PREOPERATIVE / POSTOPERATIVE CARE OF THE SCOLIOSIS / KYPHOSIS PATIENT - CHW

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- Surgery to the spine can be done for many reasons such as fractures, degenerative disease, scoliosis, kyphosis, spinal stenosis, tumours and other defects.
- Appropriate preoperative preparation is important to ensure patient safety.
- Staff should be aware of the appropriate post-operative care of the patient in order to avoid potential complications and ensure patient safety.
- This practice guideline outlines the pre and post-operative spinal care of the scoliosis/kyphosis patient.

This includes spine operative techniques, pre/post-operative spinal care and discharge information.

This guideline outlines the preoperative workup phase and the post-operative care post-surgery day 1 – discharge day (5-7).

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st July 2022	**Review Period**: 3 years
Team Leader:	Nurse Practitioner	**Area/Dept**: Orthopaedics CHW

Date of Publishing: 20 April 2023 11:08 AM Date of Printing: 20 April 2023

CHANGE SUMMARY

- Due for mandatory review – no major changes made.
- **20/4/23:** Minor review – Instrumentation types updated/ equipment ordering intranet site added.

READ ACKNOWLEDGEMENT

- Clinical staff caring for spinal surgery patients with scoliosis/kyphosis should read and acknowledge this document.

TABLE OF CONTENTS

1 Anterior Spinal Fusion / Posterior Spinal Fusion

Definition

A child/adolescent may require surgery on the spine for many different reasons, such as fractures, degenerative disease, scoliosis, kyphosis, spinal stenosis, tumours or other defects. Not all children/adolescents with a spinal deformity require surgical intervention. Surgical intervention is determined by the surgeon in relation to degree of the curvature, deformity decompensation and neurologic status[11].

A spinal fusion is the joining of vertebrae to stabilise the spine; this is achieved by using bone grafts and instrumentation. Bone grafts are used to fuse the vertebrae to form a solid stable section of the spine while instrumentation is used to straighten the spine into a stable position while healing occurs. Instrumentation, called implants are metallic and come in many shapes and sizes, i.e. hooks, rods, screws, wire loops and cables. There are two common surgical approaches used, the Posterior approach involves a long straight incision down the midline of the back, the Anterior approach involves a thoracotomy or thoracoabdominal incision.

Instrumentation is not always used when an anterior spinal fusion is performed; some children require both an anterior and posterior procedure to correct a spinal deformity[11].

Types of Instrumentation:

- Expedium Titanium
- K2M Range spinal system (Mesa)
- NuVasive growing rods
- Everest Range

General Principles

To adequately prepare and manage children undergoing spinal surgery in order to enhance and minimise post-operative complications.

Pre-operative Preparation

1. Spinal work-up occurs before surgery in Preadmission clinic. The child will have blood work-up (FBC, EUC,COAG,X match, KCT), MSU, MRSA Swabs, X-rays (hard copy 3ft spine PA/Lat left and right benders), respiratory function test and consultation with Anaesthetist, Respiratory team, Orthopaedic Resident, Occupational therapist (if required) and Nurse Practitioner.
2. If there are any signs of infection e.g. Chest infection or urinary tract infection surgery may be cancelled.

3. The Parent and child will receive appropriate information in relation to the procedure and after care provided by medical, nursing and allied health staff. It is important that the family and health professionals outline the desired goals and outcomes associated with the procedure.
4. Discuss approximate length of stay with the family.
5. Commence organisation of community supports if home care is required after discharge.
6. Check skin integrity
7. Check vital signs, temperature, pulse, respiration and blood pressure.
8. Measure patient's height and weight.
9. Check consent form
10. All test results should be checked the following day and any abnormalities acted on. If the patient is found to be positive for MRSA or sensitive Staph aureus, treatment should be commenced as per Appendix 1/ Appendix 2

Ordering of Equipment

All instrumentation requests for surgery are to be booked online via the intranet utilising the Operating Theatres Special Equipment/ Loan Set Request:

Intranet homepage, Clinical Forms, Operating Theatres, Special Equipment Loan and Request.
http://chw.schn.health.nsw.gov.au/o/forms/operating_theatres/special_equipment_loan_and_request.php

Post-Operative Management

(Summary of care as per Appendix 3 – Spinal Patient Care Guidelines)

Positioning

- Postoperatively the child may lay/sit as comfortable as possible in bed unless postoperative orders indicate otherwise.
- The child should be log rolled every 2 hours to avoid pressure areas and to reduce pooling of pulmonary secretions. Check skin for areas of breakdown.
- Use pillows to support back and place a pillow between the legs to roll patient as this helps maintain correct body alignment. Keep shoulders and hips in alignment.
- Incorrect position or lifting patients by the armpits may dislodge hooks and rods. Sitting the child/adolescent is achieved by rolling the patient to the edge of the bed, then position the child/adolescent on their side and they push up with their arms as the legs swing over the side of the bed in one motion[11].

Observations

- Temperature monitored 2-4 hourly to detect post-operative infection. Intravenous antibiotics given prophylactically until indwelling catheter is removed.
- Pulse and Respirations are monitored hourly whilst on narcotic infusion.
- Blood pressure should be recorded hourly for 6 hours, then 2nd hourly in the acute post-operative period. The high risk of blood loss and the use of hypotensive anaesthesia make the monitoring of blood pressure during the first 72hrs imperative[11]. A desired MAP will be indicated in the postoperative orders; MAP should be monitored and maintained for the first 24 – 48 hours (see operative report). If MAP below desired level follow escalation protocol. Hourly neurovascular observations should be monitored and recorded for the first 48 hours and then 4th hourly until discharge. Neurological loss has been reported to occur 36 hours or more after surgery, so neurovascular evaluation should continue to be monitored throughout the child/adolescent hospitalisation on a regular bases. **If there is a decrease in neurovascular status, please contact the orthopaedic registrar immediately, if no response within 10 minutes, contact the spinal fellow via switch board, if no response please contact the spinal consultant immediately**.
- Oximetry is required in the immediate post-operative period to detect oxygen desaturation. Oxygen therapy is commonly required, especially after an anterior fusion.

Physiotherapy

- All spinal fusion patients should have twice a day chest physio, starting in the immediate post-operative period. All patients' respiratory function is assessed by physiotherapy post operatively and treatment prescribed as indicated e.g. Deep breathing exercises, Bubble PEP and positioning.

Pain Management

- There are a number of intraoperative factors that influence the post-operative pain course. These factors include soft tissue dissection, extensive incision, insertion of intercostal/wound catheters as well as vertebral manipulation and instrumentation.

  Effective pain management is an extremely important aspect of post-operative care. It is essential to optimise return of normal respiratory function, enable mobilisation and thus prevent post-operative complications due to immobility such as pneumonia, ileus, pressure areas and deep vein thrombosis.
- Management of acute pain post operatively is best treated with a multimodal approach. Using medications with different mechanisms of action to target pain pathways can result in additive or synergistic analgesic effects and superior pain relief. Additional benefits include reducing opioid requirements and opioid related side effects such as respiratory depression, constipation and itch. Analgesic regimes used for scoliosis surgery may consist of simple analgesics (paracetamol, non-steroidal anti-inflammatories), intravenous opioids (intraoperative methadone, post-operative PCA/NCA) and low dose ketamine infusion. The use of a short three day course of Gabapentin can also be utilised. Analgesia prescription needs to be tailored to the

patient and the prescriber must be aware of any contraindications to ensure safe prescription. Pain management is overseen by the Acute Pain Service (APS).

- Non pharmacological techniques can also be of benefit and include deep breathing, pacing activities, meditation and mindfulness. The APS is able to assist with exploring these techniques.

ERAS (Enhanced Recovery After Surgery)

- ERAS (see Appendix 4) at CHW is a fast track recovery program that is utilised for idiopathic scoliosis patients
- The ERAS regime consists of post-operative interventions targeting analgesia, bowel care, mobilisation and diet. There is an emphasis on the early identification and management of any complications or issues that may delay a patient's recovery and safe discharge home on this fast track recovery program.

Nutrition and Hydration

- Ice to suck day 0 and then trial clear fluids. Diet is then upgraded as tolerated. If abdominal distension, nausea or vomiting occur, diet should be restricted until symptoms pass. An Ileus may develop secondary to narcotic use or surgery[12].

Intravenous therapy

- Monitor and record fluid balance. An in dwelling catheter is left insitu for 48-72 hours. Monitor output closely for 72 hours post operatively. Fluid imbalance may occur due to fluid and blood loss during surgery causing a temporary slowdown decreasing urine output. Second daily electrolytes need to be monitored in relation to a fluid overload, dehydration and inappropriate antidiuretic hormone secretion[11, 12].
- Check haemoglobin day 1 & 3 post operatively. A fluid balance shift secondary to blood loss and the use of anaesthetic can occur. A blood transfusion may be required if haemoglobin falls sufficiently[11].

Wound Care

- If bleeding or oozing excessively from wound, prior to 48 hours reinforce and report and document blood loss.
- Wound dressing left intact for 4 days and then changed to observe suture line. It is recommended that a sterile technique be used when changing the dressing. Leave sterile strips insitu and spray with opsite spray/ cover with primapore (surgeon dependant).
- The child may shower at day 4 after the wound has been reviewed.
- Anterior spinal fusions have an underwater sealed drain insitu. This is usually left on suction unless otherwise noted in the post-operative orders. The underwater sealed drain is removed after 48 hours if oscillation and drainage cease, the drain is sutured in, and the suture needs to be removed before taking out the drain. (as per Appendix 3)
- Wound drain is insitu for 48 hours. Losses should be monitored hourly on fluid balance chart for 24 hours then 6 hourly until removed. Wound drains may need to be changed in the first 24 hours.

- Intravenous antibiotics are given prophylactically until the chest drain, wound drain and IDC are removed. (as per Appendix 2)

> **NB:** If the patient returns from theatre with wound drain unvacced, ask orthopaedic registrar who attended theatre if this is for a reason - that is to stop excessive loss.

Hygiene

- Frequent mouth care required when NBM.
- 4 hourly peri toilets needed whilst IDC insitu.
- Daily sponge whilst on bed rest, when mobilising the child/adolescent can shower with assistance. The use of a shower chair is necessary.
- If wearing a jacket/brace check with surgeon if jacket can be removed whilst showering.
- Be aware of correct lifting and positioning techniques when moving the child/adolescent. Use a hoist if the child/adolescent uses a wheelchair.

Mobilisation

- Following an anterior spinal fusion, without instrumentation, children may sit in bed and mobilise gently unless otherwise indicated in the postoperative orders.
- Active limb exercises to be encouraged frequently whilst on bed rest. Contact physiotherapy for specific exercise regime.
- Wearing of jackets should be as per doctor's orders.
- Once able to mobilise, the child/adolescent is slowly progressed from sitting out of bed to walking/wheelchair short distances.
- Returning to normal activities will be limited and should be discussed with orthopaedic surgeon.

Escalation protocol

- **Contact Orthopaedic registrar via hospital page.**
- **If no response within 10 minutes, contact spinal fellow via switch board.**
- **If no immediate response contact spinal consultant via switchboard.**

Optimal Outcome

Stabilisation and/or Correction of Spine

Prevention of complications in relation to surgery and rehabilitation

Psychology well being

Encourage the child/adolescent to participate in varying aspects of their care. Empowerment over decision making gives the child/adolescent the control to promote a positive healing experience[12].

Self-care

Promote maximum self-care for the child/adolescent. Frustration with mobilisation and problems associated with body image need to be acknowledged and discussed openly.

Mobilisation

The child/adolescent should be able to mobilise safely. A gradual increase in physical activity should be encouraged as instructed by orthopaedic guidelines.

Potential Complications

Pulmonary Complications

- **Pneumothorax/Pneumonia /Plural effusion:** Potential complication from lying flat, anaesthetic, opioids and chest drain. Close monitoring and physiotherapy are required to decrease the incidence of respiratory complications.
- **Chyle effusion:** Chest tube fluid consists of chyle rather than pleural fluid. Close monitoring of chest drain fluid required[14].

Neurovascular Complications

- **Transient paresis/ Paralysis:** Motor and sensory loss can occur due to compression of the spinal cord. It is important to monitor neurovascular status hourly for 48 hours post-surgery and frequently thereafter (As per Appendix 3). Even after 72 hours there can be a rapid motor and sensory loss, thereby the need to check neurovascular status throughout hospital stay remains a priority[14].

Blood Loss

- There is a potential for moderate to severe blood loss during the operation and post-operatively. Blood loss from wound drains and chest drains needs to be monitored closely. Blood should be collected daily for Haemoglobin levels. A blood transfusion may be required if haemoglobin falls sufficiently[11].

Inappropriate Antidiuretic Hormone Secretion (SIADH)

- Diminished urinary output is common during the first 72hrs, as a result of fluid and blood loss.
- Hyponatremia with associated increased in urine sodium are signs of SIADH. Test urine for specific gravity to assure proper hydration in conjunction with daily electrolytes.

Ileus and Gastrointestinal Distress

- Common problem associated with the disruption of the nerves to the peritoneum and handling of the peritoneum during surgery. Also associated with the use of opioids when using narcotic infusions. Bowels sounds should be present before oral diet and fluids commenced.

Skin Integrity Compromise

- Strict pressure care is required to reduce the risk of developing a pressure sore. Areas such the heels, shoulders, hips and back should be examined closely for skin breakdown. Immobility increases the risk of developing a pressure sores.

Wound infection

- Wound infections are a common complication of surgical procedures. Protection of the wound during the early post-operative period is essential. An elevated temperature and an increase in the white cell count are the classic signs of wound infection. The wound should also be observed for any signs of infection/breakdown.

Urinary Tract infection

All children having a spinal fusion have indwelling catheter (IDC) inserted in theatres. Urinary tract infections are common when an IDC is inserted, therefore beware of the signs and symptoms of a urinary tract infection. The risk for a urinary tract infection increases the longer the IDC is in.

Requirements for Discharge

- Child can mobilise safely, either with wheelchair or walking, depending on child's individual needs
- Child can safely transfer from bed to chair
- Tolerating a normal diet/ feeds
- Passing urine and have had Bowels open post-surgery.
- Parents instructed on wound care, are aware of the signs of wound infection
- If child requires a brace/jacket, education given to the care of the brace/jacket in relation to skin
- Hard Copy x-ray of spine prior to discharge
- Prescriptions for medications arranged and weaning plan given
- Follow up appointments arranged
- Contact phone numbers of health professionals given to parents/carer
- Follow up with GP at 1 week for wound check
- Follow up at 4 - 6 weeks with orthopaedic consultant, with a new x-ray.

2 Care of a Child in a Polythene Jacket

Definition

A Brace/Jacket is sometimes used post-operatively to stabilise the spine. There are many different types of jackets used depending on the level of the surgery required on the spine. Most jackets are made out of polythene. The Orthotic department measures, fabricates, fits and monitors the brace. A plaster impression is generally required for brace fabrication.

General Principles

- Skin under the jacket must be checked daily for signs of pressure, irritation and breakdown. Pay particular attention to the chin, shoulders, hips and the occipital and parietal areas of the scalp for pressure areas.
- A close fitting cotton T-shirt should be worn under the jacket to avoid direct skin and jacket contact , this should be changed daily or more often if saturated with perspiration.
- Do not use any creams or powder under the brace, they will cause skin irritation.
- For hygiene, remove the front of the jacket whilst the child/adolescent is lying supine. Sponge the child/adolescent and the inside of the jacket ensuring both the skin and jacket are well dried. Replace the front of the jacket and secure. Turn the child/adolescent and repeat the procedure.
- The child/adolescent spine must be kept in alignment when the jacket is unsecured.

Hygiene instructions

1. To clean the patients back, have two towels rolled up in logs.
2. Turn child prone, place one towel horizontally under the forehead and the other under the chin; this enables the face to be clear of the mattress.
3. Unfasten the straps again. Check the back of the head for pressure areas, matt hair, red or broken areas. Wash the back and dry. Clean inside of the jacket as per the front.
4. Change any wound dressings 48 hours post operatively or as necessary. Report decree of swelling around neck.

Clothes may be worn over the jacket. A larger size may be needed for ease of dressing.

Hazards/WHS

- **Staff:** As per Manual Handling Polices
- **Care givers:** Teach parents/cares the correct lifting and transferring techniques

Infection Control

- Standard precautions apply-Risk of body fluids

Education /Evidence

- The care described in this policy, for a child/adolescent following a spinal fusion is consistent with evidence provided in the current literature reviewed.

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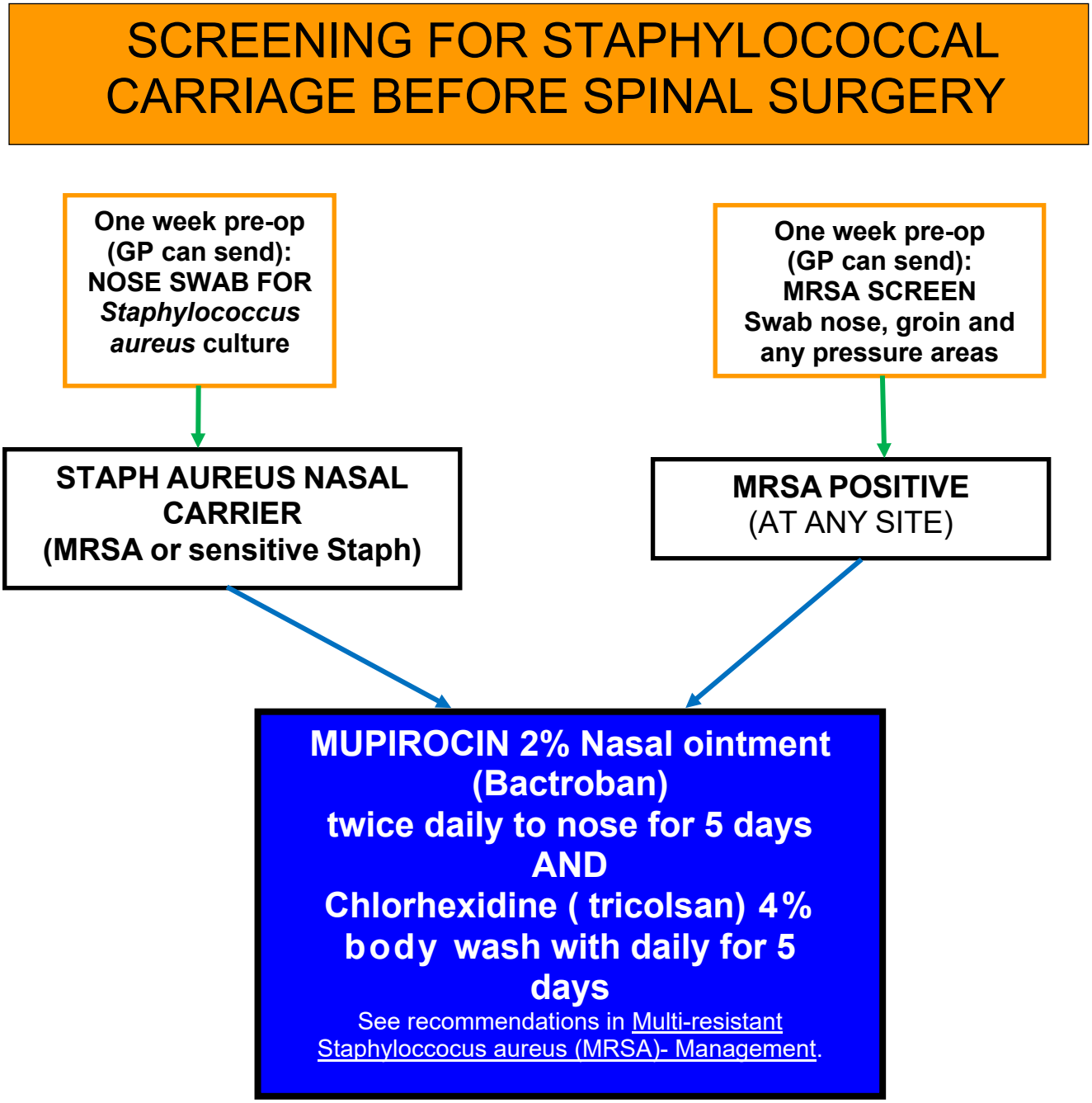
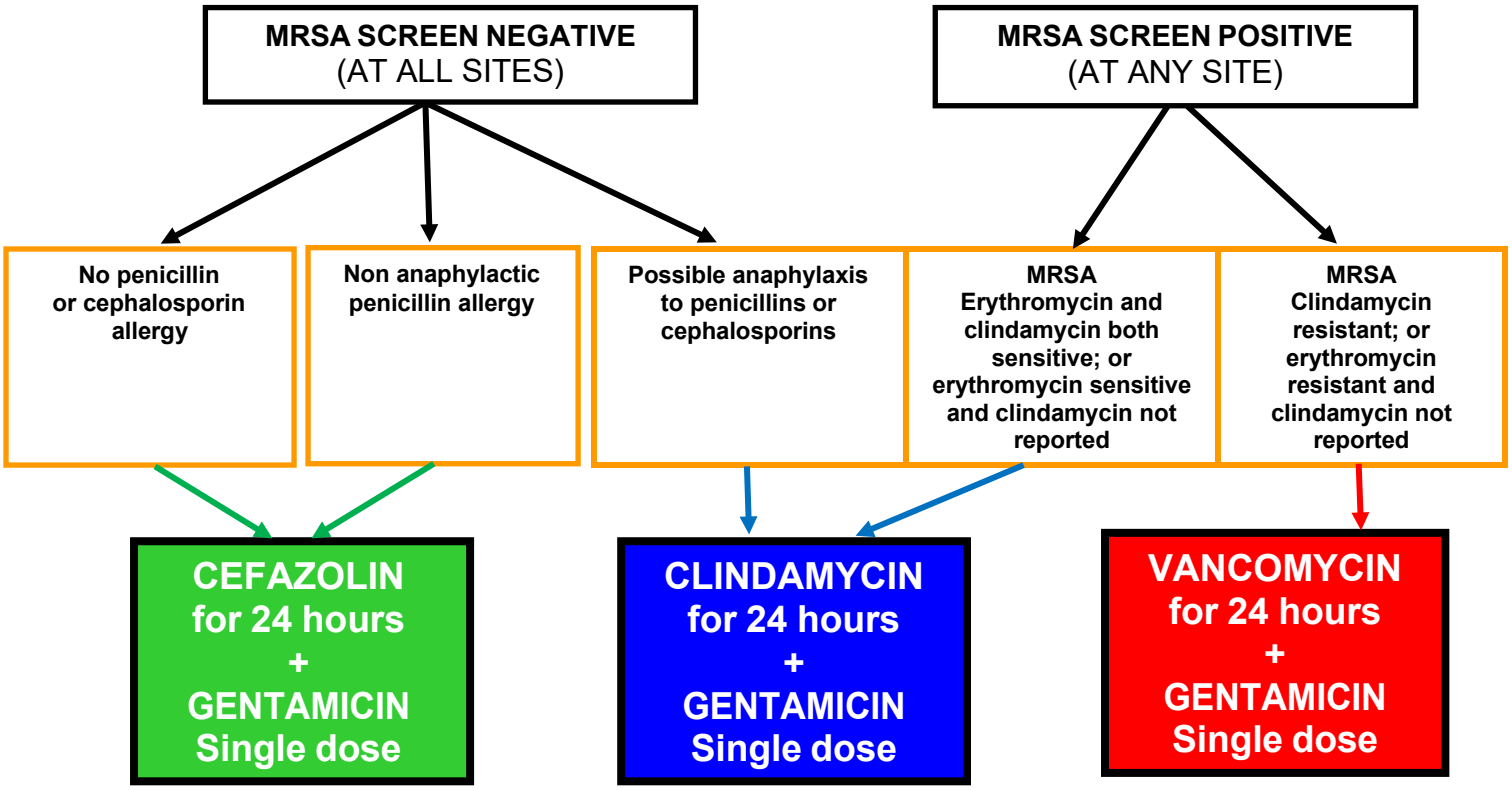
Appendix 1: Flowchart 1 – Screening for Staphylococcal before Spinal Surgery



Appendix 2: Flowchart 1 – Antibiotic Prophylaxis Regimen for Spinal Surgery

ANTIBIOTIC PROPHYLAXIS REGIMEN FOR SPINAL SURGERY

Drug dosages as per meds4kids



Appendix 3: Guidelines for Spinal Patient Care

(***These act as a guide only, please consult the patient notes for orders***)

Day 0:

- Neurovascular observations hourly
- Respirations and pulse hourly.
- Blood pressure hourly for 6 hours, then 2nd hourly
- Temperature 4th hourly
- Regular PAC
- Ice to suck only

Day 1:

- Check FBC, UEC, LFT
- *Only consider transfusion if Hb < 80 (unless symptomatic)*
- Neurovascular observations q1h
- Ice to suck until bowel sounds present, then progress to clear fluids
- Chest physiotherapy
- Routine Observations
  - 2hrly BP
  - Hourly pulse, respirations and saturation monitoring
  - 4th hourly temp
- Regular PAC
- Cease IVab 24hrs post-surgery

Day 2:

- Wound drain out at 48 hours if minimal/no drainage
- Chest drain out at 48 hours
  - drainage should be occurring
  - double clamp chest drain at 6am, chest x-ray at 10am, review x-ray
  - If x-ray satisfactory remove chest drain as per protocol and repeat-ray Continue intravenous antibiotics.
- Neurovascular observations hourly for first 48hours then 4th hourly
- Routine Observations (4hrly BP and temp, hourly pulse, resps and saturation monitoring)
- Free Fluids progress to light diet in evening if bowel sounds present and nil nausea or vomiting. Laxative to be ordered once light diet is commenced
- Regular PAC Chest Physio

- Begin to sit patient in bed/ out of bed if able

Day 3:

- Continue PCA
- Encourage mobilisation (sit in bed)
- Repeat bloods (FBC, EUC) Regular PAC
- 4th Hourly Neurovascular observations
- Routine Observations (4hrly BP and temp, hourly pulse, respirations and saturation monitoring)
- Chest Physio
- Sit patient in bed/ out in chair/ mobilise

Day 4:

- Continue PCA as per pain team
- Wean to oral analgesics
- Maintain oxygen monitoring until all narcotics ceased
- 4th Hourly Neurovascular observations
- Encourage mobilisation
- Shower/ change of dressing (Cover wound as per surgeon preference)
- X-ray 3ft erect PA/ lat spine once mobilising (hard copy)
- Regular PAC
- Routine Observations

Day 5 and onwards:

- Continue mobilisation (mobilise gently around room /ward)
- 4th Hourly Neurovascular observations
- Analgesia as required
- Leave wound dressing intact
- Aim for discharge 5 – 7 days post operatively
- Discharge letters, etc, supplied by NP prior to discharge

Follow up:

- LMO 1 week post discharge for wound check
- Follow up OPD 6 weeks with an x-ray

Appendix 4: ERAS protocol for Idiopathic Scoliosis Patients

Post Op Day	Analgesia regimen	Anti-emetics, Diet and Bowel care	Mobilisation
0	Regular IV Paracetamol QID Bolus only PCA/NCA Low dose Ketamine infusion (48hrs) Consider nocte Gabapentin (3 night course)	PRN anti-emetic Ice to suck Trial of clear fluids	Log roll every 2 hours Sit on edge of bed if able
1	Parecoxib IV (second day of 3 day course if given intraoperatively) Regular Paracetamol QID (change to oral as tolerated) Bolus only PCA/NCA Low dose Ketamine infusion Targin BD if clinically indicated	PRN anti-emetic Clear fluids Trial of light diet Cease IV fluids when drinking adequately Commence stool softeners	Sit out of bed Commence mobilisation in the afternoon
2	Parecoxib IV (Final dose) Regular oral Paracetamol Cease PCA/NCA and Ketamine infusion Continue or consider Targin BD if clinically indicated Oral Oxycodone for breakthrough pain PRN	Light diet Cease anti-emetics Progress to normal diet as tolerated Continue stool softeners	Mobilise TDS
3	Commence regular Ibuprofen TDS (24 hrs total) Continue regular Paracetamol QID Continue Targin BD if clinically indicated Oral Oxycodone for breakthrough pain PRN	Normal diet Continue stool softeners	Mobilise TDS Trial of stairs
4	Reduce regular Paracetamol to TDS Prepare Targin/Oxycodone weaning plan Cease regular Ibuprofen	Normal diet Continue stool softeners Add fleet enema if bowels not open	Mobilise TDS Assess mobility and safety for discharge