Learning Package

Paediatric: Intravenous Cannulation

Sites where Learning package applies	All Sites who provide care to infants and children
Description	This cannulation package is an advanced skills training program which will allow accredited registered nurses (RN's) to provide timely and expert intravenous (IV) access in paediatric patients within Hunter New England Local Health District (HNE LHD).
Target audience	Registered Nurses required to cannulate infants and children in paediatric settings
Learning Outcomes, On completion of this package you will be better able to:	1. Provide the RN with the theoretical background required to safely and efficiently insert an IV cannula in the paediatric patient. 2. Facilitate the provision of clinical support to enable RN's to gain the needed clinical practice to become skilled in paediatric IV cannulation. 3. Provide RN's with advanced clinical skills training and enhance skill base

Hyperlink to Package

Keywords	Paediatric, Cannulation, IV, Intravenous, cannula, IVC
Document registration number	TBA
Replaces existing document?	Yes

Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:

- NSW Health PD2014_036 Clinical Procedure Safety http://www0.health.nsw.gov.au/policies/pd/2014/pdf/PD2014_036.pdf
- NSW Health PD 2007_036 Infection Control Policy http://www.health.nsw.gov.au/policies/pd/2007/pdf/PD2007_036.pdf
- NSW Health Policy Directive PD2012_007 User applied Labelling of Injectable Medicines, Fluids and Lines http://www0.health.nsw.gov.au/policies/pd/2012/pdf/PD2012_007.pdf
- NSW Health Policy Directive PD2007_052 Sharps Injuries - Prevention in the NSW Public Health System http://www0.health.nsw.gov.au/policies/pd/2007/pdf/PD2007_052.pdf
- NSW Health Policy Directive 2013_043 – Medication Handling in NSW Public Health Facilities http://www0.health.nsw.gov.au/policies/pd/2013/pdf/PD2013_043.pdf
- HNELHD Nurse and Midwife Initiated Medicines PD2013_043: PCP 4 http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0010/72676/PD2013_043_PCP_4_Nurse_and_Midwife_Initiated_Medicines.pdf
- HNELHD Care Paediatric Intravenous Cannula Care HNELHD GandP 15_19 http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0015/81105/HNELHD_GandP_15_19_Paediatric_Intravenous_Cannula_Care.pdf

Is this package recorded in HETI?	Yes
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NSW CHILDREN'S HEALTHCARE NETWORK NORTHERN

Paediatric-Intravenous Cannulation Learning Package

June 2015

Kaleidoscope
CHILDREN, YOUNG PEOPLE AND FAMILIES

NSW GOVERNMENT Health
Hunter New England
Local Health District

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Date Due:

Purpose: This LP provides the theoretical underpinning required before a registered nurse can be assessed as competent in paediatric cannulation.

Date for Learning Package Review: April 2019
LP packages should be reviewed every 3 years or earlier if changes in NSW Health or HNELHD policy or clinical practice change.

Acknowledgements:

This self - directed learning package was originally developed by:

- Anna-Lee Pascoe, RN - Kempsey Health Campus, July 2007 from an adaption of The Children's Hospital Westmead Cannulation Package, July 2007
- Revised 2008 by Elizabeth Newham (Paediatric Nurse Educator, John Hunter Children's Hospital) & Rhonda Winskill (Clinical Nurse Consultant, Hunter New England Health)

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TABLE OF CONTENTS

Introduction 6
Disclaimer 6
Aim 6
Learning Objectives 6
Pre-requisites and Target Group 6
The accreditation process 7
Definitions 7
Indications for paediatric cannulation 8
Overview of learning activities 8
Anatomy, physiology & vein selection 9
Activity 1 12
Activity 2 14
Growth & development considerations 15
Activity 3 16
Anxiety & pain 18
Activity 4 19
Activity 5 21
What now? 23
REFERENCE LIST 24
RECORD OF PAEDIATRIC CANNULATIONS 26
REFLECTION ON LEARNING 27
LEARNING PACKAGE EVALUATION FORM 29

Introduction

This cannulation package is an advanced skills training program which will allow accredited registered nurses (RN's) to provide timely and expert intravenous (IV) access in paediatric patients within Hunter New England Local Health District (HNE LHD). The program is designed as a self-directed workbook incorporating journal articles, written work, and clinical demonstration.

The path for achieving accreditation is outlined below. Eligible RN's will progress along this pathway and on successful completion of the program will be accredited to perform paediatric IV cannulation in their clinical area. This package does not replace the HNE LHD Adult IV Cannulation Program (http://intranet.hne.health.nsw.gov.au/ivad) but is designed to complement it.

Disclaimer

This learning package has been prepared by health professionals employed in Hunter New England Local Health District CYP&F. While all care has been taken to ensure that the information is accurate at the time of development, the authors recommend that all information is thoroughly checked before use if utilised by another context or organisation

Aim

To provide experienced RN's with the knowledge, skills and understanding to competently and confidently insert an IV cannula in the paediatric patient (children up to 16 years of age).

Learning Objectives

1. Provide the RN with the theoretical background required to safely and efficiently insert an IV cannula in the paediatric patient.
2. Facilitate the provision of clinical support to enable RN's to gain the needed clinical practice to become skilled in paediatric IV cannulation.
3. Provide RN's with advanced clinical skills training and enhance skill base

Pre-requisites and Target Group

RN's are eligible to undertake this paediatric cannulation package if they have:

a) Been successfully cannulating adult patients for a minimum of 12 months, are accredited in adult cannulation and have successfully completed at least 20 adult cannulations in the previous 12 months (excluding JHCH nurses who will be required to have completed the John Hunter Hospital adult IVC program and modified clinical experience arranged by the nurse educator).

AND

b) There is an identified need in their clinical area for paediatric cannulation as identified by their line manager and in consultation with their relevant nurse educator.

AND they have either:

c) Completed FLECC or equivalent certificate, and are practicing at an advanced level.

OR

d) Are currently working in a clinical area where continual paediatric IV cannulation experience can be maintained.

AND

All clinical staff who are performing IV Cannulation must meet the requirements detailed in the HNELHD Pol 14_03 Aseptic Technique for Medium or Higher Risk Procedures Conducted in Clinical Settings
http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0020/125174/HNELHD_Pol_14_03_Aseptic_Technique.pdf This includes completing the Staff procedure competency self-assessment prior to annual PDR.
Staff also need to be familiar with consent requirements especially in line with the NSW Health PD2014_036 Clinical Procedure Safety
http://www0.health.nsw.gov.au/policies/pd/2014/pdf/PD2014_036.pdf

The accreditation process

Step 1:

1. Complete the 'Paediatric - Intravenous Cannulation Package'. This should take approximately 4 hours.
2. Submit workbook activities to your relevant Nurse Educator.

Step 2:

1. Perform 5 successful paediatric IV cannulations, under the supervision of an RN accredited in paediatric cannulation or medical officer experienced in paediatric cannulation. **
2. Submit your record of practice to your relevant Nurse Educator for accreditation.
3. Completion of the workbook and supervised cannulation assessment will be registered on HETI by your Nurse Educator
4. Continually self-assess and evaluate own performance including submitting your "staff procedure" self-assessment prior to your yearly PDR.

** If additional skill development and experience is required this should be negotiated with your Nurse Educator.

Definitions

Venipuncture	the procedure of puncturing a vein with a needle with the intent of withdrawing blood.

Intravenous cannulation: the procedure where a catheter is inserted into a vein – the needle is then withdrawn and the cannula left insitu. This then enables medications and fluids to be inserted into the patient with minimal discomfort over a period of time/days.

Indications for paediatric cannulation

ALERT
If the first cannulation attempt is unsuccessful, only one more attempt should be made then referral to a more experience clinician should be considered

All paediatric cannulations must be discussed with a medical officer prior to commencement of the procedure to evaluate the need for the cannula**.**

As paediatric IV cannulations can be very traumatic for both the child and their parents, considerable thought should be given as to the need and/or the urgency of cannula insertion.

Indications for paediatric IV cannulation include:
1. Paediatric patients with a decreased level of consciousness
2. Paediatric patients with significant traumatic injuries
3. Paediatric patients with severe burns
4. Paediatric patients who require IV fluid therapy and/or IV medication administration
5. Paediatric patients who have suffered cardiac arrest

NOTE: If Intravenous access is time critical an Intraosseous (IO) needle should be inserted after no more than 60 seconds.

Overview of learning activities

The following learning activities are designed to provide both theoretical and practical knowledge in the skill of paediatric IV cannulation. To complete this package some self-directed reading and study will be required. The following learning activities are to be completed and submitted to your Nurse Educator before clinical accreditation can be obtained. Some activities will include essential reading and others will have additional suggested readings that you can choose to undertake if relevant to you. Also please complete the ‘Reflection of Learning’ and ‘Evaluation Form’ at the end of this LP as well. One critical essential reading is the HNELHD Clinical Guideline for Paediatric Cannulation available on the Policy and Procedure Directory

On completion and submission of this learning package and the required clinical skills a record of your completion will be added to your professional development record in HETI.

Anatomy, physiology & vein selection

One of the integral processes in IV cannulation is the selection of an appropriate vein for insertion of the cannula. This can often be a skill in itself particularly in children who are difficult to cannulate. It is therefore important to have the knowledge and skills not only of the clinical practice of IV cannulation but also of the anatomy and physiology of veins.

The diameter of veins range from 0.1mm to greater than 1mm and are composed of three layers called the tunica interna, tunica media and tunica externa. The tunica interna is the inner elastic endothelial layer. Many veins, especially those in the limbs, feature valves, thin folds of tunica interna that form flap-like cusps. The valve cusps project into the lumen, pointing toward the heart. The low pressure in veins allows blood returning to the heart to slow and even back up. The valves aid in

venous return by preventing backflow of blood. Valves typically occur at junctions between veins and can be felt or seen as small bulges in the vein. It is important to avoid cannulation near valves as they can interfere with advancement of the cannula (Tortora & Derrickson 2006:742). The tunica media is the middle layer that consists of muscle and elastic tissue as well as nerve fibres, which function to ensure the vein remains in a state of tonus and stimulate the vein to contract and relax. Changes in temperature and mechanical or chemical irritation may cause venospasm, which impedes the flow of blood and may cause pain. Venospasm is usually relieved by the application of heat, as it promotes vasodilation and improves blood flow, which in turn reduces pain.The tunica externa is the thickest layer and consists of collagen and elastic fibres. Veins lack the external or internal elastic laminae found in arteries. They are distensible enough to adapt to variations in the volume and pressure of blood passing through them, but are not designed to withstand high pressure (Tortora & Derrickson, 2006:742).

Before inserting an IV cannula, it is important to ensure that the vein you have selected is actually a vein, and is not an artery, tendon or other anatomical structure.

The primary distinction between veins and arteries is that veins are non-pulsatile whilst arteries are. Both veins and arteries can be palpated on the surface or deep in the tissue, however venous blood tends to be dark red and is slow to return through the cannula, whilst arterial blood is bright red and flows back rapidly through the cannula. It is therefore important to have knowledge of the location of common veins in the arm and leg. Figure 1 demonstrates the anatomy of a vein. Figures 2 and 3 are the vein locations in the arm, hand, leg and feet.

The veins just below the surface of the skin (superficial veins) on the arms are the vessels most typically used for cannulation. The metacarpal veins are readily accessible, easily visualized and palpated, and allow for subsequent cannulations above previous sites. These veins are formed by the unison of digital veins. Digital veins run along the lateral portion of the fingers.
The most suitable choice for cannulation in the dorsum of the hand is the cephalic. Whilst this is a large vein that is easily stabilized and accessible, its position above the wrist joint potentiates mechanical phlebitis. An alternate choice for cannulation in the dorsum of the hand is the metacarpal veins. Like the cephalic vein, these veins are often visable and easy to palpate.

The veins of the antecubital fossa are usually used for venepuncture, however may be utilised for IV cannulation if no suitable vein is found in the dorsum of the hand. Both the median cephalic and basilic veins are large, easily palpable and visualised, and well supported by muscular and connective tissue. Whilst these veins are good candidates for cannulation it can be difficult to stabilize the elbow joint which potentiates cannula dislodgement, infiltration, extravasation and mechanical phlebitis (Dougherty, 1999).

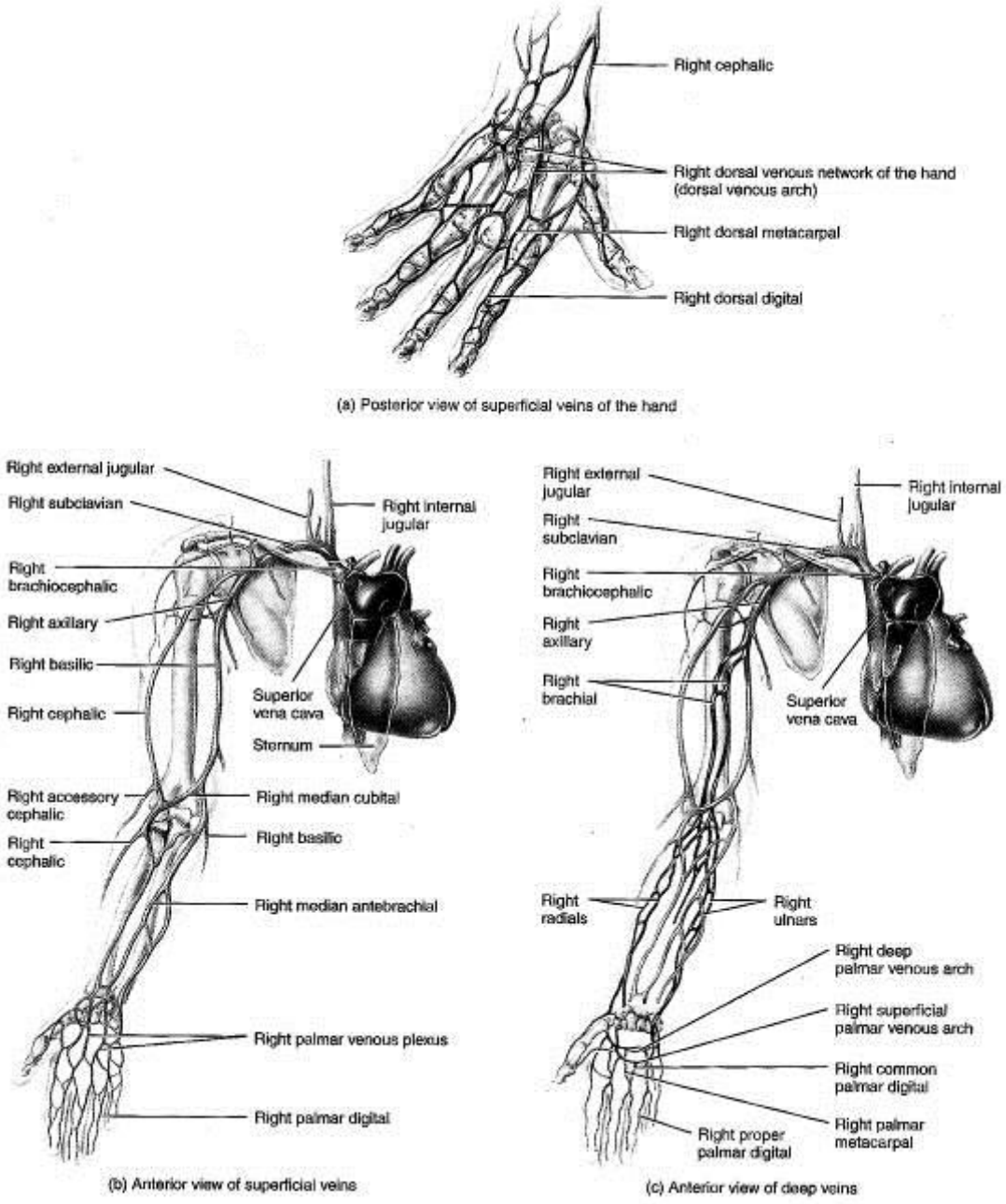

Figure 2 (Tortora & Derrickson, 2006:783)

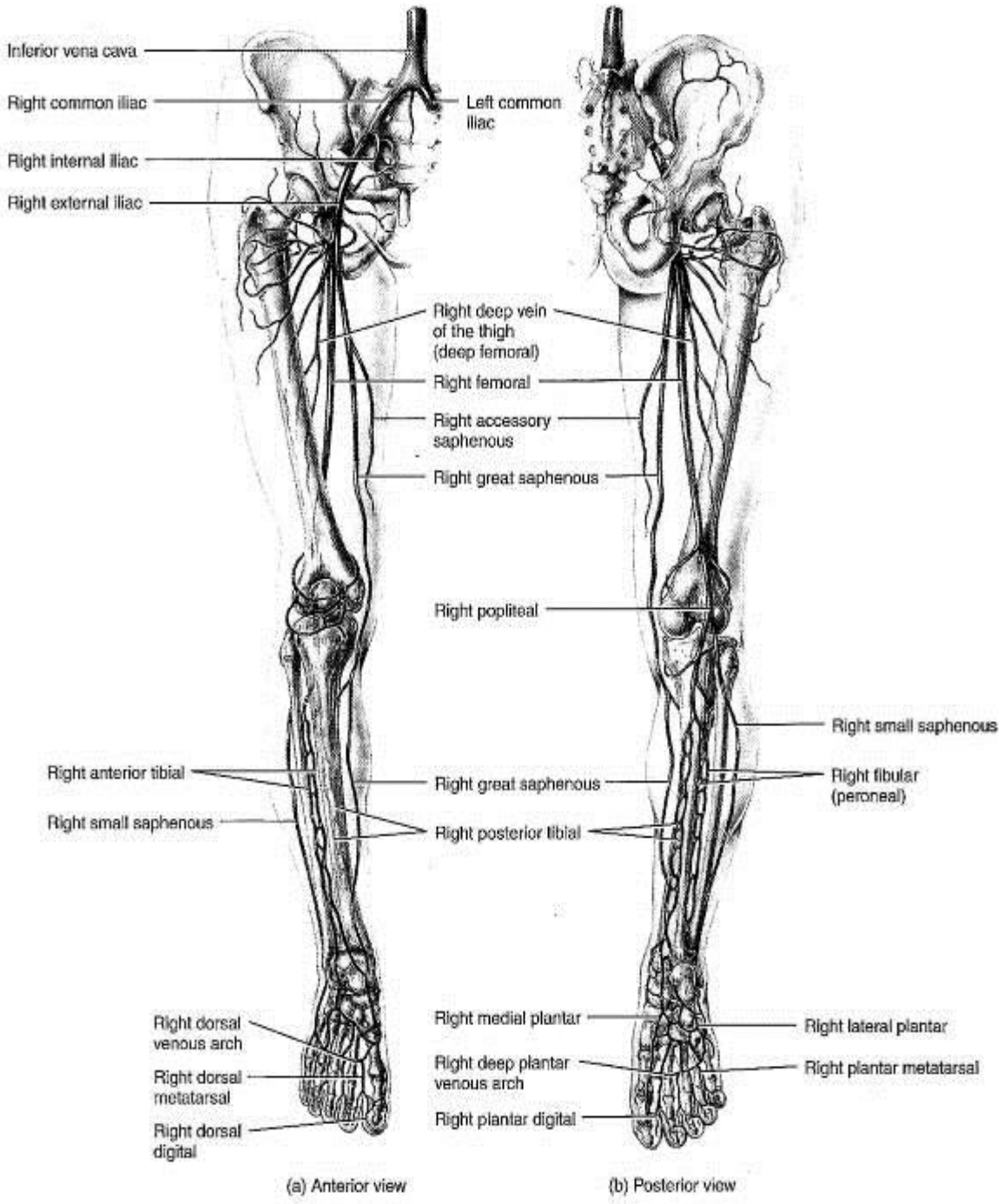

Figure 3 (Tortora & Derrickson 2006:790)

Activity 1

Using a textbook or other appropriate resource, label each of the veins marked in the figures below.

Suggested reading

Hadaway, L. & Millam, D. (2005) On the road to successful IV starts. Nursing 35(1),1-4.

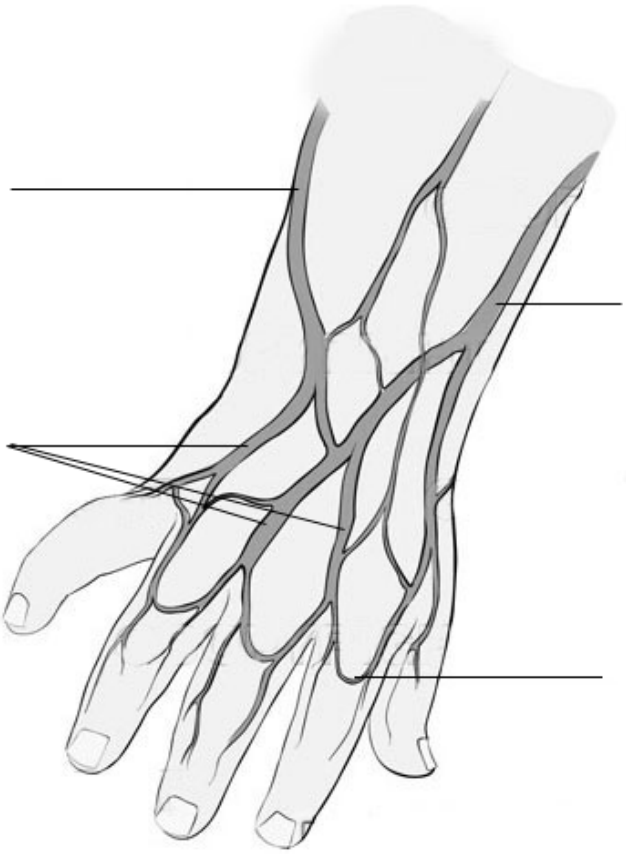

Diagram sourced from: www.fotosearch.com

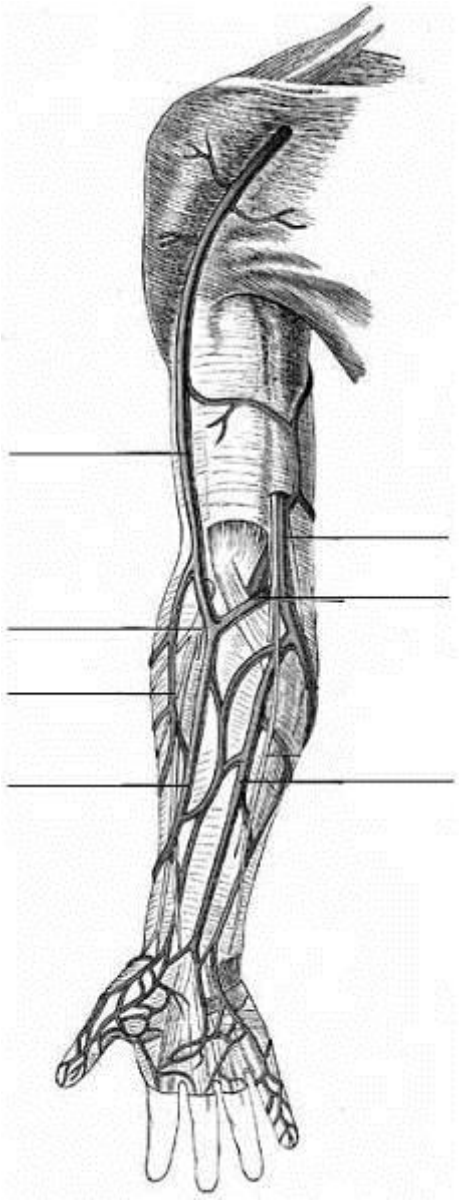

Diagram sourced from: www.proprofs.com

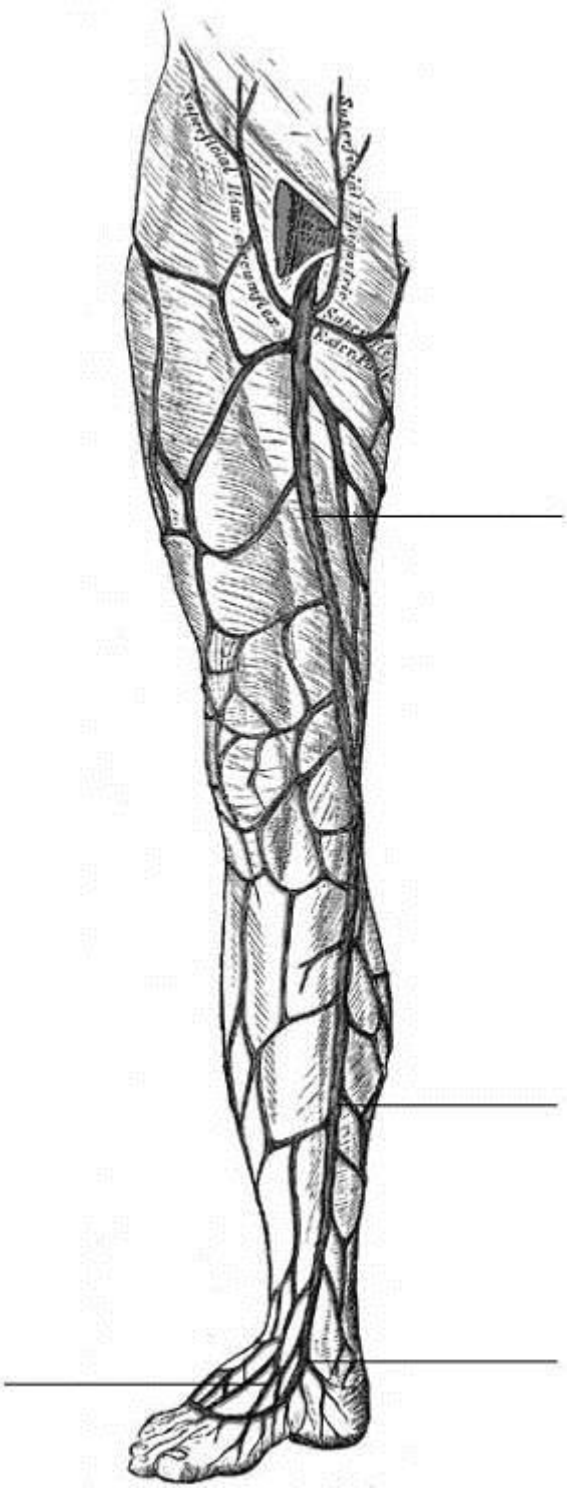

Diagram sourced from: www.fpnotebook.com

Activity 2

Examine the veins in your own arm, hand and leg. Try to identify the veins in figures 2 and 3. Take time to palpate the vein with your fingers and get a feel for what a vein feels like.

One of the common pit falls for people beginning to cannulate is that they do not take the time to choose a good vein. Vein selection is perhaps the single most important factor in consistently cannulating successfully. An extra few minutes spent palpating and locating a suitable vein can often be the difference between 'getting' and 'missing' an IV cannulation.

Moreover, choosing the appropriate vein can have an impact on patient care and outcome.

Complete the table below outlining characteristics of a good vein and veins to avoid.

Characteristics of a good vein	Veins to avoid

Suggested reading

Resources available on HNE LHD cannulation webpage
http://intranet.hne.health.nsw.gov.au/ivad

Growth & development considerations

The insertion of an intravenous cannula in children creates special problems related to the child's size, your ability to gain their co-operation and their interpretation of the events.

The size of the child's limb in which the cannula is to be inserted is smaller and the veins are finer. Consequently, finer and shorter cannulas are utilized for paediatric patients. The gauge of the cannula should be sufficiently smaller than the vein to allow good haemodilution of intravenously injected fluids. However the nurse needs to balance the need for haemodilution with the need for the largest bore cannula possible.

It is recommended that a 24 gauge cannula is used for children 3 years and younger, and a 22 gauge cannula for children more than 3 years old. The exception to this rule is for children receiving blood products, in which a 22 gauge cannula should be inserted regardless of age.

The ability to gain a child's co-operation is dependant on their willingness to tolerate restriction, their anxiety over being hurt, the actual physical pain experienced, and previous experience of health care and hospitalization (Andreoni, 2005:830).

The ability to provide appropriate psychosocial support to a child cannot be over emphasized. Being held down by strangers conveys a message to anyone that they are about to be hurt. As a consequence high anxiety levels develop. Anxiety is a significant factor in a child's perception of pain and thereby influences the level of pain experienced by the child during cannulation. Moreover, this may also affect the degree of co-operation by the child. Previous experience may also influence the degree to which the child will co-operate during the cannulation procedure, and may even flow onto future procedures and health care (Andreoni, 2005:830). It is therefore important to have an adequate understanding of the developmental stages and the perceptions of children of various age groups in terms of how they may react to IV cannulation. Toddlers for example, depend on the security of their parents when threatened by the unknown or adverse circumstances. Consequently, the nurse needs to gain the confidence and co-operation of the parents. Parental involvement needs to be negotiated by the nursing staff to determine how much of a role they will play in the procedure. Simons (2001) suggests that nurses are the key health care professionals responsible for managing children's pain, but they are only having a passive role in relation to their patient's pain. Despite some familiarity with the procedure the infant or child may still become quite fearful and anxious. Diversional tactics can be of some benefit, and nurses need to access appropriate distraction equipment that can be beneficial to reduce anxiety and distract the child from the procedure.

The infant or child may respond in some very objectionable, uncooperative and physical ways, in an attempt to gain some control over what is happening to them. It may be necessary to hold a child gently but firmly during IV cannulation to maintain the child's safety, prevent injury and achieve IV cannulation success. **Holding is distinguished from restraint by the degree of force required and the intention.** The child should be given reassurance that the pain and therapeutic holding they are experiencing is not punishment for any wrong doings. If therapeutic holding is required safe strategies must be used and consent gained.

Where possible, it may be of some benefit to develop some more positive reinforcement for co-operation. A sticker, special toy, cuddle from mum or playing their favourite DVD after the procedure can often assist with co-operation when the patient is going to be having this procedure on a regular basis, or for future hospital presentations. In addition the use of topical anaesthetic agents will help minimize the pain and trauma of cannulation.

Activity 3

Essential reading

Royal College of Nursing (RCN). (2010) Restricting physical intervention and therapeutic holding for children and young people. RNC, London.

Rosenthal, K. (2005) Tips for venipuncture in children. *Nursing. December 35 (1) 31.*

Winskill, R. & Andrews, D. (2008) Minimizing the 'ouch' – A Strategy to minimize pain, fear and anxiety in children presenting to the emergency department. *Australian Emergency Nurses Journal. 11,* 184-188.

Almond C (1999) 'Acute Paediatric Pain – Assessment and Management. *Australian Emergency Nurses Journal. 2(3)* 22-24.

Suggested reading

Read the following guideline, found at the HNE LHD PPG intranet site at:
http://ppg.hne.health.nsw.gov.au

JHCH 1.8 Paediatric Procedural Care at JHCH/JHH/RNC.

1. Consider the age groups listed below and make a list of the growth and developmental considerations that should be taken into account when cannulating children from this age group.

Also list 2 main distraction techniques that may be useful to employ when undertaking IV cannulation on these children.

a. Infant

_____

_____

_____

_____

_____

b. Toddler

_____

_____

_____

_____

_____

c. Preschool Age

_____

_____

_____

_____

_____

d. School age

_____

_____

_____

_____

_____

e. Adolescent

_____

_____

_____

_____

_____

Anxiety & pain

The anxiety and pain associated with cannulation can be minimized using a number of strategies e.g. distraction techniques, the application of topical anaesthetic creams or the administration of nitrous oxide gas.

Topical anaesthetic creams should be applied prior to the procedure and take approximately 30-60 minutes to successfully anaesthetise the area, an affect which persists for 2 - 4 hours after removal of the cream - depending on the product used (MIMS Online, 2015). The application of the topical anaesthetic creams requires planning and precautions must be noted. It is therefore important to not only set aside a suitable time to perform the procedure after the application of the cream, it is also important to apply the cream to a site that has a potentially suitable vein. There is little point in anaesthetising an area which will not provide a suitable vein.

Nitrous oxide gas is administered immediately prior to cannulation and continues until the cannula has been successfully inserted. Nitrous oxide should only be considered if paediatric equipment is available and must be administered by staff accredited in the use of nitrous oxide. One of the reasons for people tolerating a noxious event is by understanding that it is necessary to do so to achieve a desired goal. Often the value of an IV cannulation is rather obscure especially to the child whose understanding is very limited until age 6 to 7 years.

Kmietowicz (1999) has found that children react and report their pain in different ways. Children's behaviour, appearance, activity and vital signs are good indicators of the severity of pain. The use of pain assessment tools appropriate for their age can help however it is noted in previous literature that generally before the ages of 11 to 12 years, children were less likely to be able to articulate the value of a painful event. Blake (2002) suggests that by giving a child choice allows them some control over what is happening. If enough time is available to provide a topical application of anaesthetic this will help reduce the painful experience. It is important to be honest with children and not say that something is not going to hurt them if it will (Browne, 1999).

Activity 4

Essential reading

Review the current drug information of the topical anaesthetic cream used in your facility at: http://www.ciap.health.nsw.gov.au/home.html

Review the following Paediatric Pain Tools:

- Neonatal/ Infant Pain Scale (NIPS) on the 'Paediatric Emergency Department Observation Chart, under 3 months'.
- Pain Score – Self Assessment and Pain Score FLACC Pain Scale (Behavioural) on either the ' Paediatric Emergency Department Observation Chart, 3-12 months, 1-4 years, or 5-11 years or over 12 years'.

Suggested reading

Obtain a copy of 'NHMRC Emergency Care Acute Pain Management Manual" 2011, available at www.nhmrc.gov.au Read Section 1, pages 8-10, Section 3 page 42 and Section 4 pages 43-46.

1. Please list the topical anaesthetic creams you have available in your facility?

_____

_____

_____

_____

In relation to these creams please answer the following questions:

a) How long does the cream have to be on before effect takes place?

_____

_____

b) How long can the cream stay in place before it should be removed?

_____

_____

c) Is there residual effect once the cream is removed?

_____

_____

d) What are the contraindications and possible side effects of the cream?

_____

_____

2. Describe the pain assessment tools you would use to assess pain in a 4 year?

_____

_____

_____

_____

_____

Activity 5

Essential reading

Obtain and read a copy of HNE LHD Paediatric Cannulation Guideline.

Suggested reading

Resources and journal articles available on the UK website site: www.ivteam.com

Answer the following questions based on the case studies provided:

Sam is a 4 year old boy who presents to the emergency department with fever and vomiting. Sam is pale, lethargic, tachycardic and tachypnoeic, has dry lips and is irritable. Sam fails a trial of enteral (oral/nasogastric) fluids and requires IV cannulation for bloods and IV rehydration.

1. Sam will be anxious about the procedure – how will this affect his veins?
    a. May cause vasodilation
    b. They will not be affected at all
    c. Veins will become more mobile
    d. May cause vasoconstriction
    e. Valves become more noticeable

2. Which of his veins would you avoid using?
    a. Median cubital
    b. Basilic
    c. Cephalic
    d. Dorsal
    e. Metacarpal

3. What intervention(s) might you employ to make the procedure more tolerable for Sam?
    a. Nitrous oxide
    b. Topical anaesthetic patches
    c. Distraction toys
    d. Bubble therapy
    e. All of the above

Sally, an extremely active 18 month old child is rather ‘chubby’ for her age. Her mother is in attendance. Sally requires IV cannulation for possible antibiotic therapy since medical history suggests possible meningitis. Because of her increased body mass her veins do not appear obvious at first glance

1. Discuss methods of promoting vasodilation in this child

_____

_____

2. How would you determine which veins were suitable in this child?

_____

_____

3. Describe how you would approach distraction and pain assessment and pain relief with Sally and her mother?

_____

_____

Kyle is a very active 7 year old who requires IV cannulation as he is displaying early signs of appendicitis. However, Kyle has been cannulated before and he is terrified of the procedure. Kyle's mother is also anxious as last time Kyle was cannulated it took multiple attempts and they both became extremely upset.

1. Discuss how you would approach this situation

_____

_____

_____

_____

2. Discuss the approach, methods and risks of therapeutic holding that you may choose to use to keep Kyle as still as possible during the procedure?

_____

_____

_____

_____

3. What is the best way to relieve the fear and anxiety of Kyle and his mother?

_____

_____

_____

_____

4. Following the procedure what positive re-enforcement measures would you employ?

_____

_____

_____

_____

Congratulations you have completed the Intravenous Cannulation Package – Paediatric.

What now?

Complete your record of practice with 5 successful paediatric cannulations under the supervision of an RN accredited in paediatric cannulation or medical officer experienced in paediatric cannulation. Submit this record to your relevant nurse educator for accreditation for paediatric cannulation.

Afterwards maintain your clinical practice portfolio by continually self-assessing and evaluating your own performance in cannulation.

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HNELHD PD2005_042:PCP 1 Credentialing for Insertion of Adult Peripheral Intravenous (IV) Cannula

HNELHD Guideline 15_03 Development, approval and review of learning packages for use within HNELHD

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http://www.ivteam.co

RECORD OF PAEDIATRIC CANNULATIONS

Date	Patient's Age	Successful	Unsuccessful (Tick relevant column)	Assessor's Name (Please Print)	Assessor's Signature

I,_____, hereby declare I feel confident to perform paediatric intravenous cannulations without further supervision.

_____ _____
(Participant's signature) (Date)

I, _____, hereby declare that _____ has performed a minimum of 5 paediatric intravenous cannulations to my satisfaction.

_____ _____
(Supervisor's signature) (Date)

LP and completion of supervised cannulation entered into HETI Online on_____ (Date)

Relevant Manager notified of new scope of practice on _____ (Date)

NB Please refer to the HNELHD PD2005_042:PCP 1 for assessor guidance

REFLECTION ON LEARNING

Date: Paediatric Intravenous Cannulation LP

Amount of time spent completing LP:

What are the RN or speciality competency standard (s) this LP meets?

_____
_____
_____
_____
_____

Please outline the key learning you obtained:

_____
_____
_____
_____
_____
_____
_____
_____

Was the learning useful for your practice? Please explain?

_____
_____
_____
_____
_____
_____
_____

How will the learning influence your practice?

_____
_____
_____
_____
_____
_____
_____

Is there further information you need to obtain?

_____
_____
_____
_____
_____
_____

Signature **Date**

LEARNING PACKAGE EVALUATION FORM

Please circle your response to the following questions:

1. The aims and objectives of the learning package were clear and appropriate to your learning needs and goals? Yes No

2. I have achieved my learning goals? Yes No

3. As a result of completing this package I now have a better understanding of paediatric cannulation Yes No

4. The activities and case scenarios were helpful? Yes No

5. The package was easy to follow? Yes No

6. The workload was reasonable? Yes No

7. The information and skills I can use from the package are:

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8. Some suggestions I would like to make to improve the package are:

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9. Further comments I would like to make are: