Improving Surgical Care and Recovery Core and Surgery Specific Pathways Worksheet

Use this worksheet to develop enhanced recovery pathways for use at your hospital. The information in this tool is based on evidence reviews (see appendix) conducted by the National Project Team at the American College of Surgeons and Johns Hopkins Armstrong Institute for Patient Safety and Quality. The evidence reviews included literature searches, followed by reviews (including meta-analyses and systematic reviews) of relevant available articles, as well as reviews of relevant published guidelines.

The Improving Surgical Care and Recovery (ISCR) program was developed for colorectal, gynecologic, specific orthopedic, and emergency general surgery procedures. Recommended approaches and sample processes to consider are based on these types of procedures. However, some hospitals in the program also expanded their use of these pathways to other surgical procedures. Many elements of the ISCR pathway will also apply to other procedures. However, there will be differences. It is recommended that you review the evidence for other surgical procedures before spreading beyond the ISCR pathways included in this program.

This worksheet should be used by your team, in conjunction with the review of evidence, to develop a clinical pathway that incorporates the processes of enhanced recovery (e.g., use of narcotic-sparing multimodal pain management, early restoration of functional status, avoidance of prolonged fasting periods) and best practices for preventing harms (e.g., surgical site infection, venous thromboembolism and urinary tract infection). This worksheet includes some common approaches for incorporating these processes in your pathway, but there may be other approaches that are also appropriate. We anticipate that pathways will vary from hospital to hospital because only certain skills or medications may be available in some sites. However, it is important to try to adhere to as many of the processes as possible. Higher rates of adherence to a more comprehensive bundle of enhanced recovery processes is associated with fewer overall complications, reduced lengths of stay, and lower mortality.1-3

**Disclaimer:**

**The findings and recommendations in this document are those of the authors, who are responsible for its content, and do not necessarily represent the views of AHRQ. No statement in this report should be construed as an official position of AHRQ or of the U.S. Department of Health and Human Services.**

**Any practice described in this document must be applied by healthcare practitioners in accordance with professional judgement and standards of care in regard to the unique circumstances that may apply in each situation they encounter.**

**Use of brand, manufacturer, or vendor names is for identification only and does not imply endorsement by the Agency for Healthcare Research and Quality or the U.S. Department of Health and Human Services.**

**References**

1. Ripollés-Melchor J, Ramírez-Rodríguez JM, Casans-Francés R, et al. Association between use of enhanced recovery after surgery protocol and postoperative complications in colorectal surgery: the Postoperative Outcomes Within Enhanced Recovery After Surgery Protocol (POWER) Study. JAMA Surg. 2019 Aug 1;154(8):725-736. doi: 10.1001/jamasurg.2019.0995. Erratum in: JAMA Surg. 2022 May 1;157(5):460. PMID: 31066889; PMCID: PMC6506896.

2. Wei IH, Pappou EP, Smith JJ, et al. Monitoring an ongoing enhanced recovery after surgery (eras) program: adherence improves clinical outcomes in a comparison of three thousand colorectal cases. Clin Surg. 2020 Aug;5:2909. Epub 2020 Aug 10. PMID: 33163851; PMCID: PMC7643765.

3. Ripollés-Melchor J, Abad-Motos A, Díez-Remesal Y, et al. Association between use of enhanced recovery after surgery protocol and postoperative complications in total hip and knee arthroplasty in the Postoperative Outcomes Within Enhanced Recovery After Surgery Protocol in Elective Total Hip and Knee Arthroplasty Study (POWER2). JAMA Surg. 2020 Apr 1;155(4):e196024. doi: 10.1001/jamasurg.2019.6024. Epub 2020 Apr 15. PMID: 32049352; PMCID: PMC7042927.

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The tables below list each component that should be considered when developing your pathway. Process examples are provided that can be applied to all or some ISCR pathways, including: colorectal, gynecologic, hip and knee replacement, hip fracture, and emergency general surgery (major abdominal, appendectomy, cholecystectomy) procedures. The information is intended to be adapted by a hospital based on collective review of the pathway by all local stakeholders. Important stakeholders include surgeons, anesthesia providers, nurses, pharmacists, physical therapists, and technicians, as well as other healthcare providers. As a team, review each component of the pathway and discuss what approach best fits your hospital. Any practice described in this tool must be applied by healthcare practitioners in accordance with professional judgment and standards of care in regard to the unique circumstances that may apply in each situation they encounter.

Most hospitals find it easiest to agree on a single pathway that best fits the majority of their surgery patients, recognizing that there will be procedures and patient risk factors that require exceptions.

**Dosages of medications are not included. Please consult with a pharmacist as you develop your pathway. Medication side effects should be taken into consideration on an individual patient basis prior to administration.**

ISCR Pathway Components

## Preoperative Patient Education

For elective procedures and those with longer lead time prior to operation: Patients should receive preoperative education, including detailed information on the surgical procedure and components of the enhanced recovery pathway in which patients are expected to participate (e.g., smoking cessation, diabetes management, reduced fasting, preoperative bathing, early ambulation, early oral intake, venous thromboembolism prophylaxis, possible use of regional anesthesia, avoiding or minimizing opioid pain medication, and discharge planning)

* Additional patient education aspects for colorectal procedures: bowel preparation

*For emergency general surgery:* Patients should receive detailed information on the surgical procedure and possible complications. Expectations, including but not limited to the anticipated postoperative course, possible intensive care unit admission and stay, and the time to recovery of baseline functional status, should be included. Although counseling prior to hospital presentation about pathway components will not be possible in the emergency general surgery population, it is encouraged that hospitals develop a mechanism to educate and engage patients and families undergoing emergency surgery either immediately before or after the procedure to improve patient engagement.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Patient Education**  | **Recommended approach:*** Review existing patient education materials for surgery patients
* Adapt the provided patient education booklet template as needed to your hospital and use it to counsel and educate patients on enhanced recovery
* Identify staff (surgeons, nurses and/or office staff) who will ensure patients receive and understand education
* If patient’s cognitive status allows, it is helpful to have preoperative education to set patient and family expectations, and promote engagement in surgery and recovery
* Coordinate patient education materials with existing educational sessions and exercise sessions
 |  *Enter decisions/notes here* | [Resource: Sample patient education booklets](https://www.ahrq.gov/hai/tools/enhanced-recovery/implementing/patient-booklets.html)  **Tip:** Education should be given weeks in advance for all nonemergency procedures. For emergency procedures, education may be given right before the procedure, to a family member/caregiver, as soon as possible after the procedure.  | Patient education provided to patient/caregiver*Example: Providing ISCR patient education booklet and instructions which address preoperative (fasting) and postoperative (pain control) information (Y/N)* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Special Considerations for Elderly Patients

Elderly patients are at higher risk of surgical complications. All patients 65 years of age or older should have advance care planning discussions prior to surgery. In addition, medications can have undesired side effects in the elderly and should be avoided or carefully monitored.1 If possible, discussions should also include the patient’s overall health goals, goals related to the current condition and treatment options, and risk of the operation including patient-centered outcomes.

* *For elective procedures (colorectal, hip and knee, gynecologic):* Advance care planning discussions should take place prior to admission if possible.
* *For emergency procedures (hip fracture, appendectomy, cholecystectomy, major abdominal procedures):* Advance care planning discussions should take place upon admission

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Goals and Decision Making for Elderly Patients** | **Recommended approach:**The Coalition for Quality in Geriatric Surgery recommends presurgery discussion of the patient’s overall health goals, as well as those related to the current condition and treatment options, risks of the operation including patient-centered outcomes, and advance care planning. | *Enter team decisions/notes here* | Resource: Hospital Standards to Promote Optimal Surgical Care of the Older Adult2 | Evidence of advanced care planning (patients 65 years of age or older) |
| **All ISCR Pathways** | **Care for Elderly Patients** | **Recommended approach:*** Discuss advance care planning for all patients 65 years of age or older.
* Avoid using medications that may have harmful side effects in the elderly (e.g., antihistamines, gabapentinoids, antispasmodics).1
* Delirium precautions should be initiated for patients at high risk of developing delirium
* Keep patient awake and alert during the day
* Provide glasses and hearing aids when applicable
* Provide familiar items (e.g., bathrobe) from home
* Keep water within reach
* Open the room shades during the day
* Turn the television off in the evening
* Develop early alert systems for identifying and acting on changes in behavior
 | *Enter team decisions/notes here* | **Tip:** Include documentation of code status as part of the admission order set.**Tip**: To help keep patients awake and alert during the day, engage family members, ancillary staff (e.g., dieticians and housekeeping).  | Evidence of advanced care planning (patients 65 years of age or older)Preoperative (preop) delirium screening (patients 65 years of age or older)Postoperative (postop) delirium screening (patients 65 years of age or older) |

1 American Geriatrics Society. American Geriatrics Society 2019 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc. 2019;67(4):674-94.

2 Berian JR, Rosenthal RA, Baker TL, et al. Hospital standards to promote optimal surgical care of the older adult: a report from the Coalition for Quality in Geriatric Surgery. Ann Surg. 2018 Feb;267(2):280-90. doi: 10.1097/SLA.0000000000002185. PMID: 28277408.

## Preoperative Medical Assessment

**Diabetes Management:** Preoperative diabetes mellitus in patients undergoing surgery may adversely affect postoperative outcomes. Diabetes mellitus should be screened for and identified prior to performing surgery. Diabetes care should be optimized through consultation with primary care or endocrinology. Decisions about surgical management in diabetic patients should be tailored to the individual referring to your hospital’s policies or guidelines.

**Smoking/Tobacco Cessation:** Smoking is associated with increased risk for postoperative complications. Patients should abstain from smoking at least 4 weeks pre- and post-elective surgery. Preoperative interventions (counseling and/or nicotine replacement therapy) focused on smoking cessation are recommended. For procedures where it is not possible to counsel patients on smoking cessation 4 weeks prior to operation (e.g., hip fracture, emergency general surgery), patients who smoke should be counseled to cease smoking for at least 4 weeks after surgery to promote healing.

**Weight Management:** Obese patients, especially those with a body mass index (BMI) greater than 40 are at increased risk of adverse outcomes and often experience delayed and dampened functional recovery. Establishing institution-specific guidelines with regards to surgical risk and BMI should be considered.

**Anemia:** Patients undergoing surgery should be screened for preoperative anemia and referred for appropriate workup and treatment if necessary. Medical optimization with either oral or intravenous iron supplementation based on an institution-specific hemoglobin goal may be considered.

**Immune Modulating Therapy:** Although there is concern about the impact of immune modulating agents on perioperative outcomes, there is limited evidence to guide clinical decision making at this time.

**Malnutrition:** Malnourished patients may be at increased risk of perioperative complications with surgery but there is no consensus on optimal screening or interventions.

**Opioid Use:** Current evidence suggests that only a small fraction of the patients on opioids preoperatively will be able to fully wean themselves off of them postoperatively. Patients who can successfully wean themselves from opioids before surgery may have better outcomes than those who cannot. Information about long-term opioid use should be incorporated into discussions with patients before surgery and guide informed clinical decision making with patients. Support should be offered for addressing opioid use before and after surgery as appropriate.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** **All ISCR Pathways**  | **Preoperative Medical Assessment****Preoperative Medical Assessment** | **Recommended approach:** All of these factors should be included in the preoperative risk counseling and considered when counseling on the anticipated recovery with patients.Diabetes management* Review every patient’s diabetes status and review or order related laboratory tests as needed
* Optimize diabetes in partnership with primary care or endocrinology providers

Smoking/tobacco cessation* Smoking cessation 4 weeks pre- and post-elective surgery
* For emergency surgeries, patients should be counseled to cease smoking for at least 4 weeks post-surgery to promote healing
* Provide counseling and nicotine replacement therapy or other medications as needed

Anemia* Each institution should establish hemoglobin level guidelines and recommendations for optimization of levels before surgery following national guidelines.
* Consider evaluating and treating preoperative anemia with iron supplementation if anemia is the result of iron deficiency. Use either oral or intravenous based on clinical situation.

Opioid use* Evaluate patient’s preoperative opioid use by discussing with patient, and if needed, reviewing State prescription monitoring program databases and medical history.
* Counsel patients on expected opioid use post-surgery based on preoperative use.

Weight management (hip and knee replacement specific component)* Patients should have their body mass index (BMI) measured and risks associated with an elevated BMI should be considered as part of the preoperative evaluation and risk counseling
* Obese or overweight patients should be advised to lose weight, but no formal recommendation for a specific weight loss method or program is endorsed

Delirium prevention protocol for geriatric patients * A standardized delirium prevention protocol should be used to assess for preoperative delirium and to prevent postoperative delirium in geriatric patients

*Emergency General Surgery Major Abdominal Surgery Considerations:** Assess the patient’s physiologic condition on presentation for signs of sepsis or other physiologic derangements
* If patient shows signs of sepsis, initiate antibiotics early, provide fluid resuscitation, and consider admission to the intensive care unit
 | *Enter team decisions/notes here* | **Tip:** Identify an endocrinologist or primary care provider at your hospital who could be a point person to help you with patients who do not have an established provider.**Tip:** Partner with primary care physicians to evaluate unexplained anemia.**Tip:** Some electronic health record systems have clinical decision support that can be helpful in flagging triggers (e.g., low blood pressure, high temperature) to begin sepsis screening protocols. | Preadmission counseling, examples include:* Smoking cessation – 4 weeks before surgery
* Outpatient opioid use ≤ 10 days before admission
 |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Preoperative Venous Thromboembolism Prophylaxis

Preoperative administration of a single dose of venous thromboembolism (VTE) chemoprophylaxis (in patients without contraindications) and the use of sequential compression devices beginning prior to anesthesia induction are recommended. Timing of VTE chemoprophylaxis administration should consider the need for performing regional analgesia.

*Considerations for emergency general surgery (EGS) (major abdominal procedures)*: The necessity of routine preoperative VTE prophylaxis for low-complexity EGS patients is unclear; therefore, risk assessment of every patient is recommended. Patients undergoing emergency major abdominal surgery are at higher risk for VTE and should have chemoprophylaxis and mechanical prophylaxis initiated upon presentation.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Preoperative Venous Thromboembolism (VTE) Prophylaxis**  | **Choose your approach:*** Use a risk assessment tool for patients on presentation to stratify VTE risk1
* Mechanical prophylaxis (e.g., sequential compression device) routinely
* Chemoprophylaxis should be administered in the immediate preoperative period or intraoperatively for those surgical procedures in which its use is supported by evidence according to guidelines such as the [CHEST Guidelines](https://www.chestnet.org/Guidelines-and-Topic-Collections) or the [American Society of Hematology](https://ashpublications.org/bloodadvances/article/3/23/3898/429211/American-Society-of-Hematology-2019-guidelines-for)

Examples include:* Heparin
* Low molecular weight heparin

Note: VTE prophylaxis should not be administered to patients with high bleeding risk*Hip and Knee Replacement and Hip Fracture Surgery Considerations:* While chemoprophylaxis is recommended for all patients undergoing hip fracture surgery and hip/knee replacement surgery, there is no convincing evidence favoring preoperative or postoperative initiation. There is evidence that immediate perioperative administration (within 2–4 hours before or after surgery) may increase the risk of bleeding in excess of the potential VTE risk reduction. 2 | *Enter team decisions/notes here* | **Tip:** Place reminders for patient risk assessment in the admission order sets and familiarize the care team with one of [the risk assessment tools](https://www.ahrq.gov/patient-safety/resources/vtguide/guide4.html) (e.g., [Caprini](https://thrombosiscanada.ca/wp-content/uploads/2017/04/VTE-Risk-Assessment-Tool-Caprini-Score-Card-Eng-30Apr2018.pdf) or Padua).1 **Tip**: Include in preoperative order set. **Tip:** Coordinate with anesthesiology and/or acute pain services to facilitate timing of administration of chemoprophylaxis to allow for safe use of neuroaxial blocks. | Preoperative VTE prophylaxis  |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Maynard G. Choose the Model To Assess VTE and Bleeding Risk. In: Preventing Hospital-Associated Venous Thromboembolism: A Guide for Effective Quality Improvement, 2nd ed. Rockville, MD: Agency for Healthcare Research and Quality; August 2016: chapter 4. https://www.ahrq.gov/patient-safety/settings/hospital/vtguide/index.html

2 Childers CP, Siletz AE, Singer ES, et al. Surgical Technical Evidence Review for Elective Total Joint Replacement Conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery. Geriatr Orthop Surg Rehabil. 2018 Feb 12;9:2151458518754451. doi: 10.1177/2151458518754451. PMID: 29468091; PMCID: PMC5813847. https://doi.org/10.1177%2F2151458518754451.

## Preoperative Bowel Preparation

Patients undergoing elective colorectal surgery or other relevant procedures should undergo combined mechanical bowel preparation with oral antibiotics and be allowed to drink nonalcoholic, noncaffeinated liquids freely up to 2 hours prior to induction to avoid dehydration.

* *Considerations for gynecologic surgery procedures:* Patients undergoing straightforward gynecologic surgery should not receive a bowel preparation. For complex procedures where a colon resection might be done in conjunction with the gynecologic procedure, a mechanical bowel preparation plus oral antibiotics is recommended.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
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| **All ISCR Pathways With Planned Bowel Resection** | **Bowel Preparation** | **Recommended approaches:** * Bowel prep with neomycin + metronidazole + polyethylene glycol the day before operation
* Bowel prep with neomycin + erythromycin + polyethylene glycol the day before operation
 | *Enter team decisions/notes here* | **Resource:** Healthcare Infection Control Practices Advisory Committee (HICPAC) Guidelines for Prevention of Surgical Site Infections. 1  | Preoperative mechanical bowel prepPreoperative oral antibiotics |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Berríos-Torres SI, Umscheid CA, Bratzler DW, et al. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. JAMA Surg. 2017;152(8):784-91. doi:10.1001/jamasurg.2017.0904. <https://www.cdc.gov/infectioncontrol/guidelines/ssi/index.html>.

## Preoperative Bathing

Patients should undergo at-home bathing the night before surgery or morning of surgery with either antibacterial soap or antiseptic agent. Chlorhexidine cloths upon admission should be considered for patients who could not complete bathing prior to arrival at the hospital.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways**  | **Preoperative Bathing** | **Choose your approach:** * At-home bathing at least the night before or morning of surgery with either antibacterial soap or antiseptic agent (either washcloths with chlorhexidine gluconate or soap with chlorhexidine gluconate, such as Hibiclens®).
* If time allows before emergency procedures, use an antiseptic agent prior to patient going into the operating room.
 | *Enter team decisions/notes here* | **Tip**: Develop a workflow that fits at your hospital to educate patients on the importance of bathing prior to surgery.**Tip:** Talk with your preop area to standardize documentation of preoperative bathing.  | Preoperative bathing |

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## Preoperative *Staphylococcus aureus* Decolonization

Carriers of *S. aureus* should be identified and a decolonization regimen should be considered prior to surgery.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Decolonization**  | **Choose your approach:** * Develop process to screen patients for S. aureus carriage.1
* Develop decolonization regimen (e.g., 5 days of nasal mupirocin plus chlorhexidine bathing) for patients found to be nasal carriers2

*OR** Implement protocol for povidone iodine decontamination for all patients starting in the preoperative area3
 | *Enter team decisions/notes here* | **Tip:** considerwho will order and perform screening and how the topical agents will be provided to patients in the appropriate preoperative timeframe. | *Enter ISCR measures here* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Sporer SM, Rogers T, Abella L. Methicillin-resistant and methicillin-sensitive Staphylococcus aureus Screening and decolonization to reduce surgical site infection in elective total joint arthroplasty. J Arthroplasty. 2016 Sep;31(9 Suppl):144-7. doi: 10.1016/j.arth.2016.05.019. Epub 2016 May 18. PMID: 27387479.

2 Huang SS, Singh R, McKinnell JA, et al. Decolonization to reduce postdischarge infection risk among MRSA carriers. N Engl J Med. 2019 Feb 14;380(7):638-50. PMID: 30763195.

3 Sharara SL, Maragakis LL, Cosgrove SE. Decolonization of Staphylococcus aureus. Infect Dis Clin North Am. 2021 Mar;35(1):107-133. doi: 10.1016/j.idc.2020.10.010. Epub 2020 Dec 7. PMID: 33303331.

## Preoperative Reduced Fasting

Reduced fasting with intake of solids until 6 hours prior to induction and intake of clear liquids until 2 hours prior to induction is recommended for patients unless they have documented delayed gastric emptying or other contraindications.

* *For colorectal patients receiving mechanical bowel preparation:* intake of clear liquids until 2 hours prior to induction is recommended.
* *For colorectal patients not receiving mechanical bowel preparation:* intake of solids until 6 hours prior to induction and intake of clear liquids until 2 hours prior to induction is recommended.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All Nonemergency ISCR Pathways**  | **Reduced Fasting** | **Recommended approach:*** Clear liquids may be ingested for up to 2 hours before elective procedures. A light meal or nonhuman milk may be ingested for up to 6 hours before elective procedures. Additional fasting time (e.g., 8 or more hours) may be needed in cases of patient intake of fried foods, fatty foods, or meat.1 If time allows before emergency procedures, follow guidance above.
 | *Enter team decisions/notes here* | **Resource:** American Society of Anesthesiologists Practice Guidelines for Preoperative Fasting1**Tip:** Nothing by mouth (NPO) instructions for colorectal patients need to be coordinated with the bowel preparation instructions – all team members should agree on instructions. | Allow clear liquids before surgery |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 American Society of Anesthesiologists Committee. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures: an updated report by the American Society of Anesthesiologists Committee on Standards and Practice Parameters. Anesthesiology. 2011 Mar;114(3):495-511. doi: 10.1097/ALN.0b013e3181fcbfd9. PubMed PMID: 21307770.

## Preoperative Carbohydrate Loading

Routine carbohydrate loading in the immediate preoperative period is recommended, though there is not consensus regarding the optimal regimen and formulation. Preoperative carbohydrate loading is not recommended in patients with diabetes.

* *Considerations for orthopedic procedures*: there is limited evidence demonstrating benefit specifically in orthopedic surgery patients

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All Nonemergency ISCR Pathways** | **Carbohydrate Loading** | **Choose your approach:*** Drink: choose one: sports, nutritional or fruit drink
* If time allows before emergency procedures, follow guidance above
 | *Enter team decisions/notes here* | **Tip**: Drinks with high sugar content should not be provided to patients with diabetes.**Tip**: Ensure drink volume instructions are harmonized with institution policy. | *Enter ISCR measures here* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Preoperative Glycemic Control

To prevent hyperglycemia, glucose control should be considered in all patients regardless of diabetic status, beginning in the immediate preoperative period and continuing until discharge. Hyperglycemia is prevalent in both diabetic and nondiabetic hospitalized patients and has been associated with surgical site infections and complications. A 2017 Centers for Disease Control and Prevention guideline recommends target blood glucose levels of less than 200 mg/dL for all surgical procedures.1 Other organizations have included consideration of observational evidence and made recommendations for lower targets.2

*Considerations for gynecologic procedures*: Review of guidelines and recent evidence relevant to gynecologic surgery identified targets ≤180-200 mg/dL.3

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR pathways** | **Glycemic Control** | **Recommended approach:*** Check glucose in preoperative area, per your institution’s guidelines
 | *Enter team decisions/notes here* | **Tip:** If your hospital chooses to implement a perioperative glucose control protocol, look for evidence-based examples. Also, make sure that you involve your hospital endocrinologists, anesthesiologists, perioperative nurses, and preoperative evaluation clinic. Effective protocols are multidisciplinary and can be complicated to implement.**Tip:** Include sliding scale insulin in order set to help maintain glucose levels. | *Enter ISCR measures here* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Berríos-Torres SI, Umscheid CA, Bratzler DW, et al. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. JAMA surgery. 2017;152(8):784-91.

2 Ware LR, Gilmore JF, Szumita PM. Practical approach to clinical controversies in glycemic control for hospitalized surgical patients. Nutr Clin Pract. 2022 Jun;37(3):521-35. doi: 10.1002/ncp.10858. Epub 2022 Apr 30. PMID: 35490289.

3 Kalogera E, Nelson G, Liu J, et al. Surgical technical evidence review for gynecologic surgery conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery. Am J Obstet Gynecol. 2018 Dec;219(6):563.e1-563.e19. doi: 10.1016/j.ajog.2018.07.014. Epub 2018 Jul 19. PMID: 30031749.

## Preoperative Normothermia

Normothermia should be maintained throughout the preoperative, intraoperative, and immediate postoperative period. Preoperative warming maybe helpful in maintaining intraoperative normothermia and should be especially considered for patients who are elderly, patients with cardiopulmonary disease, and long procedures.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All Pathways** | **Normothermia** | **Recommended approach:*** Forced air warmer in preoperative area
 | *Enter team decisions/notes here* | **Tip**: Place blanket warmers in prep area and include in order set/policy. Let all know that blanket warmers also increase patient satisfaction. |  *Enter ISCR measures here* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Preoperative Antibiotics

| **Pathway**  | **Component** | **Example Processes To Consider*As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| All Emergency General Surgery Pathways | **Preoperative Antibiotics** | **Recommended approach:*** Begin broad spectrum antibiotics within one hour of presentation if patient is exhibiting signs of sepsis or peritonitis.1

*Cholecystectomy (for complicated acute cholecystitis):** Begin antibiotics with coverage of gram-negative rods and anaerobes as soon as possible upon presentation, within 1 hour if signs of sepsis1
 | *Enter team decisions/notes here* | **Resource:** Healthcare Infection Control Practices Advisory Committee (HICPAC) Guidelines for Prevention of Surgical Site Infections:<https://www.cdc.gov/infectioncontrol/guidelines/ssi/index.html>2**Tip:** Consult with your pharmacist for appropriate redosing intervals and dosing in in patients with renal insufficiency.  | *Enter ISCR measures here* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Mazuski JE, Tessier JM, May AK, et al. The Surgical Infection Society revised guidelines on the management of intra-abdominal infection. Surg Infect. 2017 Jan;18(1):1-76.

2 Berríos-Torres SI, Umscheid CA, Bratzler DW, et al. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. JAMA Surg. 2017;152(8):784–91. doi:10.1001/jamasurg.2017.0904

## Preoperative Multimodal Pain Management

Routine administration of multiple nonopioid analgesics in the immediate preoperative period is recommended if no contraindications.

* *Considerations for geriatric patients 65 years of age or older:* care should be taken with regards to medication contraindications in older or frail patients.
* *Considerations for orthopedic procedures:* the role of nonsteroidal anti-inflammatory agents in orthopedic surgery is controversial due to concerns over the long-term impact on bone healing. However, for short-term use, the potential benefits may outweigh the risks. Care should be taken in patients with renal insufficiency.
* *Considerations for hip fracture procedures:* this approach should be undertaken as quickly as possible after presentation to the hospital. Regional analgesia – assuming no contraindications and availability of resources, the use of a peripheral nerve block prior to surgery may be beneficial to help control pain, reduce opioid use, and minimize delirium.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Preoperative Multimodal Pain Management** | **Choose your approach:** If no contraindications, **give all of the following** **analgesics,** but choose the dosing:1. Acetaminophen – by mouth (PO)
2. Cyclo-oxygenase-2 inhibitor [e.g., celecoxib] PO
3. Consider gabapentin PO or pregabalin PO *(Avoid gabapentin in elderly patients, patients with chronic kidney disease, and patients at risk for respiratory depression as it can promote excessive drowsiness)*

*Optional for any procedure with planned bowel resection:* * Mu opioid antagonist [e.g., alvimopan 30 minutes to 5 hours prior to surgery] if bowel resection planned
 | *Enter team decisions/notes here* | **Tip:** Engage with anesthesiology colleagues and preoperative area nurses to improve your compliance of preoperative medication bundle.**Tip**: Gabapentin can sometimes be sedating.**Tip**: Review literature on Mu opioid antagonist before considering adding to pathway to ensure it will provide benefit to your patient population.**Tip:** The electronic health record system can be helpful to ensure a standard bundle of medications. | Multimodal pain management |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Preoperative and Intraoperative Antiemetics and Adjunct Agents

Routine administration of antiemetic agents and other adjuncts should be considered in patients without contraindications to reduce the incidence of post-anesthesia nausea and vomiting.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Antiemetics and Adjunct Agents** | **For nausea (choose one or multiple):*** Preoperative scopolamine patch once. Remove 24 to 72 hours after surgery (postoperative nausea and vomiting). *Do not use if the patient is 65 years of age or older*
* Intraoperative antiemetic (e.g., dexamethasone prior to incision and/or ondansetron 45–60 minutes prior to skin closure)
* Intraoperative avoidance of nitrous oxide

*OR** Intraoperative total intravenous anesthetic approach with propofol-based regimen
 | *Enter team decisions/notes here* | **Resource:** Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting1 |  Preoperative antiemetic prophylaxis  |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Gan TJ, Belani KG, Bergese S, et al. Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. Anesth Analg. 2020 Aug;131(2):411-48. doi: 10.1213/ANE.0000000000004833. Erratum in: Anesth Analg. 2020 Nov;131(5):e241. PMID: 32467512.

## Intraoperative Prophylactic Antibiotics

Prophylactic antibiotics should be administered within 60 minutes prior to incision or 120 minutes for vancomycin and fluoroquinolones. Selection should be based on surgical site infection (SSI) pathogens commonly associated with the specific procedure type, local antimicrobial resistance patterns, and a balance of benefits versus potential risks associated with the antibiotic (e.g., risk for *Clostridioides difficile* (*C. difficile*) infection or emergence of multidrug-resistant organisms). Intraoperative redosing and weight-based dosing should follow guideline recommendations.

* *Considerations for orthopedic procedures:* First-generation cephalosporins are the most commonly studied. Alternative regimens may be needed for institutions with highly resistant organisms, such as methicillin-resistant *Staphylococcus aureus* (MRSA) or *C. difficile*. Vancomycin should be included with cefazolin or used as an alternative agent in institutions that have a high prevalence of MRSA SSIs and for patients who are known to be colonized with MRSA. There is no evidence to support the use of prophylactic antibiotics more than 24 hours postoperatively.
* *Considerations for gynecologic procedures:* First-generation cephalosporins are the most commonly used in gynecologic procedures. There is no evidence to support the use of prophylactic antibiotics more than 24 hours postoperatively.
* *Considerations for emergency general surgery (major abdominal procedures):* For all patients not already receiving antibiotics prior to surgery, antibiotics should be started within 1 hour prior to incision. If using vancomycin or fluoroquinolones in such patients, start 2 hours prior to incision. Antibiotics should be discontinued at the end of the procedure except in the case of complicated intra-abdominal infection, which should be treated with a short course (4 days) following adequate source control.1,2

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures***As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.* |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Prophylactic Antibiotics** | **Choose your approach (see guideline for details):**Choose your prophylactic antibiotics approach by using [Healthcare Infection Control Practices Advisory Committee (HICPAC)](https://www.cdc.gov/hicpac/index.html) and/or Society for Healthcare Epidemiology of America (SHEA) guidelines and antibiotic stewardship practices\*:\*First dose should be administered within 60 minutes before incision (120 minutes for fluoroquinolones and vancomycin). Intraoperative redosing for longer cases and those with significant blood loss should be done as described in the Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery6 | *Enter team decisions/notes here* | **Resource:** Antibiotic Choice Is Independently Associated With Risk of Surgical Site Infection After Colectomy: A Population-Based Cohort Study3**Resource**: Selection of Prophylactic Antimicrobial Agent May Affect Incidence of Infection in Small Bowel and Colorectal Surgery4**Resource:** Choice of Intravenous Antibiotic Prophylaxis for Colorectal Surgery Does Matter5**Resource:** Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery5**Tip:** If available use your antibiotic stewardship committee and include your pharmacist in standardizing your prophylactic antibiotic approach.**Tip:** Include in operating room briefing.**Tip:** For vancomycin, coordinate with anesthesia providers and preoperative area nurses to ensure administration in ample time before incision. | *Enter ISCR measures here* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Sawyer RG, Claridge JA, Nathens AB, et al. Trial of short-course antimicrobial therapy for intraabdominal infection. New England Journal of Medicine. 2015;372(21):1996-2005.

2 Mazuski JE, Tessier JM, May AK, et al. The Surgical Infection Society revised guidelines on the management of intra-abdominal infection. Surg Infect. 2017 Jan;18(1):1-76

3 Hendren S, Fritze D, Banerjee M, et al. Antibiotic Choice Is Independently Associated With Risk of Surgical Site Infection After Colectomy: A Population-Based Cohort Study. Ann Surg 2013;257:469-75.

4 Eagye KJ, Nicolau DP. Selection of prophylactic antimicrobial agent may affect incidence of infection in small bowel and colorectal surgery. Surg Infect (Larchmt) 2011;12:451-7.

5 Deierhoi RJ, Dawes LG, Vick C, et al. Choice of Intravenous Antibiotic Prophylaxis for Colorectal Surgery Does Matter. J Am Coll Surg. 2013 Nov;217(5):763-9. doi: 10.1016/j.jamcollsurg.2013.07.003. Epub 2013 Sep 14. PMID: 24045142.

6 Bratzler DW, Dellinger EP, Olsen KM, et al. American Society of Health-System Pharmacists (ASHP); Infectious Diseases Society of America (IDSA); Surgical Infection Society (SIS); Society for Healthcare Epidemiology of America (SHEA). Clinical practice guidelines for antimicrobial prophylaxis in surgery. Surg Infect (Larchmt). 2013 Feb;14(1):73-156. doi: 10.1089/sur.2013.9999. Epub 2013 Mar 5. PubMed PMID: 23461695.

## Intraoperative Skin Preparation

Skin preparation should be done with an alcohol-based regimen (either alcohol plus chlorhexidine or alcohol plus an iodophor) unless contraindicated.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Skin Preparation** | **Recommended approach:** * Alcohol-based regimen (e.g., ChloraPrep™, Duraprep™)
 | *Enter team decisions/notes here* | **Tip:** Train all operating room staff on standardized skin preparation, including skin preparation for patients with ostomies. | Skin preparation |

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## Intraoperative Anesthesia

Intraoperative anesthesia should be tailored to optimize anesthetic depth while facilitating rapid awakening after completion of the surgical procedure. Adjunct agents that allow potent, long-acting opiates to be avoided should be considered. Standardized pathways should include multimodal strategies to prevent nausea and vomiting in the postoperative period.

Minimize use of opioids and consider the use of anesthetic agents/techniques, such as:

* Intravenous infusions of anesthetics (e.g., lidocaine, ketamine, magnesium)
* Regional anesthesia (e.g., epidural, spinal, or peripheral block or intrathecal morphine)
* General anesthesia (e.g., propofol/total intravenous anesthesia)
* Postoperative nausea and vomiting prophylaxis

*Considerations for emergency general surgery (EGS) (major abdominal procedures)*: Neuromuscular monitoring should be used to ensure full reversal of the patient at the end of the procedure. EGS patients can be at particular risk for complications of partial reversal, due to acidosis, relative hypothermia, and potentially having a full stomach due to the acute presentation of their disease.

*A note on choosing anesthetic agents:* The choice of regional versus general anesthesia should be made by the anesthesiologist in conjunction with the perioperative team and should be tailored to the individual patient and skill set of the providers. Intrathecal hydrophilic opioids such as morphine may provide prolonged postoperative analgesia but require coordination with the postoperative care team to ensure appropriate monitoring is available.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Standard Intraoperative Anesthesia Pathway** | **Example approach: Below are three elements which you should consider when building your protocol:**1. Type of anesthesia and analgesia to allow rapid awakening, return of function and minimize opioids:
2. General anesthesia (e.g., desflurane, sevoflurane, propofol /total intravenous anesthesia)
3. Regional anesthesia (e.g., epidural, spinal, truncal peripheral nerve blocks [e.g., transversus abdominis plane (TAP) block)/catheters])
4. Non-narcotic analgesia adjuncts (one or more of the following)\*:
5. Intravenous lidocaine
6. Ketamine
7. Magnesium

\**Consensus dosing recommendations not available. Confer with local anesthesia providers, other perioperative healthcare providers, and pharmacists to develop standardized approach*1. Postoperative nausea and vomiting prophylaxis:
2. Ondansetron
3. Dexamethasone
 | *Enter team decisions/notes here* | **Resource:** Anesthesia colorectal evidence review1**Resource**: Anesthesia gynecologic evidence review2**Resource:** Anesthesia total hip and knee replacement evidence reviews3,4**Resource:** Anesthesia hip fracture evidence review5 | Regional anesthesia |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Ban KA, Gibbons MM, Ko CY, et al. Evidence Review Conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: Focus on Anesthesiology for Colorectal Surgery. Anesth Analg. 2019 May;128(5):879-89. doi: 10.1213/ANE.0000000000003366. PMID: 29649026.

2 Grant MC, Gibbons MM, Ko CY, et al. Evidence review conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for gynecologic surgery. Reg Anesth Pain Med. 2019 Feb 7:rapm-2018-100071. doi: 10.1136/rapm-2018-100071. Epub ahead of print. PMID: 30737316.

3 Soffin EM, Gibbons MM, Ko CY, et al. Evidence Review Conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: Focus on Anesthesiology for Total Knee Arthroplasty. Anesth Analg. 2019 Mar;128(3):441-53. doi: 10.1213/ANE.0000000000003564. PMID: 29889710.

4 Soffin EM, Gibbons MM, Ko CY, et al. Evidence Review Conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: Focus on Anesthesiology for Total Hip Arthroplasty. Anesth Analg. 2019 Mar;128(3):454-65. doi: 10.1213/ANE.0000000000003663. PMID: 30044289.

5 Soffin EM, Gibbons MM, Wick EC, et al. Evidence Review Conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: Focus on Anesthesiology for Hip Fracture Surgery. Anesth Analg. 2019 Jun;128(6):1107-1117. doi: 10.1213/ANE.0000000000003925. PMID: 31094775.

## Intraoperative Tranexamic Acid

To minimize intra- and postoperative blood loss and transfusion in hip and knee replacement procedures, tranexamic acid (TXA) is an antifibrinolytic drug that should be considered in patients without contraindications. However, the optimal dose, timing, and route of its administration are currently undefined.

* *A note about hip fracture procedures*: Available studies in hip fracture surgery are limited and there is insufficient data to determine if TXA will promote a hypercoagulable state.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **Hip and Knee Replacement and Hip Fracture Surgery** | **TXA** | **Recommended approach:** * Consider for intraoperative use on an individual basis in patients at high bleeding risk, or for intraoperative bleeding.
 | *Enter team decisions/notes here* | *Enter any additional resources and tips recommended by your ISCR team here.* | Intraoperative TXA use |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Intraoperative Blood Transfusion

Although levels of hemoglobin between 6 and 10 g/dL triggering blood transfusion are reported in the literature (including guidelines),1 experts agree that judicious use of blood transfusion during surgery is not associated with adverse outcomes and that hemoglobin of 7–8 g/dL is the recommended threshold level for transfusion, taking clinical context into account.2

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Blood Transfusion** | **Recommended approach:** * Judicious blood transfusion during surgery for hemoglobin levels of 7–8 g/dL or lower, taking clinical context into account
 | *Enter team decisions/notes here* | *Enter any additional resources and tips recommended by your ISCR team here.* | Intraoperative transfusion of packed RBCs (red blood cells and whole blood products) |

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1 Practice Guidelines for Perioperative Blood Management: An Updated Report by the American Society of Anesthesiologists Task Force on Perioperative Blood Management\*. Anesthesiology 2015;122(2):241-275. doi: 10.1097/ALN.0000000000000463

2 Carson JL, Guyatt G, Heddle NM, et al. Clinical Practice Guidelines From the AABB: Red Blood Cell Transfusion Thresholds and Storage. JAMA. 2016;316(19):2025–2035. doi:10.1001/jama.2016.9185

## Intraoperative Ventilation

A lung-protective ventilation strategy is recommended. Tidal volumes of 6–8 mL/kg of predicted body weight with positive end expiratory pressures of 5 cm H2O may decrease pulmonary complications.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Ventilation** | **Recommended approach:*** Intraoperative tidal volume 6–8 mL/kg of predicted body weight with positive end expiratory pressures of 5 cm H2O
 | *Enter team decisions/notes here* | *Enter any additional resources and tips recommended by your ISCR team here.* | *Enter ISCR measures here* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Intraoperative Normothermia

Normothermia should be maintained throughout the preoperative, intraoperative, and immediate postoperative period. Preoperative warming maybe helpful in maintaining intraoperative normothermia and should be especially considered for patients who are elderly, patients with cardiopulmonary disease, and for long procedures.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Normothermia** | **Choose your approach:** * Forced air warmer in operating room
* Warmed intravenous fluids in the operating room
 | *Enter team decisions/notes here* | **Tip:** Place blanket warmers in prep area and include in order set/policy. Let all know that blanket warmers also increase patient satisfaction. | Normothermia |

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## Intraoperative Euvolemia

Intraoperative fluid management should be individualized to minimize fluid loss and maintain euvolemia.

* *Considerations for colorectal procedures:* Goal-directed fluid therapy may be beneficial in high-risk patients or surgical procedures where there are large fluid shifts, blood loss, or a systemic inflammatory response. Balanced crystalloid solutions are preferred, and albumin supplementation can be considered as needed.
* *Considerations for hip and knee replacement procedures:* There is a lack of procedure-specific evidence for the value of goal-directed fluid therapy in elective joint replacement surgeries.
* *Considerations for hip fracture procedures:* Current evidence does not support use of a specific protocol or advanced hemodynamic monitoring to guide fluid resuscitation beyond usual care.
* *Considerations for gynecologic procedures:* Goal-directed fluid therapy is recommended for high-risk patients (presence of significant comorbidities such as congestive heart failure) or when there is large blood loss.
* *Considerations for emergency general surgery (EGS) (major abdominal procedures):* Fluid management in the EGS population must consider the clinical status of the patient. Goal-directed fluid therapy may be beneficial in high-risk patients with signs of sepsis and procedures with large fluid shifts or bleeding. Targeting euvolemia in the early postoperative period is a reasonable strategy in appropriate patients without signs of hypovolemia or hypoperfusion. Balanced crystalloid solutions are preferred, such as lactated Ringer’s or Plasma-Lyte®.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Euvolemia** | **Recommended approach:*** Intraoperative fluid management should be individualized to minimize fluid and maintain euvolemia
* Fluid composition should be a balanced crystalloid solution such as lactated Ringer’s or Plasma-Lyte®
* Patients with sepsis may benefit from a goal-directed fluid approach
 | *Enter team decisions/notes here* | *Enter any additional resources and tips recommended by your ISCR team here.* | *Enter ISCR measures here* |

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## Intraoperative Wound Protector Use

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Wound Protector Use** | **Recommended approach:*** Wound protectors are recommended for all **open** procedures
 | *Enter team decisions/notes here* | *Enter any additional resources and tips recommended by your ISCR team here.* | *Enter ISCR measures here* |

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## Intraoperative Avoidance of Tubes and Drains

Routine use of nasogastric tubes or surgical drains is not recommended.

* *Considerations for colorectal procedures:* The role of pelvic drainage after rectal anastomoses remains uncertain and should be patient specific.
* *Considerations for gynecologic procedures:* If nasogastric tube is used intraoperatively, remove at time of extubation. Peritoneal or retroperitoneal drains may be used if there is a rectal anastomosis within 6 cm from anal verge or the patient is high risk for postoperative pelvic collections.
* *Considerations for emergency general surgery (EGS) (major abdominal procedures):* Nasogastric tubes may be used in situations where prolonged preoperative ileus is anticipated or it is necessary to divert gastric contents.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways**  | **Avoid Tubes and Drains** | **Recommended approach:*** No routine use of drains at end of procedure except for cases with low rectal anastomosis in gynecologic surgery
* Remove nasogastric or orogastric tube at end of procedure

*EGS Major Abdominal Surgery Considerations:* * Routine use of intraperitoneal drains is not recommended.
* Routine nasogastric tube decompression is not recommended unless prolonged ileus is anticipated or it is necessary to divert gastric contents.

*Appendectomy and Cholecystectomy Considerations:** Routine use of peritoneal drains is not recommended for surgery for acute cholecystitis or appendicitis
 | *Enter team decisions/notes here* | **Tip:** Remove nasogastric tubes before leaving the operating room if appropriate. | *Enter here* |

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## Intraoperative Urinary Catheter Insertion

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Indwelling Urinary Catheter Use** | **Recommended approach:*** Ensure that it is communicated to the operating room (OR) team (or documented) that the patient voided prior to arriving in the OR so that an indwelling urinary catheter can be avoided
* If urinary catheter is inserted, remove before the patient leaves the operating room if not needed for hemodynamic monitoring
 | *Enter team decisions/notes here* | **Tip:** Have instructions placed in standardized order sets. | Indwelling urinary catheter avoidance or early removal  |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Intraoperative Intra-articular, Local Infiltration, and Periarticular Injection

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **Hip and Knee Replacement Pathway**  | **Intra-articular, Local Infiltration, and Periarticular Injection** | **Recommended approach:*** Consider intra-articular injection or local/periarticular infiltration of local analgesics for controlling postoperative pain when regional analgesia is not available
 | *Enter team decisions/notes here* | *Enter any additional resources and tips recommended by your ISCR team here.* | Multimodal pain management |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Postoperative Venous Thromboembolism Prophylaxis

Combined mechanical and chemoprophylaxis for venous thromboembolism (VTE) is recommended for the duration of hospitalization in all patients. Postoperative chemoprophylaxis should begin within 24 hours of surgery. **No consensus exists regarding optimal regimen and duration of therapy, but at least 28 days total duration is a common target for patients undergoing surgery for colorectal cancer, hip and knee replacement, hip fracture, and gynecologic malignancies.** Options include low molecular weight heparin, vitamin K antagonists, direct oral anticoagulants, or aspirin (at least 325 mg BID [twice per day]).

* *Considerations for emergency general surgery (EGS) (appendectomy/cholecystectomy procedures)*: Low-risk patients undergoing appendectomy and cholecystectomy may be appropriate for mechanical prophylaxis alone1
* *Considerations for EGS (major abdominal procedures)*: Optimal postoperative chemoprophylaxis should ideally begin within 12 hours of surgery.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways**  | **Postoperative Venous Thromboembolism (VTE) Prophylaxis** | **Choose your approach:*** Use a risk assessment tool to stratify VTE risk2
* Patients with 0–1 risk factors and short operative time may be candidates for mechanical prophylaxis alone
* Patients with 2+ risk factors should receive chemoprophylaxis with one of the following:
	+ Heparin\*
	+ Low molecular weight heparin\*
	+ Options may also include vitamin K antagonists, direct oral anticoagulants or aspirin (at least 325 mg twice per day [BID] for aspirin).

\*Consider increasing dose in obese patients with body mass index (BMI) > 40 | *Enter team decisions/notes here* | **Tip:** Familiarize the care team with  [risk assessment tools](https://www.ahrq.gov/patient-safety/resources/vtguide/guide4.html) (e.g., [Caprini](https://thrombosiscanada.ca/wp-content/uploads/2017/04/VTE-Risk-Assessment-Tool-Caprini-Score-Card-Eng-30Apr2018.pdf) or Padua).2  **Tip:** Follow institutional or other guidelines when using VTE prophylaxis with epidural analgesia.**Tip:** Include VTE prophylaxis in admission order sets and have policy in place to prescribe VTE prophylaxis for a total of 28 days after surgery if that is indicated by the patient’s diagnoses and operation. **Tip:** Patient education should be done about risks and benefits of post discharge prophylaxis. | First postoperative VTE chemoprophylaxis doseMedical VTE prophylaxis continued 28 days postoperatively |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Schünemann HJ, Cushman M, Burnett AE, et al. American Society of Hematology 2018 guidelines for management of venous thromboembolism: prophylaxis for hospitalized and nonhospitalized medical patients. Blood Adv. 2018;2(22):3198–3225.

2 Maynard G. Choose the Model To Assess VTE and Bleeding Risk. In: Preventing Hospital-Associated Venous Thromboembolism: A Guide for Effective Quality Improvement, 2nd ed. Rockville, MD: Agency for Healthcare Research and Quality; August 2016: chapter 4. https://www.ahrq.gov/patient-safety/settings/hospital/vtguide/index.html.

## Postoperative Multimodal Pain Management

A standard, multimodal antiemetic and opioid sparing analgesic regimen is recommended for all postoperative patients. Medications should be administered orally with cessation of intravenous (IV) medication as early as tolerated by the patient. Opioid-sparing pain regimens should be optimized postoperatively and continued in the post-discharge period. Regimens can involve:

* Regional analgesia
* Core nonopioid analgesic regimen
* Optional analgesic adjuncts
* Optional opioid analgesic agents only as needed

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Postoperative Multimodal Pain Management** | **Choose your approach:*** **Nonopioid analgesics**

Scheduled:* + Acetaminophen. IV dosing is an alternative if the patient is unable to take by mouth (PO).

*AND** + Nonsteroidal anti-inflammatory drug (e.g., ibuprofen, ketorolac) should be considered on an individual basis.
	+ Consider gabapentin PO or pregabalin PO once (avoid gabapentin in elderly patients, patients with chronic kidney disease, and patients at risk for respiratory depression as it can promote excessive drowsiness)
* **If expertise or resources are available, use:**
	+ Regional analgesia (e.g., transversus abdominis plane block) using a local anesthetic regimen
* **If available, adjuncts to consider for all pathways:**
	+ Lidocaine topical patch placed for up to 12 hours in a 24-hour period
	+ N-Methyl-D-aspartate (NMDA) antagonists (e.g., dextromethorphan)
* **If available, adjuncts to consider for colorectal and gynecologic surgery:**
	+ Mu opioid antagonists (e.g., alvimopan for a maximum of 7 days)
 | *Enter team decisions/notes here* | **Tip:** Use your pharmacist to determine dosages and dosing schedules**.****Tip:** Standardize multimodal pain management options in order sets and ensure timing of meds is conducive to patient sleep patterns.**Tip:** Ensure physicians, nurses and patients are educated about benefits of pre-emptive analgesia and around-the-clock multimodal medications.**Tip:** Use patient-controlled analgesia pumps initially with a demand dose which may be considered for major abdominal procedures where optimal pain control cannot be obtained with multimodal analgesia.**Tip:** Avoid gabapentin in elderly patients and patients at risk for respiratory depression as it can promote excessive drowsiness. | Multimodal pain management |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Postoperative Early Alimentation

Early postoperative feeding is recommended for patients unless they experience nausea or vomiting.

* *Considerations for hip fracture procedures:* There is currently no evidence supporting the use of nasogastric or parenteral nutrition or supplementation with respect to mortality or complications.
* *Considerations for gynecologic procedures:* Encourage oral intake as early as 4 hours following surgery and advance as tolerated per patient.
* *Considerations for emergency general surgery (major abdominal procedures):* Initiation of enteral feeding of patients who require gastric content diversion or are anticipated to have a prolonged preoperative ileus should be considered on a case-by-case basis. Enteral feeding is preferred over parental whenever possible.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways**  | **Early Alimentation** | **Choose your approach:** * Clear liquids postoperative day (POD) 0
* Regular diet POD 0
 | *Enter team decisions/notes here* | **Tip:** Offer patient a glass of water prior to leaving recovery room. | First postoperative intake of liquidsFirst postoperative intake of solidsDate tolerating diet  |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Postoperative Early Mobilization

Mobilization as soon as possible after surgery is recommended for all patients. Ideally, patients should be mobilized within 24 hours of surgery unless a significant contraindication exists. Provided the patient’s condition allows for it, aim to have patients walk 3–4 times a day from postoperative day (POD) 1.

* *Considerations for hip and knee replacement procedures:* Mobilization with weight bearing as tolerated (WBAT) is recommended. There is no benefit to using continuous passive motion over early ambulation.
* *Considerations for hip fracture procedures:* Mobilization with WBAT is recommended. There is no benefit to using continuous passive motion over early ambulation.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Early Mobilization** | **Choose your approach:** * Out of bed to chair on POD 0
* Ambulate on POD 0
* Ambulate on POD 1
 | *Enter team decisions/notes here* | **Tip:** Partner with physical therapy and nursing to design an early mobility strategy.**Tip:** Engage patients with checklist and teach nurses that patients use call bell less when patients start to ambulate.**Tip:** Consider adding a prompt to your order set, such as "Consider increasing ambulation each day." | First postoperative mobilizationWBAT on POD 1 |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Prevention of Postoperative Ileus and Constipation

Use of postoperative laxatives and chewing gum is recommended for prevention of postoperative ileus.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **Colorectal and Gynecologic Pathways**  | **Prevention of Postoperative Ileus and Constipation** | **Recommended Approach:*** Chewing gum: 3 times daily
* Consider laxatives as needed: e.g., senna with docusate, docusate, magnesium oxide, magnesium hydroxide, bisacodyl
 | *Enter team decisions/notes here* | *Enter any additional resources and tips recommended by your ISCR team here.* | Return of bowel function (e.g., resolution of postoperative ileus) |

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## Postoperative Indwelling Urinary Catheter Avoidance or Early Removal

Routine urinary bladder catheter removal by postoperative day (POD) 1 is recommended in most situations.

* *Considerations for colorectal procedures:* For patients undergoing low rectal surgery, routine bladder drainage is at the discretion of the surgeon, and can be considered through PODs 3–5 based on the higher risk of urinary retention associated with these procedures
* *Considerations for gynecologic procedures:* Urinary bladder catheters should be removed immediately after minimally invasive gynecologic surgery or within 6 hours after uncomplicated abdominal hysterectomy. Urinary catheters should be removed on POD 1 after debulking surgery for gynecologic malignancies in the absence of specific indications for prolonged urinary catheter use (i.e., partial bladder resection).
* *Considerations for emergency general surgery (major abdominal procedures):* Indwelling urinary catheters that are placed should be removed as soon as possible (in operating room if feasible) unless bladder drainage is needed for hemodynamic monitoring or procedure-specific reasons.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways**  | **Early Indwelling Urinary Catheter Removal or Avoidance** | **Choose your approach:** * No indwelling urinary catheter
* Discontinue indwelling urinary catheter on POD 0
* Discontinue indwelling urinary catheter on POD 1
 | *Enter team decisions/notes here* | **Tip**: Have instructions placed in standardized order sets to discontinue if catheter left in at end of surgery.**Tip**: Consider either not using indwelling urinary catheters or removing at the end of the operation. | Prolonged indwelling urinary catheterization  |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Postoperative IV Fluid Discontinuation

Routine discontinuation of intravenous (IV) maintenance fluid is recommended as soon as the patient is drinking liquids unless the patient has difficulty with oral intake, there is evidence of kidney injury, or there is evidence of hypovolemia. This is usually on postoperative day (POD) 1.

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **IV Fluid Discontinuation** | **Choose your approach:** * Change IV to heparin or saline lock IV on POD 0
* Change IV to heparin or saline lock IV on POD 1
 | *Enter team decisions/notes here* | **Tip:** Place in order sets. | IV fluid discontinuation  |

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## Postoperative Antibiotics

| **Pathway**  | **Component** | **Example Processes To Consider*****As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.*** | **Team Decisions/Notes*****As a team, note exceptions and contraindications to the treatment or medications.*** | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **Emergency General Surgery: Major Abdominal Surgery** | **Postoperative Antibiotics** | **Recommended approach:*** Patients with complicated intrabdominal infections should not receive more than 4 days of antibiotics following adequate source control.1
 | *Enter team decisions/notes here* | **Tip:** Standardize order sets to include antibiotic courses no longer than 4 days. | *Enter ISCR measures here* |
| **Emergency General Surgery: Appendectomy and Cholecystectomy** | **Postoperative Antibiotics** | Appendectomy* Patients with acute and gangrenous appendicitis should not receive postop antibiotics
* Patients with perforated appendicitis should receive postop antibiotics for 96 hours following adequate source control.1

Cholecystectomy* No antibiotics should be given after the patient leaves the operating room
 | *Enter team decisions/notes here* | **Tip:** Standardize order sets to include antibiotic courses no longer than 4 in patients with perforated appendicitis. | *Enter ISCR measures here* |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Sartelli M, Coccolini F, Kluger Y, et al. WSES/GAIS/SIS-E/WSIS/AAST global clinical pathways for patients with intra-abdominal infections. World J Emerg Surg. 2021 Sep 25;16(1):49. doi: 10.1186/s13017-021-00387-8. PMID: 34563232; PMCID: PMC8467193.

## Postoperative Discharge Pain Control

Multimodal pain control is recommended for all patients upon discharge from the hospital. Opioid-sparing regimens are recommended; patients may be appropriate for discharge from the hospital only on nonopioid pain medications.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Discharge Pain Control** | **Recommended approach:*** **Nonopioid analgesics**

Scheduled:* + Acetaminophen

 *AND** + Nonsteroidal anti-inflammatory drug (e.g., Ibuprofen)

*Note: if patient requires narcotics at discharge, reduce the quantity of opioids prescribed then by using a standardized discharge quantity of prescribed opioids, based on patient and procedure-specific institutional practices.1*  | *Enter team decisions/notes here* | **Resource:** [American College of Surgeons Resources for Safe and Effective Pain Control After Surgery](https://www.facs.org/for-medical-professionals/education/for-your-patients/resources-for-safe-pain-control/medical-professionals/)**Resource:** [Michigan OPEN Opioid Prescribing Recommendations](https://michigan-open.org/prescribing-recommendations/)**Tip:** Refer patients to pain control sections of patient education materials. | Opioids prescribed at dischargeQuantity of opioid pills prescribed |

Abbreviations: ISCR = Improving Surgical Care and Recovery

1 Hyland SJ, Brockhaus KK, Vincent WR, et al. Perioperative Pain Management and Opioid Stewardship: A Practical Guide. Healthcare. 2021 Mar 16;9(3):333. doi: 10.3390/healthcare9030333. PMID: 33809571; PMCID: PMC8001960.

## Postoperative Discharge Planning

Discharge planning should begin well before admission (when feasible) and involve a multidisciplinary approach including physical therapists, case managers, and social workers.

* *Considerations for colorectal procedures:* Consider inclusion of wound, ostomy and continence nurses (WOCNs) in discharge planning.
* *Considerations for hip fracture procedures:* Initiate discharge planning as early as possible prior to surgery. The use of standardized discharge criteria assessing medical stability as well as functional recovery and strength is recommended.
* *Considerations for emergency general surgery (EGS) (appendectomy/cholecystectomy procedures):* Discharge planning should begin as soon as the patient is admitted.
* *Considerations for EGS (major abdominal procedures):* Discharge planning should begin as soon as the patient is admitted. Consider inclusion of WOCNs in discharge planning when applicable.

| **Pathway**  | **Component** | **Example Processes To Consider***As a team, go through each component and discuss what approach best fits your hospital. It may be an option other than what is listed below.* | **Team Decisions/Notes***As a team, note exceptions and contraindications to the treatment or medications.* | **Other Available Resources and Tips To Consider** | **ISCR Measures*****As a team, decide on specific and standardized measures you can track at your hospital. It may be helpful to record your definitions here.*** |
| --- | --- | --- | --- | --- | --- |
| **All ISCR Pathways** | **Discharge Planning** | **Recommended approach:*** A multidisciplinary approach to discharge planning should begin before admission or upon presentation for all surgeries, to include:
* The patient and family
* Wound nurses, if applicable
* Physical therapists
* Occupational therapists
* Case managers
* Social workers
 | *Enter team decisions/notes here* | **Tip:** Patients recover faster if they are discharged to home – plan early to ensure the right resources are in place for them to succeed in recovery at home.**Tip:** Depending on patient’s clinical status, pain level, and functioning at discharge, consider prescribing opioids only if indicated. | Opioid prescribed at discharge  |

Abbreviations: ISCR = Improving Surgical Care and Recovery

## Appendix: Evidence Reviews Conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery

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| --- |
| 1. Ban KA, Gibbons MM, Ko CY, et al. Surgical technical evidence review for colorectal surgery conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery. J Am Coll Surg. 2017 Oct;225(4):548-57.e3. Epub 2017 Aug 7. PMID: 28797562; PMCID: PMC9275829. <http://dx.doi.org/10.1016/j.jamcollsurg.2017.06.017>.
 |
| 1. Childers CP, Siletz AE, Singer ES, et al. Surgical technical evidence review for elective total joint replacement conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery. Geriatr Orthop Surg Rehabil. 2018 Feb 12;9:2151458518754451. PMID: 29468091; PMCID: PMC5813847. [https://doi.org/10.1177%2F2151458518754451](https://doi.org/10.1177/2151458518754451).
 |
| 1. Ban KA, Gibbons MM, Ko CY, et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for colorectal surgery. Anesth Analg. 2019 May;128(5):879-89. PMID: 29649026. <https://doi.org/10.1213/ANE.0000000000003366>.
 |
| 1. Siletz A, Childers CP, Faltermeier C, et al. Surgical technical evidence review of hip fracture surgery conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery. Geriatr Orthop Surg Rehabil. 2018 May 20;9:2151459318769215. PMID: 29844947; PMCID: PMC5964861. <https://doi.org/10.1177/2151459318769215>.
 |
| 1. Soffin EM, Gibbons MM, Ko CY, et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for total knee arthroplasty. Anesth Analg. 2019 Mar;128(3):441-53. PMID: 29889710. <https://doi.org/10.1213/ANE.0000000000003564>.
 |
| 1. Kalogera E, Nelson G, Liu J, et al. Surgical technical evidence review for gynecologic surgery conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery. Am J Obstet Gynecol. 2018 Dec;219(6):563.e1-563.e19. Epub 2018 Jul 19. PMID: 30031749.<https://doi.org/10.1016/j.ajog.2018.07.014>.
 |
| 1. Soffin EM, Gibbons MM, Ko CY, et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for total hip arthroplasty. Anesth Analg. 2019 Mar;128(3):454-465. PMID: 30044289. <https://doi.org/10.1213/ANE.0000000000003663>.
 |
| 1. Soffin EM, Gibbons MM, Wick EC, et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for hip fracture surgery. Anesth Analg. 2019 Jun;128(6):1107-17. PMID: 31094775. <https://doi.org/10.1213/ANE.0000000000003925>.
 |
| 1. Grant MC, Gibbons MM, Ko CY, et al. Evidence review conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for gynecologic surgery. Reg Anesth Pain Med. 2019 Feb 7:rapm-2018-100071. Epub ahead of print. PMID: 30737316. <https://doi.org/10.1136/rapm-2018-100071>.
 |
| 1. Hornor MA, Liu JY, Hu QL, et al. Surgical technical evidence review for acute appendectomy conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery. J Am Coll Surg. 2018 Dec;227(6):605-617.e2. Epub 2018 Oct 12. PMID: 30316962. <https://doi.org/10.1016/j.jamcollsurg.2018.09.024>.
 |
| 1. Grant MC, Gibbons MM, Ko CY, et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for bariatric surgery. Anesth Analg. 2019 Jul;129(1):51-60. PMID: 30113392. <https://doi.org/10.1213/ANE.0000000000003696>.
 |
| 1. Liu JY, Hu QL, Lamaina M, et al. Surgical technical evidence review for acute cholecystectomy conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery. J Am Coll Surg. 2020 Mar;230(3):340-54.e1. Epub 2019 Dec 26. PMID: 31884063. <https://doi.org/10.1016/j.jamcollsurg.2019.11.014>.
 |
| 1. Hu QL, Grant MC, Hornor MA, et al. Technical evidence review for emergency major abdominal operation conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery. J Am Coll Surg. 2020 Dec;231(6):743-64.e5. Epub 2020 Sep 24. PMID: 32979468. <https://doi.org/10.1016/j.jamcollsurg.2020.08.772>.
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AHRQ Pub. No. 23-0052

June 2023