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ICSI Health Care Order Set Development:

- A topic is selected by The Committee on Evidence-Based Practice based on its relevance to member organizations.
- A work group of physicians and other health care professionals, usually 5-8, who are experts in the topic area is identified (with a formally designated leader).
- Prospective work group members are asked to disclose any potential conflicts of interest relevant to the topic of the report; conflicts.
- The literature search is completed and pertinent research, regulatory statements, and order sets that may have already been developed and identified. In addition, work group members are asked to provide key references and current order sets from their organizations.
- ICSI Staff prepares a draft order set for the work group.
- The work group meets to review the draft order set under the facilitation of an ICSI staff person.
- After approval of the order set by the work group, it is sent to the member organizations for review and comment.
- Following review, the work group reconvenes to review and respond to member comments and revise the order set as necessary.
- The work group leader represents the group to the steering committee. Committee members review the report to determine whether the conclusions are supported by the evidence cited and if member responses have been adequately answered.
- After Steering Committee approval, the order set is distributed to members. Newly approved order sets are posted at <http://www.icsi.org>.
- Order sets are reviewed regularly and revised, if warranted.

A Health Care Order Set is a set of standardized instructions for the management of a particular disease, condition, or procedural intervention, presented as a group of orders to be individually selected and signed by an authorized prescriber.

The order set is created in MS Word and is available as a separate download. The MS Word order set is designed to utilize the forms function in MS Word version 98 and newer. It is expected that organizations may need to customize the order set to meet specific organization processes.

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Foreword

Scope and Target Population

This order set covers the postoperative care of adults for total hip and total knee arthroplasty and does not include discharge orders.

Clinical Highlights and Recommendations

- Antibiotic prophylaxis is proven to reduce postoperative infections.
- Antibiotic prophylaxis should be discontinued after 24 hours unless otherwise indicated.
- Two grams of Cefazolin is recommended for antibiotic prophylaxis.
- Clindamycin is an alternative for Cefazolin for patients allergic to Cephalosporins or have a history of anaphylactic shock to Penicillin and is equally effective against gram positive organisms.
- Routine use of vancomycin should be reserved for patients with previous history of MRSA.
- Aspirin is not recommended for venous thromboembolism prophylaxis because other methods are more effective.

Related ICSI Scientific Documents

Other ICSI guidelines whose scope and/or recommendations are closely related to the content of this guideline are:

1. Anticoagulation Therapy Supplement
2. Venous Thromboembolism Prophylaxis
3. Venous Thromboembolism

Evidence Grading

Individual research reports are assigned a letter indicating the class of report based on design type: A, B, C, D, M, R, X.

A full explanation of these designators is found in the Supporting Evidence section of the guideline.

Disclosure of Potential Conflict of Interest

In the interest of full disclosure, ICSI has adopted the policy of revealing relationships work group members have with companies that sell products or services that are relevant to this guideline topic. The reader should not assume that these financial interests will have an adverse impact on the content of the guideline, but they are noted here to fully inform readers. Readers of the guideline may assume that only work group members listed below have potential conflicts of interest to disclose.

No work group members have potential conflicts of interest to disclose.

ICSI's conflict of interest policy and procedures are available for review on ICSI's website at <http://www.icsi.org>.

Order Set

This order set covers the postoperative care of adults for total hip and total knee arthroplasty and does not include discharge orders.

Patient Information *(two are required)*

Last Name: _____

First Name: _____

Date of Birth: ___/___/_____

Patient's age: _____

ID #: _____

Legend:

- Open boxes are orders that a clinician will need to order by checking the box
- Pre-checked boxes are those orders with strong supporting evidence and/or regulatory requirements that require documentation if not done.

Vitals

- Vital Signs routine post op
 - Neurovascular checks with Vital Signs
- Patient weight: _____ kg
Patient height: _____ cm

Activity *(See Footnote #2)*

Early ambulation decreases the risk of venous thromboembolism

- Begin bedside commode or bathroom privileges on Post Op Day 1
- Up in chair as soon as appropriate
- Weight Bearing Status
 - Non-weight bearing
 - Partial weight bearing _____%
 - Foot Touch weight bearing
 - Full weight bearing as tolerated

HIPS:

- Avoid adduction past midline, external rotation with extension, flexion greater than 90 degrees
- Abductor pillow while in bed, do not flex greater than _____ degrees

KNEE:

- Do not allow patient to rest with pillow under knee
- Knee immobilizer per protocol

Allergies/Adverse Drug Reactions

- None
- Yes, Name: _____ Type of reaction: _____
_____ Type of reaction: _____
_____ Type of reaction: _____

Order Set**Nursing Orders (See Footnote #3)**

- Cough and deep breathe every two hours while awake
- O₂ per nasal cannula keep saturation greater than 90%; discontinue when saturation at 90% or above on room air.
- Incentive Spirometer every hour while awake
- Empty and record Hemovac(s) drainage every eight hours. Discontinue drain on Post Op Day 2 or Post Op Day _____ if not done previously by surgeon (*if drainage is greater than 40 ml per shift, do not discontinue drain*)
- Autotransfusion per protocol
- Input and Output every shift. Discontinue Post Op Day 2 if tolerating intake by mouth
- Discontinue Foley on Post Op Day 2 if able to void
- Straight catheter every six hours as needed if unable to void
- Place a Foley catheter for residual volume greater than 300 ml
- Ice packs 20-30 minutes to affected area every shift while awake as needed
- Cryocuff maintenance per protocol
- EZ Wrap ice pack, change per protocol
- Change dressing on Post Op Day _____

Mechanical VTE Prophylaxis

- Graded compression stockings: (*remove twice a day for 30 minutes*)
 - knee high thigh high
- Pneumatic compression:
 - foot boots knee high thigh high
- Instruct patient on foot pumps

Diet

- Regular diet as tolerated
- Constant Carbohydrate (CHO) as tolerated
- Other

IVs

- D5 0.45% NaCl with KCl 20 mEq/liter at 75 ml/hr or at _____ ml/hour
- D5 0.9% NaCl with KCl 20 mEq/liter at _____ ml/hour
- Lactated Ringers at _____ ml/hour
- Other: _____ at _____ ml/hour
- Change to intermittent when intake by mouth adequate, discontinue intermittent when antibiotics are completed

Sedative/Symptom Medication

Assess pain and offer medication before therapy/treatment (*Insert institution's pain management protocol*)

- Morphine Sulfate continuous infusion: 0-2 mg/hr 1 mg/hr _____ mg/hr
 - With a demand dose every 10 minutes (*maximum of 6 demand doses per hour*)
 - 1 mg 2 mg _____ mg
 - With a demand dose every 15 minutes (*maximum of 4 demand doses per hour*)
 - 1 mg 2 mg _____ mg
- After 24 hours, stop continuous infusion and have patient demand-dose only

OR

Order Set

- Hydromorphone (Dilaudid) continuous infusion: 0.1 mg/hr 0.2 mg/hr _____ mg/hr
 - With demand dose every 10 minutes (*maximum of 6 demand doses per hour*)
 - 0.1 mg 0.2 mg _____ mg
 - With a demand dose every 15 minutes (*maximum of 4 demand doses per hour*)
 - 0.1 mg 0.2 mg _____ mg
- After 24 hours, stop continuous infusion and have patient demand-dose only

- Temazepam (Restoril) by mouth as needed for sleep
 - 7.5 mg (*for age greater than or equal to 65 years*) 15 mg

Choose One:

- Prochlorperazine (Compazine) 10 mg by mouth every four to six hours as needed for nausea/vomiting
- Droperidol (Inapsine) 0.625 to 1.25 mg IV every six hours as needed for nausea/vomiting
- Promethazine (Phenergan) 25-50 mg IV by mouth every 4 hours as needed for nausea

If fail with above:

- Ondansetron (Zofran) 4 mg IV once as needed for nausea. May repeat once after 6 hours as needed for nausea.
- Dolasetron (Anzemet) 12.5 mg IV once as needed for nausea

Bowel Care:

- Magnesium hydroxide (Milk of Magnesia®) 30 mL by mouth every day as needed for constipation
- Bisacodyl (Dulcolax) one suppository every day as needed for constipation
- Docusate 100 mg by mouth every day while on opioids
- Senna 1 tab by mouth every day while on opioids
- Ferrous Sulfate 324 mg by mouth once a day

- Resume medications as listed on home medication sheet (MD must review and sign)
- _____
- _____

Medications (See Footnote #4)

Pharmacologic VTE Prophylaxis (*Aspirin is not recommended as monotherapy*)

- Warfarin _____ mg post-op
 - INR daily (*recommend INR goal 2-3*)
 - Warfarin order daily
 - Initiate patient education
- Dalteparin 5000 units subcutaneous every 24 hours beginning 12 hours after surgery (*Reduce for CRCL less than 30 mL/min*)
 - Platelet count and hemoglobin every other day beginning post-op day 2.
 - Discontinue** dalteparin if platelet count drops 50% or more from baseline value
 - Notify Physician**
 - Initiate patient education
 - Notify Physician** if bleeding occurs

Order Set

- Enoxaparin 30 mg subcutaneous every 12 hours beginning 12 hours after surgery (*Reduce for creatinine clearance less than 30 mL/min*)
 - Platelet count and hemoglobin every other day beginning post-op day 2
 - Discontinue** enoxaparin if platelet count drops 50% or more from baseline value
 - Notify Physician**
 - Initiate patient education
 - Notify Physician** if bleeding occurs

- Fondaparinux 2.5 mg subcutaneous every 24 hours beginning 8 hours after surgery (**THERE ARE NO AGENTS THAT REVERSE FONDAPARINUX**)
 - Initiate patient education
 - Notify Physician** if bleeding occurs

Antibiotic Prophylaxis

Antibiotic prophylaxis should be discontinued within 24 hours unless otherwise indicated

- Cefazolin 1 gm IV every eight hours times two doses post op
- Clindamycin 600 mg IV every eight hours times two doses post op (*if allergic to Cephalosporins or history of anaphylactic shock to Penicillin*)
- Vancomycin 1gm IV every 12 hours times two doses for 24 hours therapeutic coverage (*if allergic to Clindamycin or known to be colonized with MRSA. Consult with pharmacy for dosing recommendations*).

Diagnostic Tests

- HGB at 1800 today HGB in AM daily x 2 days
- AP pelvis and lateral hip in PACU Right Left Reason: post op hip
- AP knee and lateral knee in PACU Right Left Reason: post op knee

Other (See Footnote #5)

Rehabilitation

- Physical therapy to evaluate and treat to begin on Post Op Day 1 twice a day
- Restrictions/precautions: _____

- Continuous Passive Motion to start on day _____. Begin flexion to _____ %.
- Record daily range of motion for Total Knee Arthroplasty
- Occupational Therapy to evaluate and treat daily, begin on Post Op Day 2 for ADL's
- Other: _____

Consults

- Primary Clinician/Hospital Service: reason: _____
- Social Service consult for discharge planning

Authorized Prescriber Signature: _____

Printed Name: _____

Date & Time of Orders: ____/____/____ ____:

Footnotes

1. Pre-Checked Orders

ICSI order sets utilize two types of boxes for orders. One is the open box that clinicians will need to check for the order to be carried out. The second box is a pre-checked box and are those orders that have strong evidence and/or are standard of care and require documentation if the clinician decides to "uncheck" the order.

There is increasing evidence that pre-checked boxes are more effective in the delivery of care than physician reminders; even within the computerized medical record environment (*Dexter, 2004*). Organizations are recognizing the benefit of using pre-checked boxes for other orders to promote efficiency. Organizations are encouraged, through a consensus process, to identify those orders to utilize pre-checked boxes to increase efficiency, reduce calls to clinicians, and to reduce barriers for nursing and other professionals to provide care that is within their scope.

2. Admitting Data

Patient information would be part of the medical record in electronic ordering. Institutions will need to add this section per their organization's policy.

Physician information would not be necessary in electronic ordering. How to contact would not be actionable in the electronic ordering.

3. Nursing Orders

Mechanical VTE Prophylaxis

All patients admitted for surgical reasons should be evaluated for risk of VTE development.

All patients should receive patient education and early ambulation. Education should include the signs and symptoms of VTE. Encourage early and frequent ambulation with flexion/extension exercises for the ankles (*Geerts, 2004*). Elastic stockings or intermittent pneumatic compression should also be considered (*White, 2000*).

For more information, see the ICSI Venous Thromboembolism Prophylaxis guideline.

Supporting evidence is of classes: C, R

4. Medications

Pharmacologic VTE Prophylaxis

In addition to patient education and early ambulation, patients should be assessed for their risk of VTE development to determine if antithrombotic therapy should be given. Patients undergoing lower extremity joint replacement are considered at very high risk for developing VTE (*Rosendaal, 1999*).

Patients at high risk for VTE development and who do not have contraindications to antithrombotic therapy should receive anticoagulation prophylaxis at admission and continue for a minimum for 10 days. For patients undergoing total hip replacement, consider extending anticoagulation prophylaxis to 28-35 days post op.

Aspirin and LDUH are not recommended as VTE pharmacologic prophylaxis agents.

Pharmacologic prophylaxis is not without risk. Patients should be evaluated for an increase risk of bleeding.

The following are contraindications for pharmacologic prophylaxis:

- Extreme thrombocytopenia
- History of Heparin-Induced Thrombocytopenia (HIT) is contraindicated for use of heparins
- Uncontrolled hypertension (Systolic greater than 200, Diastolic greater than 120)
- Bacterial endocarditis
- Active hepatitis or hepatic insufficiency
- Other conditions that could increase risk of bleeding

Warfarin alone without concomitant heparin has been shown effective in the prevention of VTE for patients requiring hip replacement surgery or elective knee replacement arthroplasty (*Geerts, 2004*).

Loading doses for rapid induction of warfarin should be avoided. Loading doses can increase the patient's risk of supratherapeutic INR and make it more difficult to determine a steady-state dose.

A single target INR value should be used as a goal endpoint. The target INR for most conditions is 2.5 with an acceptable range of 2.0-3.0.

Patients with renal insufficiency (CrCl less than 30 mL/min) should have an adjusted dose (*Sanderink, 2002*). The manufacturer recommended dose of enoxaparin is 30 mg daily; the manufacturer of dalteparin does not list a similar dose recommendation.

See the ICSI Venous Thromboembolism Prophylaxis guideline and the ICSI Anticoagulation Therapy Supplement for more information.

Supporting evidence is of classes: C, R

Heparin-Induced Thrombocytopenia (HIT)

HIT is an immune-mediated reaction to heparins. It occurs in 2-3% of patients treated with LDUH and less than 1% of patients treated with LMWH. This syndrome can be associated with paradoxical increased risk for venous and arterial thrombosis. Patients who develop HIT without associated thrombosis will have a significant risk for thrombosis in the subsequent 100 days. Patients with a history of HIT should be not treated with LDUH or LMWH (*Warkentin, 2003*).

HIT should be suspected in patients who develop a skin lesion reaction at the injection site, have a systemic reaction to a bolus administration of heparin, or develop a greater than 50% decrease in platelet count from baseline labs while on heparin. These patients should have their heparin stopped while antibody testing for HIT is performed. Patients with a high clinical probability of having HIT should be treated with an appropriate alternative anticoagulant before antibody test results are available. Direct thrombin inhibitors (DTIs) are the alternative anticoagulant of choice for patients with HIT. Three brands are FDA approved: lepirudin (Refludan®), argatroban, and most recently, bivalirudin (Angiomax®) (*Warkentin, 2003; Warkentin, 2004a; Warkentin, 2004b*).

Patients with a history of HIT and have a high-risk for VTE or who develop HIT while on heparin prophylaxis should be managed by an anticoagulation expert.

For more information, see the ICSI Anticoagulation Therapy Supplement.

Supporting evidence is of class: R

Warfarin alone without concomitant heparin has been shown effective in the prevention of VTE for patients requiring hip replacement surgery or elective knee replacement arthroplasty (*Geerts, 2004*).

Loading doses for rapid induction of warfarin should be avoided. Loading doses can increase the patient's risk of supratherapeutic INR and make it more difficult to determine a steady-state dose.

A single target INR value should be used as a goal endpoint. The target INR for most conditions is 2.5 with an acceptable range of 2.0-3.0.

Patients with renal insufficiency (CrCl less than 30 mL/min) should have an adjusted dose (*Sanderink, 2002*). The manufacturer recommended dose of enoxaparin is 30 mg daily; the manufacturer of dalteparin does not list a similar dose recommendation.

See the ICSI Venous Thromboembolism Prophylaxis guideline and the ICSI Anticoagulation Therapy Supplement for more information.

Supporting evidence is of classes: C, R

Antibiotic Prophylaxis

Antimicrobial prophylaxis can decrease the incidence of infection, particularly wound infection after certain operations. Antimicrobial prophylaxis is generally recommended for those procedures with high infection rates, those involving implantation of prosthetic material and those in which the consequences of infection are especially serious.

The rationale for antibiotic choices presented in this order set reflects the basic tenets of surgical site infection prevention. The agent needs to have evidence that it reduces surgical site infection rates. It should be safe, inexpensive and bactericidal.

Given these considerations, the agent of choice has been Cefazolin. If a patient is unable to receive a cephalosporin because of a penicillin allergy, an alternative for gram-positive coverage is either clindamycin or vancomycin (guidelines for prevention of SSI). To reduce selective pressure for glycopeptide resistant organisms, clindamycin has been selected as an alternative agent to vancomycin. While studies are not available to support this, the pharmacokinetics indicate good tissue and bone penetration and clindamycin is active against the organisms of interest. However, for institutions with a high incidence of prosthetic joint infections with methicillin resistant staphylococci, or patients known to be colonized with these organisms or with severe adverse drug reactions to penicillins or clindamycin, vancomycin should be administered (*Medical Letter on Drugs and Therapeutics, The, 2001; Mangram, 1999*).

Antibiotic prophylaxis should be discontinued within 24 hours after surgery unless otherwise indicated. The goal of antibiotic prophylaxis is to maintain therapeutic levels during surgery. Prolonging antibiotic prophylaxis does not provide any additional protection against infection and increases the risk of *Clostridium difficile* infection and resistant to organisms (*Bratzler, 2005; Scher, 1997*). The National Quality Forum has established consensus standards for hospital care that include the discontinuation of antibiotic prophylaxis within 24 hours after surgery (*JCAHO, 2005*).

Supporting evidence is of classes: C, R

5. Other

Rehabilitation

The use of continuous passive motion (CPM) in combination with physical therapy may increase the flexion and shortens the length of stay for patient. A meta-analysis of studies on total knee arthroplasty comparing CPM in combination with physical therapy versus physical therapy alone showed greater flexion at two weeks and showed statistically significant results in shorter lengths of stay in the hospital (*Brosseau, 2003*).

Supporting evidence is of class: M

Supporting Evidence

Evidence Grading System

I. CLASSES OF RESEARCH REPORTS

A. Primary Reports of New Data Collection:

- Class A: Randomized, controlled trial
- Class B: Cohort study
- Class C: Non-randomized trial with concurrent or historical controls
Case-control study
Study of sensitivity and specificity of a diagnostic test
Population-based descriptive study
- Class D: Cross-sectional study
Case series
Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

- Class M: Meta-analysis
Systematic review
Decision analysis
Cost-effectiveness analysis
- Class R: Consensus statement
Consensus report
Narrative review
- Class X: Medical opinion

References

- Bratzler DW, Houck PM. Antimicrobial prophylaxis for surgery: an advisory statement from the National Surgical Infection Prevention Project. *Am J Surg* 2005;189:395-404. (Class R)
- Brosseau L, Davis J, Drouin H, et al. Continuous passive motion following total knee arthroplasty. *The Cochrane Collaboration* 2005;4:1-69. (Class M)
- Dexter PR, Perkins SM, Maharry KS, et al. Inpatient computer-based standing orders vs physician reminders to increase influenza and pneumococcal vaccination rates: a randomized trial. *JAMA* 2004;292:2366-71. (Class A)
- Geerts WH, Pineo GF, Heit JA, et al. Prevention of venous thromboembolism: the seventh ACCP conference on antithrombotic and thrombolytic therapy. *Chest* 2004;126:338S-400S. (Class R)
- JCAHO. Specification Manual for National Hospital Quality Measures. Release Notes 1.02. February 25, 2005. (Class Not Assignable)
- Mangram AJ, Horan TC, Pearson ML, et al. Guideline for prevention of surgical site infection, 1999. Hospital Infection Control Practices Advisory Committee. *Infect Control Hosp Epidemiol* 1999;20:250-78. (Class R)
- Medical Letter On Drugs and Therapeutics, The. Antimicrobial prophylaxis in surgery. *The Medical Letter On Drugs and Therapeutics* 2001;43:91-98. (Class R)
- Rosendaal FR. Risk factors for venous thrombotic disease. *Thromb Haemost* 1999;82:610-19. (Class R)
- Sanderink GJ, Guimart CG, Ozoux ML, et al. Pharmacokinetics and pharmacodynamics of the prophylactic dose of enoxaparin once daily over 4 days in patients with renal impairment. *Thromb Res* 2002;105:225-31. (Class C)
- Scher KS. Studies on the duration of antibiotic administration for surgical prophylaxis. *Am Surg* 1997;63:59-62. (Class C)
- Warkentin TE. An overview of the heparin-induced thrombocytopenia syndrome. *Seminars in Thrombosis and Hemostasis* 2004a;30:273-83. (Class R)
- Warkentin TE. Heparin-induced thrombocytopenia: pathogenesis and management. *Brit J of Haematology* 2003;121:535-55. (Class R)
- Warkentin TE, Greinacher A. Heparin-induced thrombocytopenia: recognition, treatment, and prevention: the seventh ACCP conference on antithrombotic and thrombolytic therapy. *Chest* 2004;126:311S-375S. (Class R)
- White RH, Gettner S, Newman JM, et al. Predictors of rehospitalization for symptomatic venous thromboembolism after total hip arthroplasty. *N Engl J Med* 2000;343:1758-64. (Class C)

This section provides resources, strategies and measurement specifications for use in closing the gap between current clinical practice and the recommendations set forth in the guideline.

The subdivisions of this section are:

- Knowledge Products and Resources
- Other Resources Available

Knowledge Products and Resources

Criteria for Selecting Resources

The following resources were selected by the *Postoperative Total Hip and Total Knee Arthroplasty* work group as additional resources for providers and/or patients. The following criteria were considered in selecting these sites.

- The site contains information specific to the topic of the guideline.
- The content is supported by evidence-based research.
- The content includes the source/author, and contact information.
- The content clearly states revision dates or the date the information was published.
- The content is clear about potential biases, noting conflict of interest and/or disclaimers as appropriate.

Resources Available to ICSI Members Only

The following materials are available to ICSI members only. Also available is a wide variety of other knowledge products including tool kits on CQI processes and Rapid Cycling that can be helpful. To obtain copies of these or other Knowledge Products, go to <http://www.icsi.org/knowledge>.

To access these materials on the Website you must be logged in as an ICSI member.

Other Resources Available

Title/Description	Audience	Author/Organization	Websites/Order Information
Postoperative Total Hip and Total Knee Arthroplasty Order Set; MS Word version	Providers	ICSI	http://www.icsi.org/knowledge