

INTEGRATED FRAGILITY HIP FRACTURE PROGRAM: A MODEL FOR HIGH QUALITY CARE

APPENDIX A: INTEGRATED FRAGILITY FRACTURE PROGRAM PROTOCOLS

Selected medical and surgical protocols used during this study are outline below. We have only included protocols that remain clinically up to date and supported by current literature and practice. Protocols that are new and under active study have not been included.

VITAMIN D SCREENING AND REPLACEMENT:

- Vitamin D level sent in the Emergency Department (ED) as part of ED hip fracture order set
- Results available prior to hospital discharge
- For 25-OH Vitamin D level <30 ng/mL: Supplement with Ergocalciferol 50,000 U weekly for 8 weeks only and Cholecalciferol 2000 U orally daily thereafter.
- For 25-OH Vitamin D level 30-50 ng/mL: Supplement with Cholecalciferol 2000 U orally daily.
- Primary care follow up for further bone health evaluation and treatment

SURGICAL SITE INFECTION (SSI) PREVENTION PROTOCOL:

All patients undergo nasal staphylococcal PCR testing as part of the ED hip fracture order set. Results of MSSA and MRSA screen determine perioperative SSI prevention interventions. See grid below to determine interventions based on staphylococcal screening. Further detail of each intervention follows.

SURGICAL SITE INFECTION PREVENTION PROTOCOL

	Hair clipping on floor	Full body CHG night before	Full body CHG morning of surgery	Nasal PI	Vancomycin Prophylaxis * Based on pt history obtained by floor nurse
Screen not performed	X	X	X	X	
MRSA positive	X	X	X	X	X
MSSA positive	X	X	X	X	
MRSA negative	X	X	X	X	
MSSA negative	X	X	X	X	

Preoperative Surgical Site Infection Prevention Interventions:

- Hand washing before and after patient encounter by all staff
- Hair clipping prior to chlorhexidine (CHG) wiping done by floor nurse and includes hemipelvis to mid-lateral thigh (see diagram below)
- Patient skin decolonization with CHG Wipes or CHG Wash. Full body decolonization done the night before and the morning of surgery by floor nurse
- Pre-op nasal Povidone-Iodine (PI) to all patients upon admission to inpatient unit
- Completion of accurate, timely preoperative Antibiotics (see chart below)

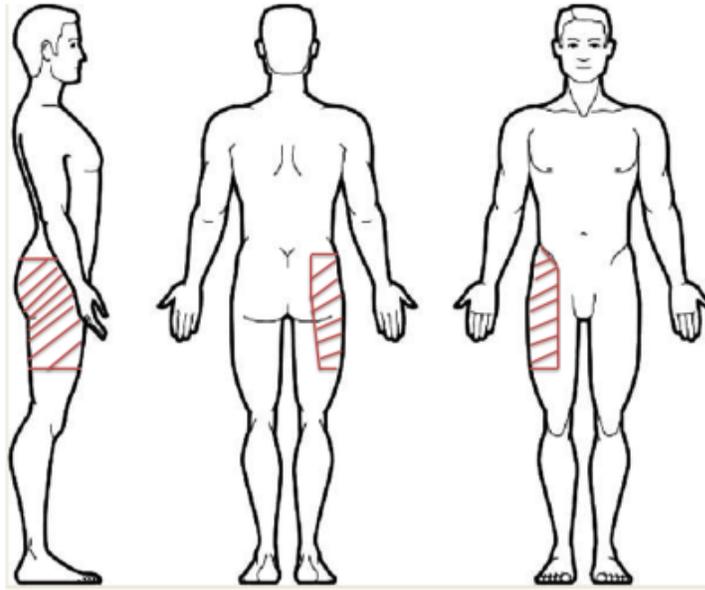


Diagram of hair clipping sites prior to use of chlorhexidine wipes

Protocol Effective 10/2017

YNHH CMC Antibiotic Administration Grid: Hip & Knee Surgery

	Standard Abx Protocol:	MRSA (+) Abx Protocol:
Knee Surgery: UKA & TKA	Cefazolin: 1g < 80kg, 2g 80-120 kg, 3g >120kg + <i>option</i> of giving 2 doses Postop.	Cefazolin AND Vancomycin: ≤ 80kg = 1g, 81-120kg =1.5g, ≥ 121kg = 2g
Hip Surgery: Hemi & THA	Cefazolin as above, PLUS, "Extended Gram Negative Antibiotic Protocol" Gentamicin: Per YNHHS SCIP protocol given as a single dose over 30 min; <u>no repeat dosing</u>	Cefazolin + Gentamicin, AND: Vancomycin

IF PCN allergy: use Vancomycin as the preferred agent (not Clindamycin)
 IF VANCO allergy: use Daptomycin per current YNHHS SCIP Protocols.

Notes:

- Redose Cefazolin at 3 hours for complex or revision cases.
- All Abx can now be given as single PREOP doses, no repeat dosing is required. (CDC 5/2017)
- If unsure about patient allergies, contact pharmacy prior to case.

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Intraoperative Surgical Site Infection Prevention Interventions:

- 5-minute surgical site scrub (CHG preferred) is performed by OR nurse after isolation drapes and prior to case initiation
- Sterile site preparation (ChlorPrep preferred) allow to dry for 3 minutes
 - To reduce risk of fire from alcohol content do not allow pooling
- Normothermia maintained during procedure (Body ≥ 36°C, OR Room ≥ 68°F)
- Dilute betadine lavage (22.5mL PI in 500mL NS) mixed & utilized at end of case prior to closure
- Antibacterial occlusive dressing (Aquacel) applied for arthroplasty cases

Process for Ordering Antibiotics

- Rapid staphylococcal nasal screen done in ED as part of ED order set
- Rapid staphylococcal nasal screen done on Center for Musculoskeletal Care (CMC) unit for transfers and direct admissions
- Positive results called to CMC unit nurse by the lab.
- The CMC RN notifies the covering provider of the positive staphylococcus screen.
- Advanced practice provider (APP) reviews the records of the hip fracture patient
- APP orders appropriate antibiotic based on result of staphylococcal screen, patient weight and allergies
- Nurse informs preoperative area if the patient requires Vancomycin
- Vancomycin is started on the CMC unit prior to transport to the operating room (OR)

BLOOD MANAGEMENT PROTOCOL:

Blood Transfusion Guidelines

Blood transfusions should be avoided. Do not transfuse patients unless hemoglobin is < 7.0 g/dl or patient has symptomatic anemia refractory to intravenous fluid resuscitation. Symptoms of anemia may include chest pain, shortness of breath, hypotension or postural hypotension, tachycardia unresponsive to volume repletion. Blood transfusions must be approved by Hospitalist Comanagement attending.

Perioperative Tranexamic Acid Treatment:

- Tranexamic acid 1 gram IV x 1 dose administered at the time of incision
- Tranexamic acid 1 gram IV x 1 dose administered in Postoperative Anaesthesia Care Unit (PACU) 3 hours postoperatively
- No exclusion criteria

VENOUS THROMBOEMBOLISM PROPHYLAXIS PROTOCOL:

- Preoperative: Heparin SC 5000 U tid prior to surgery
- Postoperatively: Enoxaparin 40 mg SC qd (or as adjusted for renal function and BMI)

Note that this protocol was revised after completion of our study due to (American Society of Regional Anaesthesia) ASRA guideline change April, 2018

ANTICOAGULANT AND ANTIPLATELET AGENT PERIOPERATIVE MANAGEMENT:

- **Warfarin:** Patients require an INR of 1.7 prior to operative intervention.
- **Direct Oral Anticoagulants:** Patient with normal renal function require a delay of 48 hours prior to high bleeding risk orthopedic surgery. Specifics of management should be discussed directly with comanagement hospitalist attending physician.
- **Antiplatelet Agents:** Antiplatelet agents include aspirin, clopidogrel (Plavix), Ticagrelor (Brilinta), Aspirin/Dipyridamole (Aggrenox). Hip fracture surgery may be safely performed in patients on antiplatelet therapy. As patients do require prolonged VTE prophylaxis postoperatively, ongoing use of dual antiplatelet therapy while on an anticoagulant should be individually assessed. The patient's individual risk factors should be assessed by the comanaging physician in coordination with the patient's cardiologist, if necessary.

Note that this protocol has been revised since the completion of our study. We are now using a protocol that determines time to OR based on surgical procedure and associated bleeding risk.

HIP FRACTURE CHECKLIST:

ED Orders Checklist:

- Confirm ED has ordered hip fracture order set and the following:
 - Labs:
 - Basic metabolic panel (BMP)

- Complete blood count (CBC)
 - PT/INR and PTT
 - Type and screen
 - Staphylococcal PCR (not culture)
 - Vitamin D level
 - X-rays
 - Chest PA/lateral
 - Hip AP/lateral
 - Femur AP/lateral
 - EKG
- Hip Fracture Consults
 - Hospitalist Consult
 - Regional Anaesthesia Block team Consult

Orthopedic Admission Checklist:

- Use prepopulated H&P smartphrase
 - Send to attending for co-signature
- Utilize admission order set (Can also be saved as a favorite to your list by “right-clicking” on the order)
- Complete admission medication reconciliation
 - Review pre-hospital anticoagulation with surgeon and medical team
 - Hold ACEI/ARB/Diuretics on morning of surgery
- Discuss case and planned procedure with hip fracture orthopedic surgeon on call
- Complete consent form
- Complete booking form
 - Confirm procedure, vendor, implant, table, and availability with attending
 - Start time is 12:00 pm on weekdays
 - Saturday start time is 9:00 am but can request 7:30 am (discuss with attending surgeon)
 - Sunday start time is per OR availability. OR will try to get hip fractures on and will call in second team if needed.
 - Fax booking form
- DVT preoperative prophylaxis with heparin SC
- Tranexamic acid protocol
- Palliative care consult if history of dementia and residing in a skilled nursing facility.
- IMPORTANT: Contact APP manager if patient is admitted to an attending who is not on call.

Day of Surgery Checklist:

- Confirm NPO status
- Confirm medical risk stratification has been documented and follow up on recommendations
- Confirm medication reconciliation has been completed
- Confirm consent is complete
- Review staphylococcus PCR screen
 - Order Vancomycin if positive for MRSA
- Review medicine reconciliation
 - Hold ACEI/ARB/Diuretics on morning of surgery
- Ensure that cardiopulmonary physical examination is included in daily progress note
- **If case gets bumped to following day: Confirm that new attending is aware (will need new consent/booking under new attending’s name)

Postoperative Checklist:

- Utilize Postoperative order set (can also be saved as a favorite to your list by “right-clicking” on the order)
- DVT prophylaxis: Enoxaparin for 35 days postoperatively
- Plan of care in the brief operative note. Include:
 - Anticoagulation

- TXA status
- Weight bearing status
- Dressing type
- Special considerations

APPENDIX B: STUDY OUTCOME VARIABLES

Definition of Outcome Variables	
30-day mortality	Death during or within 30-days of the index admission for hip fracture
Transfusion	Transfusion of one or more blood product (including RBCs, platelets, FFP) during the hip fracture hospital admission
Adverse effects of drugs	Adverse event attributed to medication administered during the hip fracture hospital admission (e.g. delirium attributed to a medication)
Venous thromboembolic events	Venous thromboembolic event occurring during the hip fracture inpatient admission. VTE was defined as ultrasound-detected DVT or PE diagnosed by CT or V/Q scanning.
Sepsis	Sepsis documented during inpatient admission
Myocardial infarction	Acute coronary syndrome during the hospital stay, including ST-elevation MI, type I and type II NSTEMI
Mechanical surgical fixation complications	Complication relating to surgical implant occurring during index hospital admission for hip fracture
Length of stay	Length of stay uses standard hospital definition of midnights admitted to the hospital.
30-day readmission	Readmission to any Yale New Haven Hospital System hospital within 30-days of hip fracture index admission
Unexpected return to the OR	Return to the operating room during index hip fracture admission for an unforeseen complication of hip fracture surgery (e.g. hematoma, infection)
Time to OR	ED admission to OR arrival categorized as less than or equal to 24 hours, greater than 24 hours but less than or equal to 36 hours, or greater than 36 hours.

- RBC, red blood cell; FFP, fresh frozen plasma; VTE, venous thromboembolism; CT, computed tomography; V/Q, ventilation perfusion; MI, myocardial infarction; NSTEMI, non-ST-elevation myocardial infarction; LOS, length of stay; OR, operating room.
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