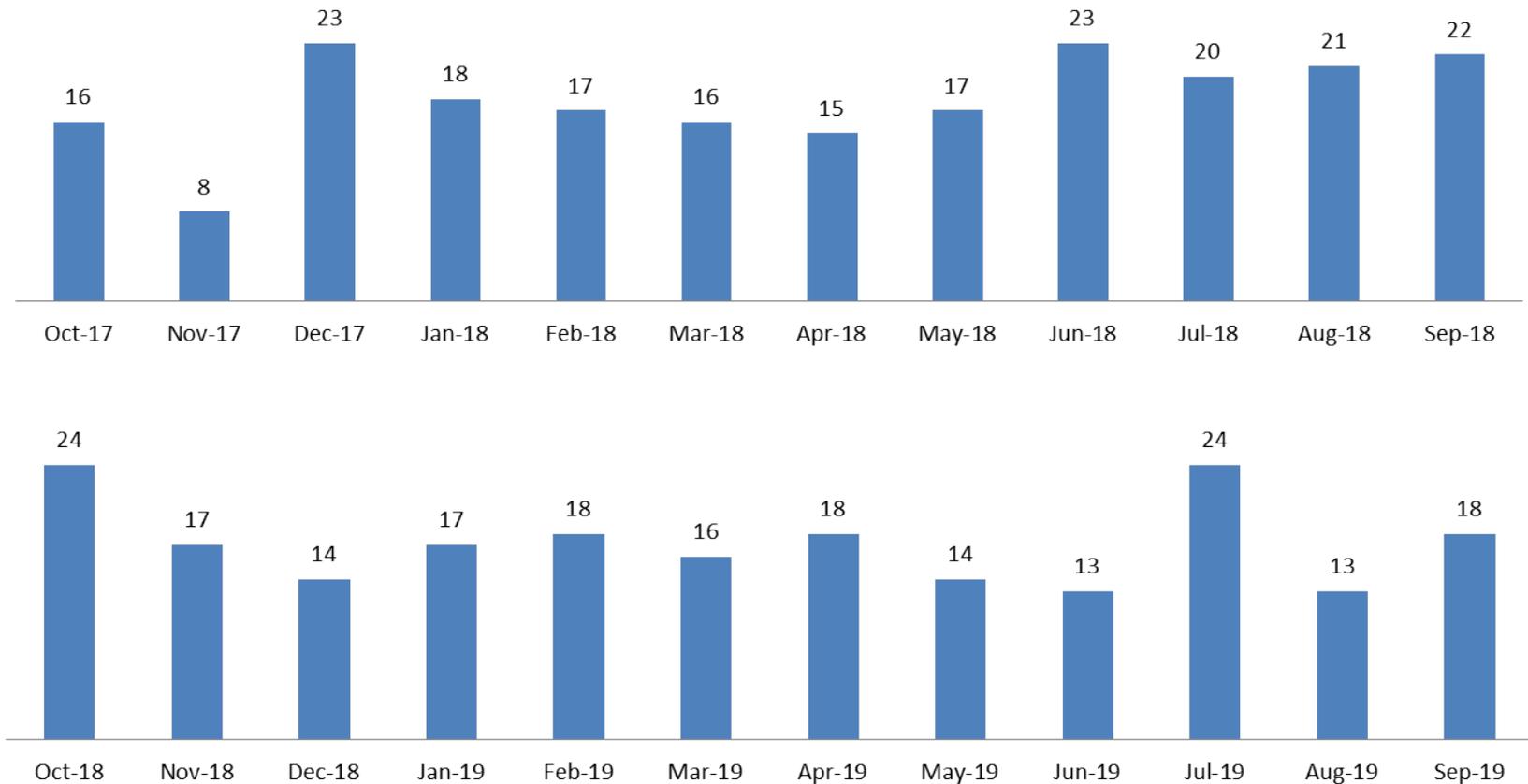
 Datix®



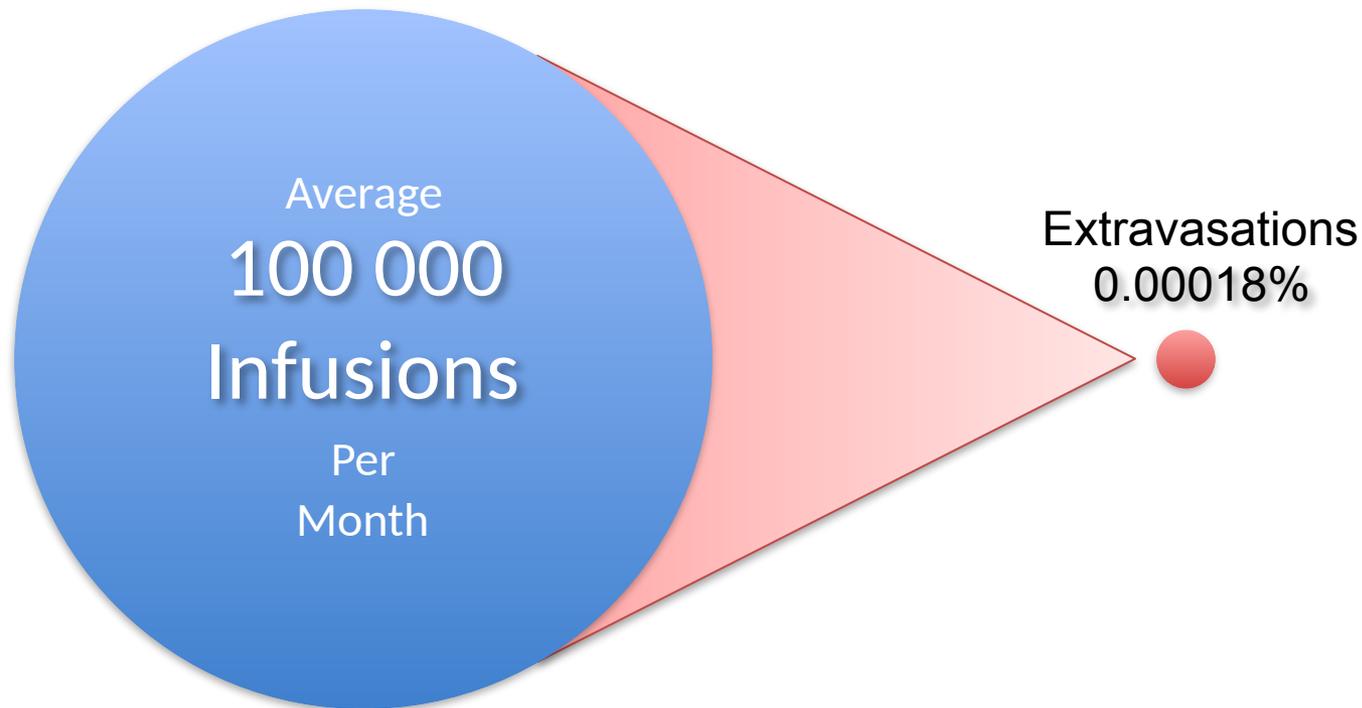
Analysis of Incident Reports



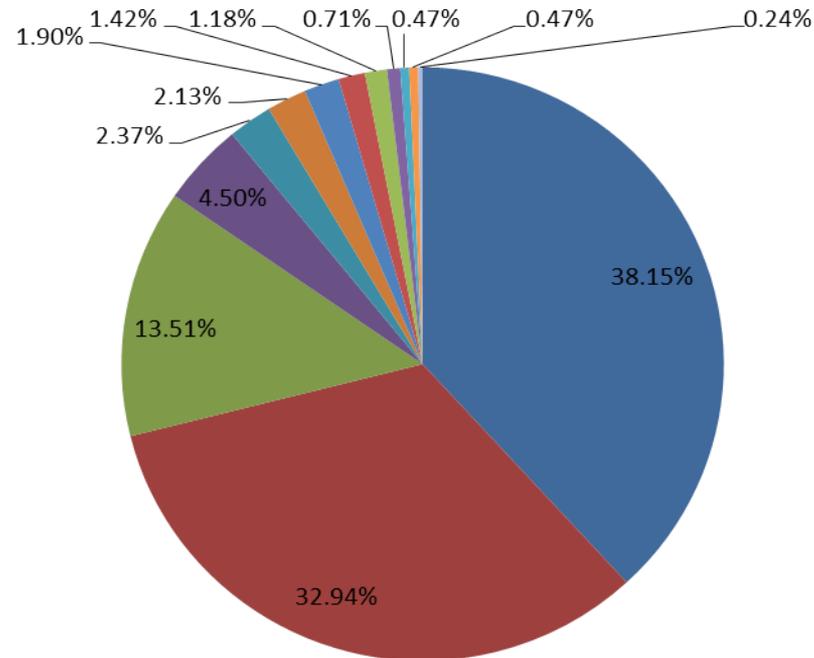
Extravasation incidents reported at LTHT



Extravasation incidents reported at LTHT

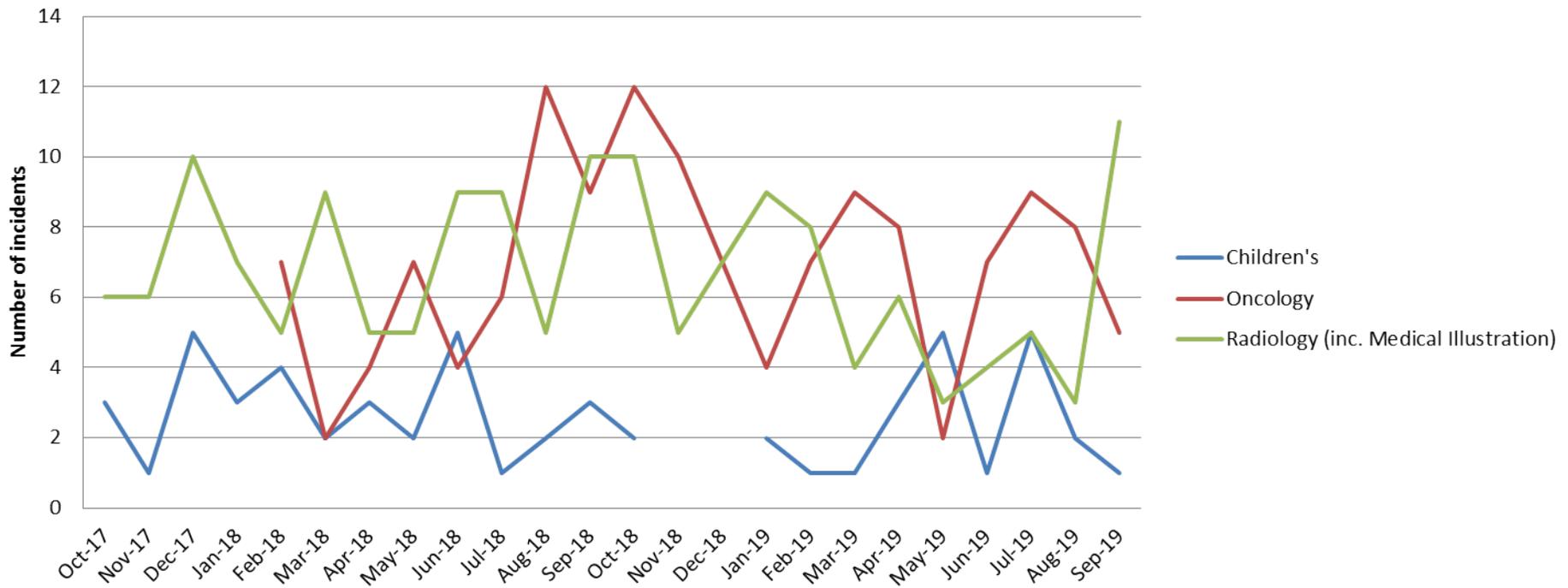


Extravasation incidents by directorate location

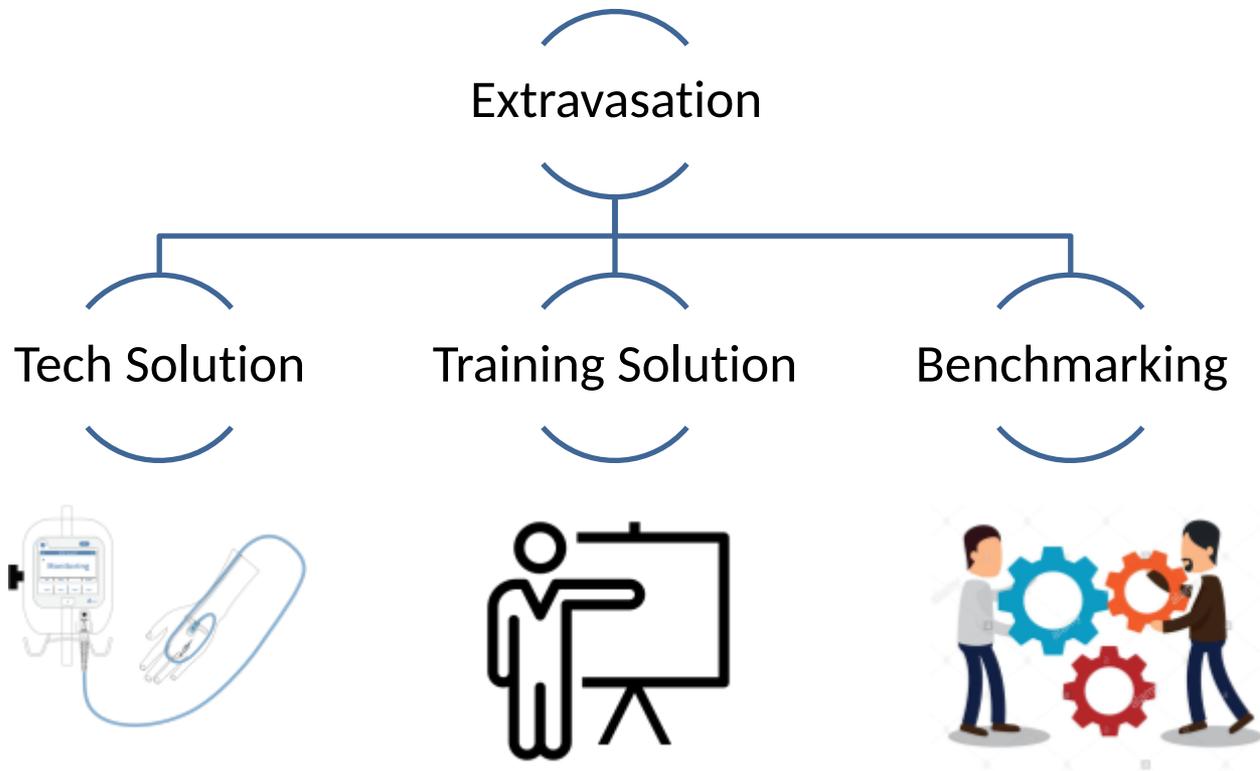


- Radiology (inc. Medical Illustration)
- Oncology
- Children's
- Oncology (previously Leeds Cancer Centre)
- Theatres & Anaesthesia
- Adult Critical Care
- Emergency & Specialty Medicine
- Abdominal Medicine & Surgery
- Women's
- Cardio-Respiratory
- Centre for Neurosciences
- Chapel Allerton Hospital
- Trauma & Related Services

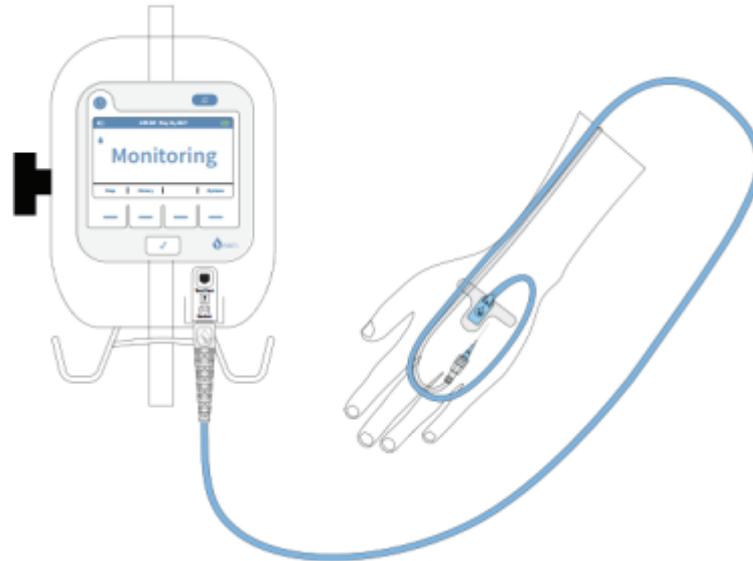
Extravasation incidents trend



Prevention Solutions



Pressure monitor via infusion devices



- Some infusion devices can detect pressure changes and alarm.
- This potentially helps to detect extravasation earlier.

Other automated methods to detect extravasation

Method	Drawback
Subcutaneous temperature measuring	Temperature differences are often too small for practical measurement
Plethysmographic detection techniques (volume variation)	Insensitive to small changes in volume
Photo-plethysmography - measure optical scattering properties of capillary blood	Extravasation often occurs too deep to be detected
Impedance plethysmography - measure changes in electrical impedance	Maintaining electrical contact between electrodes and skin can be difficult

Training content



- Incidents are shared monthly with clinical educators
- Incidents are used to improve the training content
- MELVIS (Medical Equipment Learning Verification Information System) – to incorporate IV training with infusion pumps training.

On-going and future work

- Sharing information with other NHS Trusts
- Benchmarking
 - How do you analyse incident data – Datix?
 - How many infusions do you perform per month?
 - How many extravasation incidents do you record every month?
 - What preventative technology is in use in your Trust?



Sharing best practice

	Trust name	Number of IV infusions	Number of reported extravasation incidents
Nov-19			
Dec-19			
Jan-20			
Feb-20			
Mar-20			
Apr-20			
May-20			
Jun-20			

Thank you!
Any questions?