Basics of Cancer Care Workshop

“Management of Extravasation of Chemotherapy Drugs”

Nursing Division,

Ministry of Health, Malaysia

Learning Outcomes

By the end of this lesson, learners will be able to:

- Define extravasation
- Identify predisposing factors to extravasation
- Explain the roles and responsibilities of nurses in the management of extravasation.

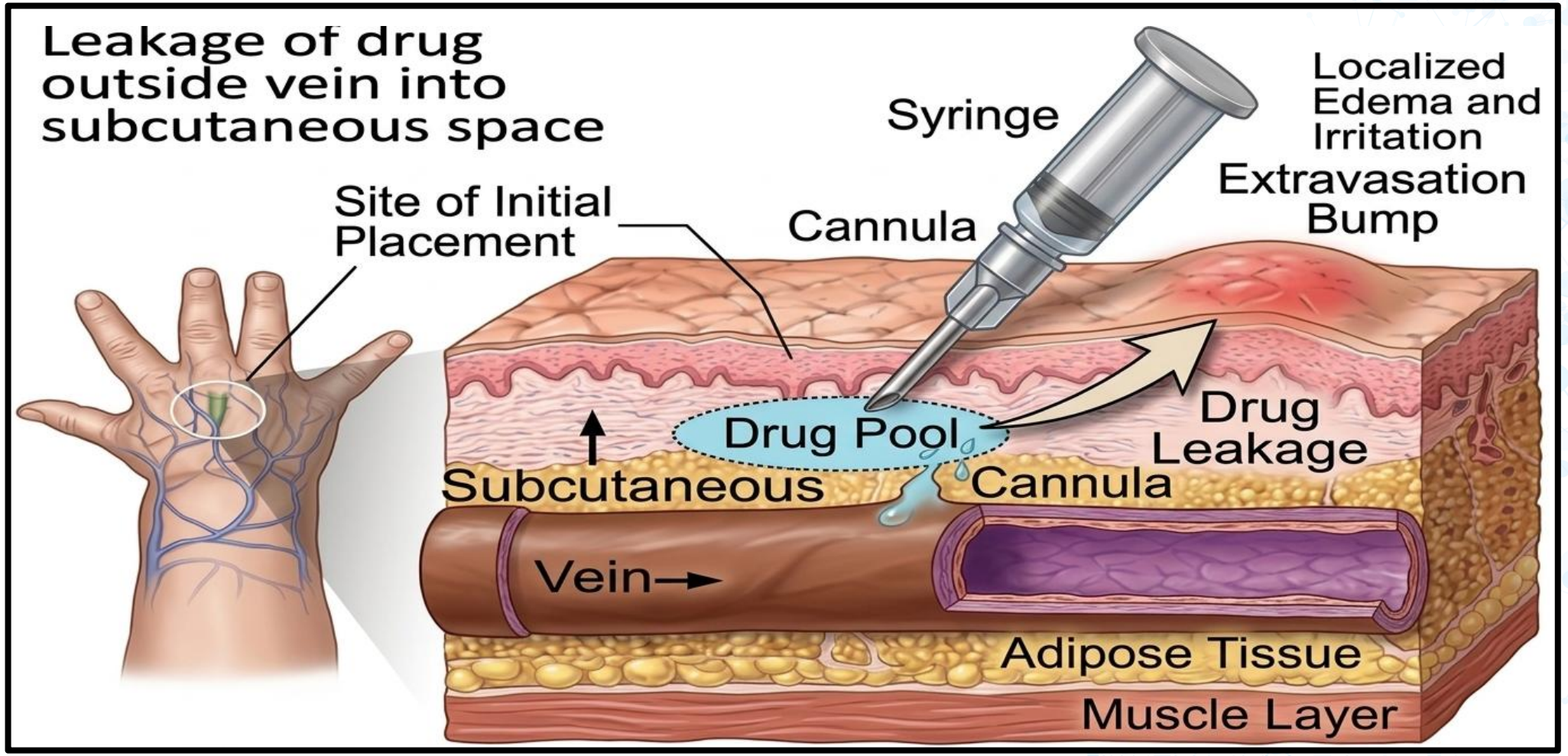
What is extravasation ?



- Chemotherapy extravasation is the **leakage** of a vesicant or irritant anticancer drug from a vein or vascular access device **into surrounding tissue**.

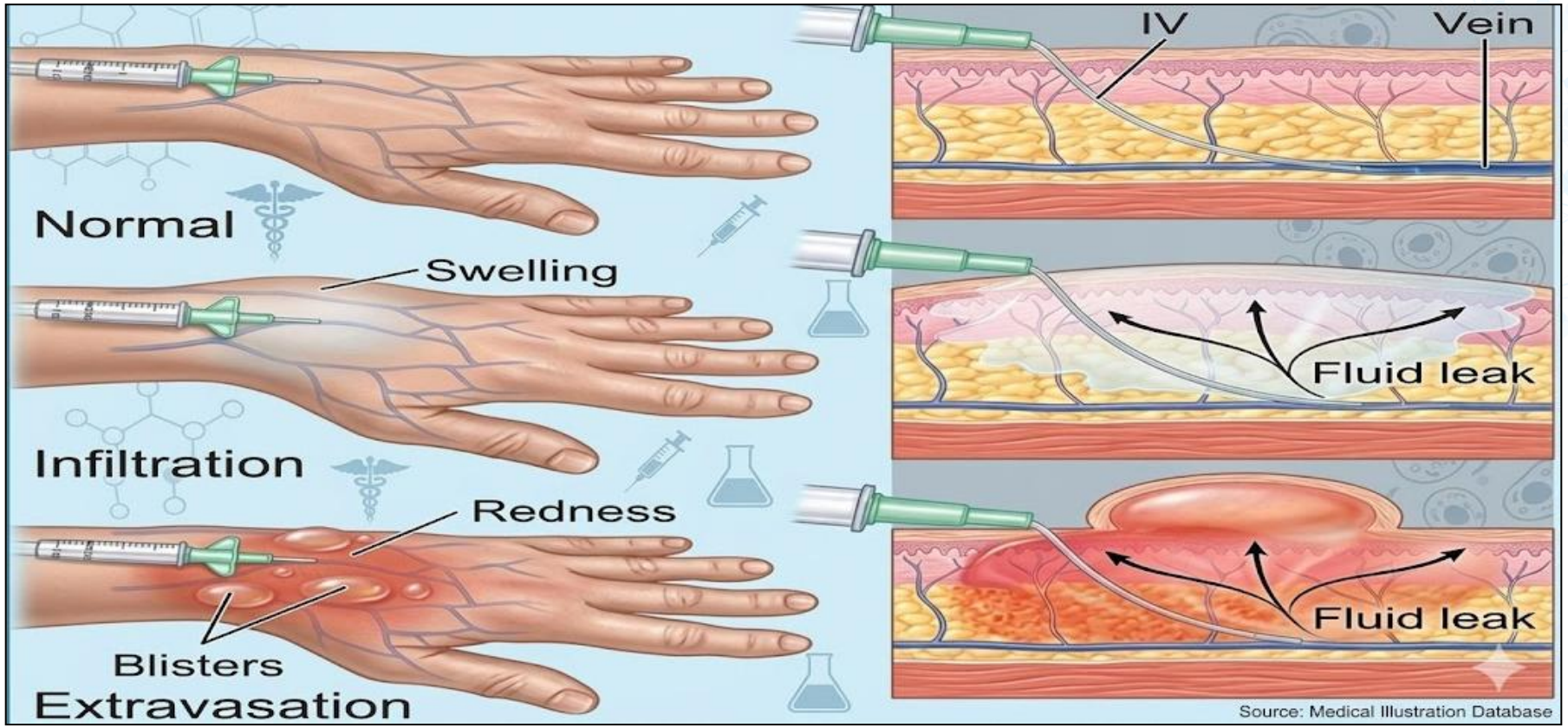
- This can cause tissue damage, including blistering or necrosis (tissue death), especially when toxic substances like **chemotherapy drugs** are involved.

Schematic of Extravasation in the Patient's Hand



Infiltration and Extravasation

- Infiltration is leakage of non-vesicant fluid into tissue.
- Extravasation is leakage of vesicant or tissue-damaging medication into tissue.



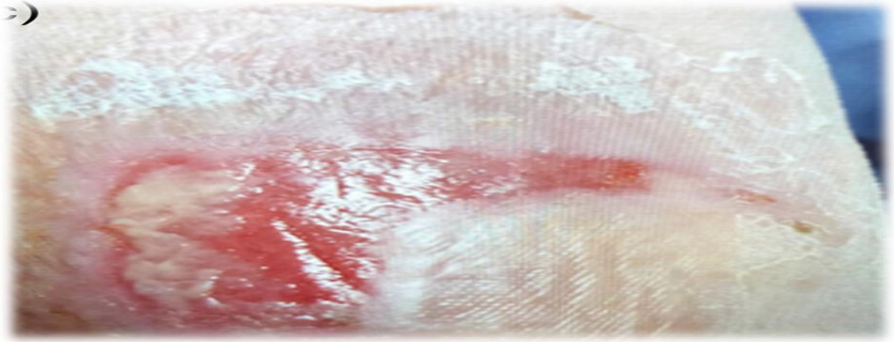
Case Study 1: Patient's images of extravasation over time.

1



1 day after extravasation. Described as a smooth erythematous plaque with central areas of erosion and desquamation.

2



1 week after extravasation. Described as a scaly plaque with central erosion and fibrinous material.

3



2 weeks after extravasation. Described as a scaly patch with central haemorrhagic crusting at the site of prior erosion.

Case Study 2 : Patient's image of extravasation after 6 days.



Case Study 3: Reconstruction

1



Local chemotherapy drug-induced perivenous extravasation injury which led to necrosis of the dorsal side of hand.

2



Reconstruction of the defect with reverse adipofascial perforator flap (RAPF) (size 8.5 x 5.5 cm).

3



Appearance of the flap 2 weeks post-op.

4



Side defect covered with split thickness skin graft.

Chemo port Extravasation



Day5



Day31



Day62

Factors Associated with Extravasation

Key Factors in Catheter Complications

Catheter-Specific Factors



- Insertion into site that is likely to be affected by movement (e.g. areas of joint flexion, dominant hand)
- Poor securing of implanted port access needle
- Multiple venipuncture sites (e.g. a second puncture above the first)



Physiologic Factors



- Clot formation above the cannulation site
- Thrombus or fibrin sheath at the catheter tip
- Lymphedema

Pharmacologic Factors



- Cytotoxicity
- Vasoconstrictive potential

Factors Associated with Extravasation, continued..

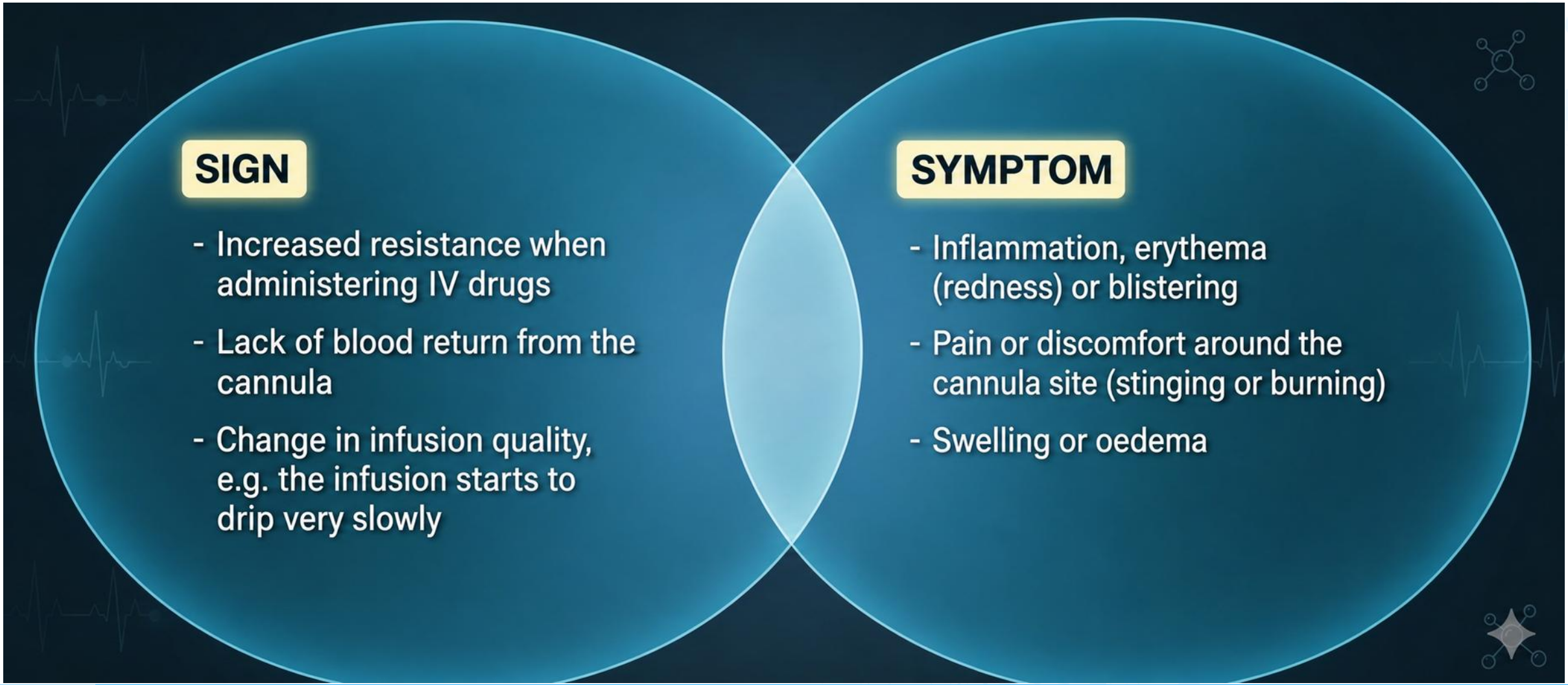
Patient-Specific Risk Factors

- Small size and poor condition of veins
- Age (elderly and paediatric)
- Patient activity
- History of multiple IV cannulations
- Psychiatric patient.

Nurse-Specific Factors

- Inexperience or lack of skill
- Interruptions/distractions

Signs And Symptoms of Extravasation: For IV Cannulation



Signs and Symptoms of Extravasation For CVAD

If extravasation occurs through a CVAD/CVC, the patient may complain of:

Aching discomfort in the shoulder/neck-this is the most common

Pain, burning, aching/ discomfort, swelling of chest wall

Fluid leakage at or around exit site and along subcutaneous canal



Day5



Day31



Day62

Types of Chemotherapy Drugs by Extravasation Risk

Vesicant

- Vesicants are drugs (cytotoxic or non-cytotoxic) with the potential to cause **blistering and ulceration** and if left untreated can cause tissue necrosis

Dactinomycin
Daunorubicin
Doxorubicin
Epirubicin
Idarubicin
Mitomycin C
Paclitaxel
Vinblastine
Vincristine
Vinorelbine
Docetaxel





Irritant

- Agent that cause venous pain due to local irritation and vessel wall spasm, which may occlude blood flow.
- Symptoms: pain with/without inflammation, no necrosis

Carboplatin
Etoposide
Irinotecan
Cisplatin
Oxaliplatin
Ifosphamide
Flurouracil





Neutral/non vesicant

- Causes very little or no tissue damage when extravasation occurred

Asparaginase
Bleomycin
Cyclophosphamide
Cytarabine
Fludarabine
Gemcitabine
Rituximab
Transtuzumab
Bortezomib
Methotrexate



Severe Complications

- Severe local tissue damage
- Delayed healing / delay in chemotherapy treatment
- Longer hospital stay
- Infection
- Tissue necrosis
- Disfigurement
- Loss of function; rarely, severe injury may require surgical debridement or amputation
- Emotional consequences









Extravasation

Role & Responsibility of Nurses

Selection of Insertion Site

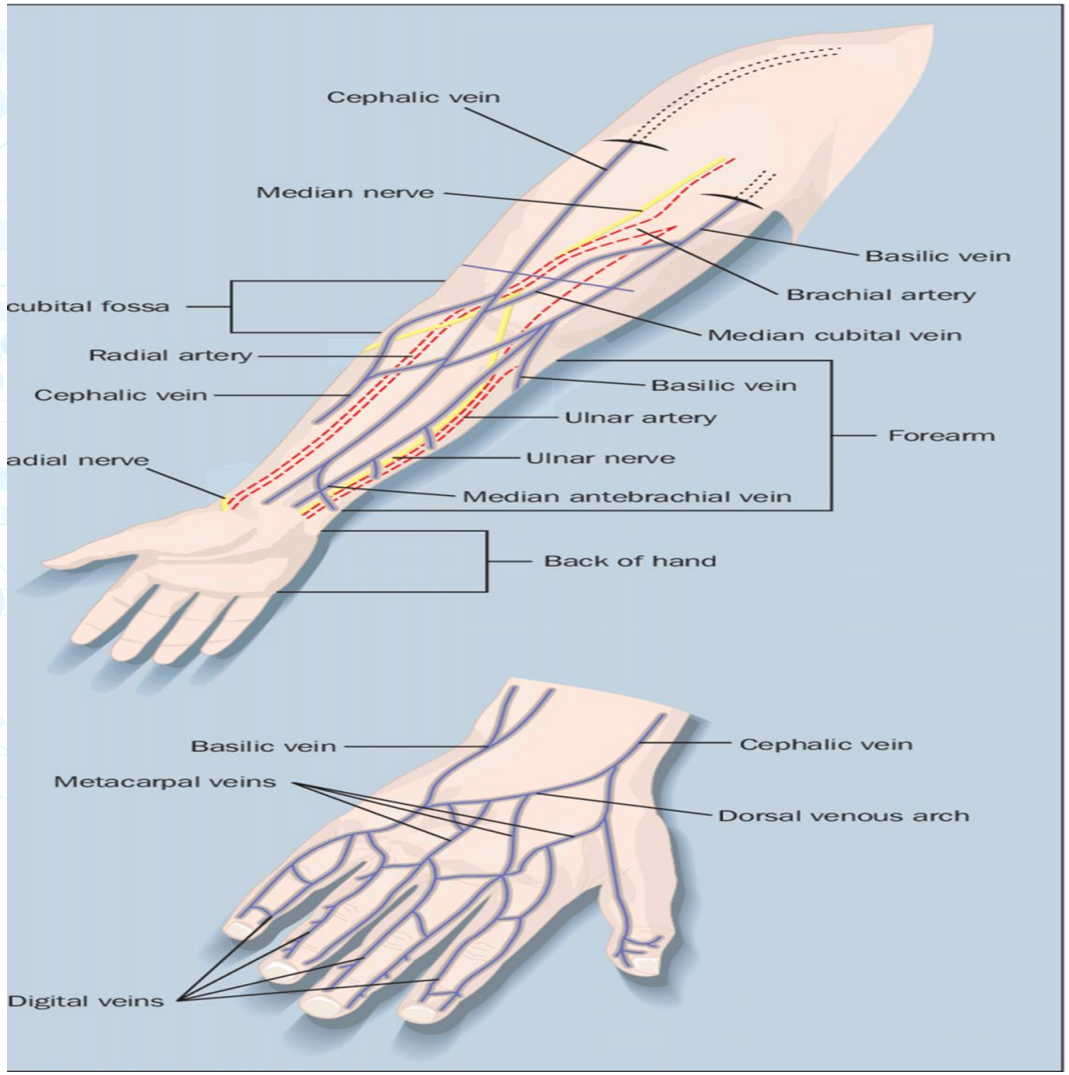
How to identify a suitable vein?

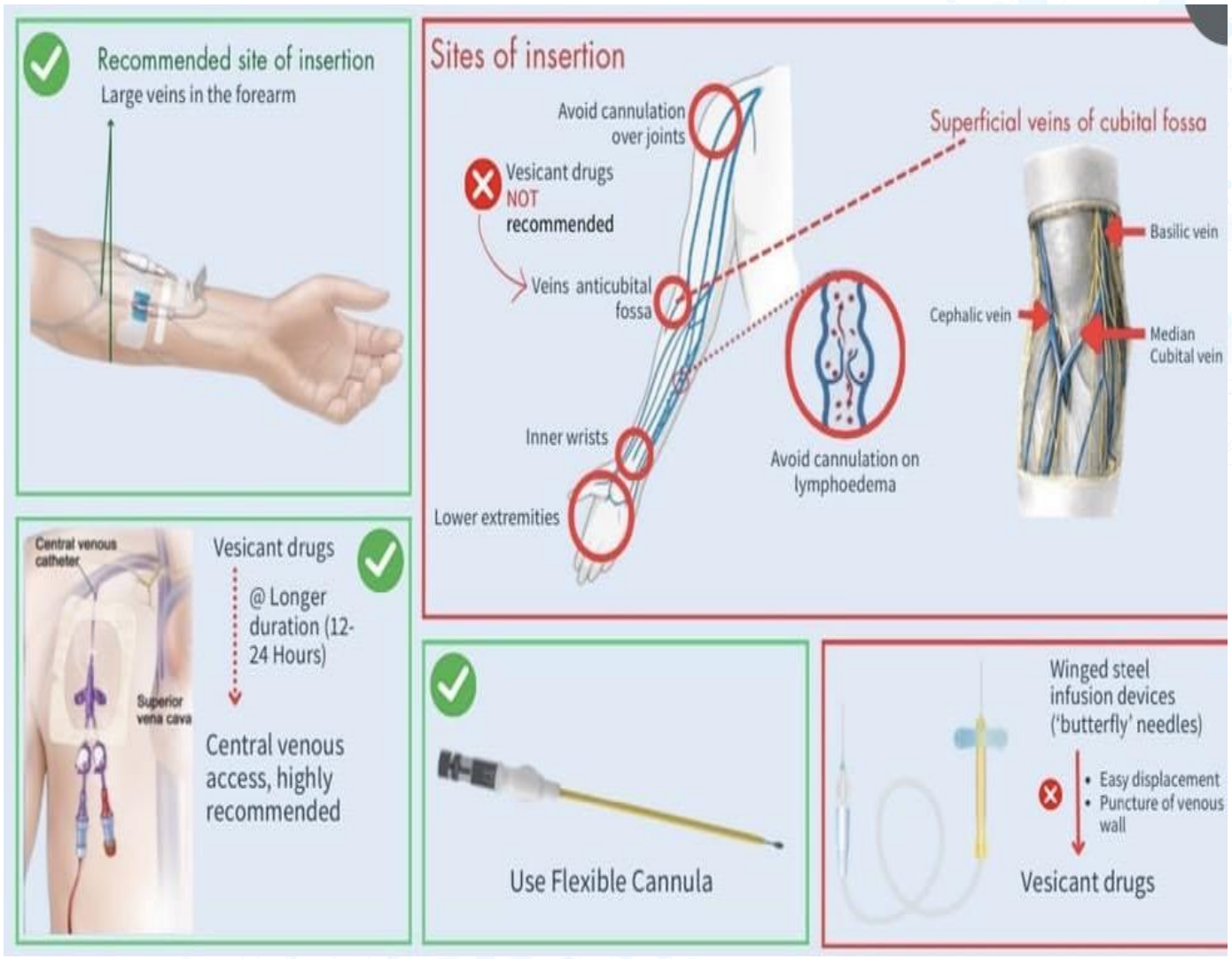
- Bouncy
- Soft
- Use a vein proximal to any previous puncture site only if clinically appropriate; avoid cannulating distal to a recent failed puncture or site of infiltration
- Straight
- Has a larger lumen
- Well supported

What veins should you avoid?

- Near bony prominences
- Inflamed/bruised
- Avoid joints because movement increases the risk of dislodgement and extravasation
- Arm on the side of mastectomy or lymph-node dissection, according to local policy
- Avoid cannulation in an arm with lymphoedema
- Have undergone multiple previous punctures

Selection of Insertion Site, continued





Procedure for Administration of Chemotherapy

Before	During	After
➢ IV catheter must be tested with IV fluids 250cc in 30 minutes - to determine the patency of the vessel prior to administration of chemotherapy drugs. ➢ A blood return (backflow) should be obtained before drugs are administered. ➢ If more drugs must be administered, vesicants should be administered first – because the vein is most stable and least irritated at the start of treatment.	➢ Flushing with 10–20 ml of saline solution between different drug infusions is recommended. ➢ Continue monitoring the cannula insertion site and check regularly for the appearance of symptoms such as swelling, pain, redness or a sluggish infusion rate. ➢ Bolus dosages of vesicant drugs may be administered concurrently with a fast-running infusion of compatible IV fluid.	➢ Flushing with 250mls to 500mls of saline after completed chemotherapy. ➢ Monitoring sign and symptoms extravasation. ➢ Remind patient to inform nurse if sign and symptoms occur. ➢ Do not apply any lotion/ cream/ oil. ➢ Patients should not self-apply creams, oils, massage, heat or cold unless instructed. If extravasation occurs, compress type must be drug-specific and guided by protocol.

Health Education

- Inform patients and relatives about the early signs and symptoms of extravasation before starting chemotherapy.
- Advise patient to limit movement.
- Do not apply any **lotion/oil/cream** at the affected area.
- Do not apply cold or warm compresses unless advised by the oncology team, because compress choice depends on the drug.
- Advise the patient to seek urgent medical attention if signs or symptoms occur.

Extravasation

Management of Extravasation

Management of Extravasation

1.Stop the infusion/bolus immediately. Leave the cannula/ chemo port needle in place

2.Call for assistance (M.O, senior nurse). Notify Oncologist

3.Get extravasation kit.

4.Put on chemotherapy glove and PPE.

5.Disconnect the infusion/bolus. Leave the branula / chemoport intact. Cap off the tubing/syringe of the giving set.

6.Identify extravasation agent

7.Briefly explain to the patient what has happened.

8.Try to gently aspirate as much as extravasation solution as possible using a 10mls syringe.

9. Leave cannula/port needle in place while attempting aspiration; remove only after aspiration step according to protocol
DO NOT FLUSH THE LINE

10. Mark with a marker pen an outline of the extravasation area (measure diameter, length and width of extravasation area)

11. Photograph the area with patient consent and according to institutional documentation policy

Management of Extravasation, continued….

12. Apply cold or warm compress according to the drug-specific protocol. eviQ commonly recommends 15–20 minutes every 6 hours for 48 hours for many agents.
(**DO NOT place the compress directly on the skin).**

13. Rub a thin layer of Hydrocortisone cream over inflamed site (if necessary).

14. Elevate the limb for comfort and to reduce swelling. Avoid strenuous movement; normal gentle use may be allowed depending on protocol and comfort.

15. Administer analgesia (if necessary)

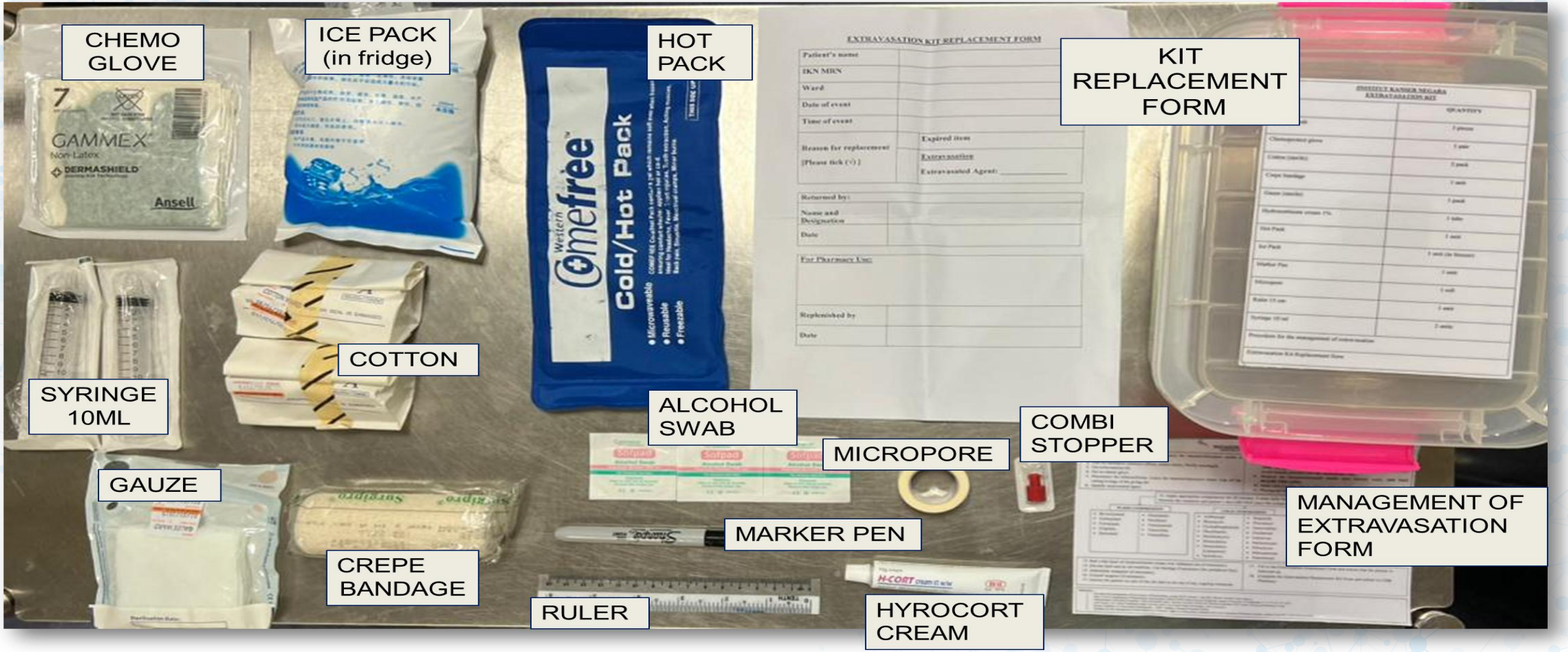
16. Consult surgeon (if necessary)

17. Instruct the patient on care of the site and on the use of any ongoing treatment.

18. Fill in the Extravasation Assessment Form and ensure that the patient is followed up.

19. Complete the Extravasation Replacement kit Form and submit to CDR Pharmacy.

Extravasation Kit



Example Forms

Extravasation

Assessment Form

IKN/RTO/DAYCARE/06

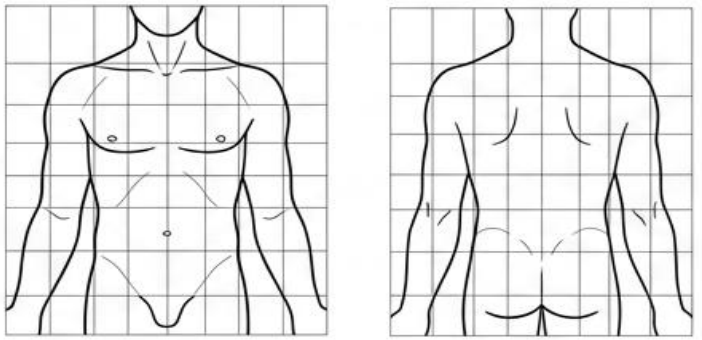
INSTITUT KANSER NEGARA
EXTRAVASATION ASSESSMENT FORM

Name: _____ ID: _____

MRN: _____

Gender: Male/Female Specialist i/c _____ Ward: _____

Extravasation incident	Extravasation recognized
☐ Yes	☐ Yes, ☐ N ☐ No
Types Of Venous Access Device	**Cannulation**
☐ Cannula ☐ CVAD (Chemoport)	☐ Cannula ☐ CVAD (Chemoport) CVAD: _____
Type of Administration	**Signs and symptoms (please ticks)**
☐ Infusion pump ☐ IV Bolus ☐ IV Infusion (gravity)	☐ Pain ☐ Tracking ☐ Swelling ☐ Erythema ☐ Leakage ☐ Stinging ☐ Burning ☐ Loss of blood return ☐ Bleb formation ☐ Infusion slow/rate change
Signs and symptoms (please ticks)	



Measurement of area: _____ Mark Affected Area

IMMEDIATE INTERVENTIONS

Date and Time: _____
Antidote administered (specify): _____
☐ Cold compress ☐ Warm compress
Photo Taken **Yes / No**

Referral/Follow Up Appointments	Patient Discharged Checklist
☐ Dermatology _____	☐ Information Sheet including self care instructions
☐ Plastics _____	☐ Take home medication (analgesic, creams)
☐ Surgical _____	☐ Follow up appointments
☐ Community _____	
☐ Cancer Care _____	
☐ Other _____	

Person perfoming assessment:

Name: _____
Designation: _____
Signature: _____

OBSERVATION OF EXTRAVASATION SITE

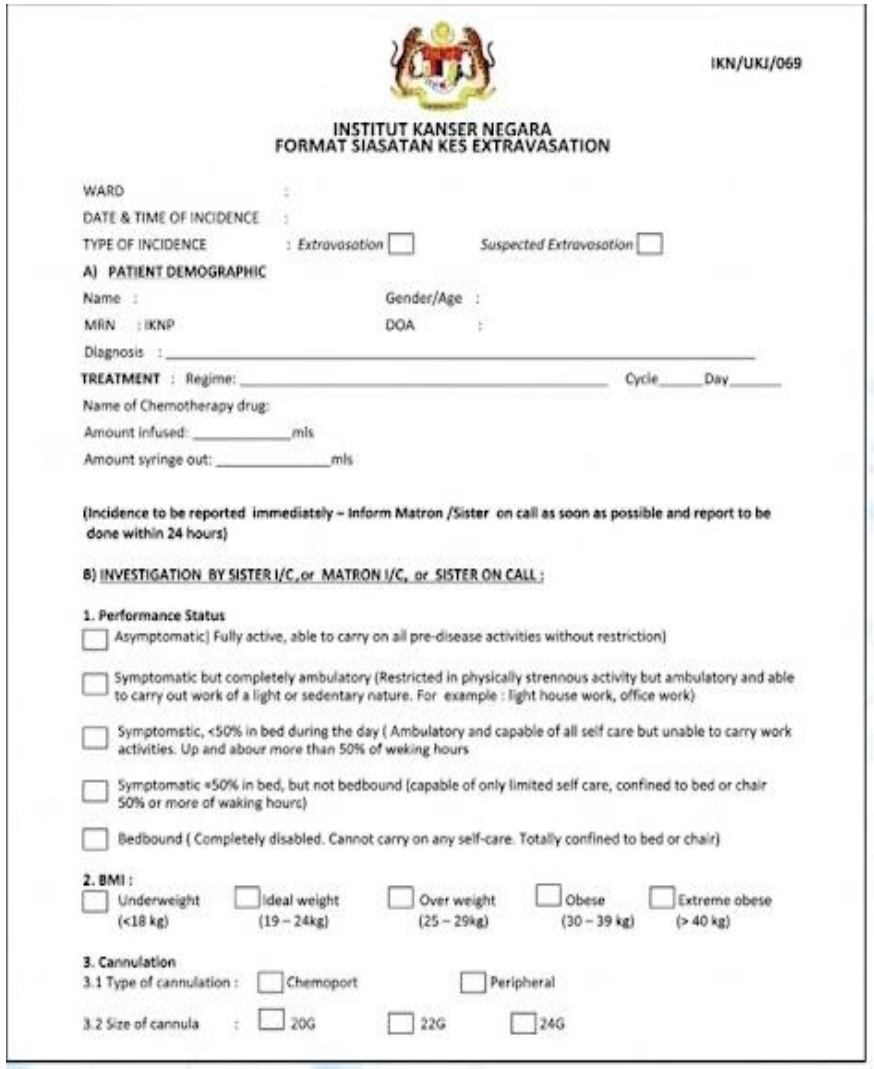
Extravasation Assessment Flow Chart

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 14	Day 21	Day 28
Date										
Skin Colour										
Skin Temp										
Skin integrity										
Oedema										
Mobility										
Pain										
Fever										
Photo										
Signature										

Grading Scale	0	1	2	3	4
Skin Colour	Normal	Pink	Red	Blanched Centre	Blackened
Skin Temperature	Normal	Warm	Hot		
Skin integrity	Unbroken	Blistered	Superficial Skin Loss	Tissue loss exposing subcutaneous tissue	Tissue loss muscle /bone exposure, deep crater or necrosis
Oedema	Absent	Non-pitting	Pitting		
Mobility	Full	Slightly limited	Immobile		
Pain	Grade using a scale of 0 – 10 : 0 = no pain 10 = worse pain				
Fever	Normal	Elevated			

Example Forms

Incident Form Format for Extravasation



IKN/UKJ/069

INSTITUT KANSER NEGARA
FORMAT SIASATAN KES EXTRAVASATION

WARD :
DATE & TIME OF INCIDENCE :
TYPE OF INCIDENCE : *Extravasation* ☐ *Suspected Extravasation* ☐

A) PATIENT DEMOGRAPHIC

Name : Gender/Age :
MRN : IKNP DOA :
Diagnosis : _____

TREATMENT : Regime: _____ Cycle____Day____
Name of Chemotherapy drug:
Amount infused: _____mls
Amount syringe out: _____mls

(Incidence to be reported immediately – Inform Matron /Sister on call as soon as possible and report to be done within 24 hours)

B) INVESTIGATION BY SISTER I/C,or MATRON I/C, or SISTER ON CALL :

1. Performance Status

☐ Asymptomatic) Fully active, able to carry on all pre-disease activities without restriction)

☐ Symptomatic but completely ambulatory (Restricted in physically strennous activity but ambulatory and able to carry out work of a light or sedentary nature. For example : light house work, office work)

☐ Symptomstic, <50% in bed during the day (Ambulatory and capable of all self care but unable to carry work activities. Up and about more than 50% of weking hours

☐ Symptomatic >50% in bed, but not bedbound (capable of only limited self care, confined to bed or chair 50% or more of waking hours)

☐ Bedbound (Completely disabled. Cannot carry on any self-care. Totally confined to bed or chair)

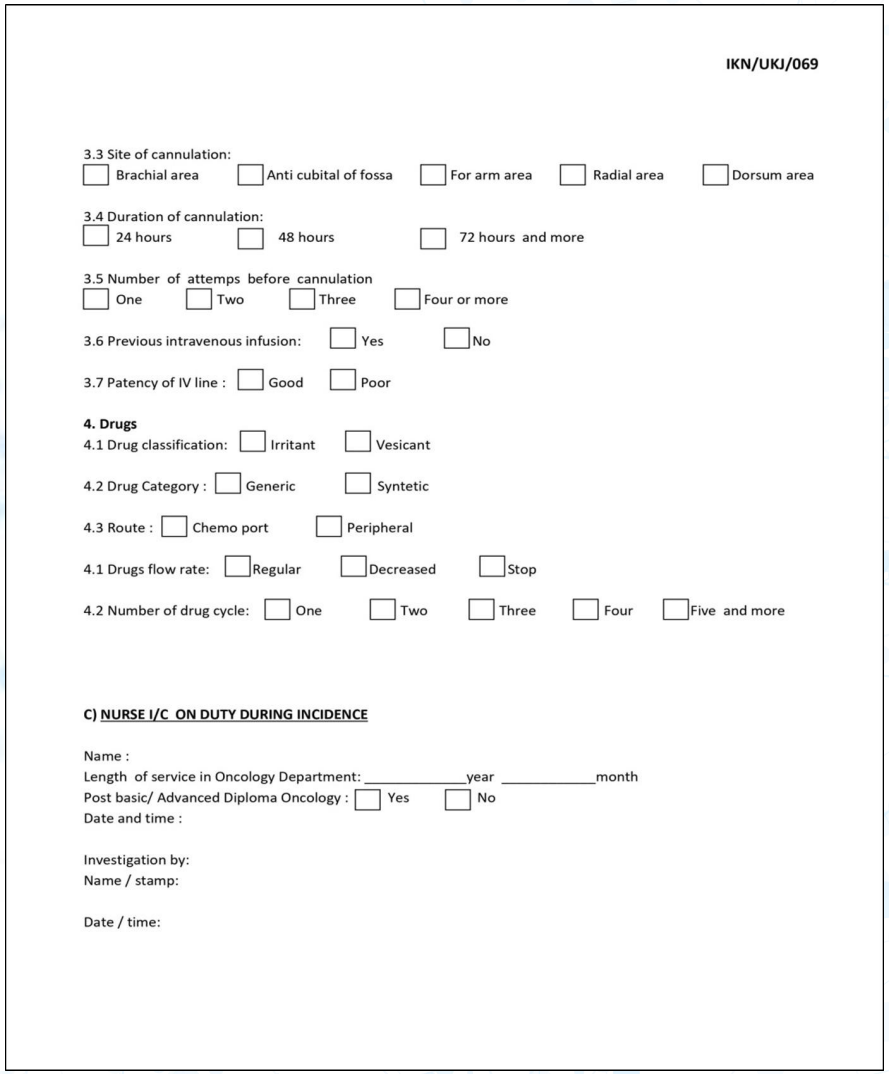
2. BMI :

☐ Underweight (<18 kg) ☐ Ideal weight (19 – 24kg) ☐ Over weight (25 – 29kg) ☐ Obese (30 – 39 kg) ☐ Extreme obese (> 40 kg)

3. Cannulation

3.1 Type of cannulation : ☐ Chemoport ☐ Peripheral

3.2 Size of cannula : ☐ 20G ☐ 22G ☐ 24G



IKN/UKJ/069

3.3 Site of cannulation:
☐ Brachial area ☐ Anti cubital of fossa ☐ For arm area ☐ Radial area ☐ Dorsum area

3.4 Duration of cannulation:
☐ 24 hours ☐ 48 hours ☐ 72 hours and more

3.5 Number of attemps before cannulation
☐ One ☐ Two ☐ Three ☐ Four or more

3.6 Previous intravenous infusion: ☐ Yes ☐ No

3.7 Patency of IV line : ☐ Good ☐ Poor

4. Drugs

4.1 Drug classification: ☐ Irritant ☐ Vesicant

4.2 Drug Category : ☐ Generic ☐ Syntetic

4.3 Route : ☐ Chemo port ☐ Peripheral

4.1 Drugs flow rate: ☐ Regular ☐ Decreased ☐ Stop

4.2 Number of drug cycle: ☐ One ☐ Two ☐ Three ☐ Four ☐ Five and more

C) NURSE I/C ON DUTY DURING INCIDENCE

Name :
Length of service in Oncology Department: _____year _____month
Post basic/ Advanced Diploma Oncology : ☐ Yes ☐ No
Date and time :

Investigation by:
Name / stamp:

Date / time:

Example Form

Incident Reporting Form (Ir. 2.0)

SULIT

MINISTRY OF HEALTH MALAYSIA
PATIENT SAFETY INCIDENT REPORTING FORM

IR 2.0/2017

*Borang boleh diisi dalam **Bahasa Malaysia***

DATE OF REPORTING: 3/12/ 2019

SECTION A: TO BE COMPLETED BY THE REPORTER OF THE INCIDENT

INCIDENT DESCRIPTION (Please fill in the blanks)

1.	**NAME OF FACILITY/ INSTITUTION**	NATIONAL CANCER INSTITUTE WARD RTO 8A	**PATIENT'S NAME**	LIM KONG HOE
2.	**DATE OF INCIDENT**	03 / 12 / 2019	**IF UNCERTAIN**	APPROXIMATE DATE: ___/___/___
3.	**TIME OF INCIDENT**	09 : 15 AM/ PM	**IF UNCERTAIN**	APPROXIMATE TIME: ___:___ AM /PM
4.	**PATIENT'S RN/ OTHER INDENTIFICATION NUMBER** : IKNP00043471 **AGE**: 67 **ETHNIC**: CHINESE **GENDER** : MALE / FEMALE / UNKNOWN (please circle) **STATUS** : ALIVE / DECEASED **LANGUAGE BARRIER**: YES / NO **DIAGNOSIS** : CA RIGHT TONSILLAR SCC S111			

5. **TYPE OF PATIENT** (please tick one)

✓	INPATIENT		DAY CARE
	OUTPATIENT		OTHERS: SPECIFY
	A&E		

LOCATION/ WARD / CLINIC : WARD RTO 8A/ BED 26

DEPARTMENT(S) INVOLVED (please tick)

	MEDICAL		O&G	/	ONCOLOGY
	SURGICAL		PHARMACY		GERIATRIC
	ORTHOPAEDIC		RADIOLOGY & IMAGING		REHABILITATION
	PAEDIATRIC		A&E		ICU/ CCU
	LABORATORY		PSYCHIATRY		
	OTHERS: SPECIFY				

6. **TYPE OF INCIDENT** (please tick one) ✓ **Actual** ☐ **Near Miss**

Examples of incidents that need to be reported: (Note that this list is not exhaustive)

	i.	Wrong surgery/procedure –wrong site, side or patient
	ii.	Unintended retained foreign body in patient after an operation/procedure
	iii.	Error in transfusion of blood/blood products
	vi.	Medication error (please fill in MERS form as well)
	v.	Patient fall in the facility
	vi.	Obstetric related incidents
	vii.	Adverse outcome of clinical procedure
	viii.	Pre-hospital care and ambulance service related incident
	ix.	Radiotherapy related incident
	x.	Patient suicide / attempted suicide
	xi.	Patient discharged to wrong family members / next-of -kin
	xii.	Assault/ battery of patient
	xiii.	Unanticipated Fire – Fire, flame, or unanticipated smoke, heat, or flashes occurring in the facility
/	xiv.	**Others type of incident :** Extravasation

7. **BRIEF DESCRIPTION OF WHAT HAPPENED** (Please fill in the blanks)
The description should explain what happen prior and during the incident and how it occurred. Do include any additional information which you think may lead to the incident

3/12/2019 at 9.15am , patient complain having swelling, warm and pain .Seen redness over the canulation area at the right hand fore arm cephalic vein size 22G after back from toilet. Attended STAT and checked done by Staff Nurse A. Informed Dr. J and attended STAT.Noted extravasation during ongoing cycle 1 day 4 , 2nd pint IV5FU . Started at 5.30am and detected extravasation at 9.15am .Immediately stop chemotherapy infusion at 9.15am . Extravastion action taken .Blood seen during withdraw fluid from canulation about 2.5mls.Branula removed done .Mark the extravasation site, size measurement 9cm x 7.5cm .Cold compression applied for 20 minutes done.Taking photo done. Hydrocort cream applied with thin layer over swelling area.New branula inserted at left hand branula size 22G. Good backflow presented witness by SN N.Continue chemotherapy as plan.

SULIT

IR 2.0/2017

PATIENT OUTCOME (please tick one) **& IMMEDIATE ACTION – ONLY FOR ACTUAL INCIDENT**

8. **OUTCOME OF INCIDENT**

	NONE
✓	MILD
	MODERATE
	SEVERE
	DEATH
	CURRENTLY CANNOT BE DETERMINED

9. **IMMEDIATE ACTION FOLLOWING INCIDENT**

1.Stop chemotherapy infusion STAT .
2.Informed to Dr. J STAT .
3.Aspirate fluid from canulation about 2.5mls blood seen.
4.Branula off as witness by Dr and Sr ward.
5.Marking area site done .Measurement 9cm x 7.5cm taken .
6.Photograph image at extravasation site done.
7.Cold compress 20minutes applied for QID ,
8.Applied hydrocort cream and rub thin layer over swollen .
9.Elevate hand done.
10.Health education given .

REPORTED BY

10. **DESIGNATION:** (please tick one)

	NURSE		SPECIALIST
✓	HOUSE OFFICER		PHARMACIST
	MEDICAL OFFICER		OTHERS:

SIGNATURE OF REPORTER:
NAME:
DATE:

Note: As part of good leadership and clinical governance, please inform the incident to your Head of Department(s) immediately.

SECTION B : TO BE COMPLETED BY THE RISK MANAGER/ QUALITY MANAGER OF HOSPITAL

1. **ACTION TAKEN:**

Mandatory Root Cause Analysis:
1) Incident with Severe or Death outcome
2) Other incident/near miss based on the Risk Manager/ Quality Manager assessment
3) Directive from State Health Department / Ministry.

(Please tick)

	"PRESCRIPTION SLIP"
	MONITOR THE TREND FIRST
	RCA
	MIRCA (Multi-incident Root Cause Analysis)

Additional comments :

2. **e-IR SUBMITTED?**

Please submit to e-IR **within 5 days** from the date of the incident.

Date of Submission: ____/____/____

3. **RISK MANAGER/ QUALITY MANAGER OF HOSPITAL**

(please fill in the blanks)

NAME:
SIGNATURE:

DESIGNATION:
DATE:

Important: Extravasation is a Medical Emergency

Extravasation of medications must be treated as a **medical emergency** and immediate action must be taken.

Early detection is important to minimise damage.

REFERENCES

1. British Columbia Cancer Agency. (2014, August 1). Prevention and management of extravasation of chemotherapy (Policy No. III-20).

2. Pérez, J. E., Cavalli, F., Marsoni, S., Roila, F., & Schmoll, H. J. (2012). Management of chemotherapy extravasation: ESMO-EONS clinical practice guidelines. Annals of Oncology, 23(Suppl. 7), vii167–vii173. https://doi.org/10.1093/annonc/mds297

3. Cancer Treatments Online. (2013). eviQ (Version 1.4.0). New South Wales Government. https://www.eviq.org.au

4. NHS Worcestershire. (2015, January). Guidelines for the management of extravasation of a cytotoxic agent or a monoclonal antibody used in the treatment of malignant disease (Version 4.2).

5. Matsuyama, Y., Nakamura, T., Yuasa, H., Hagi, T., Asanuma, K., & Hasegawa, M. (2025). Skin and soft tissue disorders caused by trabectedin extravasation: A case report. Biomedical Reports, 22(2), Article 1933. https://doi.org/10.3892/br.2025.1933

THANK YOU