Sláinte Leanaí Éireann
Children's Health Ireland

ORIENTATION & SURGICAL WARD COMPETENCY WORKBOOK IN OUR LADY'S WARD

Statement of Competence

Competence is the attainment of knowledge, intellectual capacities, practical skills, integrity and professional and ethical values required for safe, accountable and effective practice as a registered nurse or registered midwife (NMBI 2015)

Michelle O'Gorman, Clinical Nurse Education Facilitator

Nicola Moss, Clinical Nurse Education Facilitator

Issue Date: December 2022 / Review Date: December 2025

Compiled by Deborah O'Grady, Nurse Informatics Facilitator – Nurse Practice Development Unit from existing documents

Sláinte Leanaí Éireann
Children's Health Ireland

CONTENTS

Sláinte Leanaí Éireann
Children's Health Ireland

OUR LADY'S WARD

Orientation programme received by nurse and explained by preceptor
Signature of Preceptor:
Signature of Nurse:
Date:

Our Lady's Ward is predominantly a 10-bedded surgical unit, which provides care for children requiring general gastro-intestinal and genito-urinary surgery.

PATIENT PROFILE – *1-16 year old, male and female*

- Appendectomy
- Nephrectomy / hemi nephrectomy
- Bowel resection
- Bowel obstruction
- Bladder augmentation/ urinary diversion
- Stoma formation (colostomy, ileostomy)
- Newly diagnosed oncology patients for Broviac insertion, biopsy)
- Post treatment oncology patients for resection of tumour
- Peg / jejunostomy tube insertion
- Cerebral palsy
- Patients requiring isolation
- Medical patients with complex needs/BIPAP /AIRVO

This list is endless……

WARD STAFF

Clinical Nurse Manager *(CNM2)*	**Clinical Nurse Manager** *(CNM 1)*	**Clinical Nurse Facilitator** *(CNF)*
Danielle Thorpe	Alphonsa Rajan	Michelle O'Gorman
	Cely Sastrodemedjo	Nicola Moss
	Locardia Nyamurowa	

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

NURSES MAY BE IDENTIFIED BY THE UNIFORMS THEY WEAR	
Teal with Dancing Puffin Logo	CNM 1
Wine With Robin Logo	CNEF / CNM 2 / CNS
Blue with Rabbit Logo	Staff Nurse
Ceil with Hedgehog Logo	Post Graduate Nurse
White (OLCHC + TCD or UCD logo)	Undergraduate nurse
Navy with Owl Logo	ANP / ADON
Red	Dietician
Navy Scrub	ICU Nurses
Green or Burgundy Scrub	Theatre
Purple with Falcon Logo	HealthCare assistants
Yellow polo shirt	Play Specialists
Green	Household staff
Charcoal Grey with Deer Logo	CNM3

USUAL DAILY ROUTINE

Morning

- Handover from night staff
- Safety pause
- Patient allocation & overview of patient care for the day

Allocated Nurse will do……

- Safety checks
- Patient assessment/ pre op check/ IV site check
- Medications
- Pain assessment
- PEWS + fluid balance
- Hygiene
- Bloods to be taken before midday
- IV fluids and drugs charted
- Weight check **(MUST BE DOUBLED CHECKED)**

As per Operating Check List

✓ fasting since what time
✓ blood sugar
✓ blood results (if abnormal, consult team)
✓ pre-med (are theatre aware patient is due one)
✓ is patient clean
✓ due time in OT
✓ x-ray (teams should organise same)
✓ old charts (ring filing room, or ward clerk)
✓ Anaesthetic review?
Correct site surgery identified and marked

- Bed making
- Rooms tidied
- Follow up on Doctors rounds
- Any new tests or procedures ordered
- Review and document fluid balance hourly
- Update care plans
- Feedback to preceptor / CNM
- Lunches served by HCA
- Staff go to lunch too – ensure patient care is handed over to relevant staff

AFTERNOON

- Pews assessment + Fluid balance +medications
- Pain assessment
- Update care plans
- Receive post op patients
- Booked admissions arrive
- Feedback to preceptor
- Patient's tea

EVENING

- Evening meds
- Pews assessment
- + Fluid balance + medications
- Care plans completed
- Feedback to preceptor
- Supper served
- Handover to night staff

STAFF BREAK TIMES

Breakfast	30 minutes (between 09.00 & 10.30 hrs)
Lunch	45 minutes (between 12.30 & 14.00 hrs)
Tea Break	15 minutes (between 17.00 & 18.00 hrs)

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

POST-OPERATIVE PLAN

OBSERVATIONS

- ¼ hourly for 2 hours (this should be started in recovery so finished 2 hrs from time patient comes into recovery)
- ½ hourly for 2 hours
- 1 hourly for 2 hours
- 4 hourly when stable

This is a **guideline only**, do observations as condition indicates.
Place on oxygen **saturations monitor** if respiratory compromised +/- on morphine infusion
Please **do not read heart rate from monitor**, please **feel or listen** to same
Document observations clearly and when you do them, don't write them in later.
PEWS assessment and interpretation

PAIN MANAGEMENT

- Morphine Sulphate
- Epidural
- IV paracetamol / IV Tramadol / IV Difene

CALCULATING MEDICATIONS

What you want **X** Volume in which it is in
What you have
You have **For Example:** **60mg x 5mls = 2.5mls**
120mg

FLUID BALANCE

- Intravenous fluid intake for a child, is prescribed according to the child's weight.
- To calculate the fluid requirements for a child for 24 hours:

First 10kgs of body weight	100mls/kg
Next 10kgs of body weight	50mls/kg
Every kg thereafter	20mls/kg

- Expected urinary output for a child: 1ml/kg/hour
- Expected urinary output for a teenager: 0.5mls/kg/hour
- Document fluid balance every hour and check iv site

FASTING

- After consultation with the team, generally, when the patient is alert and orientated post anaesthetic they may start with clear fluids and progress as tolerated to light diet. **CHECK POST-OP NOTES.**
- However, if the bowel was handled, the patient must remain fasting until bowel sounds are heard and the team is consulted.

- Ensure oral hygiene is maintained.

WOUND CARE

- Mark any ooze on the dressing if noted. Check the wound, e.g., when doing the observations.
- Types of wound dressing include, mepore, Aquacel surgical, glue
- **All surgeons use different dressings so consult with senior staff for guidance**

CHILDREN'S SAFETY

Children's safety is an important aspect of children's nursing. Children may not have the experience and knowledge to understand the risks associated with everyday things. Therefore as nurses, we need to look at things from a child's perspective and avoid hazards, which may injure a child:

- Always ensure that children have an ID band in situ displaying the Name/ Number/ Date of birth/ Ward.
- To avoid scalds when preparing a bath, always use cold tap first and ensure water is at correct temperature.
- Supervise young children during a bath or a shower.
- To prevent scalds, hot drinks are not permitted on the ward, and parents or children may not go into the ward kitchen.
- There is a parents room available
- Sterile bottles should be used for children under 1 year.
- To prevent falls, slippers or shoes should be worn when walking in the ward
- If a child / baby is in a cot, ensure cot sides are raised and secured in position. If a child is at risk of falling out of bed, attach side-rails to the bed.
- To prevent tripping/falling, remove objects/obstructions from the floor.
- Children love to explore, so always ensure that doors to side rooms are closed.
- You must always know who is visiting your patients if you do not know please ask who everyone is. 2 visitors should only visit at any time .Remind visitors to wash your hands.

LEARNING RESOURCES AVAILABLE ON OUR LADY'S WARD

- Children's nursing and medical notes
- The children and their parents
- Nursing staff
- Members of the multi-disciplinary team
- Intranet for policy and guidelines
- Staff education board
- Intranet access

Sláinte Leanaí Éireann
Children's Health Ireland

Initials to be used throughout the booklet
Please insert your usual signature, initials and print name

Initials	Signature	Block Capitals	Date

POINTS TO CLARIFY AND INDUCTION

	Date	Signature
Admission Procedures		
Annual Leave		
Communication Issues		
Discharge Planning and Process		
Documentation		
Emergency Checks		
Emergency Procedures: including Fire, Cardiac Arrest and Security		
Hospital Tour		
Layout of a bed space		
Layout of the Unit		
Location of Policies, Procedures and Clinical Guidelines		
Nursing Shift Handover		
Off duty Requests		
Risk Management/ Incident Reporting		
Role of the Multi-disciplinary Team		
Sick Leave Policy		
Study Leave policy		
The Bleep System		
Unit Philosophy of Care		
Unit Routine – Day and Night Shifts		

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

	Date	Signature
NMBI - code of professional conduct		
NMBI- guidance on medication management		
NMBI- guidance to nurses & Midwifes on the development of policies and procedures		
NMBI- Recording Clinical Practice		
NMBI- scope of practice		
Blood Transfusion and Blood Product Policies		
Childcare Act		
Children's First DoHC		
Complaint handling & patient support service		
Concerns regarding Child abuse/neglect		
Death of a Child		
Dignity at Work Policy		
Disciplinary Procedure		
Equal status act		
European work time directive		
Freedom of information		
Grievance Procedure		
Guidelines for good practice		
Guidelines for hand hygiene in health care setting		
Health and safety legislation		
Infection Control Policies		
Intravenous (IV) policy		
Major Emergency Plan		
Medication Policy		
Misuse of drugs Act		
Nurse Practice Folder – Intranet only		
Obtaining consent		
Our children, their lives		
Prevention of Abuse of Children by a Staff Member		
Quality and fairness, a health system for you		
Smoke free work place		
The PEWS – national Clinical Guidelines		
Waste Policy		

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

MANDATORY TRAINING

The following study days are a mandatory requirement for all staff working in CHI at Crumlin.

	Date	***Nurses' Signature***	***Facilitator / Preceptors Signature***
Child Protection and Awareness Training			
Medication Management *(to be completed prior to IV day)*			
Intravenous Study Day			
Haemovigilance – Blood Tracking			
Evolve Training (Intro to Evolve & Using Evolve Every Day) - *HSE LAND*			
Paediatric Immediate Life Support - *Yearly*			
GDPR - *HSE LAND yearly*			
PEWS - *Yearly*			
Cyber Awareness - *HSE Land yearly*			
Open Disclosure - *HSE Land yearly*			
Hand Hygiene - *HSE Land Bi-Annually*			
Personal Protective Equipment - *HSE Land Bi-Annually*			
Standard & Transmission Based Precautions - *HSE Land Bi-Annually*			
Fire Safety – *ClickHSe.net Bi-annually*			
Safe Transfusion Practice for Paediatrics – *nhs.learnprouk.com Bi-annually*			
Patient Handling *HSE Land & Practical Tri-annually*			
Medical Gases - *HSE Land Tri-annually*			
Children's First – *HSE Land tri-annually*			
Recognition & Management of Sepsis in children – *HSE Land Tri-annually*			
Preceptorship *(must be on the unit >6months)*			
Preceptorship – Refresher – 3 yearly *HSEland*			
PAEDAIM *(Newly Qualified)*			
Epidural Workbook & study day			
Pain Management Study Day			
Colorectal Study Day			
Enteral Feeding Study Day			

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

SKILLS CHECKLIST

Please indicate your level of experience overall. *Tick appropriate box*		
A	Theory, no practice	
B	Intermittent experience	
C	1 – 2 years' experience	
D	plus years' experience	

Age Specific Practice Criteria

Please check the boxes below for each age group for which you have expertise in providing age – appropriate nursing care. *(Tick relevant box)*

AGE SPECIFIC PRACTICE CRITERIA	
Please check the boxes below for each age group for which you have expertise in providing age –appropriate nursing care. (Tick relevant box)	
Newborn / Neonate	
Birth - 1yr	
Toddler 1 - 3yrs	
Pre-school 3 - 5yrs	
School age children 5yrs -12yrs	
Adolescents 12 –18 yrs	

PLEASE INDICATE YOUR SKILL LEVEL 1-4 OF EXPERIENCE IN EACH CATEGORY BELOW		
1	No Experience	
2	Some experience	
3	Can perform independently	
4	Proficient /Can supervise and teach.	

MEDICATION ADMINISTRATION / IV'S	Self-Assessment	Education Completed	Preforms Safely accurately & efficiently
Drug Calculation for paediatrics			
Appropriate assessment of IVC, Flushing Connection and disconnection of Medication and IVF lines			
Addition of additives to IVF solutions			
Administer IV bolus meds			
Administer IV infusion meds			
TPN: Read & Understand Policy			
Knowledge of specific patient care required for a child on TPN (Ordering, bloods, observations, trouble shooting)			
Observed TPN Preparation & Connection			
Assisted TPN Prep & Connection			
Preformed Independently with 2nd nurse Prep & Connection			

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

MEDICATION ADMINISTRATION / IV'S	Self-Assessment	Education Completed	Preforms Safely accurately & efficiently
Central Venous Access Devices			
Read and understand policy			
Knowledge of each CVAD in OLCHC and specific care to each one:			
CVC: Care Bundle			
Blood sampling			
Dressing & Bionector change			
PICC: Care Bundle			
Blood Sampling			
Dressing & Bionector Change			
BROVIAC: Care Bundle			
Blood Sampling			
Dressing and bionector change			
IMPLATOFIX: Care bundle			
Blood sampling			
Dressing & Bionector change			
Blood Products			
Read & understand policies			
Received Haemovigilance education			
Specific Patient care required			
Blood collection & administration with supervision			
Blood collection independently & 1st checker			
Discarding of blood products			
Documentation completed			
Administer nebuliser treatments			
Read & understood Nebuliser therapy SOP			
Aware of different nebs, administration & equipment required			
Aware of uses and effects of each neb			
Patient Assessment			
Safety checks			
PEWS: read and understood Guidelines			
Supervised Pews chart completion			
Completion of Pews chart and interpretation of results competently			
Assessing and recognising a patient in shock			
Oral and Nasal Suctioning			
Oxygen administration			

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

MEDICATION ADMINISTRATION / IV'S	Self-Assessment	Education Completed	Preforms Safely accurately & efficiently
Resus Trolley			
Read and understand Resuscitation guidelines			
Aware of BLS			
Competently check resus trolley			
Aware of equipment and medication stored on resus trolley and its uses			
Gastrointestinal			
Enteral Feeding Tubes			
Read & understood guideline			
Observe NG tube insertion & care			
Insert and care for tube under supervision			
Competently insert NG tube and care for same independently			
Administer tube feeding: gravity /pump bolus & continuous			
Read and understood Enteral Feeding Tube Medication Guideline			
Administer medication via NGT competently			
Care of a child with an Naso-Jejunal tube			
Care of child with a PEG tube			
Read & understood guideline			
Aware of different Peg tubes available and their care			
Pre op care required: dietician, peg CNS, information leaflets			
Post op care: safe patient collection, adequate pain relief, specific post op instructions,			
Flush peg and administer medication			
Administer feeds			
Care of peg site – dressing			
Parental education			
Care of a child with a gastro-jejunal tube			
Repogyle tubes			
Knowledge of use and care of repogyle tubes			
Observe Insertion and use of repogyle tube including set up of Low pressure suction			
Supervised insertion and use of repogyle tube including LPS			
Competently insert and care for a repogyle tube including LPS			
Understanding of GI losses and correct replacements of same			

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

MEDICATION ADMINISTRATION / IV'S	Self-Assessment	Education Completed	Preforms Safely accurately & efficiently
Care of a patient with a stoma			
Aware of stoma type			
Assess stoma			
Preform stoma care and bag change			
Care of a patient with Crohn's disease or Ulcerative colitis			
Care of a patient with severe dehydration			
Care of the child with an acute abdomen			
Surgery			
Pre-operative care			
Fasting time (see appendix)			
Aware of pre - op bloods required for specific surgeries			
Safe surgery Policy – Read and understood			
Consent see - HSE national consent policy			
Pre op investigations e.g. MSU, CxR, U/S.			
Post Op care			
Pressure area care – assessing same, use of air mattress when required			
Wound Care			
Wound Care Plan			
Awareness of different dressing types and there usage (see appendix)			
Assess wound site, Dressings and care of individual wounds, signs of infection			
preform dressings using aseptic techniques,			
wound drains:			
Aware of types available and rationale for using same,			
Care of drains: emptying, recording output, dressing			
Observe drain removal			
Remove drain under supervision			
Competently remove drain independently			
Care of a VAC			
Care of a Chest drain			
Read and understood chest drain guideline and care plan specific safety checks			
Know equipment required when minding a chest drain			
Care of chest drain site			
Low pressure suction			
Measure and record output			
Observe for oscillating and bubbling and reasons for same			

Pain management			
Pain assessment – Baker Wong FACES & FLACC scale – *See appendix*			
Knowledge of pain medication commonly used post operatively			
Paracetamol			
Ibuprofen			
Difene			
Clonidine			
Tramadol			
Oramorph			
Oxycodone			
Morphine / oxycodone infusion:			
Read and understood morphine guidelines			
Observe morphine pump set up and connection			
Set up pump and connect under supervision			
Competently set up, connect and manage morphine pump			
Preform and interpret observations as per opioids infusion guideline			
Epidural			
Read and understood epidural guideline			
Completion of epidural workbook			
Attend epidural training session			
Observe epidural set up, connection and patient care			
Specific epidural observation – motor block, sensory block – preforming and interpreting the same			
Set up epidural, connect and provide patient care under supervision			
Competent in epidural care			
Renal / Genitourinary			
Catheters			
Read and understand guidelines			
Observe insertion of foley catheter on females			
Insert foley catheter on females only under supervision			
Competently insert foley catheter independently			
Care and removal of foley catheters on male and females			

Care of a dripping stent			
Understand dripping stent care plan			
Understand rationale for dripping stent			
Care of dripping stent			
Use of double nappy system			
Care of a patient pre / post op mitronoff			
Collection of a urine sample			
Urinalysis results			
Complex fluid balance			
Interpretation of lab results			
Blood glucose monitoring			

COMPLEX FLUID BALANCE: Respondents	Self-Assessment	Education given	Preforms accurately
Correctly calculate fluid requirements based on weight			
Aware of commonly used IVF and their actions:			
0.9% NACL			
Hartmans Solutions			
0.9% NACL & 5% dextrose			
10% Dextrose			
Replacement Fluids – 0.9% NACL & 10mmol KCL in 500mls			
Calculation of urinary output dependent of weight			
Correctly calculate requirements for fluid restricted patients			
Complete fluid balance sheet correctly and interpret same			
Bowel Washouts			
Aware of patient conditions which require bowel washouts			
Observe bowel washouts			
Preform bowel washouts under supervision			
Competently preform bowel washouts			
Aware of the different washouts used:			
Olive oil enemas			
Phosphate enemas			
Willis Washouts			
Saline washouts			
AIRVO			
Read and understands HHFNC oxygen therapy guideline			
Observe set up of AIRVO and care of patient			
Set up and care for a patient on AIRVO under supervision			
Competently set up and care for a child on AIRVO			
Preform observations and interpret same appropriately			

Bladder reconstruction			
Bladder reconstruction surgery			
Aware of the types of bladder surgery:			
Augmentation / Cystoplasty			
Mitrofanoff			
Bladder neck surgery			
Aware of pre op prep required:			

Bladder Flushes:			
Observe mittroff flushes			
Preform mittroff flushes under supervision			
Competently preform mittroff flushes			
Anchor tape changes			
Trouble shoot			
(see appendix)			

Orientation programme received by nurse and explained by preceptor

Signed: Preceptor:..... Nurse:.....

Date:.....

Sláinte Leanaí Éireann
Children's Health Ireland

MEETINGS

Three formal meetings, will be held between the preceptor and the preceptee to document progress. At the initial meeting, the preceptor and preceptee should plan the dates for the intermediate and the final meeting. Additional meetings may be held between the preceptor and preceptee to document progress and provide additional support as required. The Clinical Progress Record (CPR) (Oct 2007) documentation should be used for this purpose

Meeting	Aims	Preceptees responsibility	Timeframe for completion
Initial	• Preceptee – Reflected on and identified his / her own learning needs • Preceptor – Identify and discuss local clinical area objectives • Learning needs documented in workbook	Maintain a learning log *(see appendix 1)*	First Week
Intermediate	• Preceptor and preceptee review and discuss clinical progress • Learning outcomes for the remaining period are identified and documented. If applicable – failure to progress noted and discussed here – Action plan developed *(See appendix 2)*	• Identify own learning needs • Identify areas of strength • Identify areas where further support required	Midway through programme – i.e.: 3 months
Final	• Preceptees progress reviewed and documented in workbook • Ongoing developmental needs outlined in order to maintain competency • Certificate of competence signed and submitted to Nursing HR on completion of meeting	Identify resources to enable ongoing professional development	6 months

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

GUIDELINES FOR PRECEPTORS

"Each nurse has a continuing responsibility to junior colleagues. He/she is obliged to transmit acquired professional knowledge, skills and attitudes both by word and example" *(An Bord Altranais 2000)*.

- Each nurse is obliged and contractually bound to be actively engaged in the preceptorship of junior staff nurses (orientation/adaptation) and, undergraduate, seconded and post registration student nurses.
- A preceptor is a Registered Nurse employed by CHI
- A Registered Nurse eligible to act as a preceptor, will:
    - have at least 6 months experience in CHI
    - ii) have participated in the Preceptorship/Teaching and Assessment in Clinical Practice training (Report on the Expert Group on Midwifery and Children's Nursing Education 2004 p69)
    - be deemed suitable to act as a preceptor by individual Clinical Nurse Managers/Clinical Facilitators
- Registered Nurses will be involved as a co-preceptor on at least one occasion since the end of their initial 6 month experience
- Registered Nurses who have been absent from the hospital for 2years or more must undertake a two day Preceptorship/Teaching and Assessment in Clinical Practice training programme

The preceptor(s) are required to work with the preceptee for a minimum of seven shifts each month. If it is not possible for the preceptor to work with the preceptee for this period, then a co-preceptor can be utilized to maximize support and learning available to the preceptee. It is the responsibility of the preceptor(s) to discuss clinical practice experience with the preceptee as outlined above. Details of meetings and any additional meeting must be documented in the CPR. ***If the preceptee is failing to progress, this must be discussed with the preceptee and the CNM / CNEF / DNM and any additional specific support is outlined***.

GUIDELINES FOR PRECEPTEES

The preceptee is required to participate fully in the preceptorship program

- The preceptee is required to be aware of their own learning needs and the skills they need to develop.
- The workbook must be available at all times in the clinical area throughout the process.
- It is required that the workbook will be completed within twelve weeks.
- Preceptees are requested to facilitate this process by agreeing where possible to do the same shifts as the named preceptor.
- A minimum of 7 shifts in 4 weeks should be worked with the preceptor.

GUIDELINES FOR CLINICAL MANAGERS

When the preceptorship workbook is complete, the summary sheet must be submitted to the Human Resource Department Nursing Division. It is advised that the preceptorship workbook is retained in a locked cupboard on the unit /ward for a period of twelve months

FINAL MEETING RECORD

To be completed by the preceptor in the presence of the preceptee.
Verifier present if requested.

Sláinte Leanaí Éireann
Children's Health Ireland

INITIAL MEETING:

DATE:

Learning Needs Identified by Perceptee:
Clinical Learning Objectives:

Signature of Preceptee: _____ **Date:** _____

Signature of Preceptor: _____ **Date:** _____

Sláinte Leanaí Éireann
Children's Health Ireland

INTERMEDIATE MEETING:

DATE:

Learning Objectives Achieved
Further areas of development:

Signature of Preceptee: _____ **Date:** _____

Signature of Preceptor: _____ **Date:** _____

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

FINAL MEETING:

DATE:……

Comments
Areas Requiring further Development

Signature of Preceptee: _____ **Date:** _____

Signature of Preceptor: _____ **Date:** _____

COMPETENT	**NOT COMPETENT**
If learning outcomes have been achieved and nurse deemed competent, then Preceptor signs below: Preceptor's Signature:.....	If nurse deemed not competent, then preceptor signs below and specifies above on areas competence not achieved: Preceptor's Signature:.....

Sláinte Leanaí Éireann
Children's Health Ireland

PRE-OPERATIVE FASTING GUIDELINES FOR CHILDREN UNDERGOING ANAESTHESIA

- All children who are to undergo anaesthesia should be fasted prior to the anaesthetic, to prevent the risk of regurgitation and pulmonary aspiration during the perioperative period.

- Regular oral medication should be continued unless contraindicated.

- For elective surgery, children should be fully fasted at the time of commencement of the surgical list i.e. 8.30 am for morning lists and 1.30 pm for afternoon lists. Exceptions to this require the prior agreement of the consultant surgeon or anaesthetist on that list.

- In certain emergency situations it may not be possible to have children fully fasted. There are also certain surgical conditions where despite fasting, the child is assumed to be at risk of regurgitation. In these situations the anaesthetic technique will be modified to minimize the risk of regurgitation and aspiration.

The fasting guidelines for children are:

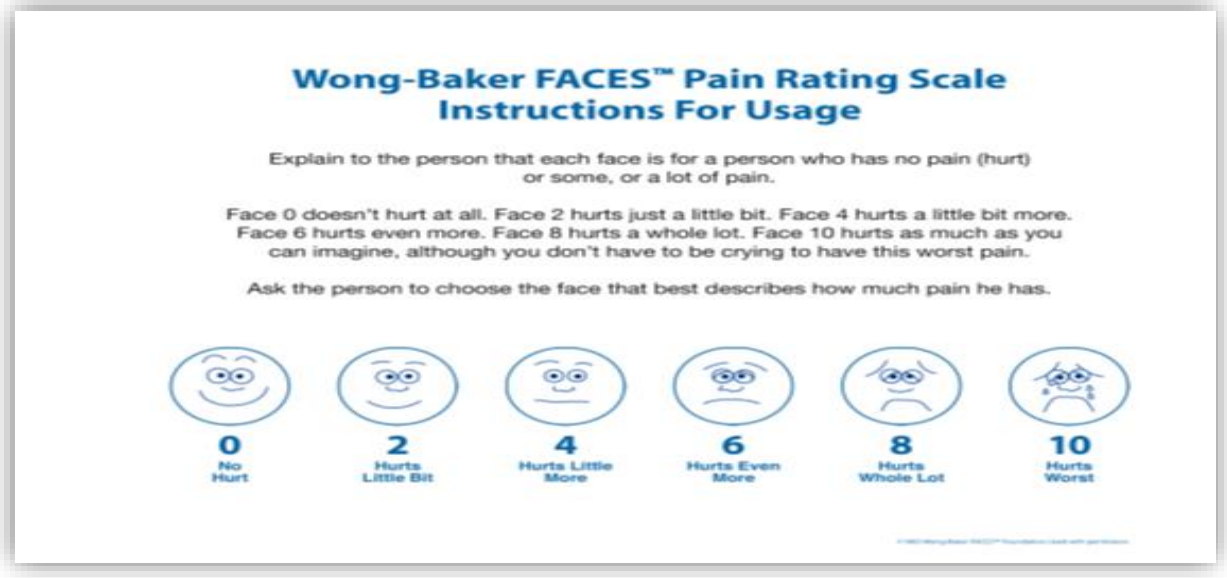
- Food, formula and most fluids – 6 hours.
- The child may be given clear fluids up to 1 hours before surgery.
- Clear fluids are defined as non-particulate liquids e.g. water, Apple Juice, glucose 5% or Flat 7 Up*

** Please add some water to reduce fizz in 7Up*

The fasting guidelines for infants are

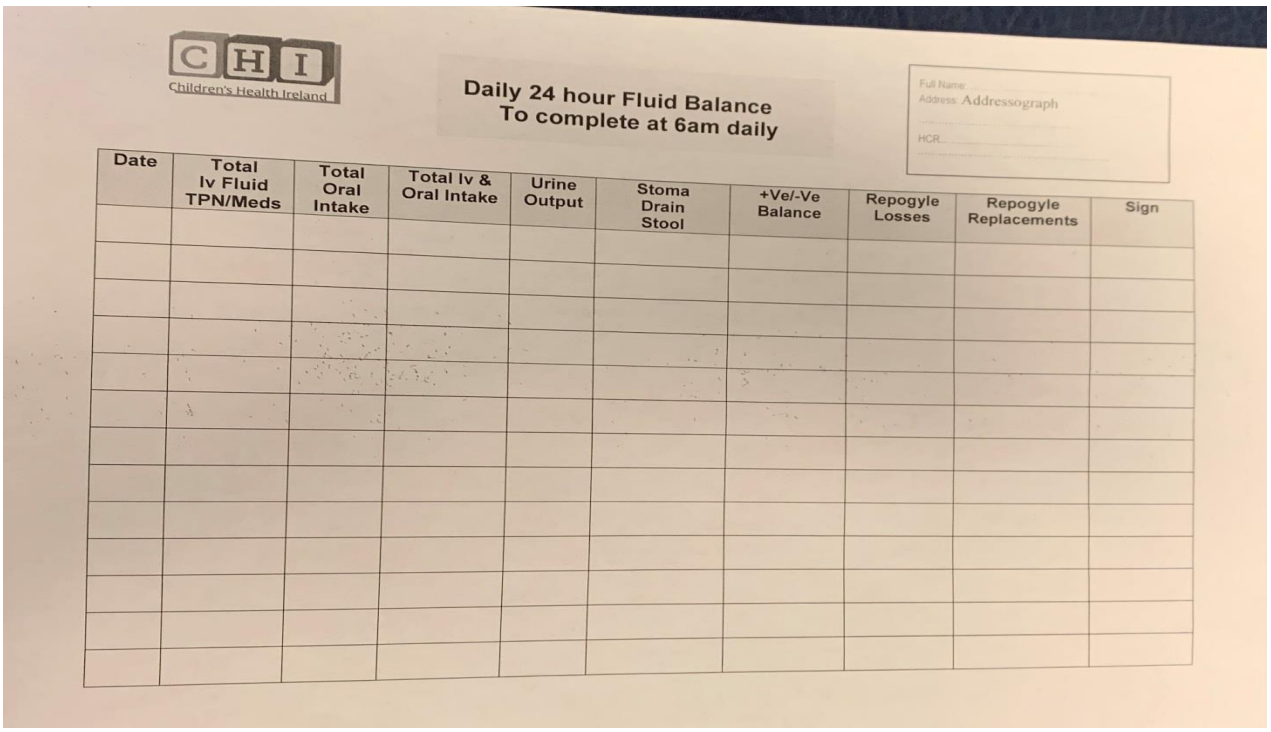
- Breast Milk - 4 hours preoperatively
- Formula, Solids - 6 hours preoperatively
- The child may be given clear fluids up to 1 hours before surgery.
- Clear fluids are defined as non-particulate liquids e.g. water, Apple Juice, glucose 5% or Flat 7 Up*

** Please add some water to reduce fizz in 7Up*



Sláinte Leanaí Éireann

Children's Health Ireland

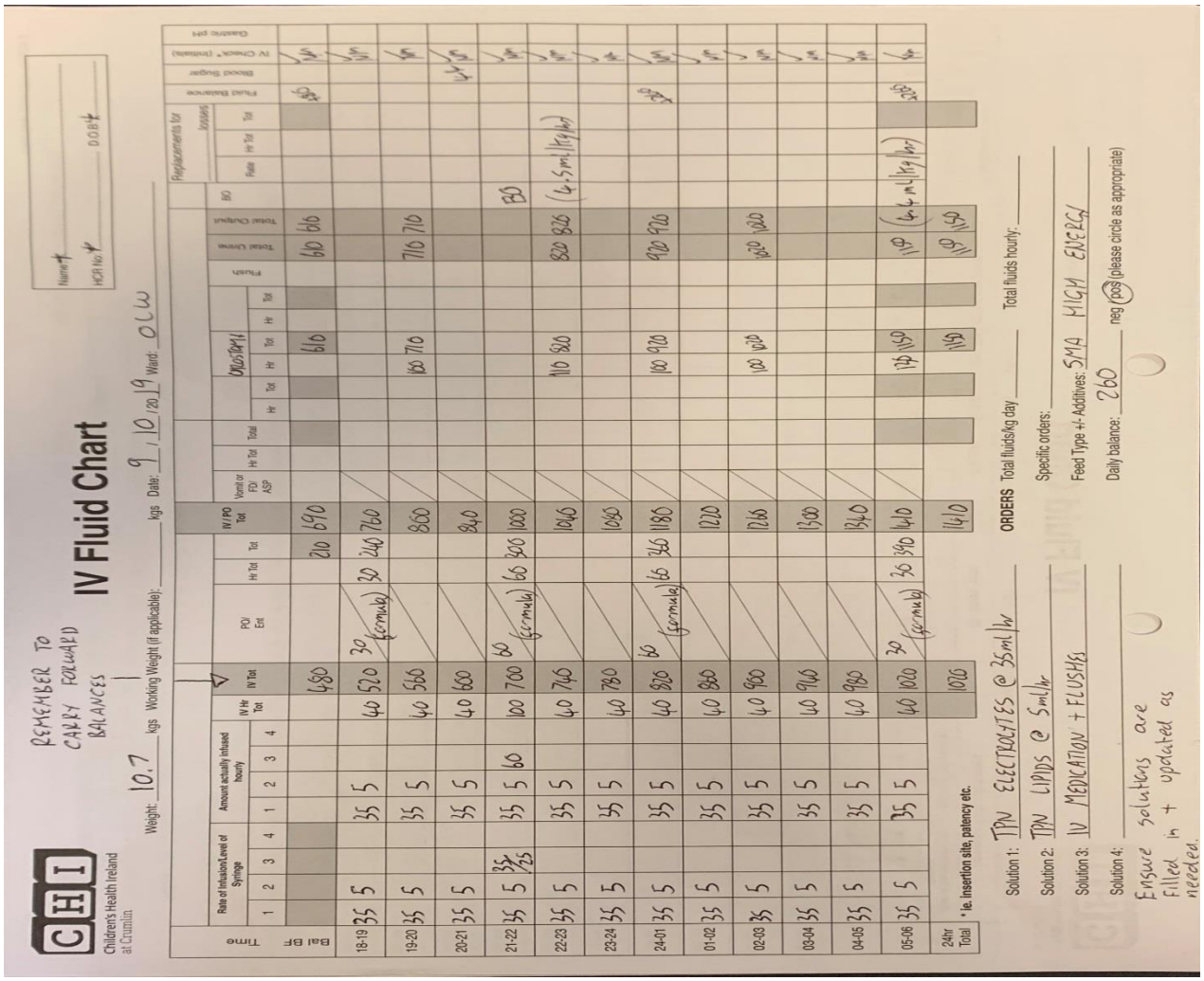


Children's Health Ireland

Daily 24 hour Fluid Balance
To complete at 6am daily

Full Name:
Address: Addressograph
HCR:

Date	Total Iv Fluid TPN/Meds	Total Oral Intake	Total Iv & Oral Intake	Urine Output	Stoma Drain Stool	+Ve/-Ve Balance	Repogyle Losses	Repogyle Replacements	Sign



Children's Health Ireland at Crumlin

IV Fluid Chart

REMEMBER TO CARRY FORWARD BALANCES

Name: _____ HCR No: _____ DOB: _____

Weight: 10.7 kgs Working Weight (If applicable): _____ kgs Date: 9/10/19 Ward: OLW

Time	Bal BF	Rate of Infusion/Level of Syringe 1	2	3	4	Amount actually infused hourly 1	2	3	4	IV Hr Tot	IV Tot	PO/ Ent	Hr Tot	IV / PO Tot	Vomit or PO/ ASP	Hr Tot	Total	Hr	Hr Tot	Tot	Fluid Balance	Blood Sugar	IV Chloride (mMol/L)	Gastric pH	Replacements for losses: Total	Hr Tot	Plain	BG	Total Output	Total Urine	Fluid
18-19	35	5				35	5			40	570	30 (formula)	30	210	690													690	690	
19-20	35	5				35	5			40	560	40 (formula)	40	770	860													710	710	
20-21	35	5				35	5			40	600				840															
21-22	35	5	35	35		35	5	60		100	700	60 (formula)	60	300	1000													820	820	BD
22-23	35	5				35	5			40	760				1040													820	820	(4.5ml/kg/hr)
23-24	35	5				35	5			40	780				1060															
24-01	35	5				35	5			40	820	60 (formula)	60	360	1180													920	920	
01-02	35	5				35	5			40	860				1220															
02-03	35	5				35	5			40	900				1260													1020	1020	
03-04	35	5				35	5			40	940				1300															
04-05	35	5				35	5			40	980				1340															
05-06	35	5				35	5			40	1020	30 (formula)	30	390	1410													1150	1150	(4.5ml/kg/hr)
24hr Total											1016				1410													1150	1150	

* ie. insertion site, patency etc.

Solution 1: TPN ELECTROLYTES @ 35ml/hr

Solution 2: TPN LIPIDS @ 5ml/hr

Solution 3: IV MEDICATION + FLUSHES

Solution 4: _____

Ensure solutions are Filled in + updated as needed.

ORDERS Total fluids/kg day _____ Total fluids hourly: _____

Specific orders: _____

Feed Type +/- Additives: SMA HIGH ENERGY

Daily balance: 260 neg/pos (please circle as appropriate)

Children's Health Ireland at Crumlin

IV Fluid Chart

Name: *

HCR No: * D.O.B: *

Weight: 44 kgs Working Weight (if applicable): _____ kgs Date: 2/2/2020 Ward: Our Ladys Ward

Time	Intravenous Fluids / Medications: Rate of Infusion/Level of Syringe 1	2	3	4	Amount actually infused hourly 1	2	3	4	IV Hr Tot	IV Tot	PO / Enteral feeds: PO/ Ent	Hr Tot	Tot	IV / PO Tot	GI Losses: REPOSITE Vomit or FD/ ASP	Hr Tot	Total	Output (e.g. Urine, Drain etc) Indicate source of output: Hr	Tot	MITRA Hr	Tot	SPC Hr	Tot	Flush	Total Urine	Total Output	BO	Replacements for REPOSITE losses: Rate	Hr Tot	Tot	Fluid Balance	Blood Sugar	IV Check* (Initials)	Gastric pH
06-07	82	48	66/25		82	1	91		174	174	N			174	30	30	30			50	50	5	5	30/30	55				-	0			✓	
07-08	82	47			82	1			83	257	P			257	25	25	55			40	90	10	15		105				30	30			✓	
08-09	82	46			82	1+1			84	341	O			341	35	35	90			60	150	10	25		175				30	60			✓	
09-10	82	44			82	1			83	424				424	30	30	120			50	200	15	40		240				40	100		4.1	✓	
10-11	82	43	66/25		82	1+1	91		174	598	N			598	40	40	160			65	265	10	50		315	(1.4ml/kg/hr)			40	140			✓	
11-12	82	41	150/25		(82)	(1)	(175)				P													KEEP TRACK OF U/O (ml/kg/hr)					REPLACING PREVIOUS HOURS LOSS'S IF A CCESS OR OTHER IV MEDS ARE NOT RUNNING.				
12-13	(82)	(40)	(66/25)		FILL IN AT THE END OF HOUR.						O																							
13-14	FILL IN AT START OF HOUR																																	
14-15																																		
15-16																																		
16-17																																		
17-18																																		

Please bring forward 12 hourly totals to overleaf

* ie. insertion site, patency etc.

Solution 1: 0.9/Nacl + 5/ Dex + 10mmol KCL in 500mls @ 82ml/hr

Solution 2: IV Morphine @ 1ml/hr + 1ml PCA

Solution 3: IV Medication and Flushes

Solution 4: _____

ORDERS Total fluids/kg day _____ Total fluids hourly: _____

Specific orders: _____

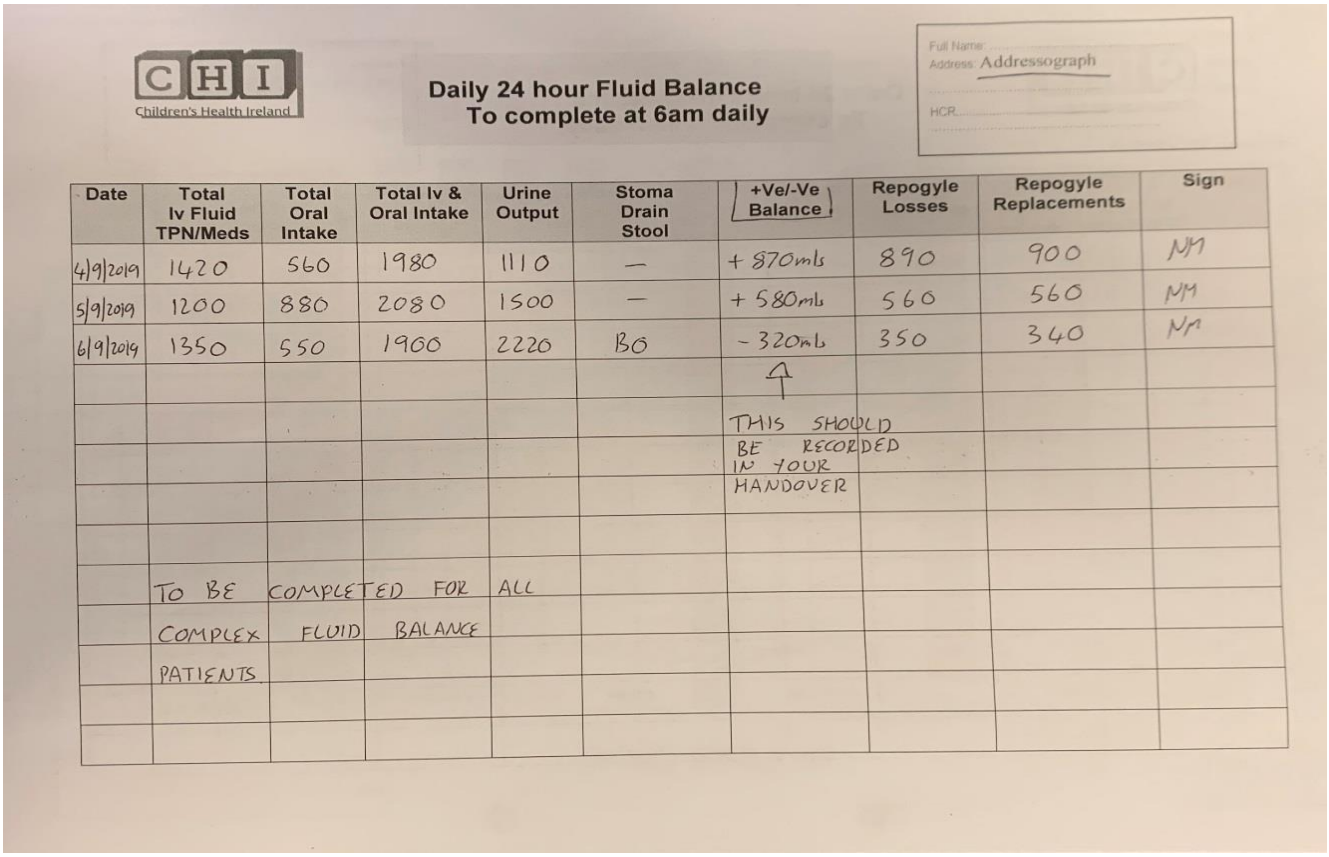
Feed Type +/- Additives: _____

Daily balance: _____ neg / pos (please circle as appropriate)

HCR 158

Issue Date: June 2018 Version 5

Sláinte Leanaí Éireann
Children's Health Ireland



Children's Health Ireland

Daily 24 hour Fluid Balance
To complete at 6am daily

Full Name:
Address: Addressograph
HCR:

Date	Total Iv Fluid TPN/Meds	Total Oral Intake	Total Iv & Oral Intake	Urine Output	Stoma Drain Stool	+Ve/-Ve Balance	Repogyle Losses	Repogyle Replacements	Sign
4/9/2019	1420	560	1980	1110	—	+870mls	890	900	MM
5/9/2019	1200	880	2080	1500	—	+580mls	560	560	MM
6/9/2019	1350	550	1900	2220	80	-320mls	350	340	MM
						THIS SHOULD BE RECORDED IN YOUR HANDOVER			
	TO BE COMPLETED FOR ALL								
	COMPLEX FLUID BALANCE								
	PATIENTS								

CALCULATING FLUID REQUIREMENTS IN CHILDREN

100mls/kg for 1st 10kg

50mls/kg for 2nd 10kg

20mls/kg for every kg after that

e.g. child 37kg

100mls x 10=1000

50mlsx10=500

20mlsx17=340

Total = 1840 in 24hours

If on IVF's they would be running at a rate of 76.6mls/hr

This can be rounded off to 76mls or 77mls/hr

URINARY OUTPUT:

Child – equal to or greater than 1ml/kg/hr

Adolescent – equal to or greater than 0.5/kg/hr

Sláinte Leanaí Éireann
Children's Health Ireland

OLIVE OIL ENEMAS

The Purpose of the warm olive oil enema is to lubricate the stool

0-3 years - 60 mls

3-7 years - 90 mls

7-12 years - 120 mls

Equipment:

- Rectal Catherter size 12
- Catherter tip syringe
- Lubricant
- Warmed Olive Oil
- Inconteinence sheet

Method:

- Allow child to go to the toilet before procedure
- Explain procedure to chidl
- Warm olive oil so it is at body temperture
- Attach syringe and catherter and draw up required amount
- Insert catherter into rectum – approx 10cm
- Slowly instill olive oil – never force in the fluid, if resistance is met try to re position catherter
- After olive oil is instilled, elevate feet/legs if possible
- Give pain relief if stomach cramps are experienced.

Transanal Irrigation:

- Transanal Irrigation is simply a way to empty the rectum so the child is socially clean i.e. to remain free of soiling accidents.
- Reasons/ conditions why someone may need Transanal irrigation:
- Hirschsprungs disease
- History of Imperforate anus
- Chronic constipation
- Neuropathic bowel
- Spina bifida

The aim of the irrigation is to do the washout daily with a solution of water, salt and sometimes a stimulant medication to stimulate the bowel and empty it of stool. This washout is performed on the toilet.

There are different types of equipment that may be used to perform this irrigation:

- The Willis System
- Peristeen
- Qufora
- Rectal washout

With the help of your CNSp, you and your child will decide which equipment suits your child best.

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

ANTEGRADE CONTINENCE ENEMA:

The A.C.E (Antegrade Continence Enema) is another method of washing out the bowel via a catherisable channel between the abdomen and the bowel. This method may be chosen for independence, so your child can do their own washout with more ease.

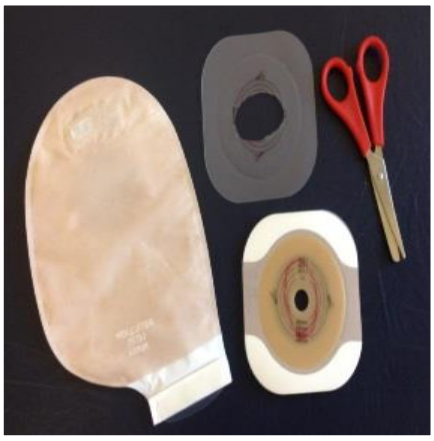
This technique was first devised in 1990 by Mr P Malone and so sometimes maybe referred to as the Malone or MACE procedure.

The catherisable channel is made from a piece of either tissue from the appendix or the small bowel. It is usually on the right hand side of the abdomen or can sometimes be in your child's belly button.

After the operation, a catheter is left in the new channel for 4-6 weeks so to allow the tract to heal and prevent it from closing over. This catheter will be used for your child's washouts until it is due to be removed. Washouts will be recommenced 2-3 days after your child's operation, as per the surgeon's instructions.

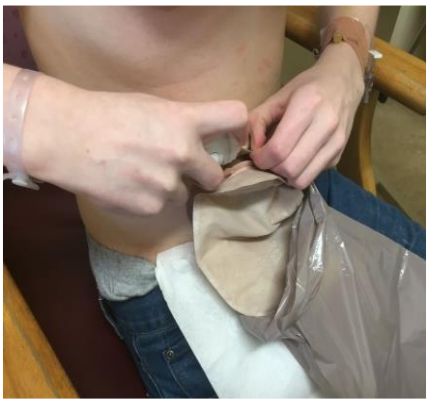
ILEOSTOMY;
TEENAGER ULCERATIVE COLITIS

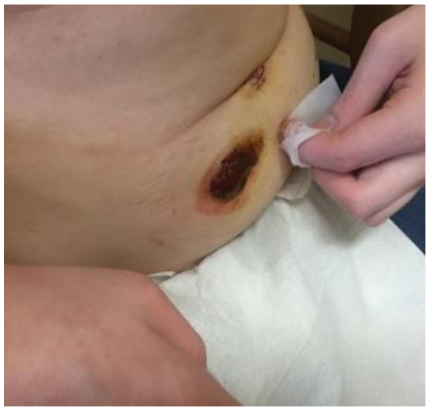
PREPARE EQUIPMENT



- Waste bag
- Pot of warm water
- Gauze squares
- Remover spray & wipes
- Barrier spray or wipe
- Seal
- Stoma base & bag
- Scissor
- Cut base to correct size using template.
- Close end of bag.

PREPARE THE PERISTOMAL SKIN

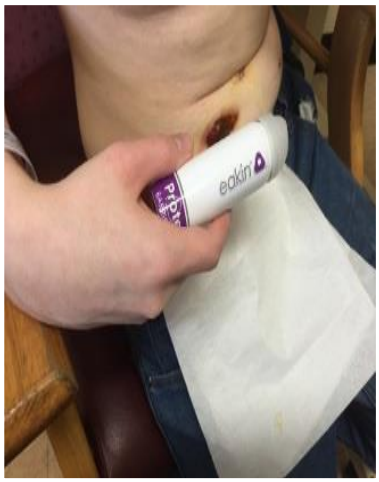


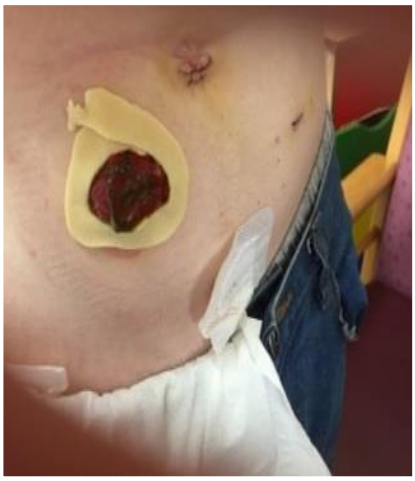


- Wash your hands.
- Remove your base and bag using remove spray and/or wipes.
- Dispose of bag in your waste bag.
- Clean the skin around the stoma using gauze and ward water.
- Dry thoroughly.

Sláinte Leanaí Éireann
Children's Health Ireland

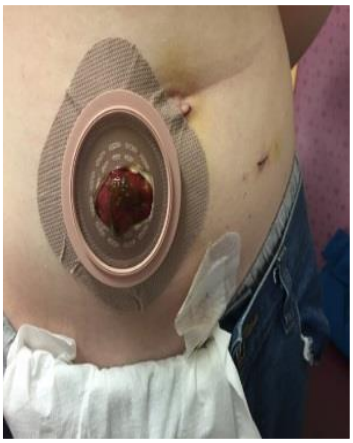
PROTECT THE PERISTOMAL SKIN

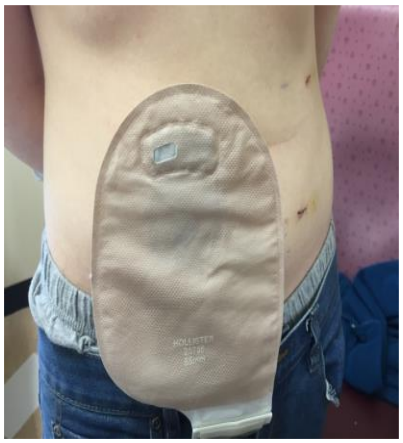




- Apply barrier
- Allow to dry
- Apply seal to peristomal skin by wrapping around the stoma.
- No peristomal skin should be present.

ATTACH BASE & BAG

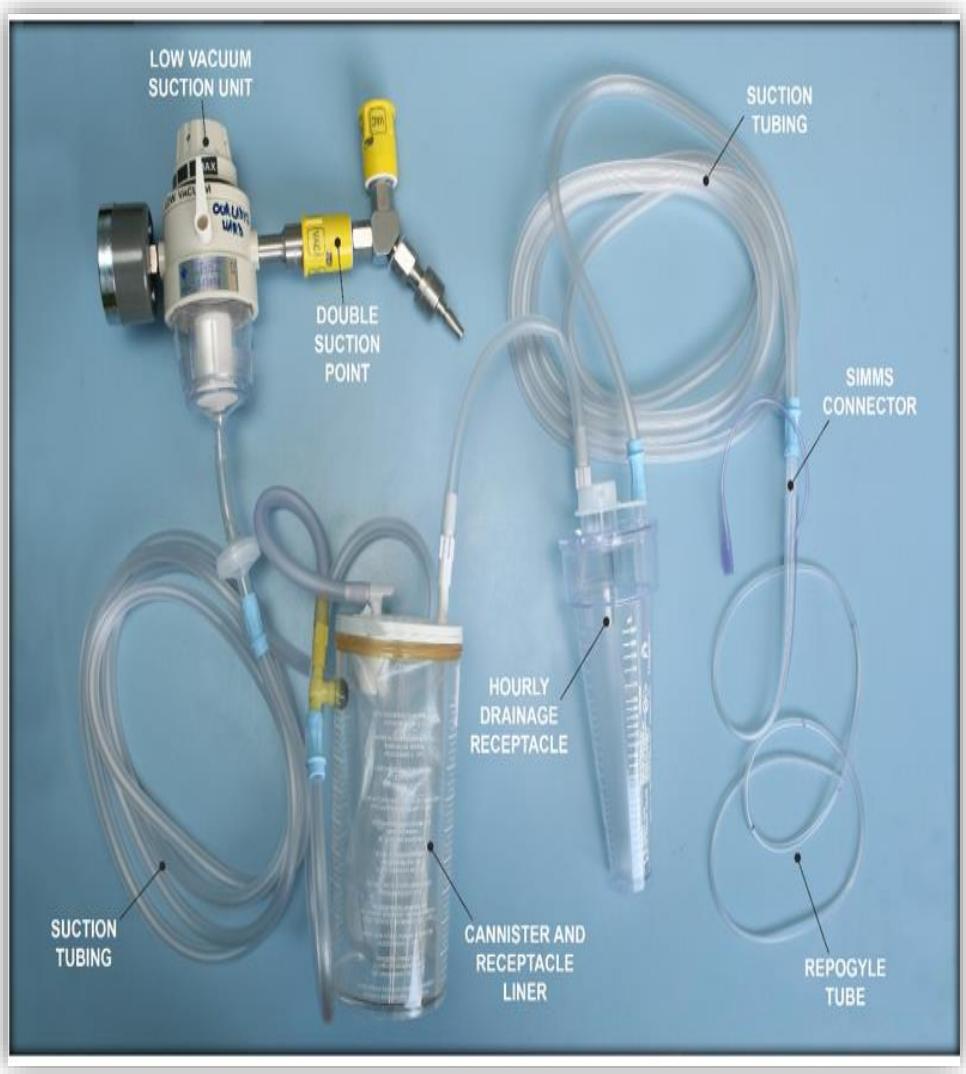




- Warm the base between your hands to make it as pliable as possible so that it will adhere to your skin.
- Remove the backing from the base and apply to the skin, centring the stoma.
- Attach the bag to the base.
- Wash your hands and dispose of your waste in the bin.

Sláinte Leanaí Éireann
Children's Health Ireland

LOW-pressure suction set up for repogyle tubes



Sláinte Leanaí Éireann
Children's Health Ireland

CHEST DRAIN

Indication for Insertion

- Pneumothorax
- Tension Pneumothorax
- Haemothorax
- Haemopneumothorax
- Pleural Effusion
- Chylothorax
- Empyema (pus) and complicated para-pneumonic pleural effusion
- Post Thoracic Surgery (Hazinski 2013, Woodrow 2013)

CARE OF THE CHILD

Monitoring

Report and document any abnormalities / concerns to the medical team as clinical condition indicates.

- Assess rate, depth, rhythm and effectiveness of respirations. Minimum 4hourly or as condition indicates. Nurse on an O2 saturation monitor continuously
- Monitor colour and oxygen saturations to establish parameters of same. Minimum of 4hourly or as condition indicates.
- Observe for equal chest expansion, increased respiratory effort and signs of respiratory distress.
- The child will usually require an opiate analgesic of choice i.e. either by infusion, NCA / PCA or orally e.g. Oramorph ® to ensure comfort and effective pain relief. Liaise with CNS Acute Pain
- Encourage deep breathing, coughing and the use of incentive spirometry. Blow bubbles may be useful in the young child. Liaise with Physiotherapist.
- Any dressing should be left in place if clean and dry.
- Surgeons will often use extra steristrips to secure chest drain at the time of incision. This additional taping may be reapplied if it becomes loose, as clinically indicated.
- Check insertion site daily. Observing for signs of infection i.e. inflammation, oedema, discharge, pyrexia. Ensure clean, dry and free from odour.
- Check tubing from chest tube to drainage system for leaks, kinks or obstructions
- Avoid dependent and ascending loops (hanging down below the top of the chest drain or lying on the floor).
- Do **NOT** manipulate the tubing by routine milking

Clamping Chest Drains

POTENTIALLY UNSAFE AND HIGHLY DANGEROUS

Chest drains should not be routinely clamped when moving or transferring a patient

THORASEAL III

Collection Chamber (1st Compartment)

The collection chamber acts as a reservoir for fluid draining from the chest drain.

Monitor the collection chamber for drainage including the presence of blood

- Amount
- Colour (blood, haemoserous, serous, chyle)
- Consistency

 Flow

Check the volume of fluid drainage for the first 2 hours a minimum of every 30 minutes post insertion and hourly thereafter or as patient's condition dictates. Document same.
Report and document any sudden changes in volume loss to the **cardiothoracic surgical team immediately.**

Significant postoperative bleeding is:
 > 3ml/kg/hour for three hours
 5ml/kg/hour in any one hour.

This should be immediately reported to the Cardiothoracic surgical team for review

NB: Do not clamp the chest drains
Ensure that there is sufficient Water for Irrigation in the chamber, as per markings on the chamber i.e. 2 cms and the chest drain is submerged.

- Water seal chamber ***should not*** be overfilled beyond 2cms.
- Observe for bubbling in the water seal chamber, on expiration and coughing
- Observe for continuous bubbling in the underwater seal and ***absent*** bubbling in the suction chamber.
- Observe water level closely in the water seal chamber in response to respiration, i.e. swinging / oscillating.
- NB: This may be minimal/ difficult to observe in the
- The water seal chamber should be placed 30cms below the child's chest.

Suction Chamber (3rd Chamber)
Fill suction chamber to 10 -15 cms of water, using Water for Irrigation i.e. ***10cm in infants*** and ***15cms in children***

- Refill water in suction chamber periodically as required to maintain negative pressure.
- To activate suction, adjust low-pressure suction devise at wall, until slow gentle continuous bubbling is observed. (Guideline on the care of children with chest drains OLCHC 2015)
- **Ensure 2 clamps are in the patients room and if the patient moves always bring the clamps with you**
- **A nurse must always accompany a patient with a chest drain**

WATER SEAL CHAMBER		
TIDALLING	**BUBBLING**	**ASSESSMENT**
Yes	Yes	Indicates patient air leak and lungs are not re –expanded.
No	No	Indicates resolution of air leak and lung re expansion
No	Yes	Indicates a possible connection or system air leak
Yes	No	Observed in total or partial pneumonectomy it can be associated with decreased lung compliance

1 **2** **3**

(1) Read this level hourly observe colour and note amount document on chest drain record sheet
(2) Underwater seal : ensure this is filled with water exactly to the line if the water level drops top it up aseptically check for bubbling or oscillating
(3) Low pressure suction water chamber: ensure it is filled to correct cms of water as prescribed this needs to be topped up to regularly to keep at he the correct level of suction

Sláinte Leanaí Éireann
Children's Health Ireland

TOTAL PARENTAL NUTRITION

(NB: please read: Parental Nutrition Care of The Child Guideline)

TPN is used when it is not possible to meet the nutritional requirements via oral or enteral route – often due to intestinal immaturity or intestinal failure.

Complications associated with TPN: electrolyte imbalance, refeeding syndrome, hyperglycaemia, infection, central venous thrombosis, hepatic disease are to name a few.

Constituents of TPN: amino acids (protein & nitrogen), carbohydrate (glucose), Lipid, water, acetate, electrolytes (sodium, potassium, calcium, magnesium, phosphate), trace elements, Vitamins.

Infection Control: the high glucose constituent in PN poses a higher risk of infection – strict ANTT Level 2 must be used when priming, connecting and disconnecting TPN whether it is via a peripheral cannula or CVAD.

Storage: They are delivered to the ward in the evening and must be stored in a designated refrigerator. It should be removed from the fridge 1 hour prior to commencement.

Weaning TPN: there should be gradual transition from TPN to enteral nutrition or oral diet. TPN can be reduced as oral diet increases. Full TPN bags should be ordered and weaning rates charted. Aqueous & lipid solutions should be reduced in correct proportion.

Ordering: To be completed by the designated ward SHO or the primary team SHO by 10 am. This needs to be sent down to ACU by 11 am latest! Once established on TPN we aim to order a day in advance so that we can change TPN on the day shift to facilitate staffing levels at night. Same to order in advance for the weekends too. Full blood test pre TPN order should be completed then as below unless indicated otherwise:

Daily for the 1st Week then Mon, Wed & Fri: Urea, electrolytes, serum calcium & potassium, FBC,

Weekly: LFT's, Total Protein, Albumin,

Twice weekly: Lipid Index (Biochem form)

Monthly: Zinc, selenium, iron, manganese & vitamin levels.

Urine: Daily for the first week – glucose (Dipstick), Monthly – Monilia.

Please Note: Maximum concentration for Glucose via a peripheral line is 12.5%

'L is for LIPID

Remember the seven L's – avoiding infusion rate errors with patient specific TPN

LABEL – Always label infusion lines and infusion pumps.

LIGHT BLUE FILTER – Lipid through the 1.2 micron filter

LIPID BAG ON THE LEFT- Always hang your lipid infusion on the LEFT hand side of the infusion stand.

LIPID PUMP LEFT OR LOWER – Hang Lipid pump on the left or lower on the stand that the aqueous

LIPID RATE – SET LAST – Always set infusion pump for the Lipid rate last.

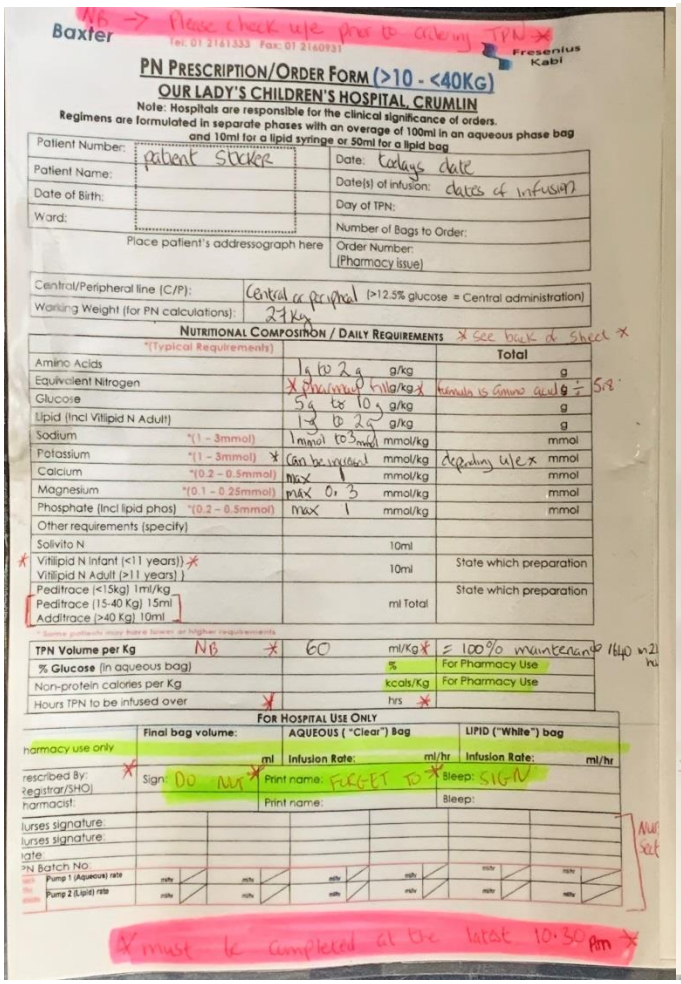
LIPID RATE IS LOWER – Always infused at a lower rate than aqueous.

LIGHTS ON – Always have the lights on when checking / setting infusion pumps.

Sláinte Leanaí Éireann

CHI

Children's Health Ireland



Baxter

Tel: 01 2161333 Fax: 01 2160931

Fresenius Kabi

PN PRESCRIPTION/ORDER FORM (>10 - <40KG)

OUR LADY'S CHILDREN'S HOSPITAL, CRUMLIN

Note: Hospitals are responsible for the clinical significance of orders.

Regimens are formulated in separate phases with an overage of 100ml in an aqueous phase bag and 10ml for a lipid syringe or 50ml for a lipid bag

Patient Number:	patient Sticker	Date:	today's date
Patient Name:		Date(s) of infusion:	dates of infusion?
Date of Birth:		Day of TPN:	
Ward:		Number of Bags to Order:	
Place patient's addressograph here		Order Number: (Pharmacy Issue)	

Central/Peripheral line (C/P):	Central or peripheral (>12.5% glucose = Central administration)
Working Weight (for PN calculations):	27 Kg

NUTRITIONAL COMPOSITION / DAILY REQUIREMENTS * see back of sheet *

*(Typical Requirements)			Total	
Amino Acids	1g to 2g	g/kg		g
Equivalent Nitrogen	* Minimum 0.15g/kg *		formula is amino acid g ÷ 5.8	
Glucose	5g to 10g	g/kg		g
Lipid (Incl Vitlipid N Adult)	1g to 2g	g/kg		g
Sodium *(1 - 3mmol)	1mmol to 3mmol	mmol/kg		mmol
Potassium *(1 - 3mmol) *	Can be increased	mmol/kg	depending U/E's	mmol
Calcium *(0.2 - 0.5mmol)	max	mmol/kg		mmol
Magnesium *(0.1 - 0.25mmol)	max 0.3	mmol/kg		mmol
Phosphate (Incl lipid phos) *(0.2 - 0.5mmol)	max 1	mmol/kg		mmol
Other requirements (specify)				
Solivito N		10ml		
* Vitlipid N Infant (<11 years) * Vitlipid N Adult (>11 years) }		10ml		State which preparation
Peditrace (<15kg) 1ml/kg Peditrace (15-40 Kg) 15ml Additrace (>40 Kg) 10ml		ml Total		State which preparation

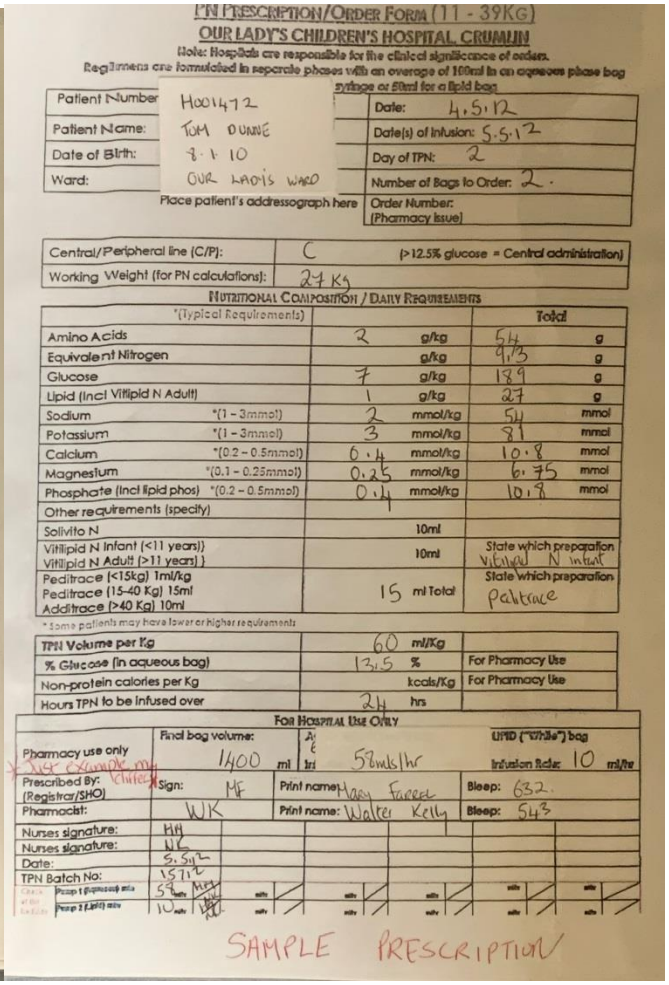
* Some patients may have lower or higher requirements

TPN Volume per Kg	NB * 60	ml/Kg *	= 100% maintenance 1640 ml/24 hrs
% Glucose (in aqueous bag)		%	For Pharmacy Use
Non-protein calories per Kg		kcals/Kg	For Pharmacy Use
Hours TPN to be infused over	*	hrs *	

FOR HOSPITAL USE ONLY

	Final bag volume:	AQUEOUS ("Clear") Bag	LIPID ("White") bag
Pharmacy use only	ml	Infusion Rate: ml/hr	Infusion Rate: ml/hr
Prescribed By: (Registrar/SHO)	* Sign: DO NOT *	Print name: FORGET TO	Bleep: SIGN
Pharmacist:		Print name:	Bleep:
Nurses signature:			
Nurses signature:			
Date:			
TPN Batch No:			
Pump 1 (Aqueous) rate	ml/hr	ml/hr	ml/hr
Pump 2 (Lipid) rate	ml/hr	ml/hr	ml/hr

* must be completed at the latest 10:30 pm *



PN PRESCRIPTION/ORDER FORM (11 - 39KG)

OUR LADY'S CHILDREN'S HOSPITAL, CRUMLIN

Note: Hospitals are responsible for the clinical significance of orders.

Regimens are formulated in separate phases with an overage of 100ml in an aqueous phase bag syringe or 50ml for a lipid bag

Patient Number:	H001472	Date:	4.5.12
Patient Name:	TOM DUNNE	Date(s) of Infusion:	5.5.12
Date of Birth:	8.1.10	Day of TPN:	2
Ward:	OUR LADYS WARD	Number of Bags to Order:	2
Place patient's addressograph here		Order Number: (Pharmacy Issue)	

Central/Peripheral line (C/P):	C (>12.5% glucose = Central administration)
Working Weight (for PN calculations):	27 Kg

NUTRITIONAL COMPOSITION / DAILY REQUIREMENTS

*(Typical Requirements)			Total	
Amino Acids	2	g/kg	54	g
Equivalent Nitrogen		g/kg	9.13	g
Glucose	7	g/kg	189	g
Lipid (Incl Vitlipid N Adult)	1	g/kg	27	g
Sodium *(1 - 3mmol)	2	mmol/kg	54	mmol
Potassium *(1 - 3mmol)	3	mmol/kg	81	mmol
Calcium *(0.2 - 0.5mmol)	0.4	mmol/kg	10.8	mmol
Magnesium *(0.1 - 0.25mmol)	0.25	mmol/kg	6.75	mmol
Phosphate (Incl lipid phos) *(0.2 - 0.5mmol)	0.4	mmol/kg	10.8	mmol
Other requirements (specify)				
Solivito N		10ml		
Vitlipid N Infant (<11 years) Vitlipid N Adult (>11 years) }		10ml	State which preparation	Vitlipid N infant
Peditrace (<15kg) 1ml/kg Peditrace (15-40 Kg) 15ml Additrace (>40 Kg) 10ml	15	ml Total	State which preparation	Peditrace

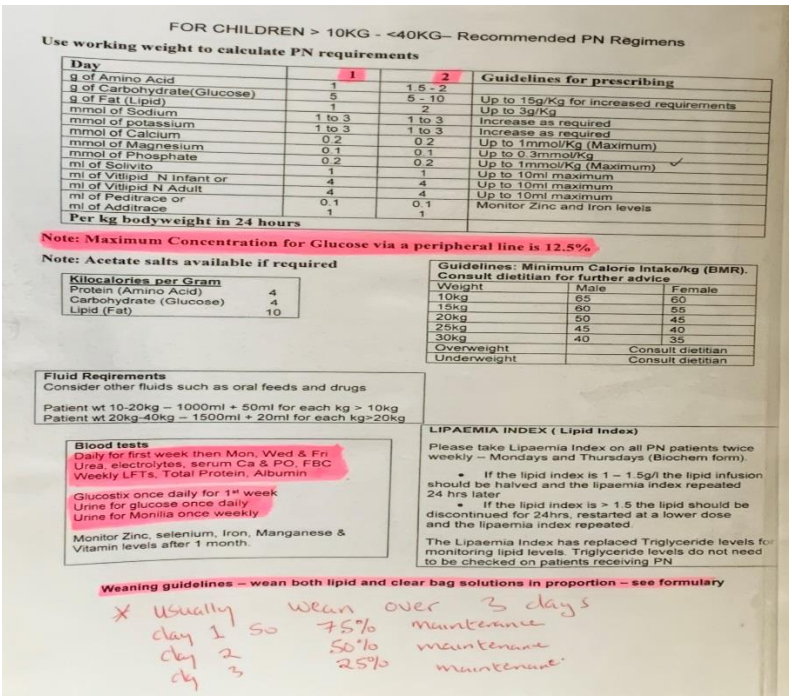
* Some patients may have lower or higher requirements

TPN Volume per Kg	60	ml/Kg	
% Glucose (in aqueous bag)	13.5	%	For Pharmacy Use
Non-protein calories per Kg		kcals/Kg	For Pharmacy Use
Hours TPN to be infused over	24	hrs	

FOR HOSPITAL USE ONLY

	Final bag volume:	AQUEOUS ("Clear") Bag	LIPID ("White") bag
Pharmacy use only	1400 ml	Infusion Rate: 58mls/hr	Infusion Rate: 10 ml/hr
* Just example * Prescribed By: (Registrar/SHO)	Sign: MF	Print name: Mary Farrell	Bleep: 632
Pharmacist:	WK	Print name: Walter Kelly	Bleep: 543
Nurses signature:	MM		
Nurses signature:	WK		
Date:	5.5.12		
TPN Batch No:	15112		
Pump 1 (Aqueous) rate	58 ml/hr	ml/hr	ml/hr
Pump 2 (Lipid) rate	10 ml/hr	ml/hr	ml/hr

SAMPLE PRESCRIPTION



FOR CHILDREN > 10KG - <40KG– Recommended PN Regimens

Use working weight to calculate PN requirements

Day	1	2	Guidelines for prescribing
g of Amino Acid	1	1.5 - 2	
g of Carbohydrate(Glucose)	5	5 - 10	Up to 15g/Kg for increased requirements
g of Fat (Lipid)	1	2	Up to 3g/Kg
mmol of Sodium	1 to 3	1 to 3	Increase as required
mmol of potassium	1 to 3	1 to 3	Increase as required
mmol of Calcium	0.2	0.2	Up to 1mmol/Kg (Maximum)
mmol of Magnesium	0.1	0.1	Up to 0.3mmol/Kg
mmol of Phosphate	0.2	0.2	Up to 1mmol/Kg (Maximum) ✓
ml of Solivito	1	1	Up to 10ml maximum
ml of Vitlipid N Infant or	4	4	Up to 10ml maximum
ml of Vitlipid N Adult	4	4	Up to 10ml maximum
ml of Peditrace or	0.1	0.1	Monitor Zinc and Iron levels
ml of Additrace	1	1	
Per kg bodyweight in 24 hours			

Note: Maximum Concentration for Glucose via a peripheral line is 12.5%

Note: Acetate salts available if required

Kilocalories per Gram	
Protein (Amino Acid)	4
Carbohydrate (Glucose)	4
Lipid (Fat)	10

Guidelines: Minimum Calorie Intake/kg (BMR). Consult dietitian for further advice

Weight	Male	Female
10kg	65	60
15kg	60	55
20kg	50	45
25kg	45	40
30kg	40	35
Overweight	Consult dietitian	
Underweight	Consult dietitian	

Fluid Reqirements

Consider other fluids such as oral feeds and drugs

Patient wt 10-20kg – 1000ml + 50ml for each kg > 10kg

Patient wt 20kg-40kg – 1500ml + 20ml for each kg>20kg

Blood tests

Daily for first week then Mon, Wed & Fri
Urea, electrolytes, serum Ca & PO, FBC
Weekly LFTs, Total Protein, Albumin

Glucostix once daily for 1st week
Urine for glucose once daily
Urine for Monilia once weekly

Monitor Zinc, selenium, Iron, Manganese & Vitamin levels after 1 month.

LIPAEMIA INDEX (Lipid Index)

Please take Lipaemia Index on all PN patients twice weekly – Mondays and Thursdays (Biochem form).

- If the lipid index is 1 – 1.5g/l the lipid infusion should be halved and the lipaemia index repeated 24 hrs later
- If the lipid index is > 1.5 the lipid should be discontinued for 24hrs, restarted at a lower dose and the lipaemia index repeated.

The Lipaemia Index has replaced Triglyceride levels for monitoring lipid levels. Triglyceride levels do not need to be checked on patients receiving PN

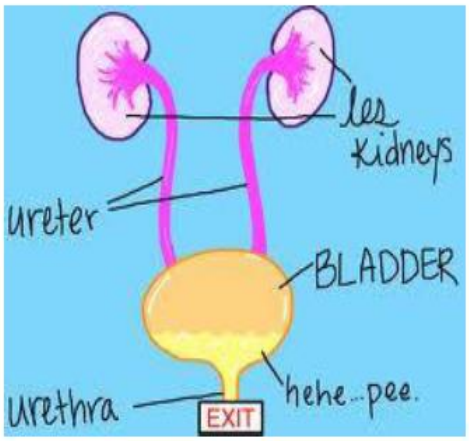
Weaning guidelines – wean both lipid and clear bag solutions in proportion – see formulary

* Usually wean over 3 days
day 1 so 75% maintenance
day 2 50% maintenance
day 3 25% maintenance

Sláinte Leanaí Éireann
Children's Health Ireland

Nursing Care
Reconstructive Bladder Surgery

Liz Boyce
Urology CNS
OLCHC



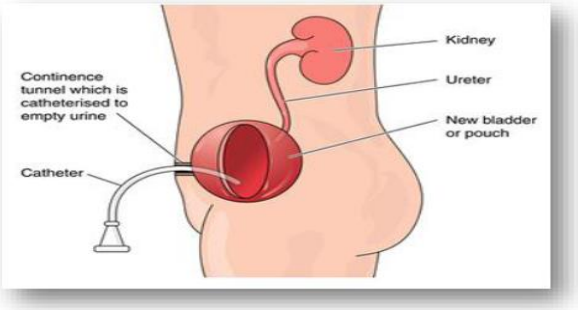
Sláinte Leanaí Éireann
Children's Health Ireland

Aims of reconstructive surgery

- Provide adequate functional bladder capacity with low filling pressure.
- To preserve upper tract from high pressure damage by VUR.
- A safe continent urinary system.
- Improved QOL and independence.

Types of Reconstruction

- Augmentation Cystoplasty
- Mitrofanoff
- Bladder Neck Surgery
- ACE
- All of or a combination of the above

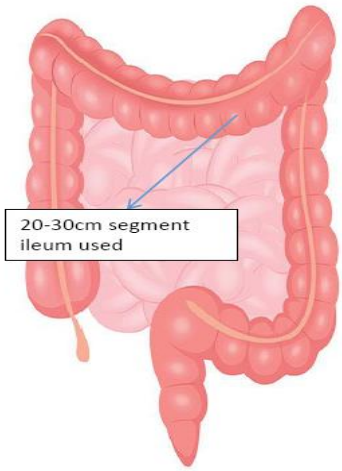


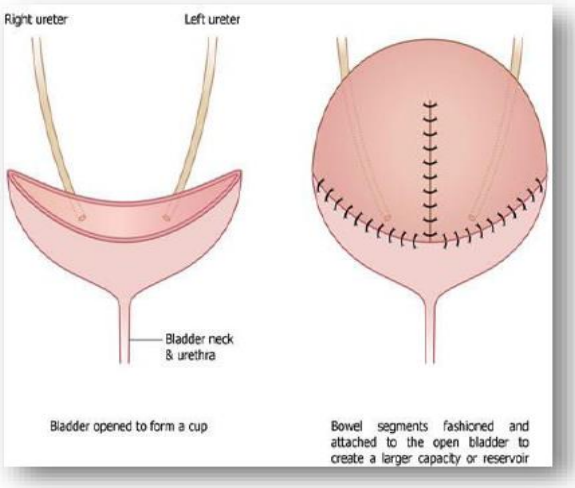
Augmentation Cystoplasty

- Enlarge a high pressure small capacity bladder using a GI segment (ileum commonly used)
- Bladder substitution-replacement of the native bladder with GI segment.

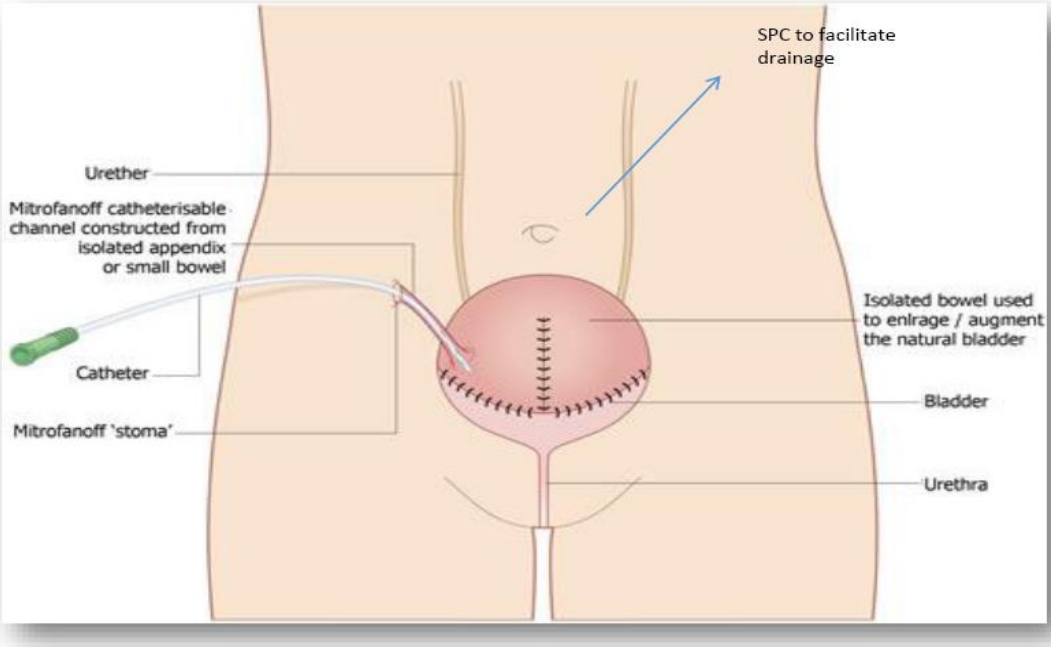
Sláinte Leanaí Éireann
Children's Health Ireland

Augmentation Cystoplasty





Augmentation Cystoplasty

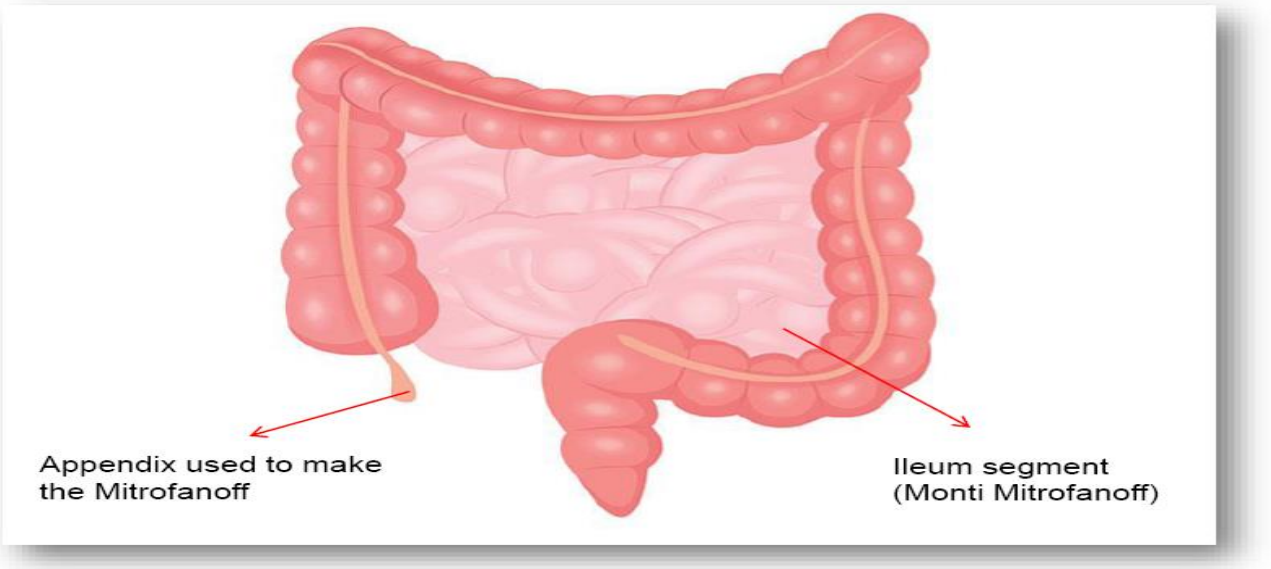


Sláinte Leanaí Éireann
Children's Health Ireland

Mitrofanoff

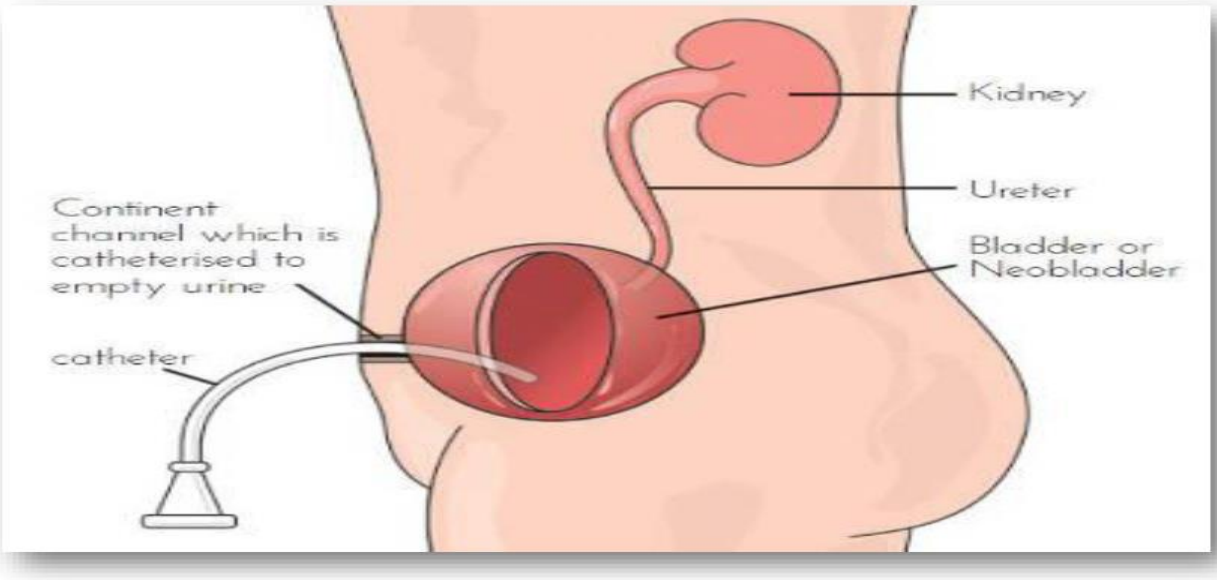
- Dr Paul Mitrofanoff (1980)
- The appendix, a portion of ileum or ureter is used and channelled from the bladder through the abdominal wall.
- Sited left or right iliac fossa or through the umbilicus forming a continent catheterisable channel to give access for intermittent bladder drainage.

Mitrofanoff



Sláinte Leanaí Éireann
Children's Health Ireland

Mitrofanoff



Bladder Neck procedure

- **BN closure** → NO URETHRAL OUTLET
- **Potentially unsafe situation**
- **BN repair pressure** → **Will have some urethral outlet if under pressure**
- **Catheter patency essential to prevent bladder filling**

Sláinte Leanaí Éireann
Children's Health Ireland

Increasing Bladder Outlet Resistance

- **Fascial Sling**

Suspension of the BN with a fascial strip. Coaptation of the BN due to traction, and/or elevation of the urethra to an intraabdominal position, which increases tension on the BN with abdominal straining.

- **Artificial Urinary Sphincter**

Ideal patients for AUS are post pubertal males/females who can void volitionally and empty their bladder.

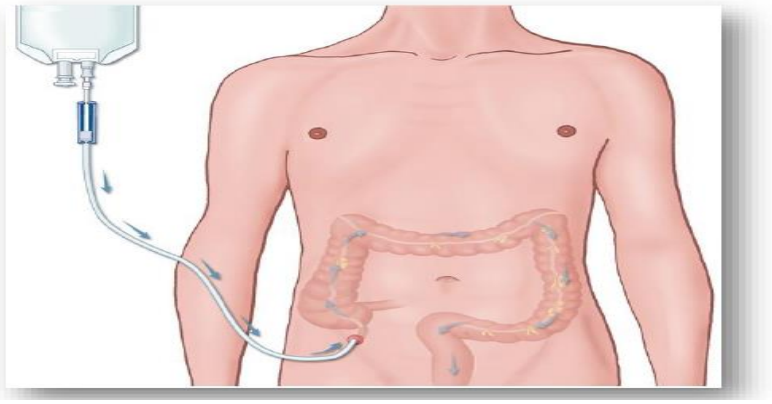
Antegrade Continence Enema

The appendix or portion of ileum is tunnelled out through the abdominal wall, usually right iliac fossa to form a continent catheterisable channel.

When flushed with enema irrigates the colon.

Faeces passes via the rectum.

Antegrade Continence Enema (ACE)



Sláinte Leanaí Éireann
Children's Health Ireland

Who?

Congenital malformations (Bladder Extrophy)

Most common candidates are those with **neuropathic bladder** (Spina Bifida)

Pre renal transplant (Renal disease/PUV/Obstructive uropathy) **SAFE** bladder required prior to transplant

Conservative Management

- Not everybody is **suitable** for surgery
- Not everybody **wants** surgery
- Anticholinergics / Botox + Clean Intermittent catheterisation
- Minimally invasive

Pre Op Assessment

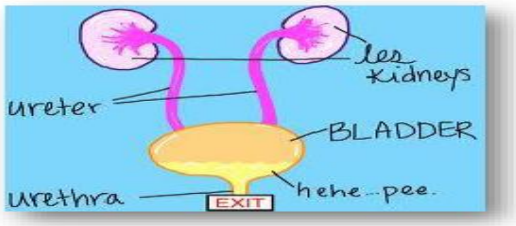
- Imaging (RUS,DMSA,MAG 3)
- Baseline renal function
- Bladder function assessment and Uroflow
- Cystometry
- Physical suitability (body habitus, weight, dexterity)
- Psychological suitability (motivation,expectations,readiness)
- All assist in the planning of patient specific surgery.

Sláinte Leanaí Éireann
Children's Health Ireland

Cystometry
(pressure flow study)

- Performed when results will affect management (pre reconstruction / Renal transplant)
- Urotherapy has failed.
- Screening tests are abnormal.
- Unknown diagnosis, not sure exactly what is going on.
- Pressure recording of both the bladder and the abdomen.
- Comprehensive assessment of the filling and storage phase, detrusor function, bladder sensation, bladder capacity and volume, compliance and urethral function.

Love and Marriage.....
Lower Urinary tract dysfunction can cause upper tract impairment



Pre Op Prep

- **Comprehensive** prep with CNS after discussion in OPD with Consultant.
- **Readiness** is paramount to ensure compliance post op.
- **Meeting** with other parents/child who have undergone reconstructive surgery to get a more subjective approach is important.

Sláinte Leanaí Éireann
Children's Health Ireland

Pre Op

- **Admit** by Team - 24-72hrs pre op, depending on bowel prep required.
- **Urine C+S URGENT** to lab. May need AB's pre op.
- **IVC** / Fluids / Routine bloods.
- **Anaesthetic** review (Epidural)

Bowel Prep

- **TOTAL BOWEL EVACUATION** Full reconstruction involving small bowel.
- **ACE/MITROFANOFF** may require lower gut prep. Dulcolax for 3 days prior to admission. W/O the evening before OT if established.
- **BN SURGERY** generally no specific prep
- **All in conjunction with low/no residue diet.**
- **Patient specific**

Bowel Prep

- Picolax
- 1 BD (8am/2pm) 1 OD on day 2 (8am)
- Good fluid intake
- Aim for yellow soft stools/clear
- In conjunction with low/no residue diet
- IVC/IVF to maintain hydration

Sláinte Leanaí Éireann
Children's Health Ireland

Post Op Management

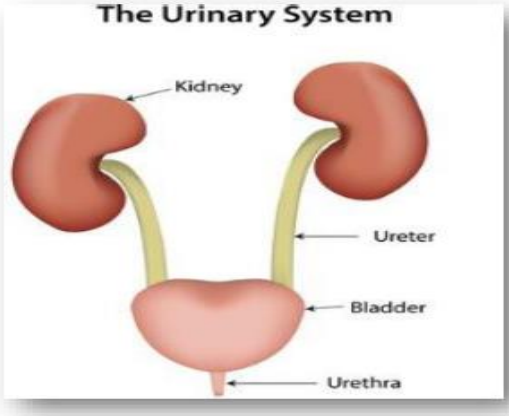
- Routine post op cares
- Specific catheter care/safety
- Catheter flushing
- Intake/output
- Pain management/spasm
- Wound care
- Mobilising
- Bowel Management

Plumbing

- Catheters post op depend on patient condition, anatomy and specific surgery performed.
- Mitrofanoff/SPC/Urethral.
- PURPOSE is to keep the bladder on CONTINUOUS DRAINAGE.
- Safety

Plumbing

- If you have a good knowledge of the child's anatomy and condition you can manage the plumbing
- Read the operative note to get a very clear picture.



Sláinte Leanaí Éireann
Children's Health Ireland

Catheters

Mitrofanoff

- Size 10Fr
- Indwelling 4-6 weeks
- Remove and start CIC

Supra Pubic

- **ALWAYS insitu post augmentation**
- Large bore (facilitate mucus drainage)
- Safety valve
- Insitu until CIC established

Catheters

- ALL catheters on free drainage initially.
- Secured to abdomen at **2 points** with elastoplast.
- Free of kinks, below the bladder, at end of bed for better syphonage.
- 24hr drainage bags when on bed rest.
- Leg bags when mobilising.
- Night drainage bags **ALWAYS** connected overnight. (2lt capacity)

Post op Mitrofanoff

- Size 10 NGT sutured at skin level
- Note CM level of tube
- 2 anchor tapes (elastoplast)
- Insitu 4-6 weeks
- Remove dressing 24-48 hrs post op and leave exposed unless excessive ooze

Sláinte Leanaí Éireann
Children's Health Ireland

Anchor Tapes

- Anchor tapes secure the tube to the skin.
- 2 stress points.
- Always change 1 at a time while sitting or lying down.
- Change when wet or loose.

Free Drainage

- Hourly urine output monitoring for first 48hrs, then extend monitoring by 1 hour if output is ok.
- Free drainage via leg bag when output is satisfactory and mobilising.
- Overnight bag MUST be connected at night.
- Strict and accurate Intake/Output.

6 weeks Post Op

- Commence Clean Intermittent Catheterisation
- 3 hourly drainage +/- Overnight drainage

Flushing

- **Mucus from anastomotic bowel segment can create post op and ongoing complications such as catheter blockage, stone formation and infection.**
- Flushing instructions will be documented in the post op note and needs to be charted in the kardex.
- Volume/frequency at Consultant/CNS discretion.
- **Usually 4-6 hourly 20-50mls 0.9% NaCl.**

Sláinte Leanaí Éireann
Children's Health Ireland

Flushing

- Clean technique
- Change equipment every 24hrs (Tray/60ml syringe/gallipots/Nacl/Alcowipes)
- As prescribed and PRN.
- **Provided what goes in comes out you can flush as required**

Aspiration

- Aspirate with care
- Exert pressure in the bladder
- Risk of mucosal damage / Pain
- Mucus is heavier than urine and will sink to the bottom of the bladder
- Flush with speed to disturb the mucus and aspirate
- If the plunger does not freely release **DON'T** put your back into it!
- Parents / Child are taught this method
- DO NOT USE THIS METHOD IN IMMEDIATE POST OP PERIOD

Sláinte Leanaí Éireann
Children's Health Ireland

Flushing Technique

(Post augmentation when both catheters are draining freely)

- Always flush via mitrof to return via SPC.
- Use an alco wipe to disconnect the catheter and instil slow steady flush.
- Observe for return via SPC.
- Monitor patient response to the flush.
- **ALWAYS** empty both drainage bags prior to flushing.
- Never aspirate the mitrof, risk of blocking with mucus.

STOP FLUSH IF.....

- Sensation of fullness or desire to pass urine
- Resistance when flushing
- Patient reports pain
- Leaking at mitrofanoff site

Sláinte Leanaí Éireann
Children's Health Ireland

Urine drainage is sluggish or decreased by half the previous hours drainage

- **Check fluid intake**. Previous 24hrs I/O to assess hydration status.
- Concentrated urine?
- Acceptable output for age/weight.
- Check position of catheters.
- Obstruction-milk the SPC by gently twisting and stretching the catheter between thumb and forefinger.
- Remove anchor tapes if necessary to milk length of the tube.
- **Gently** aspirate the SPC using a 50ml catheter tip syringe.
- **Gently** instil 5mls NaCl into the SPC.
- If SPC is patent, flush the mitrofanoff.
- When in doubt contact Team/CNS.

Urethral Leaking

- Aim to avoid it. Evident bladder filling.
- **BN repair/closure should not leak.**
- Post op bed rest and free drainage.
- Quite often one catheter will do majority of draining and one may be clamped.

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

Troubleshoot

- Find source of obstruction.
- Open any clamped catheter.
- Aspirate the SPC/check position of catheters.
- Do not get the pt to strain.
- Inform the team.
- Estimate volume of leak and document.

Intake and Output

- Appropriate output for age/weight.
- **Renal pts may be on a higher fluid challenge.**
- IV maintenance initially.
- Oral intake 1,200-1,500mls per day in regular divided volumes.
- ROUTINE is important for bladder cycling.
- Routine drinking/CIC.
- **Can be the most difficult part of recovery for many.**

Sláinte Leanaí Éireann
Children's Health Ireland

Intake and output

- HOURLY urine output monitoring.
- ACCURATE timely intake. Please don't guestimate.

Pain Management

Epidural
- Anaesthetic review pre op suitability
- Remove day 3-5 post op
- Bed rest
- Pain CNS

Morphine
- If epidural not suitable
- Side effects
- Gut motility

Sláinte Leanaí Éireann
Children's Health Ireland

Spasm

- Result of trigonal irritation from indwelling catheters
- Manifests as pain in perineum/tip of willy

Treatment

- Anticholinergics
- Oxybutynin/Tolterodine
- Side effects must be considered before prescribing

Wound care

- Remove dressings 24-48 hours post op
- Expose to air
- Mucus production from mitrofanoff is normal, protect clothes with gauze
- Clean with saline
- Shower as normal

Sláinte Leanaí Éireann
Children's Health Ireland

Mobilising

- ASAP post op depending on restrictions.
- (BN work/epidural)
- NB to promote gut motility and prevent respiratory complications.
- Stand tall ! Avoid stooping .
- Physiotherapy involvement.

Bowel Management

- If established on washouts (willis/Peristeen) return to regime post op once eating/drinking.
- ACE formation → Activated on day 5 post op. Catheter left insitu x 6 wks
- Treat with laxatives earlier rather than later. Movicol/lactulose
- Splint the abdomen while pooing.
- Fluids and diet

Sláinte Leanaí Éireann
Children's Health Ireland

Constipation

Potential Complications of Augmentation

COMMON

- Difficulty catheterising (stenosis/false passage)ACE stopper
- Bladder stones Flushing with saline reduced risk from 43% to 7%. Rate of recurrence up to 44%
- UTI
- Reoperation 34%
- Metabolic complications Absorptive properties of bowel

UNCOMMON

- Bladder perforation/Rupture uncommon but most serious and life threatening complication
- Bowel obstruction 2-6%
- Neoplasia 1.2% TCC following augmentation in population of 260.
- Screening yearly 10 years after augmentation.

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

Difficulty catheterising

- Time if they have a pop off valve
- Over distension/rupture risk if BN closed
- Trauma from repeated attempts/swelling/bleeding/pain/false passage
- Always given a smaller catheter on discharge
- **Get one in, leave it in and contact OLCHC**

UTI's

No CSU…No Point

- Chronic Bacteruria as bowel now present in the bladder
- **CSU** essential with careful **interpretation**
- **Treat if symptomatic**

Sláinte Leanaí Éireann
Children's Health Ireland

Antibiotic Resistance

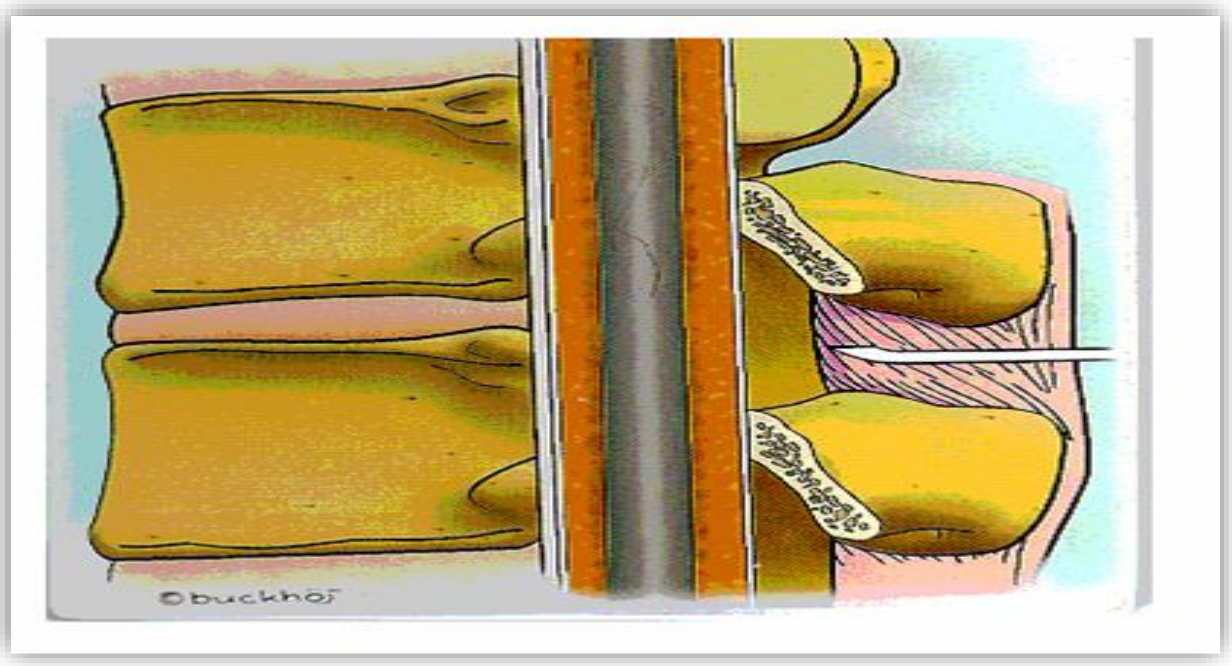
Discharge

- Length of stay 10-14 days
- Child/parents instructed in all aspects of management.
- Prescription for supplies/meds.
- Faxed to pharmacy.
- Supplies given on discharge.
- Readmit 4-6 wks post op for CIC training.
- R/O SPC once established on CIC.
- OPD 3 months.

Sláinte Leanaí Éireann
Children's Health Ireland

Epidural Analgesia

Work Book



This workbook on epidural pain management was developed to help familiarize nursing staff with the nursing care for patients receiving epidural analgesia. The training program for epidural analgesia includes 2 components including the completion of:

- Resource guide for epidural analgesia
- Classroom or ward teaching session(s)
- Return of the quiz

LEARNER OBJECTIVES

After the completion of this self-directed learning module, the nurse will be able to:

1. Identify the benefits, indications and contraindications for epidural analgesia
2. Describe the **key anatomical structures** and their functions related to epidural analgesia.
3. Identify the **mechanism of action** for the following classes of drugs:
   - Neuroaxial opioids
   - Local anaesthetics
   - Adjuvant drugs
4. Identify the most common **potential complications** of epidural analgesia and the specific actions to be taken if a complication occurs.
5. Describe the **nursing core assessment** & monitoring for patients receiving epidural analgesia
6. Demonstrate, in a simulated setting and then in the clinical setting, the following:
   - Set up of the continuous epidural infusion (pump and tubing)
   - Assessment of the patient with an epidural infusion
7. Describe necessary **documentation** for epidural analgesia

Sláinte Leanaí Éireann
Children's Health Ireland

REPONSIBILITY OF CARE

Role of Nursing Staff

Under An Bord Altranais Scope of Professional Practice (2000), nurses should maintain and improve their professional knowledge and experience in caring for patients. To meet this requirement nurses who are asked to care for children with epidural infusions should attend a theoretical teaching programme and be prepared to ensure that they are competent to care for children receiving epidural infusions. The registered nurse must be aware of and demonstrate their accountability, including their own abilities and limitations when caring for a patient who is receiving continuous epidural analgesia.

Role of the Anaesthetist and the Acute Pain Nurse

It remains the responsibility of the anaesthetic staff to support staff on the wards caring for patients with Epidurals. Ward staff will be trained to undertake the day-to-day management of epidurals. The Acute Pain Nurse will be available on weekdays for advice and assessment of patients. Medical support is also provided on a daily basis by the anaesthetic team. Out of these hours the Anaesthetist on call will be available. The acute pain team will visit patients with epidurals at least daily until the epidural has been discontinued. If a patient comes to the ward via ICU/HDU, with an epidural infusion the CNS pain should be informed to initiate daily reviews.

Introduction

Epidural analgesia (EA) is regarded as the gold standard for managing acute pain after major surgery or trauma to the chest, abdomen, pelvis or lower limbs. Epidural analgesia is an effective method of providing pain relief to children. (Llewellyn & Moriarty, 2007). When combined with other pharmacological interventions, children can achieve better pain control, decreased suffering and anxiety and improved physiological outcomes and reduced hospital stay. (Llewellyn & Moriarty, 2007). However, epidural analgesia can cause serious, even life-threatening complications and its safe and effective management requires a coordinated multidisciplinary approach. This self-directed learning module is essential information for the nurse who cares for children receiving epidural analgesia.

Definition

Epidural analgesia is achieved by infusing preservative free morphine or fentanyl or local anaesthetic or a mixture of both) through a catheter placed into the epidural space surrounding the spinal cord. An epidural catheter is usually placed to enable repeated doses or an infusion of the drug to be given. The infusion may be continuous, intermittent (Bolus) or patient controlled.

Why use epidural analgesia?

There is considerably less systemic exposure to opioids when the epidural (rather than intravenous) route is chosen.

- The drug is diffused through the dura, enters the spinal fluid where it begins to spread rostrally (toward the head) and is absorbed into the arteries supplying the dorsal horn of the spinal cord.
- The drug is able to act directly at the opioid receptors in the dorsal horn of the spinal cord
- Lower impact on GI tract
- Less constipation
- Less nausea and vomiting
- Faster return to normal GI motility (normal eating and defecation).

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

- The use of combination solutions (opioid + local anaesthetic) increases analgesia while decreasing the potential toxicity of higher doses of a single agent.
- Epidural analgesia is often considered superior to intravenous patient controlled analgesia, especially for major abdominal or thoracic surgery.
- Decreased incidence of pulmonary complications (Mann *et al* 2000)
- Earlier ambulation
- Because all other administration routes have been found to be ineffective

Physiology of pain

Noxious (thermal, chemical or mechanical) stimuli initiate a series of chemical response that result in the transmission of the stimulus by way of nerve fibres and activation of the pain pathway. Neurotransmitters and neuromodulators are involved in the inhibition or facilitation and the modulation of the painful stimulus. The conscious perception of pain occur at different levels in the brain.

Physiology of epidural analgesia

Local anaesthetics and opiates spread as if in a column, like the rise of mercury in a thermometer with increasing temperature when injected into the epidural space. The site of needle insertion, catheter tip location and volume and concentration of local anaesthetic administered determines the extent and quality of sympathetic, sensory and motor blockade.

Physiology of epidural analgesia

Local anaesthetics and opiates spread as if in a column, like the rise of mercury in a thermometer with increasing temperature when injected into the epidural space. The site of needle insertion, catheter tip location and volume and concentration of local anaesthetic administered determines the extent and quality of sympathetic, sensory and motor blockade.

Local anaesthetics block or inhibit the production of nociceptive impulses. Opioid analgesics bind to opioid receptors found in the body altering the pain response and produce analgesia through inhibition of nociceptive impulses.

Indications for epidural analgesia

Post-operative pain management (Pasero 1998; Liu & Mulroy 1998) Epidural analgesia appears to be most beneficial for the high-risk surgical patient e.g. children with impaired pulmonary function e.g. children with asthma bronchopulmonary dysplasia, cystic fibrosis or for those recovering from extremely large or painful surgical procedures. Such procedures include thoracotomies, major upper abdominal, major abdominal vascular and orthopaedic surgeries. The epidural infusion provides a localized band of analgesia at the site of the incision.

- **Multiple trauma** (Pasero 1998) Epidural analgesia is especially beneficial for patients with chest trauma, i.e.: rib fractures. The localized analgesia helps the patient overcome the pain induced splinting that contributes to the loss of pulmonary function, which in turn may lead to atelectasis and pneumonia.
- **Chronic pain** (Pasero & Mc Caffery 1999) Epidural analgesia can be used in the treatment of patients experiencing an acute exacerbation of Complex Regional Pain Syndrome (CRPS) by producing a sympathetic blockade using a local anaesthetic. This provides improved analgesia, and allows the patient to participate in physical therapy, which is vital in the control of their symptoms.
- **Cancer Pain** medical pain poorly responsive to conventional systemic opioids and adjunctive medications such as sickle cell pain cancer pain.

Sláinte Leanaí Éireann
Children's Health Ireland

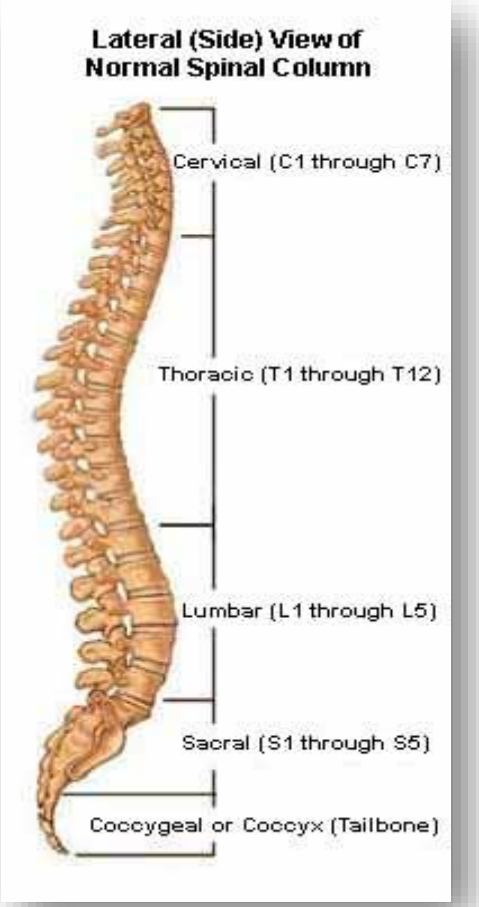
CONTRAINDICATIONS TO EPIDURAL ANALGESIA	
Absolute Contraindications for use of Epidurals:	
Infection √ Infection at Puncture site √ Meningitis √ Systemic septicemia	Localized infection at the site of insertion may lead to an infection in the epidural space. Systemic infection may lead to an infection in the epidural space
Allergy to local anaesthetics	
Bleeding √ Coagulopathy : inherited or acquired √ Thrombocytopenia	Increased risk for an epidural haematoma
Miscellaneous √ Patient/parent Refusal √ Progressive degenerative CNS disease √ Allergy to drugs used	An inadvertent dural puncture when trying to locate the epidural space in a patient with increased intracranial pressure increases the chance of cerebellar or tentorial herniation due to the loss of CSF.
Uncorrected hypovolemia	
Relative Contraindications:	
Spinal column deformities, laminectomy, or low back pain Severe backaches or headaches Patient unable to co-operate Stable neurologic disease.	May make the insertion of an epidural catheter difficult or impossible.
Anticoagulation therapy	Anticoagulation therapy and neuroaxial anaesthesia used together increase the risk of epidural haematoma, which may lead to serious adverse effects such as permanent paralysis. Anticoagulation therapy should not be initiated or changed without first advising the Acute Pain Service/Anaesthetist. Note: see summary ASRA consensus statement
Lack of qualified nursing care to monitor patients for side effects and complications	Epidural analgesia should only be used in hospital units where the staff has received adequate training. Staff should be knowledgeable concerning epidural catheter placement, epidural medications, and the possible side effects and complications from epidural analgesia

NOTE', low dose heparin is not a contraindication provided the INR is within normal range. The potential risk of epidural hematoma formation and resultant serious neurological sequela (spinal cord compression, ischemia, and subsequent paralysis) may preclude these patients as candidates. If a patient is to be on subclinical anticoagulant therapy check with the prescribing physician regarding administration

Sláinte Leanaí Éireann
Children's Health Ireland

The Vertebral Column

The vertebral column or spinal column, consists of 33 vertebrae, but since the *5 sacral vertebrae* are fused and the *4 coccygeal vertebrae* are fused, it consists of just 26 separate bones).The vertebrae are named according to the region of the back where they are located; in each region the vertebrae are numbered from top to bottom.(McCaffery & Pasero1999)



7 cervical vertebrae: located in the neck.

12 thoracic vertebrae: located in the chest.

5 lumbar vertebrae: located in the lower back.

5 sacral vertebrae: fused to form the sacrum.

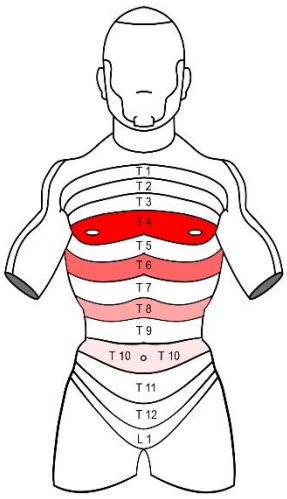
4 coccygeal vertebrae: fused to form the tailbone.

All nerves emerging from the spinal cord are called **spinal nerves**. They exit through holes *{intervertebral foramina)* formed by notches made by the vertebrae above and below each nerve. There are **31 pairs** and all are mixed nerves, having both motor and sensory fibers.

At each vertebral body level, nerve roots exit from the spinal cord bilaterally. Specific skin surface areas are innervated by a single spinal nerve or group of spinal nerves. The skin areas are called dermatomes. (Mc Caffery & Pasero 1999)

DERMATOMES

Dermatomes are segmental areas of the skin that are supplied by the spinal nerves.



C2 - C8. The neck, upper aspect of the shoulders, and the outer aspects of the arms and the hands are predominantly supplied the cervical nerves

C2, 3, 4 and **5** supply the diaphragm.

T1 - T11 The inner aspects of the arms, and all the intercostal muscles of the thoracic cavity from the 1st rib down receive their nerve supply from the thoracic nerves.

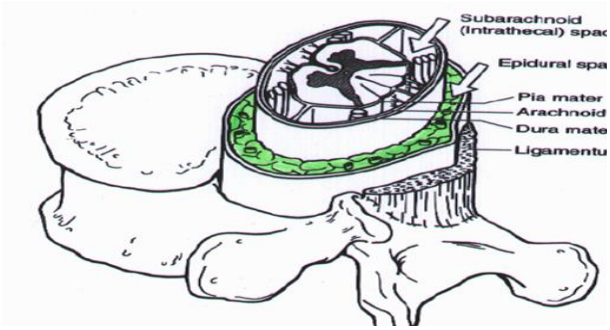
T9 - T12, The abdominal muscles receive their nerve supply from extending as far down as the pubic region anteriorly and posteriorly to the lower back.

The lumbar and sacral nerves innervate the legs from the lower back posteriorly and from the pubic region anteriorly.

Sláinte Leanaí Éireann
Children's Health Ireland

REVIEW OF ANATOMY

The spinal cord and the brain are covered by three meningeal membranes: The *pia mater*, which adheres to the cord and brain; the *arachnoid* and the *dura mater* which surrounds the spinal cord like a protective sac. Cerebrospinal fluid is contained in the *intrathecal space* (*subarachnoid space*) which is the area between the pia mater and the arachnoid mater. The *epidural space* is a potential space that lies between the dura mater and the vertebral canal, and extends from the cranium to the sacrum. It contains blood vessels, fat and connective tissue.

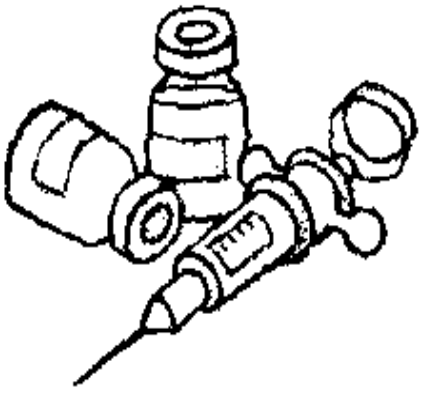


M, Pasero C: *Pain: Clinical Manual*, p216, 1999, as appears in McCaffrey Mosby, Inc.

LAYER	LOCATION	DESCRIPTION
Dura mater	outer layer next to bone	is a fibrous connective tissue containing many blood vessels
Arachnoid mater	Middle layer	is a delicate fibrous membrane
Pia mater	Inner layer next to the brain	is a vascular membrane containing a plexus of blood vessels-forms the choroids plexus

Epidural analgesia can be administered by 3 methods:

- Single injection
- Intermittent bolus
- Continuous infusion



EPIDURAL MEDICATIONS

Medications used to treat pain include Morphine, Hydromorphone, Fentanyl and Sufentonil and local anaesthetics, Levobupivicaine (chirocaine), Bupivicaine (Marcaine).

All epidurally administered medications must be preservative free.

Sláinte Leanaí Éireann
Children's Health Ireland

LOCAL ANAESTHETICS

Local anaesthetic drugs act at the spinal nerve root and affect the nerve activity by preventing the influx of sodium into the cell resulting in inhibition of nerve impulse transition. They also antagonize the release of prostaglandins reducing the inflammatory response. Local anaesthetic blocks sympathetic impulses. The secondary effect is blocking of sensory impulses before they enter the dorsal horn of the spinal cord resulting in a change of sensation, pain, touch and temperature and finally motor block if doses are increased.

Commonly used local anaesthetic agents include bupivacaine (0.25%, 0.5%) and Levobupivicaine (Chirocaine, the L-isomer of bupivacaine) 0.25%, 0.5%). When given epidurally, these drugs gain access to the nerve roots and the spinal cord by crossing the dura and subarachnoid membranes (Macintyre & Ready 2001). They inhibit pain transmission by blocking sodium ion channels which are involved in the propagation of electrical impulses along the spinal nerves.

Low concentrations of Levobupivacaine (e.g. 0.1–0.125%) preferentially block nerve impulses in the smallest diameter nerve fibres, which include the pain and temperature sensory fibres. Sensory nerves are blocked before motor because they are smaller and have less myelin so drug diffuses more quickly into the nerve. As the larger diameter motor fibres are less likely to be blocked with concentrations of 0.1–0.125% Levobupivicaine, leg weakness is avoided and the patient is able to mobilize. The dose of a local anaesthetic agent will also determine which nerves are blocked.
Solutions are given as percentages. This equals the amount of drug (in grams) in 100ml.

1% solution = 1g in 100ml = 1000 mg in 100ml = 10 mg/ml

Drug	Levobupivacaine	Bupivacaine
Onset	10-15 mins	10-15 mins
Max dose (without adrenaline)	2.5 mg/kg	2.5 mg/kg
Duration (without adrenaline)	3-12 hours	3-12 hours

Lipid solubility

Epidural medications vary in drug solubility. This variability affects the onset of action - Lipophilic drugs (Fat Soluable) (i.e. Fentanyl and Levobupivicaine (Chirocaine) cross the dura or fat layer readily and provide a more rapid onset. While hydrophilic drugs (water soluble) such as morphine and hydromorphone cross slowly thus have a slower onset of action. The poor lipid solubility may result in retention of the drug in the CNS and thus prolonged analgesia.

OPIOID ANALGESICS		
DRUG	**EPIMORPHINE**	**FENTANYL**
SOLUBILITY	Water soluble- slower onset	Lipid soluble- fast onset
ONSET	15-60 minutes -Peaks in 60 mins	5-10 minutes- Peaks in 20min
DURATION	Long- 4-24 hours	Short -3-4 hour
OTHER	More spread to brain Delayed Respiratory depression can occur up 8-10 hrs and up to 24 hr but can occur as early as 30	Less spread to brain Less delayed respiratory depression (3-4 hrs. post injection). Is most likely to be used in infusions.
ADVERSE REACTIONS	Increased sedation. Respiratory depression, hypotension, hallucinations, vomiting, constipation, urinary retention urticaria, rash, pruritus, allergic reaction.	

The infusion rates will have variable ranges depending on: patient condition, age, infusion concentrations. However, the side effects are minimized with the use of infusion.

Whenever a patient is receiving epidural analgesia with an opioid agent **naloxone** should be readily available on the unit.

Whenever a patient is receiving, Epidural analgesia **with a local anaesthetic Adrenaline (Ephedrine**) should be readily available on the unit for the treatment of hypotension.

COMMON EPIDURAL INFUSION

Common Opioid Concentrations		Common Local Anaesthetic Concentrations	
Morphine	50 microgram/ml	Levo-Bupivacaine (Chirocaine® 0.125%	1 mg/ml
Fentanyl	2–5 microgram/ml	Levo-Bupivacaine (Chirocaine®) 0.05% Chirocaine®) 0.125%	0.5mg/ml

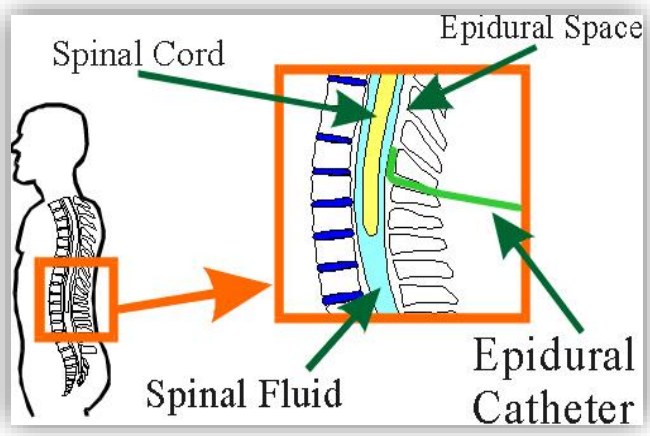
COMMON INFUSION RATES: 5-15cc/hr

Changing the Infusion Rate

The rate of infusion is adjusted to alter the extent of the block. The rate is not to be changed except by the order of the acute pain service or an anaesthetist. The one exception is in the case of a life-threatening emergency, when the epidural infusion should be ceased immediately.

The Epidural Catheter

Epidural catheters include short term percutaneously inserted catheters and tunneled long term catheters.



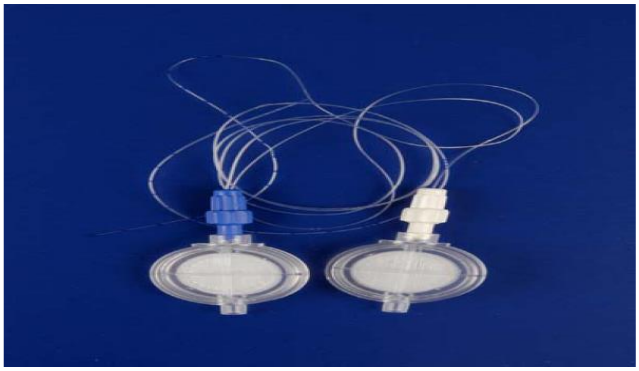
Short Term Catheter

This polyethylene catheter is used for short term pain management and is inserted as described below. It exits the spinal column and is run up the back and is looped over the shoulder.

INSERTION OF CATHETER

Catheter

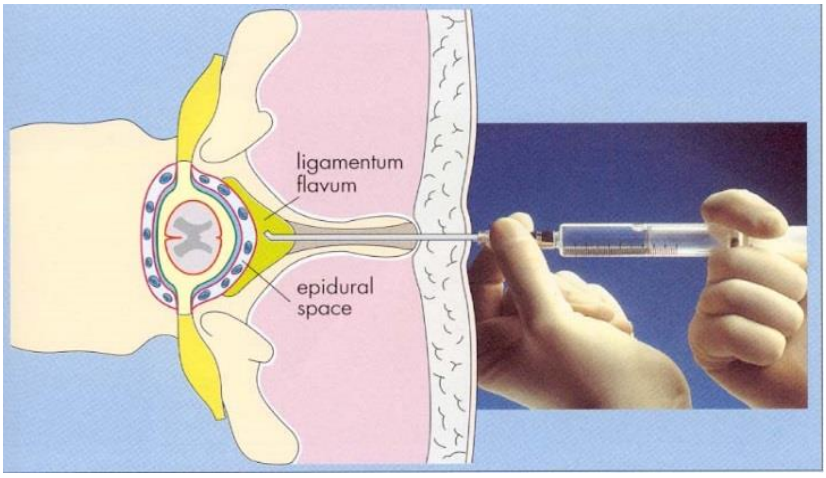
The 18G Portex epidural catheter has blue hub and has a single bold mark at 5 cm, then a mark every 1cm up to the two bold lines indicating 10 cm. The 1 cm markings continue until three bold lines together, which indicate 15 cm. There are no further markings until four bold lines together, which indicate 20 cm. The catheter has a coloured closed tip and three lateral holes.



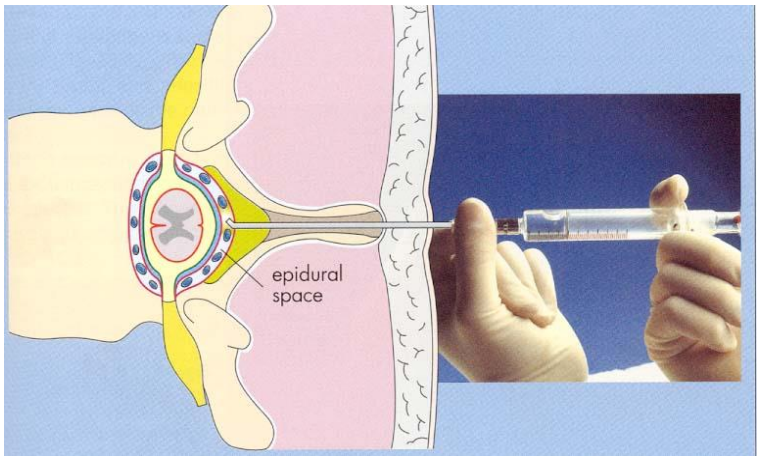
19G Portex epidural catheter has white hub and has a mark every cm from 2 cm with a bold mark indicating 5 cm. There are two bold lines together indicating 10 cm. Markings continue every 1 cm up to three bold lines together, which indicate 15 cm. The catheter has a single end hole with a coloured tip.

In children, the catheter is inserted in Theatre whilst the child is under anaesthesia. During the insertion the child may be positioned on his/her side, lying in fetal position, with both knees drawn upward with head and shoulders flexed toward the chest. This extends the spine, widening the spaces between vertebrae, making insertion of the catheter easier.

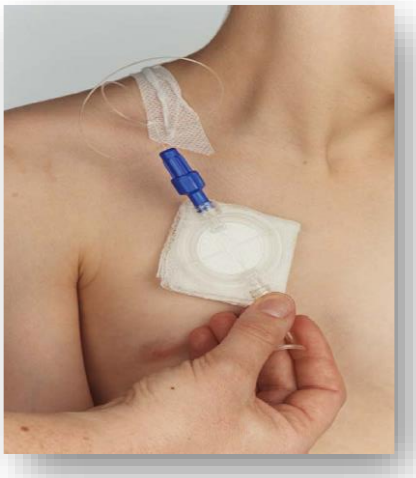
A special needle (usually a Touhey needle) is inserted through the skin, fat and fascia between the spinous processes, penetrating the ligomentum flavum then advanced into the Epidural or Subarochnoid space. During epidural catheterisation, the anaesthetist is able to recognise when the point of the needle penetrates the dense ligamentum flavum.



Entry into the epidural space exerts a negative pressure, which is recognised as loss of resistance in the syringe attached to the needle. (Mc Caffery & Pasero 1999)



Proper placement of the catheter is verified by the anaesthetist through aspiration of the catheter and a small test dose of a local anaesthetic. Once the needle has been determined to be in the appropriate position, the catheter is threaded through the needle. The needle is then removed. A connector is then attached to the catheter and a .22 micron filter is attached between the catheter and the infusion tubing which is taped with *Tegaderm* to prevent disconnection.



Once proper placement of the catheter is confirmed, a 'window' is made around the catheter exit site with an occlusive clear dressing (e.g *Tegaderm* or *Opsite*) to allow viewing of the insertion site and catheter markings. Hypoallergenic and firmly adhering tape (e.g *Hyperfix* or *Mefix*) is used to further secure the catheter up the child's back and over one shoulder where it connects with the filter.

The tubing and site should be labeled as "EPIDURAL

Only changed by CNS acute pain/anaesthetist if dressing becomes wet or loose

POSITION OF EPIDURAL CATHETER

Local anaesthetic drugs block nerve fibres at spinal segments adjacent to their site of administration. To ensure the local anaesthetic agent spreads to the dermatomes or nerves supplying the area of pain (e.g. the surgical site), the tip of the epidural catheter should be placed within the mid-dermatomal distribution of the pain site. This achieves optimal analgesia using the least amount of drugs. If the catheter is placed below the dermatomes supplying the pain site then analgesia is likely to be inadequate.
Optimal catheter location for different surgical sites

Surgical site Catheter location

- Thoracic T6–T9
- Upper abdominal T7–T10
- Lower abdominal T9–L1
- Hip/knee L1–L4

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

Equipment

Continuous epidural analgesia must only be administered via a dedicated epidural pump with a dedicated yellow administration set.

- The epidural giving set will be changed every 72 hours.
- The portex filter can be used for up to 60 days.
- The giving set should be changed if there is known contamination.
- Infusion pumps are cleaned prior to being returned to recovery.

Intravenous Access

- All children with an epidural infusion in progress must have intravenous access. Usually the IV will have a continuous infusion but in some situations (e.g. longer-term epidurals) intermittent flushing of an IV bung may be appropriate. Please discuss this with the pain service.
- After the epidural is ceased the IV must remain until the local anaesthetic/opioid has worn off (12 hours)

Catheter Disconnection

If a catheter disconnection is discovered. The infusion is stopped and the catheter should be wrapped in a sterile 4x4 and anesthesia/CNS acute pain should be notified
If the catheter disconnection is unwitnessed

1. DO NOT RECONNECT
2. Cover both ends with sterile gauze
3. Contact anaesthetist **immediately**

All unwitnessed disconnections require the epidural to be removed at the earliest possible time to reduce the risk of infection.

Leaking Epidurals

These are not uncommon in children. If the child is **comfortable** (suggesting the epidural is providing adequate analgesia), the dressing should be reinforced and the leakage observed. If the epidural dressing needs changing, the anaesthetist should be called.

If the child is in **pain,** the CNS acute pain/anaesthetist should be consulted.

MONITORING

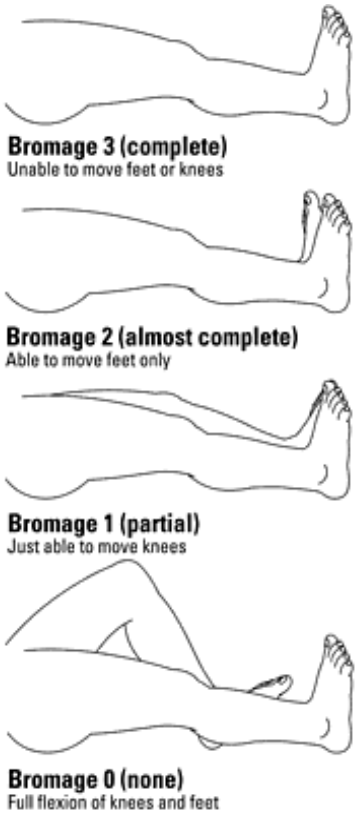
When caring for a patient receiving epidural analgesia, it is important to monitor the patient for the following:

- Signs of drug-related side-effects
- Pain intensity
- Signs of complications due to the epidural procedure

Sláinte Leanaí Éireann
Children's Health Ireland

Motor Blockade

This will depend on the concentration and total dose of local anaesthetic agent used and the position of the epidural catheter. Motor blockade occurs when the local anaesthetic agent blocks the larger diameter motor nerves. Leg weakness will occur if the motor nerves supplying the legs are blocked.



Assess Monitor motor function every 4 hours when child is awake as per the Bromage scale

0 = no block (0%) – Full flexion of knees and feet possible;
1 = Partial (33%) – Just able to flex knees, full flexion of feet;
2 = Almost complete (66%) – Unable to flex knees, still flexion in feet;
3 = complete (100%) – Unable to move legs or feet.

Sensory Assessment

Assess the level of block on both sides to see if it is changing - refer dermotome illustration

- Assess sensation at the start of each shift and thereafter every 4 hours for numbness, tingling or normal sensation using cold sensation with ice.
- Start by explaining what you are going to do to the child. Rub your arm on an area that one would expect to have normal sensation.
- Run ice (wrapped in tissue or gauze) up from the toe and note where coldness is detected by the child/young person.
- In younger children or children with communication problems it may be possible to elicit sensation by noticing wriggling, pulling away from the cold sensation.
- Note", weakness is an expected finding - this finding should be correlated to the level of sensation. If sensation or motor block is above the level specified higher notify anaesthetist.).

Pain Assessment

Assess pain hourly when awake at ret and on movement using developmentally appropriate pain scale.- FLACC, Wong-Baker Faces self-report, VAS

Breakthrough pain

- Possible causes:
- Insufficient dose
- Displaced epidural catheter
- Kinked or disconnected tubing or catheter
- Catheter placement below the site of pain
- Increase in patient activity

Managing Breakthrough pain

- Assess pain
- Note the site and quality of the patients pain (surgical sit, epidural catheter insertion site, back or neck)
- Check for leakage and for any obvious breaks or kinks in the tubing
- Increase the infusion within prescribed limits
- Notify the anaesthetist /CNS Acute pain
- Administer supplemental analgesics

Sláinte Leanaí Éireann
Children's Health Ireland

POTENTIAL ADVERSE EFFECTS AND COMPLICATIONS RELATED TO EPIDURAL ANALGESIA		
ADVERSE EFFECTS	**ORIGINS**	**NURSING CONSIDERATION**
OPIOID RELATED		
RESPIRATORY DEPRESSION	• *Early phase* respiratory depression: opioid absorption via epidural vasculature • *Late phase* respiratory depression: usually seen with morphine as drug levels accumulate in the CSF and spread to migrate to the brain.	• Clinically seen within 1 hour of administration. • Clinically seen 8-24 hours after administration. • Careful monitoring of respiratory rate, oxygen saturation, heart rate, sedation levels. • Manage as per opioid guidelines.
NAUSEA AND VOMITING	• Rostral (towards the head) spread of opioid to the brain stimulating the chemoreceptor trigger zone.	• Administer anti-emetics. • Remove opioid from infusion. • Monitor for the sedative effects of anti-emetics.
PRURITIS	• Histamine release associated with opioid use	• Monitor for allergic reactions. Administer antihistamines and decrease the opioid infusion rate as ordered. • Ondansetron may be beneficial • Low dose naloxone may be effective in reducing pruritis
URINARY RETENTION	• As with epidural opioids, blockade of the nerves supplying the bladder sphincter can cause urinary retention.	• Assess frequently for bladder distension if no indwelling catheter. • Monitor input and output. • Low dose naloxone has been shown to be effective in treating urine retention. • Be prepared to catheterize the patient
CONSTIPATION	• Stimulation of intestinal mu receptors resulting in hypomotility.	• Administer stool softners / laxitives.

LOCAL ANAESTHETIC RELATED		
HYPOTENSION	*Firstly*, local anaesthetic agents can spread outside the epidural space, blocking the sympathetic nerves. This results in peripheral vasodilatation and hypotension. It is most likely to occur if a bolus dose of local anaesthetic agent (e.g. 10 ml of 0.125% Levobupivacaine) is given to improve pain control. *Secondly*, if the local anaesthetic agent spreads above the T4 dermatome (nipple line) the cardio-accelerator nerves may become blocked, leading to bradycardia and hypotension (Macintyre & Ready 2001). •	• Monitor blood pressure and administer fluids as needed. • It may be necessary to reduce or stop the infusion. • DO NOT PUT PATIENT HEAD LOW
MOTOR BLOCKADE	Blockade of large motor fibers	• Monitor for motor involvement (weakness-complete loss of function) • Assist patient with positioning • Assess for skin irritation/ breakdown.
TOXICITY	**CNS:** *Early:* tingling lips, ringing in the ears, light-headedness, confusion, nausea and vomiting. • *Later:* convulsions, coma, respiratory arrest, cardiovascular collapse. **CVS:** *Early:* if adrenaline has been used with the local anaesthetic, tachycardia and hypertension may occur before cardiovascular collapse. • *Later:* bradycardia, hypotension, cardiac arrest (ventricular fibrillation, which can be resistant to defibrillation especially with bupivacaine. Chirocaine is thought to be safer in this respect).	• Assess for signs and symptoms of allergic reaction, e.g. respiratory distress, itching and oedema • Stop infusion • Resuscitation (ABC) as per APLS guidelines • Notify the medical team/ anaesthetist/ CNS pain
PRESSURE SORES	It is important that pressure area care is meticulous for all patients with an epidural infusion. The decreased sensation produced by epidural analgesia removes the usual warning signs that prompt patients to move and significant motor block may limit patient movement, both factors potentially contributing to the development of pressure necrosis. Most commonly the heels, medial and lateral malleoli and sacrum are involved but ALL pressure points are at risk.	The patient receiving epidural analgesia must be turned 2-3 hourly, have extra pressure control devices (such as sheepskins and air mattresses), and their skin regularly checked for signs of pressure.

CATHETER RELATED		
POST DURAL PUNCTURE HEADACHE	CSF leak as a result of accidental puncture of the dura during catheter placement. The pain is usually located in the occipital region and may be associated with neck stiffness. Headache is severe and made worse by sitting up or mobilizing. It may be associated with nausea and vomiting.	• Notify the anaesthetist. • Provide analgesic medication. • Maintain hydration – regular oral fluids or if the patient is unable to take oral fluids then the IV route should be used • Avoidance of coughing and straining – stool softening agents or laxatives may be useful • Bed rest is usually necessary as the headache is worse when the patient is sitting upright • The anaesthetist responsible for the block should be informed. If despite these measures the headache persists, the anaesthetist may perform an "autologous blood patch" (administering a small amount of the patients own blood epidurally to seal over the leak in the dura. This technique is usually rapidly effective in 70 to 80 per cent of cases.
EPIDURAL HAEMATOMA	Bleeding into the epidural space from catheter placement or catheter erosion. Incidence is very rare. As the haematoma expands to compress the nerve roots or the spinal cord, this proceeds to sensory/motor weakness.	• Assess for bleeding and haematoma formation at catheter insertion site: • Changes in neurosensory status (numbness and tingling) in extremities. • Severe localised back pain or tenderness • Unilateral or bilateral weakness in the arms, legs or trunk or other sensory deficits • Incontinence or inability to control the bowel or bladder • If patient demonstrates signs of impaired motor function. Stop infusion and contact anaesthetist immediately. • Occasionally, haematomas resolve on their own. However, most need to be evacuated surgically. Surgery should take place within 12 hours of symptom onset for the best chance of neurological recovery. • Avoid anti-coagulants. Take care with timing of epidural catheter removal if patient is receiving anti-coagulants.

EPIDURAL ABSCESS	Infection within the epidural space from an exogenous source via contaminated equipment or drugs or from an endogenous source, leading to bacteraemia which seeds to the insertion site or catheter tip. Alternatively the catheter can act as a wick through which the infection tracks down from the entry site on the skin to the epidural space.	• Assess epidural site for signs and symptoms of infection. • Assess motor strength and sensory levels frequently. • Symptoms include back pain and tenderness accompanied by redness with a purulent discharge from the catheter exit site. • If patient complains of severe pain and impaired motor function. Stop infusion and contact the anaesthetist immediately.

Sláinte Leanaí Éireann
Children's Health Ireland

REMOVAL OF EPIDURAL CATHERS

Stopping Epidural Infusion

- The stopping of the epidural infusion therapy should **only** be done in consultation with the anaesthetist, CNS Acute Pain.
- When it is decided that epidural analgesia is no longer required, the infusion is ceased and alternative analgesia administered. There is no logic in "weaning" epidural infusions.
- It is important to educate the parents and, if appropriate, the child, about the possibility of the child experiencing some discomfort or being a little unsettled as the local anaesthetic wears off. Sensation returns in about two hours.
- If significant pain occurs despite alternative analgesia, the anaesthetist should be notified, with a view to re-establishing epidural blockade, or prescribing other analgesia.

Considerations before Removal of an Epidural Catheter

- Signs of infection have been reported to anaesthetist.

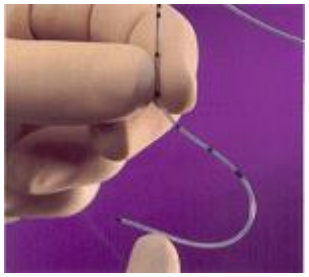
The coagulation status of the child is within normal parameters

- No Heparin has been given in the last 8 hours prior removal of catheter
- No oral long acting anti-coagulant agent has been given 12 hours prior removal of catheter.
- IV Heparin has been stopped and clotting has returned to normal.

- Pain is under control.
  - Oral/IV analgesic has been ordered, and given if appropriate, so that pain control is maintained when epidural analgesia is discontinued.
- The epidural has been stopped 2 hours before removal
- The procedure has been explained to the child/parent, including the analgesic regimen that will replace the epidural analgesia.

Removal of Epidural Catheter

- Wash hands. With bactericidal soap and water or bactericidal alcohol hand rub
- Clean Trolley & open dressing pack
- Position the child on his or her side of comfort.
- Remove tape and dressing from catheter insertion site, using adhesive removal spray/ wipes
- Wash hand again
- Clean around catheter site with 0.9% sodium chloride.
- Gently in one swift movement, remove catheter.
- Although gentle traction is necessary to remove the catheter, it should come out easily and painlessly. If resistance is met or the child reports pain or unusual sensations (e.g., tingling or a "catch in the back"), stop the procedure and notify the anaesthetist.



- Check that it is removed intact by observing marks along the catheter. The catheter tip is checked for presence of a black or blue mark.
- Apply a band-aid and leave *in situ* for 24 hours.
- Epidural catheter removal is documented in the patient's nursing notes and includes a description of the site.

Sláinte Leanaí Éireann
CHI
Children's Health Ireland

SUMMARY: CARE OF THE CHILD RECEIVING EPIDURAL MEDICATIONS

Assess site of catheter placement

- ☑ Check for signs of infection
- ☑ Keep occlusive, transparent dressing intact-Reinforce prn
- ☑ Ensure catheter is secure
- ☑ Label site
- ☑ Observe the connector to ensure that it is secure

Assess pain status

- ☑ Use a pain rating tool to evaluate the child's pain
- ☑ Document pain status on Epidural flow sheet
- ☑ Check system for mechanical errors or check site for leakage if pain relief ineffective
- ☑ Notify anaesthetist/CNS acute pain if pain relief ineffective

Assess sensory and motor function

- ☑ Ask patient if legs are numb
- ☑ Assess if motor function affected using Bromage score.
- ☑ Assess level of sensory blockade using dermatomes.
- ☑ Prior to ambulation -assess for postural hypotension
- ☑ Patient should be accompanied to ambulate and transfer
- ☑ Assess bladder and sphincter function- record I&O, BMs, bladder distention

Assess for side effects

- ☑ See previous pages- CONTACT & INFORM ANAESTHETIST of any signs of complications
- ☑ Have appropriate reversal agents available

Drugs and Pump

- ☑ Double check for correct drug and dosing
- ☑ Independently double check medication for epidural use before connecting to epidural catheter.
- ☑ Double check all catheter connections independently, ensure these are labeled **"For EPIDURAL USE ONLY"**
- ☑ Double check pumps settings and function with two nurses when changing rates
- ☑ Have reversal agents or adrenaline readily available on the ward/unit

Sláinte Leanaí Éireann
Children's Health Ireland

REFERENCES

An Bord Altranais (2007) *Guidance to Nurses and Midwives on the Administration of Medical Preparations*. An Bord Altranais, Dublin

Bibby P (2001) Introducing ward-based epidural pain relief. *Professional Nurse*. **16** (6) 1178-1182

Bird A., Wallis M. (2002) Nursing Knowledge and assessment skills in the management of patients receiving analgesia via epidural infusion. *Journal of Advanced Nursing*. **40**(5): 522-531

Clarke S (2003) Postoperative pain in children: a retrospective audit of continuous epidural analgesia in a paediatric orthopaedic ward. *Journal of Orthopaedic Nursing* **7**, 4-9

Epidural Analgesia A self-directed learning Module. 3rd Ed, Copyright, 2000, UW Hospital and Clinics Authority Board

Imbelloni LE, Vieira EM, Sperni F et al. Spinal anesthesia in children with isobaric local anesthetics: report on 307 patients under 13 years of age. *Pediatric Anesthesia* 2006; **16**: 43–48.

Jones M.D., Aaronson D.D, Harkins J.M, Small D.F., Haugh L.D. (1998) Epidural analgesia for postoperative pain control in children. *Journal of Paediatric Orthopaedics*. 18: 492-496

Jylli L, Lunderberg S and Olsson G.L. (2002) Retrospective evaluation of continuous epidural infusion for postoperative pain in children. *Acta Anaesthesia; Scand*. **46**: 654-659

Kokki H, Turunen M, Heikkinen M et al. High success rate and low incidence of headache and neurological symptoms with two spinal needle designs in children. *Acta Anaesthesiol Scand* 2005; **49**: 1367–1372.

Lejus C, Surbled M, Schwoerer D, Udin M.R, Guillaud C, Berard L, Pinaud M, (2001) Postoperative epidural analgesia with bupivacaine and fentanyl: hourly pain assessment in 348 paediatric cases. *Paediatric Anaesthesia* **11**: 327-332

Llewellyn N, and Moriarty A. (2007) The National Paediatric Epidural Audit. *Paediatric Anesthesia* **17**: 520–533

Løvstad R.Z., Støen R. (2001) Postoperative epidural analgesia in children after major orthopaedic surgery. Ac*ta Anaesthesia Scand* **45**: 482-488

Macintyre, P.E. & Ready, L.B. (1996). Acute pain: significance and assessment. In P.E. Macintrye & L.B. Ready, Acute Pain Management A Practical Guide (pp.1-12). London: W.B.Saunders.

McCaffery M, Pasero C. (1999) *Pain: Clinical Manual*, 2nd Edition. St. Louis: Mosby

Ready, L. B. (1990). Spinal opioids in the management of acute and post-operative pain. *Journal of Pain and Symptom Management*, **5** (3), 138-145.

Pasero, C., Portenoy, R.K., McCaffery, M. (1999). In McCaffery, M., Pasero, C. Eds., Pain: Clinical Manual (pp. 214-258). St. Louis: Mosby.

Schechter NL, Berde CB, Yaster M (Eds.), *Pain in infants, children, and adolescents*. 2003; Lippincott/Williams & Wilkins; Philadelphia, PA, USA.

Schwartz AJ. (2006) Learning the essentials of Epidural Anaesthesia. Nursing. **36** (1):44-50

Sláinte Leanaí Éireann
Children's Health Ireland

QUESTIONNAIRE			
True *or* False *(Please record your answers on the answer sheet provided)*		**True**	**False**
1	*Exogenous opioids bind with opioid receptors to modulate the nociceptive transmission.*		
2	*Fat in the epidural space functions as a 'depot' for the opioids and local anaesthetics.*		
3	*Lipophilic opioids such as fentanyl, when administered epidurally, have a rapid onset and a long duration of action.*		
4	*Morphine/ when administered epidurally, has a slower onset but a longer duration of action when compared to fentanyl.*		
5	*The dose of an opioid administered epidurally is about the same as an IV dose.*		
6	*Common side effects of epidural opioids are nausea, pruritus, and urinary retention.*		
7	*If the epidural catheter dressing is leaking, the nurse should stop the infusions and the epidural catheter should be removed.*		
8	*A sudden increase in a patient's sedation level may be due to the migration of the epidural catheter into the subarachnoid space.*		
9	*All medications administered epidurally must be preservative-free.*		
10	*The epidural catheter insertion site should be assessed daily for tenderness, swelling, erythema, or drainage.*		
11	When an opioid is injected into the epidural space, it disperses to three key areas. Identify the 3 areas		
1)			
2)			
3)			

12	Briefly explain how local anaesthetic injected into the epidural space acts to prevent the transmission of pain signals.
A)	
B)	
C)	
13	**Your patient has had an upper abdominal operation. The anaesthetist has specified the epidural level as T8. When you test sensory loss you find that the child has no feeling down the inner arm. What level is the epidural at? What do you do?**
14	Your patient is complaining of severe headache, what might be the cause of this headache?
15	**What action will you take?**
16	**Write short notes on each of the side effects specified below. You might include information such as likelihood of occurrence, whether some patients are at increased risk of the side effect, treatment.**

Hypotension	
Respiratory depression	
Nausea and vomiting	
Urinary retention	
17	**When you check the epidural site, you notice it is leaking. What action will you take?**

18	**Which statement is true about medications given through the epidural catheter?**	**True**	**False**
A)	*Most IV medications can be given safely via the epidural catheter*		
B)	*Antibiotics may be piggybacked into the epidural line*		
C)	*Medications must be preservative free.*		
19	**Your patient complains of numbness in his arms and tingling of his lips.**		
A)	*What is the likely cause of his symptoms?*		
B)	*What action will you take?*		
20	**Your patient complains of pain on movement. His epidural infusion is running at 3mls/hr. The prescription allows the infusion to run at 2-10mls/hr.**		
A)	*What action(s) will you take?*		
B)	*How can you ensure that this action is safely carried out?*		
20	**Mary had surgery yesterday for resection of a large abdominal mass. She has an epidural catheter in situ infusing with Chirocaine 0.125% at 5mls/hr. She is comfortable. She is reviewed by the surgeons on rounds who advise stopping the epidural and removing the catheter.**		
A)	What action will you take?		

Sláinte Leanaí Éireann
Children's Health Ireland

Care of the child with an Acute Abdomen

By Michelle O'Gorman

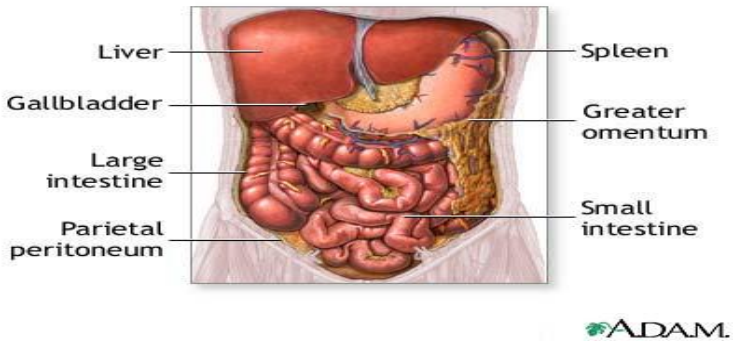
"Acute abdomen"

- Sudden onset of abdominal pain that requires urgent evaluation, diagnosis & treatment.
- Medical cause: gastroenteritis (vomiting precedes pain).
- Surgical cause: appendicitis (pain precedes vomiting).
- Medical or Surgical intervention?

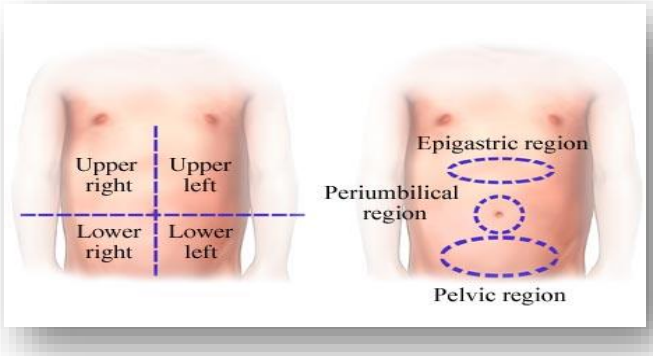
Investigations

- General appearance
- Vital signs
- Abdominal exam
- Urine
- Blood
- U/S, x-ray, CT

Anatomy



Abdominal Regions



"Bowel Obstruction"

- **Mechanical**

Occlusion of the bowel lumen

- **Non-Mechanical**

(Pseudo-obstruction, paralytic ileus)

Decreased gut motility

Mechanical Bowel Obstruction

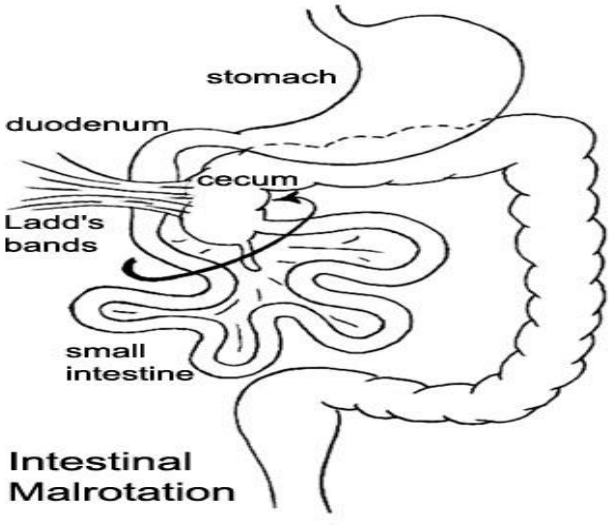
ACQUIRED

- Tumours
- Hernia
- Foreign matter in the intestines (Trizobazore)
- Volvulus
- Adhesions
- Intussusception

CONGENITAL

- Hirschsprungs
- Malrotation
- Impacted faeces (neuropathic bowel, constipation)
- Intestinal atresia
- Imperforate anus

Malrotation



Non-Mechanical Bowel Obstructions Causes

- Abdominal surgery
- Injury or trauma
- Infections
- Severe generalized infections
- Drugs
- Electrolyte imbalance

Clinical Presentation

- Nausea/Vomiting usually bilious
- Altered bowel patterns /sounds
- Constipation
- Abdominal Distension
- Dehydration
- Pain
- *Increased heart rate*
- *Agitated, irritable, rigid*

Management

- Conservative

Aim: rest the bowel hoping that obstruction resolves itself

- Active

Aim: surgically repair / remove the cause of the obstruction

Conservative Management

- NPO
- IV cannula x 2 (minimum)
- Check U&E daily
- IV fluids +/- KCL
- Correct electrolyte imbalance
- Gastric decompression - NGT on hourly aspiration and free drainage (50ml syringe) or Repogyle on low pressure suction repogyle is preferred option
- Replace gastric losses ml for ml (Or as prescribed) with 0.9% NaCl + 10mmols KCl per 500mls
- +/- antibiotics
- Analgesia
- Adequate fluid and electrolyte balance essential
- Fluid bolus usually Hartmans / CSL 10 to 20mls/kg
- And repeat if necessary as prescribed

- Observe and record response
- Then iv fluid maintenance 100mls/kg first 10kgs, 50mls for second 10kgs and 20mls for every kg thereafter
- Monitor blood sugars (6 hourly; PRN)
- Strict Intake and Output ensure patient is passing 1ml/kg hr
- Consider TPN if fasting for 3-5 days

Active Management

If symptoms do not resolve with conservative management, child may require surgery.

- Usual pre-operative care
- Explanations to the child / parents
- FBC / U&E
- Group & Hold or Crossmatch as indicated

POST-OPERATIVE CARE

Fluids and nutrition

- Fast - 1-5 days depending on surgery
- IV fluids – Hartmans for 24 hours, then Dextrose/Saline +/-KCL
- Blood sugars as indicated/minimum once per shift

Gastric Decompression

- Prevent accumulation of gastric/intestinal fluids
- CLPS using Repogyle/sump tube or 1-2 hourly aspiration with a NG tube
- Replace losses with 0.9% Saline 500MLS + 10mmols KCl

Restarting fluids and diet

- Start with clear fluids and progress to light diet as tolerated.

Pain Management

- Morphine infusion (PCA /NCA)
- Epidural
- IV Paracetamol / IV Difene (Max 2 days only)
- IV Clondine
- Iv Tramadol (after consultation with pain team if on opoids) ensure antiemetic given
- Rectal analgesia can be administered, providing the child has not had surgery on the distal colon, ensure surgeons allow this prior to administration
- Pain assessment with observations regularly

Wound

- Dry dressing and steri-strips
- Remove dry dressing after 48hours (HSE guidelines) or as per consultants instruction
- Child may have aqaucel surgical on which can stay on for up to 7 days at surgeons request if dry and intact
- Some surgeons leave wound exposed
- Glue may be used keep dry for 5/ 7 days
- If wound is oozing swab and replace the dry dressing. Clean with water prior to same.

- Remove steri-strips in 7/10 days.
- May have a stoma (Liaise with stoma CNS)
- IV antibiotics

Nursing Responsibilities

- Assess hydration status and manage fluid balance
- Hartmans is given for correction of extracellular volume and electrolyte depletion for first 24/48hrs post op.

If KCL required max is 40mmol/l (=1mmol per 25mls). Max rate of infusion is 0.2mmol/kg/hr via peripheral route or without ECG monitoring.

- Gastric losses - (Replace ml /ml or as ordered)
- Replacement fluid is 0.9NACL with 1Ommols kcl per 500 mls
- TPN if fasting for 3 to 5 days ensure full blood work up done prior to commencing TPN /central access preferable
- Urine Output (1ml/kg/hr)
- Monitor bowel sounds /motions.
- Assess for alteration in vital signs – e.g., pyrexia, tachycardia and increased pain may indicate perforation
- Positioning
- Monitor respiratory status
- Personal hygiene

Fluid Management

- Post op surgical bowel obstruction can often have 3rd spacing of fluids
- Body fluids may collect in a 3rd body compartment that is not normally perfused with fluids.
- This makes the fluid unavailable to the circulatory system.

What is 3rd Spacing - A Quick Overview

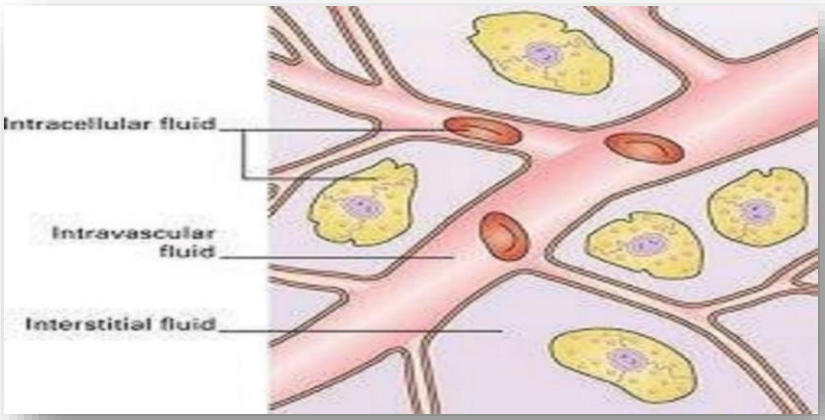
- Third spacing is an inflammatory response post op that makes all cells and tissues more permeable
- HR raised
- BP low
- Urine output marginal
- Weight is up
- Oedematous (Oedema tells you the patient is getting enough fluids but the vital signs and output are telling you the patient is hypovolaemic)

Where the fluid is usually

- 6o% of weight is fluid
    - 40% Intracellular
- 60% Extracellular – interstitial (between cells, in tissue)
    - intravascular

(inside the blood vessels)

- Fluid loss: urine, sweat, stool, incidental losses from resp. effort



How fluids move

- Diffusion : fluids move from area of high concentration to low concentration
- Osmosis: movement of fluid through a semi permeable membrane
- Active transport: fluid moves from area of low concentration to high concentration

Types of fluids

- Isotonic: doesn't affect cell size, stays where it is put, no osmosis
- Examples: lactated ringers, 0.9% sodium chloride.

- Hypertonic: fluid shift into blood vessels
  examples: 5% dextrose in 0.45% sodium chloride, 5% dextrose in 0.9% sodium chloride
- Hypotonic: fluid shifts out of the blood vessels and into the cells and interstitial spaces
  Example: 0.45% sodium chloride

<u>What is a Repogyle Tube?</u> –(Note other hsp use ryles tube or NGT)

- Used for gastric decompression
- Come in sizes 6Fr, 8Fr, 10Fr, 12Fr, 14Fr, 16Fr, 18Fr. Manufacturers guidelines say size 8Fr for infants <1500g and 10Fr > 1500g.
- Can be connected to Low Pressure Suction
- Vent – protects mucosa
  - keep clear (Make sure it is not kinked)
  - do not knot
- Only spigot air inlet if on free drainage

REPOGYLE TUBE

- Check the position of the repogyle tube with PH paper. Should be < 5.5 as per NGT aspirate.
- If the air inlet drains this means that, the tube is blocked.
- Suction pressure may cause gastric irritation
- Ensure PPI prescribed (iv Nexium/ranitidine)

Continuous low pressure suction (CLPS)

- What is it: continuous drainage of gastric contents
- Why: decompress the stomach & bowel
- How: use a Repogyle tube & low vacuum suction
- How much suction: 50-75 mmHG

Post op complications

- Peritonitis
- Haemorrhage
- Hypovolemic shock
- Chest infection/pleural effusion
- Wound infection/wound breakdown
- Abscess formation
- Pressure sore

Sláinte Leanaí Éireann
Children's Health Ireland

ORIENTATION PROGRAMME

Children's Health Ireland at Crumlin, Dublin 12

Summary Sheet

Full Name: _____ **P.I.N. Number:** _____

Clinical Area/Unit: _____

Date attended Intravenous Study Day: _____

I confirm that …….has completed an Orientation Programme.

Signed……..

Preceptor / Clinical Nurse Education Facilitator / Clinical Nurse Manager / ADON

Date:……

I confirm that I have received and Orientation Programme. I agree to maintain, and update where necessary, my knowledge of the documents, policies and guidelines address during this programme, including any revision made to content of these or if any additional documents are developed.

Signed:……..*Nurse* *Date:……*

Please forward the <u>summary sheet only</u> to Nursing Human Resources.

Also keep a copy of summary sheet for your own personal records/portfolio.