

Appendix A: SESLHD Cardiothoracic Surgical Site Infection Care Bundle

SESLHD Cardiothoracic Surgical Site Infection Care Bundle				
Modifying Patient Risk Factors <u>Outpatient</u>	Bundle Elements	Yes	No	N/A
Smoking Cessation	Smokers are identified and encouraged to quit at the time of referral.			
	Referral to NSW Quitline or other service (13Quit or 137 848)			
	Nicotine replacement therapy offered to those receptive to quit			
Glycaemic Control	HbA1c level tested pre admission			
	If HbA1c 7% - 9% or BGL > 10mmol/L referred to GP for diabetes management			
	If HbA1c ≥ 9% or BGL ≥ 12 mmol/L referred to local Diabetes Care provider for diabetes stabilisation prior to surgery			
MRSA & MSSA Screening	Screened for MRSA and MSSA (nose and groin), 10-14 days prior to OT			
	Results checked within 48 hours			
Decolonisation Treatment	+ve patients start intranasal mupirocin 2% ointment five days before OT date			
	+ve patients start aqueous Chlorhexidine washes five days before OT date			
	Decolonisation patient information provided			

Modifying Patient Risk Factors Outpatient

Most patients attending NSW Health Services who smoke do not receive smoking cessation interventions (Cancer Institute, 2018). Patients undergoing surgery have been found to be more receptive to advice and information provided by health care professionals (Fong, 2018).

Effective smoking cessation interventions comprise brief assessment and advice, nicotine replacement therapy (NRT) and referral to a smoking cessation service.

Benefits of smoking cessation are exponential over time. Within weeks of cessation immune function is improved in individuals who quit smoking. Two meta-analyses demonstrated reduced wound complications four weeks after smoking cessation (Truntzer, 2017). In another study a perioperative smoking intervention at 4 weeks prior to surgery demonstrated a significant reduction in the complication rate.

There is also convincing evidence that active smokers at the time of cardiac surgery have a higher incidence of infective complications and increased mortality (Sepebripor AH, 2012) (Jones R, 2011).

Quitting for 3 weeks has been shown to improve wound healing (Kuri M, 2005). Quitting for 6 weeks decreases sputum volumes to normal and improves pulmonary function and at 6 months immune function is significantly recovered (Kotani N, 2001).

Hyperglycaemia is associated with an increased risk of surgical site infections. (World Health Organisation, 2016).

Staphylococcus aureus is a common cause of infections. A large proportion of infections due to Staphylococcus aureus originate from the patient's own flora (World Health Organisation, 2016). MRSA and MSSA can be effectively treated with nasal Mupirocin 2% (Schweizer, 2015). To maximise efficacy of treatment, Mupirocin 2% needs to start 5 days before OT.

Modifying Patient Risk Factors <u>Inpatient</u>	Bundle Elements	Yes	No	N/A
Smoking Cessation	Smokers are identified and encouraged to quit using the 5 “A” approach			
	Smokers are referred to QUIT line or other service (13Quit or 137 848)			
	Nicotine replacement therapy offered to those receptive to quit			
Glycaemic Control	Local CBRs are followed for the management of diabetic surgical patients POWH http://seslnweb/POWH/documents/cpm/Section15/SurgeryandMedicalProceduresPatientswithdiabetes.pdf			
	SGH http://seslnweb/SGSHHS/Business_Rules/Clinical/documents/D/Diabetes_IV_Insulin_Administration_Adults_SGSHHS_CLIN226.pdf			
MRSA and MSSA Screening Decolonisation	If MRSA and MSSA results not available within 5 days of OT, patient screened for MRSA and MSSA carriage risk (see MRSA /MSSA risk assessment tool)			
	If identified as high risk intranasal Mupirocin 2% ointment commenced			
	Decolonisation treatment ceased if swabs return -ve			
Delirium Prevention	Prevent post-operative delirium in cardiothoracic patients through screening, implementation of strategies to prevent and treat underlying causes. Screening and strategies are followed as per SESLHDPR/345 Procedure - Prevention, Diagnosis and Management of Delirium in Older People			

Enhanced Nutritional Support	Patient screened for underweight / at risk of malnutrition using the Malnutrition Screening tool			
	Patients with a Malnutrition Screening score ≥ 2 are referred to a Dietitian <ul style="list-style-type: none"> • Patients aged 65 years or over with a BMI $< 22 \text{ kg/m}^2$ are referred to a Dietitian • Patients aged under 65 years with a BMI $< 18.5 \text{ kg/m}^2$ are referred to a Dietitian 			
Wound Management Sternal Support Vest	Patients are risk assessed for potential to develop sternal wound complications			
	Patients identified high risk, are considered for a sternal support vest			
Pre-operative shower	Patient has showered or bathed with an antiseptic agent at least the night before theatre			

Modifying Patient Risk Factors Inpatient

Patients who undergo major surgery have an increased risk of malnutrition due to fasting periods, the stress of surgery, and the subsequent increase in metabolic rate. Nutritional status can have a profound impact on the immune system. (Zhong, 2015)

Surgery induces complex changes in the hemodynamic, metabolic and immune responses of the body, which can cause inflammation, affect wound healing and increase mortality (Culebras, 2013). Patients who undergo major surgery have an increased risk of malnutrition due to fasting periods, the stress of surgery, and the subsequent increase in metabolic rate. Nutritional status can have a profound impact on the immune system. Malnutrition associated with a weakened immune system and impaired stress resistance results in an inability to effectively respond when it encounters stress such as major surgery, trauma and infection with an estimated 55% of patients undergoing major cardiovascular surgery acquiring an infection (Zhong J, 2015) , (Culebras, 2013) (Tepaske R, 2001)

There is evidence that early use of external non-elastic sternal support devices reduces sternal wound complications and may be associated with a shorter length of hospital stay (Tsang, et al. 2016)

Randomized controlled trial evidence suggested uncertain trade-offs between the benefits and harms regarding the optimal timing of the preoperative shower or bath, the total number of soap or antiseptic agent applications, or the use of Chlorhexidine gluconate washcloths for the prevention of SSI. (Berrios-Torres S, Umscheid C, Bratzler D, Leas B, Stone E et al, 2017)

Reducing SSIs Intra-Operative	Bundle Elements	Yes	No	N/A
Surgical Hair Removal	Hair removal is restricted to what is surgically necessary			
	Hair removal is via electric clippers with a single-use head			
	Hair removal is timed to occur as close as possible to the operating procedure			
	Hair removal is performed in non OT area			
Prophylactic Antibiotics	First dose of prophylactic cefazolin 2G given within 60 minutes (ideally 15-30 minutes) before incision			
	An alternative prophylactic antibiotic is given to patients with a history of immediate hypersensitivity to penicillins			
Skin Preparation	Skin prepped with 2% Chlorhexidine gluconate in 70% isopropyl alcohol solution or iodine/alcohol solution (unless contraindicated) and allowed to dry by evaporation			
	Skin prep timed to occur immediately before incision			
	Pooling of preparation avoided			
	Skin prep applied with the appropriate technique			
Normothermia	Aim for normothermia pre and post bypass			
	Forced air warming devices set at maximum and then adjusted to maintain a patient temperature of at least 36.6°C			
	All irrigation fluids used intraoperatively, except for a period of induced hypothermia should be warmed in a thermostatically controlled cabinet to a temperature of 38-40°C to prevent heat loss (National Institute for Healthcare and Care Excellence, 2008)			
	Fluid warmers are indicated when large amounts of blood, intravenous fluid and or blood products are administered			
Glycaemic Control	BGL within target range 5mmol/L to 10mmol/L			

	If on an insulin infusion, BGL checked hourly			
Optimal Tissue Oxygenation and Tissue Perfusion	Maintain appropriate FiO2 / Ventilation / cardiac output			
Wound Management Negative Pressure Dressing	Patients with risk factors for sternal wound complications are identified Patients identified as high risk (modified Fowler score > 10) are considered for negative pressure wound management			
	In appropriately selected patients PICO negative pressure dressing applied in the operating theatre and left insitu for six to seven days			
	Low risk patients have a hydrocolloid (comfeel) dressing applied in the operating theatre and left insitu until post-op day seven or until day of hospital discharge			

Reducing SSIs Intra-Operative

For patients undergoing any surgical procedure hair either should not be removed or only on the basis of necessity, removed only with a clipper. Shaving is strongly discouraged at all times, whether preoperatively or in the OR. (World Health Organisation, 2016)

Prophylactic antibiotics are timed to optimise bactericidal concentration in the serum and tissues when the incision is made. (Australian Therapeutic Guidelines , 2014). Aim for appropriate antibiotic selection, dose, and timing of first and repeat dose.

The Australian therapeutic guidelines (Antibiotics, Australian Therapeutic Guidelines for, 2014) recommend the use of a first generation cephalosporin, such as cefazolin as the preferred drug for prophylaxis in cardiac surgical patients, however it emphasises that antibiotic selection may need to be modified according to patient risk factors such as the presence of a pre-existing infection, recent antibiotic use, known colonisation with multi-resistant organisms e.g. MRSA, and environmental factors such as the organisms causing infection and the patterns of antibiotic susceptibility within the hospital, and the potential selection pressure of antibiotic use

Alcohol based antiseptic solutions for surgical site skin preparation are more effective to aqueous solutions in reducing SSI (World Health Organisation, 2016)

The benefits of induced hypothermia during cardiopulmonary bypass is well described; normothermia should be maintained at other times during the intraoperative period.

Core temperature is the best single indicator of body temperature. During open heart and thoracic surgery core temperature is best measured from the nasopharynx or tympanic membrane, as the ambient temperature may affect the open thoracic cavity (i.e. the temperature measured from the oesophagus will be less accurate)

There is a substantial body of evidence to support the use of negative pressure wound therapy on closed surgical wounds to prevent post-operative SSI (Dohmen et al, 2014).

A majority of studies of closed incisional negative pressure therapy reported that use was associated with decreases in wound complications, wound dehiscence, SSIs, haematoma/ seroma formation and incisional drainage (Willy et al 2016).

Reducing SSIs Post –Operative	Bundle Elements	Yes	No	N/A
Normothermia	Warming device (i.e. Bair Hugger rewarming blankets) applied to patient directly on admission to CTICU			
	Re-warmed to 36.5 degrees			
	If the patient's core temperature drops below 36 degrees, the rewarming blanket is re applied			
Prophylactic Antibiotics	For prophylaxis the use of cefazolin 2G repeated postoperatively every eight hours for up to two further doses. (Australian Therapeutic Guidelines for Antibiotics Version, 2014)			
Glycaemic Control	BGL within target range 5mmol/L to 10mmol/L			
Timely Extubation	Protocol driven extubation			
Nutrition	Oral diet should be commenced as soon as suitable to avoid unnecessary fasting			
	For patients in the critical care setting who are not suitable for oral diet, enteral nutrition should be commenced within 24-48 hours.			
	If enteral nutrition is not tolerated after the usual troubleshooting (e.g. Prokinetics, post-pyloric feeding), parenteral nutrition should be commenced			
Wound Management Sternal Support Vest	Patients are risk assessed for sternal wound complications (see Preoperative, Intra operative and postoperative risk factors)			
	Patients at high risk are provided with a sternal support device			