*** Drug Safety Alert ***

Pradaxa (dabigatran etexilate mesylate): Drug Safety Communication - Should Not Be Used in Patients with Mechanical Prosthetic Heart Valves

The U.S. Food and Drug Administration (FDA) is informing health care professionals and the public that the blood thinner (anticoagulant) Pradaxa (dabigatran etexilate mesylate) should not be used to prevent stroke or blood clots (major thromboembolic events) in patients with mechanical heart valves, also known as mechanical prosthetic heart valves. A clinical trial in Europe (the RE-ALIGN trial) 1 was recently stopped because Pradaxa users were more likely to experience strokes, heart attacks, and blood clots forming on the mechanical heart valves than were users of the anticoagulant warfarin. There was also more bleeding after valve surgery in the Pradaxa users than in the warfarin users.

Pradaxa is not approved for patients with atrial fibrillation caused by heart valve problems. FDA is requiring a contraindication (a warning against use) of Pradaxa in patients with mechanical heart valves.

RECOMMENDATION: Health care professionals should promptly transition any patient with a mechanical heart valve who is taking Pradaxa to another medication. The use of Pradaxa in patients with another type of valve replacement made of natural biological tissue, known as a bioprosthetic valves, has not been evaluated and cannot be recommended. Patients with all types of prosthetic heart valve replacements taking Pradaxa should talk to their health care professional as soon as possible to determine the most appropriate anticoagulation treatment. Patients should not stop taking anticoagulant medications without guidance from their health care professional; stopping Pradaxa or other anticoagulants suddenly can increase the risk of blood clots and stroke.

See Complete MedWatch Safety Alert:
http://www.fda.gov/Safety/MedWatch/SafetyInformation/SafetyAlertsforHumanMedicalProducts/ucm332949.htm

ICSI Institute for Clinical Systems Improvement

Health Care Guideline

Preoperative Evaluation

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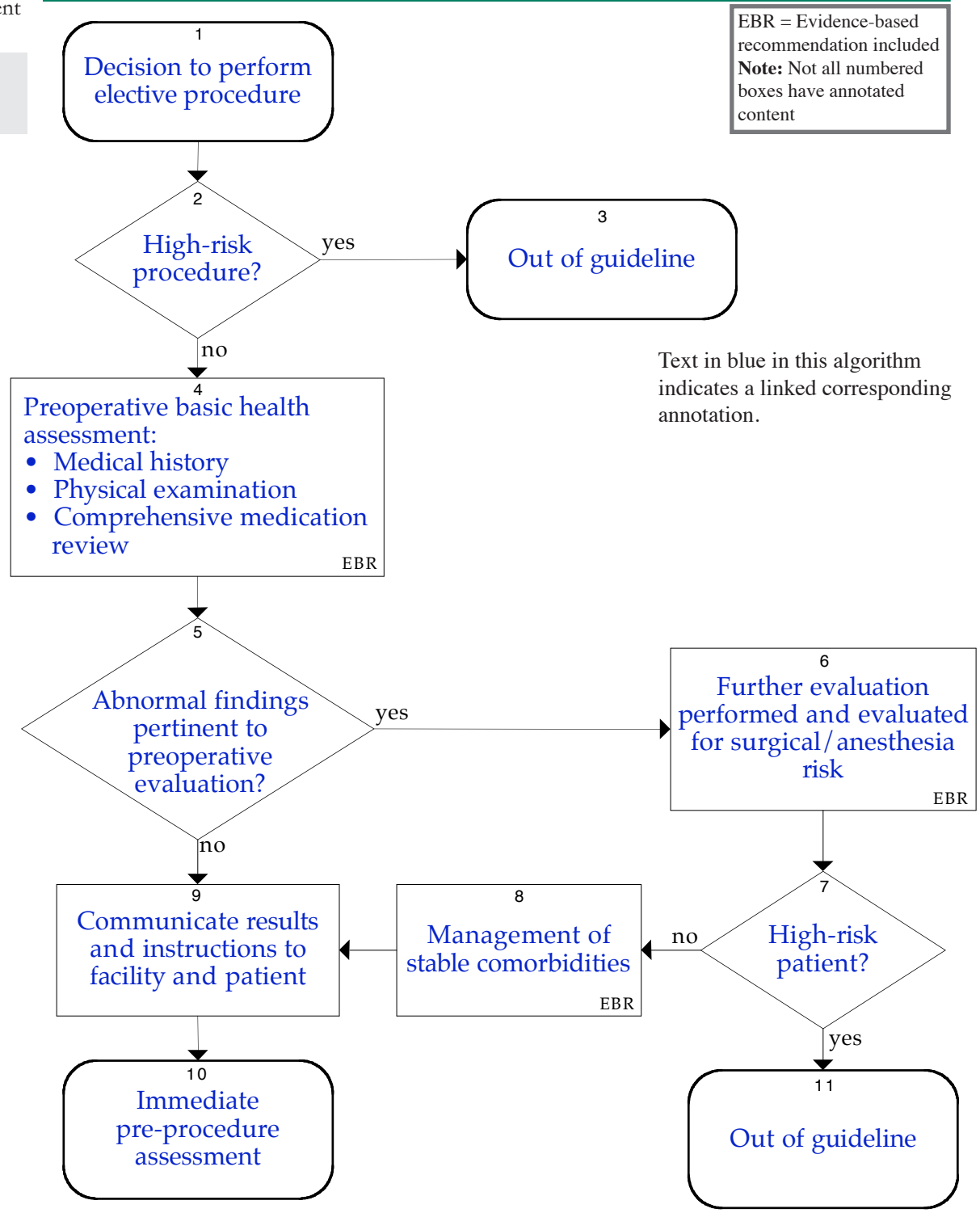
Preoperative Evaluation

EBR = Evidence-based recommendation included
Note: Not all numbered boxes have annotated content



Text in blue in this algorithm indicates a linked corresponding annotation.

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Evidence Grading

A consistent and defined process is used for literature search and review for the development and revision of ICSI guidelines. Literature search terms for the current revision of this document include; preoperative and/or preoperative assessment with obstructive sleep apnea, statins, beta-blockers, STOP-bang, medications, NSAIDS, vitamins, supplements, risk, risk factors, surgical site infection, surgical risk, anesthesia risk, comorbidities, and communication.

In 2011, ICSI began its transition to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system as a method of assessing the quality of evidence and writing recommendations.

GRADE has many advantages over other systems including:

- development by a widely representative group of international guideline developers;
- explicit and comprehensive criteria for downgrading and upgrading quality of evidence ratings;
- clear separation between quality of evidence and strength of recommendations that includes a transparent process of moving from evidence evaluation to recommendations;
- clear, pragmatic interpretations of strong versus weak recommendations for clinicians, patients, and policy makers;
- explicit acknowledgement of values and preferences; and
- explicit evaluation of the importance of outcomes of alternative management strategies.

In the GRADE process, evidence is gathered related to a specific question. Systematic reviews are utilized first. Further literature is incorporated with randomized control trials or observational studies. The evidence addresses the same population, intervention, comparisons and outcomes. The overall body of evidence for each topic is then given a quality rating.

Once the quality of the evidence has been determined, recommendations are formulated to reflect their strength. The strength of a recommendation is either strong or weak. Low quality evidence rarely has a strong recommendation. Only outcomes that are critical are considered the primary factors influencing a recommendation and are used to determine the overall strength of this recommendation. Each recommendation answers a focused health care question.

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Supporting Literature

In addition to evidence that is graded and used to formulate recommendations, additional pieces of literature will be used to direct the reader to other topics of interest. This literature is not given an evidence grade and is instead used as a reference for its associated topic. These citations are noted by (author, year) and are found in the references section of this document.

Category	Quality Definitions	Strong Recommendation	Weak Recommendation
High Quality Evidence	Further research is very unlikely to change our confidence in the estimate of effect.	The work group is confident that the desirable effects of adhering to this recommendation outweigh the undesirable effects. This is a strong recommendation for or against. This applies to most patients.	The work group recognizes that the evidence, though of high quality, shows a balance between estimates of harms and benefits. The best action will depend on local circumstances, patient values or preferences.
Medium Quality Evidence	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.	The work group is confident that the benefits outweigh the risks but recognizes that the evidence has limitations. Further evidence may impact this recommendation. This is a recommendation that likely applies to most patients.	The work group recognizes that there is a balance between harms and benefits, based on moderate quality evidence, or that there is uncertainty about the estimates of the harms and benefits of the proposed intervention that may be affected by new evidence. Alternative approaches will likely be better for some patients under some circumstances.
Low Quality Evidence	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change. The estimate or any estimate of effect is very uncertain.	The work group feels that the evidence consistently indicates the benefit of this action outweighs the harms. This recommendation might change when higher quality evidence becomes available.	The work group recognizes that there is significant uncertainty about the best estimates of benefits and harms.

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Recommendations Table

The following table is a list of evidence-based recommendations for the Preoperative Evaluation guideline.

Note: Other recommendation language may appear throughout the document as a result of work group consensus but is not included in this evidence-based recommendations table.

Topic	Quality of Evidence	Recommendations	Strength of Recommendation	Annotation Number	Relevant Resources
Assessment of risk factors for developing surgical site infections	Low	Include risk factors for development of surgical site infections as part of the complete preoperative basic health assessment.	Strong	4	*Hennessey, 2010*
Beta-blockers	Low	Beta-blockers should be continued throughout the perioperative period for any patient who is already taking beta-blockers.	Strong	8	*Levin, 2009; Pass, 2004; Mercado, 2003; Lee, 1999*
		Vascular surgery patients with a positive stress test should be initiated on beta-blockers in the perioperative period if they are not already taking them.	Strong	8	*Levin, 2009; Pass, 2004; Mercado, 2003; Lee, 1999*
Clopidogrel, prasurgil, ticlopidine after coronary stent placement	Low	Surgery should be avoided for at least four weeks after bare-metal stent implantation.	Strong	8	*Douketis, 2012; Holmes, 2010; Grines, 2007*
		Surgery should be avoided for one year after drug-eluting stent implantation.	Strong	8	
		If surgery cannot be avoided during the above time periods, dual anti-platelet therapy should be continued perioperatively unless strongly contraindicated (i.e., procedures associated with high risk for clinically significant bleeding, such as intracranial surgery)	Strong	8	
		If deemed necessary to discontinue clonidogrel/prasurgil/ticlopidine preoperatively, aspirin should be continued, if at all possible, in the perioperative period in order to decrease cardiac risk.	Strong	8	
Coagulation studies	Low	If clinical circumstances suggest a potential bleeding problem, clinician should perform coagulation studies.	Strong	6	*Asaf, 2001*

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Topic	Quality of Evidence	Recommendations	Strength of Recommendation	Annotation Number	Relevant Resources
Diabetes	Low	Individual patient evaluation and instruction should occur prior to surgery to avoid extremes in glucose levels.	Strong	8	*Mercado, 2003*
		Doses of long acting insulins (glargine, NPH, etc.) may be decreased by up to 50% preoperatively.	Strong		
		Oral diabetic agents should be held preoperatively.	Strong		
		Short-acting, sliding scale insulin should be used to treat high blood glucose values in patients holding their normal anti-diabetic medications.	Strong		
Drugs to continue	Low	Clinicians should complete a thorough medication review (including all prescription, non-prescription, and herbal medications) with the patient at least one week before surgery if at all possible.	Strong	8	*Winchester, 2010; Levin, 2009; Comfere, 2005; Pass, 2004; Mercado, 2003; Ang, 2001*
		Medications contributing to the patient's current state of medical homeostasis should be continued (i.e., neuro/psych medications, anti-arrhythmic agents, HIV medications, statins, anti-hypertensives) with the exception of the medication groups listed in drugs to stop.	Weak		
Drugs to stop	Low	Medications that do not contribute to the medical homeostasis of the patient should be discontinued in preparation for surgery (i.e., non-prescription medications, herbal medications, and over-the-counter supplements)	Weak	8	*Levin, 2009; Pass, 2004; Mercado, 2003; Ang, 2001*
		Medications that may increase risk of adverse outcomes perioperatively should generally be discontinued according to pharmacokinetic principles (i.e., NSAIDS, ACEI [angiotensin converting enzyme inhibitor]), ARB [angiotensin receptor blocker], diabetes medications, anticoagulants, osteoporosis agents, hormone therapy)	Weak		
		Inadvertent administration of medications the night before or morning of surgery is not typically an indication for cancellation of surgical procedures.	Weak		

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Topic	Quality of Evidence	Recommendations	Strength of Recommendation	Annotation Number	Relevant Resources
Electrocardiogram	Low	Perform electrocardiogram for all patients age 65 and over within one year prior to procedure.	Weak	6	*Correll, 2009*
	High	Electrocardiograms are not indicated, regardless of age, for those patients having cataract surgery.	Strong	6	*Schein, 2000*
	High	Preoperative electrocardiograms are not recommended for patients undergoing other minimal risk procedures, unless medical history/assessment indicate high-risk patient.	Strong	6	*Schein, 2000*
Hemoglobin	Low	A preoperative hemoglobin should only be obtained based on the patient's underlying medical condition and the planned procedure.	Strong	6	*Wasserman, 1964*
Nicotine cessation	Low	Patients should always be strongly encouraged to quit nicotine use.	Strong	8	*Myers, 2011*
Obstructive sleep apnea	High	Clinicians should remind patients who have been formally diagnosed with obstructive sleep apnea and have an oral applicance or continuous positive airway pressure equipment to bring their appliance or equipment with them on the operative day.	Strong	8	*Farney, 2011; Vasu, 2010; Abrishami, 2010; Gupta, 2001*
	Low	Clinicians should screen patients for sleep apnea or sleep apnea symptoms and communicate this information to the surgical team.	Strong		
Preoperative basic health assessment	Low	A preoperative basic health assessment must be completed for all patients undergoing a diagnostic or therapeutic procedure (exceptions are addressed in Annotation #4, "Preoperative Basic Health Assessment").	Strong	4	*Committee on Standards and Practice Parameters, 2012; Roizen, 1987*
Prevention of perioperative infective endocarditis	Low	Patients diagnosed with certain cardiac conditions and undergoing specified procedures should receive appropriate antibiotic prophylaxis.	Strong	8	*Wilson, 2008*

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Foreword

Introduction

Most non-high-risk patients having elective surgery do not require routine laboratory and diagnostic testing including electrocardiograms unless a specific indication is present. This guideline acknowledges this observation, and stresses a basic history and physical examination as the key events in a preoperative assessment. Further testing is required for certain procedures, abnormal findings and age-related risks.

It is understood that the scope of this document is related to the period of time prior to the patient arriving at the hospital for surgery; however, it is recognized that the content and management of patients preparing for surgery preoperatively is also closely associated with the content and management of patients in the perioperative period.

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Scope and Target Population

The guideline describes appropriate evaluation for elective, non-high-risk operative procedures for adult and pediatric patients. Pediatric patients for whom this guideline is intended are those between the ages of 2 and 15 years. Patients over age 15 are considered adults for the purposes of this guideline.

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Aims

1. Increase the percentage of complete preoperative history and physical examinations obtained for patients two years of age and older undergoing elective, non-high-risk surgery and eliminate diagnostic tests performed without clinical indications. *(Annotation #4)*
2. Increase the percentage of patients two years of age and older undergoing elective, non-high-risk surgery who receive appropriate management of stable comorbidities prior to procedure. *(Annotation #8)*
3. Eliminate canceled or delayed elective, non-high-risk surgical procedures for patients two years of age and older due to incomplete preoperative history and physical examination and ineffective communication between clinicians. *(Annotations #4, 9)*

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Clinical Highlights

- Provide a comprehensive preoperative basic health assessment for all patients undergoing a diagnostic or therapeutic procedure as defined in the guideline. *(Annotation #4; Aims #1, 3)*
- Most laboratory and diagnostic tests including electrocardiograms are not necessary with routine procedures unless a specific indication is present. *(Annotation #6; Aim #1)*
- Patient education and instruction strongly influence perioperative outcomes (e.g., medication management, apnea screening, nicotine cessation and surgical site infection). *(Annotation #8; Aim #2)*

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Implementation Recommendation Highlights

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline.

- Develop a reliable, standardized system to obtain complete preoperative history and physical examinations and appropriate preoperative testing to eliminate unwarranted variation. (See Appendix B, "Preoperative Forms – Adult and Pediatric," Appendix C, "Preoperative Questionnaire – Adult" and Appendix D, "Preoperative Questionnaire – Pediatric.")
- Establish a reliable mechanism to communicate completed preoperative history and physical examinations, associated test results, and instructions to procedure location and patient prior to procedure. (See Appendix A, "Patient Preoperative Guide," and Appendix B, "Preoperative Forms – Adult and Pediatric.")
- Develop a comprehensive patient-centered approach to education and appropriate procedure preparation.

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Related ICSI Scientific Documents

Guidelines

- Antithrombotic Therapy Supplement
- Venous Thromboembolism Prophylaxis

Protocols

- Perioperative Protocol

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Definition

Clinician – All health care professionals whose practice is based on interaction with and/or treatment of a patient.

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Algorithm Annotations

1. Decision to Perform Elective Procedure

The decision to perform an elective procedure is usually made at the time of the surgical or other consultation. There may be exceptions; for example, a non-surgical procedure such as a computed tomography-guided lung biopsy might be arranged by the primary physician after discussion with a radiologist.

A member of the surgical team explains to the patient the procedure and the need for anesthesia, and may obtain and document consent. These issues must be addressed but are not part of this guideline.

Patient education is essential to assist the patient in preparing for the surgical procedure and to reinforce compliance with preoperative instructions. The "Patient Preoperative Guide," an optional tool, may assist in these efforts. Please refer to Appendix A, "Patient Preoperative Guide."

Patients undergoing high-risk or emergent procedures are beyond the scope of this guideline as a more extensive evaluation and risk assessment may be needed.

The technical aspects of shared decision-making to proceed with surgery are beyond the scope of this guideline, but are included as a reference in Appendix F, "ICSI Shared Decision-Making Model."

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2. High-Risk Procedure?

High-risk referred to here is primarily surgical procedure-derived risk of *cardiac/pulmonary* complication. Cardiovascular complications are more common in adults, and pulmonary complications are more common in children. If a procedure presents other specific *non-cardiovascular* associated high-risk, that risk and its stratification are beyond the scope of this guideline and need to be individually addressed by the surgeon. For example, a neurosurgical procedure may have an inherent elevated hemostasis risk.

The above scheme only distinguishes between high-risk procedures and non-high-risk procedures. Certainly further refinement is possible as illustrated in Eagle (high-, intermediate- and low-cardiac-risk categories) *(Eagle, 2002)*. This guideline work group took the approach of universal precautions, meaning that, if all high-risk procedures are excluded and all patients are adequately evaluated preoperatively, there is questionable gain in further procedural risk stratification.

Although it is ultimately up to the involved clinicians to determine whether a particular procedure is considered to be high risk, it is generally accepted that most high-risk (greater than five percent combined incidence of cardiac death and non-fatal myocardial infarction) procedures fall into the following categories:

- Major cardiac and non-cardiac thoracic procedures
- Aortic and other major vascular procedures
- Anticipated prolonged surgical procedures (usually greater than four hours) associated with large fluid shifts and/or blood loss (e.g., pancreas resection [Whipple procedure], major spinal surgery)

Overall mortality rates for ambulatory surgery are much lower than hospital rates due to both patient and procedure pre-selection. A study of major mortality and major morbidity within one month of an ambulatory surgery and anesthesia demonstrated only four deaths out of a total of 38,598 patients and 45,090 procedures. Two of the deaths were due to motor vehicle accidents and the other two due to myocardial infarction. The overall non-accident-related death rate was 1/22,545 *(Warner, 1993)*.

In general, the type of anesthesia employed (general anesthesia versus spinal anesthesia) and duration of surgery have not been shown to be independently correlated with risk of complication.

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3. Out of Guideline

Patients having high-risk procedures fall outside the scope of this guideline.

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4. Preoperative Basic Health Assessment

Recommendations:

- A preoperative basic health assessment must be completed for all patients undergoing a diagnostic or therapeutic procedure (exceptions are addressed below) *(Low Quality Evidence, Strong Recommendation) (Committee on Standards and Practice Parameters, 2012; Roizen, 1987*).
- Include risk factors for development of surgical site infections as part of the complete preoperative basic health assessment *(Low Quality Evidence, Strong Recommendation) (Hennesey, 2010)*.

This guideline follows the basic premise that diagnostic tests (laboratory and x-ray) are not a part of the preoperative basic health assessment.

Roizen et al. have said that "history-taking and the physical examination are still the best means of preoperative screening, and laboratory tests other than those indicated by the history and physical examination are not cost effective, do not provide medicolegal protection, and in fact may harm the patient" *(Roizen, 1987)*.

Meneghini et al. in reviewing charts of children classified as physical status 1 and 2 (using the American Society of Anesthesiologists Classification System) who underwent minor surgical procedures have said that "on the basis of our experience we believe that a thorough clinical assessment of the patient is more important than routine preoperative laboratory screening, which should be required only when justified by real clinical indications. Moreover, this practice eliminates unnecessary costs without compromising the safety and the quality of care" *(Meneghini, 1998)*.

A complete preoperative basic health assessment includes:

- **Medical history**

  Indication for surgical procedure

  Allergies and intolerances to medications, anesthesia or other agents (specify reaction type)

  Known medical problems

  Surgical history

  Trauma (major)

  Current medications (prescription, over-the-counter medications, herbal and dietary supplements)

  Risk factors for development of surgical site infection (e.g., smoking, diabetes, obesity, malnutrition, chronic skin disease)

  Malnutrition is a known risk factor for decreased wound healing and increased surgical site infections. A basic nutritional assessment should be considered on all patients undergoing surgery, with lab verification reserved for those patients felt to be at risk.

  Focused review of issues pertinent to the planned anesthesia and procedure:

  - Current status of pertinent known medical problems

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- Cardiac status
- Pulmonary status
- Functional status (the ability to perform at four or more METs) *(Eagle, 2002)*
- Hemostasis status (personal or family history of abnormal bleeding)
- Possibility of severe (symptomatic) anemia
- Possibility of pregnancy
- Past personal or family history of anesthesia problems
- Smoking, alcohol history and illicit drugs

- **Physical examination**

  Weight, height and body mass index

  Vital signs – blood pressure, pulse (rate and regularity), respiratory rate

  Cardiac

  Pulmonary

  Other pertinent exam

(American Academy of Pediatrics, 1996)

A sample preoperative form is attached in Appendix B, "Preoperative Forms – Adult and Pediatric."

Basic Health Assessment Applications

A preoperative basic health assessment as outlined in this guideline is required for all patients undergoing a diagnostic or therapeutic procedure, regardless of setting, except for:

- Otherwise healthy patients receiving peripheral nerve blocks, local or topical anesthesia, and/or no more than 50% nitrous oxide/oxygen and no other sedative or analgesic agents administered by any route – for example, most dental procedures or excision of simple skin lesions.
- Patients receiving "sedation/analgesia" (often referred to as "conscious sedation") defined as "a state that allows patients to tolerate unpleasant procedures while maintaining adequate cardiopulmonary function and the ability to respond purposefully to verbal command and/or tactile stimulation." This technique is commonly used for procedures such as endoscopy and bronchoscopy, and may be used for certain surgical procedures. Patient history must be available at the time they receive sedation/analgesia.

Although the preoperative basic health assessment is not specifically required for sedation/analgesia and other minor procedures, a limited preoperative assessment and documentation is required and mandated by The Joint Commission and other organizations.

(American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists, 2001)

The preoperative basic health assessment is usually done within 30 days of the planned procedure. However, a review of the current history and focused physical examination will occur at the surgical facility prior to the procedure.

The patient needs to be aware that the preoperative assessment is not a substitute for preventive services, but the preoperative evaluation may be used as an opportunity to address preventive services.

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This is another opportune time to initiate or augment patient education efforts, including the use of the patient preoperative guide. Please see Appendix A," Patient Preoperative Guide." Refer to ICSI Perioperative Protocol.

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5. Abnormal Findings Pertinent to Preoperative Evaluation?

Abnormal findings are results from the preoperative basic health assessment that suggest that further evaluation is needed in order to assess or optimize surgical/anesthesia risk and care. Examples of abnormal findings are a patient taking medication such as a diuretic, suggesting the need for a recent potassium level; the presence of chest pains; or a markedly elevated blood pressure. Examples of abnormal findings in pediatric patients include a current upper respiratory infection or asthma.

There may be other abnormal findings that, although not relevant to the planned procedure, may be relevant to the patient's general health. The evaluation of these findings would follow standard medical practice and is beyond the scope of the guideline. This type of finding would not necessarily need to delay the procedure.

Preoperative questionnaires to assist in determining abnormal findings for adult and pediatric patients are attached in Appendix C, "Preoperative Questionnaire – Adults," and Appendix D, "Preoperative Questionnaire – Pediatrics."

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6. Further Evaluation Performed and Evaluated for Surgical/ Anesthesia Risk

Recommendations:

- If clinical circumstances suggest a potential bleeding problem, clinician should perform coagulation studies *(Low Quality Evidence, Strong Recommendation) (Asaf, 2001)*.
- Perform electrocardiogram for all patients age 65 and over, within one year prior to procedure *(Low Quality Evidence, Weak Recommendation) (Correll, 2009)*.
- Electrocardiograms are not indicated, regardless of age, for those patients having cataract surgery *(High Quality Evidence, Strong Recommendation) (Schein, 2000)*.
- Preoperative electrocardiograms are not recommended for patients undergoing other minimal risk procedures, unless medical history/assessment indicate high-risk patient *(High Quality Evidence, Strong Recommendation) (Schein, 2000)*.
- A preoperative hemoglobin should only be obtained based on the patient's underlying medical condition and the planned procedure *(Low Quality Evidence, Strong Recommendation) (Wasserman, 1964)*.

Further evaluation may be as simple as asking a few more questions, performing further physical examination, or ordering a laboratory or radiological exam. More in-depth evaluations may be needed, such as a consultation or cardiac stress testing.

The type and extent of evaluation required should be guided by standard medical practice with consideration of the patient's underlying medical condition and the planned procedure. For example, some clinicians will order a baseline preoperative hemoglobin if significant blood loss is anticipated. Recommendations for this type of testing are beyond the scope of the guideline.

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Abnormal findings might trigger a need for a specific laboratory or other diagnostic test. Note that most laboratory and diagnostic tests (e.g., hemoglobin, potassium, coagulation studies, chest x-rays, electrocardiograms) are not routinely necessary unless a specific indication is present.

Test	Consider performing if:
Electrocardiogram	• No electrocardiogram within last year in patients (regardless of age) with history of diabetes, hypertension, chest pain, congestive heart failure, smoking, peripheral vascular disease, inability to exercise or morbid obesity. • At time of preoperative evaluation, patient has any intercurrent cardiovascular symptoms, or signs and symptoms of new or unstable cardiac disease.
Coagulation studies	• Patient has a known history of coagulation abnormalities or recent history suggesting coagulation problems or is on anticoagulants. • Patient needs anticoagulation postoperatively (where a baseline may be needed).
Hemoglobin	• Patient has a history of anemia or history suggesting recent blood loss or anemia.
Potassium	• Patient is taking digoxin, diuretics, ACE inhibitors or angiotension receptor blockers.
Chest x-ray	• Patient has signs or symptoms suggesting new or unstable cardiopulmonary disease.
Pregnancy test	• Patient is of child-bearing age and a. is sexually active and history suggests possible pregnancy, e.g., delayed menstruation, or b. patient is concerned about possible pregnancy, or c. the possibility of pregnancy is uncertain.

Electrocardiogram

Cardiac arrhythmias and conduction disturbances are common findings in the perioperative period, and the electrocardiogram may be useful as a baseline study, although no controlled or randomized trials have been done to justify this widespread practice.

The reason to obtain an electrocardiogram preoperatively is to screen for abnormalities that indicate the need for further preoperative evaluation, or influence care under anesthesia. In a study evaluating the efficacy of routine preoperative electrocardiograms in predicting perioperative cardiovascular complications in an essentially healthy population studied at a large academic medical center, Tait et al. concluded that the practice of routine electrocardiogram screening for patients with no cardiovascular risk factors was a poor predictor of perioperative complication in their patient population *(Tait, 1997)*. There are no studies linking changes to patient outcomes, despite epidemiologic studies revealing a high incidence of electrocardiogram

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abnormalities that increase exponentially with age. The consensus of the guideline work group is to recommend an electrocardiogram for all patients age 65 and over, within one year prior to procedure *(Correll, 2009)*. However, electrocardiograms are not indicated, regardless of age, for those patients having cataract surgery *(Schein, 2000)*. Evidence suggests that preoperative electrocardiograms are not recommended for patients undergoing other minimal risk procedures *(Schein, 2000)*.

Coagulation Studies

There is no evidence to support routine checking of coagulation studies unless clinical circumstances suggest a potential bleeding problem. This is because of the low sensitivity and lack of predictive value of these tests *(Asaf, 2001)*.

Hemoglobin

Bleeding and thrombotic complications in the perioperative period have been documented for uncontrolled polycythemia; however, no evidence is available to quantitate the surgical and anesthetic risks of an asymptomatic normovolemic anemia *(Wasserman, 1964)*. The optimal hemoglobin level that provides a reserve for unexpected blood loss or cardiorespiratory stress varies by patient and type of procedure. A preoperative hemoglobin should therefore be obtained based on the patient's underlying medical condition and the planned procedure.

Pregnancy

There is no strong evidence for or against preoperative pregnancy testing, and most recommendations are based on expert opinion. Current anesthetic agents are generally considered safe regarding fetal development. An additional concern is the potential exposure to ionizing radiation. If pregnancy is a possibility, the woman is likely to want to factor this into her decision to pursue surgery, especially elective surgery. Requirements for preoperative pregnancy testing vary; some institutions require testing of all women of childbearing age while others offer the option of testing.

If a pregnancy test is positive, the subsequent decision-making process is beyond the scope of this guideline. Considerations would include whether the surgery is elective versus urgent, type of surgery, trimester of pregnancy, and other factors.

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7. High Risk Patient?

High risk in this context refers particularly to the risk of *cardiac* complications in adults and *airway* complications in pediatric patients. However, *non-cardiac* conditions in adults and *cardiac* conditions in pediatric patients, along with other conditions such as coagulopathy, severe symptomatic anemia, pregnancy and anesthesia reactions can be significant problems in selected patients. These conditions also need to be screened for as indicated in the preoperative basic health assessment. The specifics of risk stratification for non-cardiac conditions relative to an individual patient are beyond the scope of this guideline.

The final determination of a patient as high risk occurs after review and analysis of the preoperative basic health assessment and any other adjunctive evaluation that was indicated for surgical/anesthesia risk. The determination is the responsibility of involved clinicians, including the primary care physician, surgeon and anesthesiologist.

Although it is ultimately the responsibility of involved clinicians to determine whether a particular patient is considered to be at high risk of complication, it is generally accepted that patients at high risk usually fall into the following categories:

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Cardiovascular

- Unstable coronary syndromes
  - Recent* myocardial infarction
  - Unstable or severe angina

  *Recent can mean less than 30 days if post-myocardial infarction cardiac risk stratification is completed and patient determined to be low risk; three to six months if formal risk stratification is not done.
- Decompensated congestive heart failure
- Significant arrhythmias
  - High-grade atrioventricular block
  - Symptomatic ventricular arrhythmias in the presence of underlying heart disease
  - Supraventricular arrhythmias with uncontrolled ventricular rate
- Severe valvular disease
- Severe hypertension (diastolic consistently over 110, systolic consistently over 180)
- Congenital heart abnormalities

With regard to cardiac risk, the above scheme only distinguishes between high-risk patients and non-high-risk patients. Certainly further refinement is possible as illustrated in Eagle et al. (major, intermediate and minor clinical predictors) or the American Society of Anesthesiology (ASA) Classification System (six levels of physical status) *(Fleisher, 2007; Eagle, 2002)*. But, similar to the stance taken with high-risk versus non-high-risk procedures, this guideline work group took the approach of universal precautions. Thus, if all high-risk patients are excluded and all patients are adequately evaluated preoperatively, there is only marginal gain in further patient risk stratification.

Non-Cardiovascular

- Pulmonary disease, severe or symptomatic (e.g., chronic obstructive pulmonary disease requiring oxygen, respiratory distress at rest, asthma, cystic fibrosis)
- Poorly controlled symptomatic diabetes (causing symptoms with attendant risk of hypovolemia)
- Symptomatic anemia

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8. Management of Stable Comorbidities

Continuation or cessation of medications in the immediate preoperative period is an essential part of the instructions given to the patient. Controversy exists in this area, although some evidence supports specific instructions in selected situations. The following are the recommendations of the work group. Where those recommendations have the weight of literature or guidelines from a national organization, selected references are noted.

Antithrombotic Therapy

General recommendations regarding antithrombotic therapy are beyond the scope of this document, given the different classes of medications and the variety of situations for which they are used. (This document does, however, make recommendations regarding coronary stents and antiplatelet therapy; see below.) For patients on antithrombotic therapy, please refer to the ICSI Antithrombotic Therapy Supplement for information regarding management.

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Beta-Blockers

Recommendations:

- Beta-blockers should be continued throughout the perioperative period for any patient who is already taking beta-blockers *(Low Quality Evidence, Strong Recommendation) (Levin, 2009; Pass, 2004; Mercado, 2003; Lee, 1999).*
- Vascular surgery patients with a positive stress test should be initiated on beta-blockers in the perioperative period if they are not already taking them *(Low Quality Evidence, Strong Recommendation) (Levin, 2009; Pass, 2004; Mercado, 2003; Lee, 1999).*

For the remainder of patients undergoing non-cardiac surgery, the use of beta-blockers in the perioperative period remains controversial *(Fleischmann, 2009; Devereaux, 2008; Lindenauer, 2005).* This controversy includes the following questions:

- Which patient/procedure combinations need beta-blockers?
- When should beta-blockers be initiated?
- What is the dosage?
- How long should beta-blockers be continued postoperatively?

In general, the work group recommends:

- Consider initiation of beta 1 selective blocker therapy for patients undergoing moderate to high-risk procedure **AND** who have two or more revised cardiac risk index (RCRI) factors. Refer to table below for RCRI list.
- Begin the beta-blocker two weeks or more preoperatively, if possible.
- Continue postoperatively for a month or more.

Independent Predictors of Perioperative Cardiac Complications *(Lee, 1999)*

High-risk surgery*
History of ischemic heart disease
History of heart failure
History of cerebrovascular disease
Insulin-dependent diabetes mellitus
Preoperative serum creatinine > 2.0 mg/dL

* For more information, please refer to Annotation #2, "High-Risk Procedure?"

Coronary Artery Stent Placement (Recent) and Antiplatelet Therapy (Aspirin, Clopidogrel, Prasugrel and Ticlopidine)

Recommendations:

- Surgery should be avoided for at least four weeks after bare-metal stent implantation *(Low Quality Evidence, Strong Recommendation) (Douketis, 2012; Holmes, 2010; Grines, 2007).*

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- Surgery should be avoided for one year after drug-eluting stent implantation *(Low Quality Evidence, Strong Recommendation) (Douketis, 2012; Holmes, 2010; Grines, 2007)*.
- If surgery cannot be avoided during the above time periods, dual anti-platelet therapy should be continued perioperatively unless strongly contraindicated (i.e., procedures associated with high-risk for clinically significant bleeding, such as intracranial surgery) *(Low Quality Evidence, Strong Recommendation) (Douketis, 2012; Holmes, 2010; Grines, 2007)*.
- If deemed necessary to discontinue clopidogrel/prasurgil/ticlopidine preoperatively, aspirin should be continued, if at all possible, in the perioperative period in order to reduce cardiac risk *(Low Quality Evidence, Strong Recommendation) (Douketis, 2012; Holmes, 2010; Grines, 2007)*.

There is clear evidence that premature discontinuation of dual platelet therapy (aspirin combined with clopidogrel, prasurgil or ticlopidine for any reason after coronary stent placement results in a marked increased risk of myocardial infarction or death *(Schouten, 2007)*. Therefore, a critical part of the preoperative evaluation of a patient who fits this description is a careful assessment of the benefits of the surgery itself and surgical bleeding risk versus the high risk of cardiac events if platelet therapy is reduced or stopped prematurely. Important stent considerations include how long the coronary stent has been in place and whether the stent is a bare-metal stent versus a drug-eluting stent.

The pre-surgical evaluation of risk in this group of patients may require discussion with cardiology and surgery.

General principles are as follows:

- For patients with bare-metal stents, surgery should be avoided for at least four weeks after stenting.
- For patients with drug-eluting stents, surgery should be avoided for one year after stenting.
- If surgery cannot be avoided during the above time periods, dual anti-platelet therapy should be continued perioperatively unless strongly contraindicated such as intracranial surgery. Alternatives such as stopping the clopidrogel/prasugrel/ticlopidine and continuing aspirin or stopping all antiplatelet therapy may be necessary to reduce bleeding risk but are associated with increased cardiac risk.
- If anti-platelet therapy is held prior to surgery, it should be restarted as soon as possible following surgery *(Grines, 2007)*.

Preoperative Management of Chronic Medications

The work group acknowledges there is very little evidence surrounding the management of chronic medications perioperatively. Decisions about medications to be administered or held around the time of surgery are driven instead by case reports, expert opinion, and pharmacokinetic principles. A table has been developed for health care clinicians to help guide decisions about preoperative medication management (see Appendix E, "Drugs to Stop/Drugs to Continue").

It is extremely important to obtain a complete and accurate list of all of the patient's medications, both prescription and non-prescription (making sure to include herbal or "natural" medicines). Optimally, this would occur at least a week before surgery.

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As medication management is driven largely by expert opinion, communication with the consulting anesthesiologist may be warranted if there are specific questions or concerns related to continuing or discontinuing medications around the time of surgery.

Drugs to Continue

Recommendations:

- Clinicians should complete a thorough medication review (including all prescription, non-prescription and herbal or "natural" medicines) with the patient at least one week before surgery if at all possible *(Low Quality Evidence, Strong Recommendation) (Winchester, 2010; Levin, 2009; Comfere, 2005; Pass, 2004; Mercado, 2003; Ang, 2001)*.
- Medications contributing to the patient's current state of medical homeostasis should be continued (i.e., neuro/psych medications, anti-arrhythmic agents, HIV medications, statins, antihypertensives) with the exception of the medication groups listed below in Drugs to Stop *(Low Quality Evidence, Strong Recommendation) (Winchester, 2010; Levin, 2009; Comfere, 2005; Pass, 2004; Mercado, 2003; Ang, 2001)*.

In general, most prescription drugs can be continued up to the time of procedure, and will not interfere with any anesthetic plan. The drugs to be continued should certainly include medications where discontinuation puts the patient at risk. Anti-Parkinson's drugs, anti-seizure medications, anti-hypertensives, statins, cardiac rhythm drugs, and all analgesics fall into this category. The possible exceptions to the above are the ACE inhibitors and the angiotensin receptor blockers, although cessation of these remains controversial *(Comfere, 2005)*.

Factors for consideration

Many of the drugs typically continued in order to sustain medical homeostasis in the patient are not continued without risk, especially considering potential drug interactions with anesthesia agents. Factors to consider are the following points if the patient is taking any of the medications listed below:

Medication	Considerations
Angiotensin converting enzyme inhibitor (ACEI)/angiotensin receptor blocker (ARB)	Can decrease blood pressure at induction of anesthesia, and many drugs within this class have differing half-lives.
Monoamine-oxidase inhibitor (MAOI) including selegiline for Parkinson's disease	Avoid administration of meperidine/dextromethorphan/ephedrine and monitor closely while on narcotics (potential for reactions consisting of rigidity, hallucinating, fever, confusion, coma and death).
Tricyclic antidepressant (TCA)	Norepinephrine is a vasopressor of choice if needed.
Vitamin K antagonist (VKA)	Need to hold before surgery varies by surgery type – may not be necessary to hold for routine colonoscopy, cataract surgery or dermatological procedures.
Benzodiazepines	Continue these agents to avoid withdrawal; however, patient will likely have decreased anesthesia requirements.
Anti-epileptic agents	Continue these agents – Note: medications that depress the CNS may decrease anesthesia requirements.
Anti-psychotics	Can decrease seizure threshold and induce neuroleptic malignant syndrome – lithium can prolong the effect of neuromuscular blocking agents.
Venous thromboembolism (VTE) prophylaxis	See the ICSI Venous Thromboembolism Prophylaxis guideline for specific recommendations regarding need for bridging.
Beta-blocker therapy	See the ICSI Perioperative Protocol for specific risk calculations and recommendations.

(Pass, 2004; Mercado, 2003)

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Drugs to Stop

Recommendations:

- Medications that do not contribute to the medical homeostasis of the patient should be discontinued in preparation for surgery (i.e., non-prescription medications, herbal or "natural" medicines and over-the-counter supplements) *(Low Quality Evidence, Weak Recommendation) (Levin, 2009; Pass, 2004; Mercado, 2003; Ang, 2001)*.
- Medications that may increase risk of adverse outcomes perioperatively should generally be discontinued according to pharmacokinetic principles (i.e., NSAIDS, angiotensin converting enzyme inhibitor [ACEI]/angiotensin receptor blocker [ARB], diabetes medications, anticoagulants, osteoporosis agents, hormone therapy) *(Low Quality Evidence, Weak Recommendation) (Levin, 2009; Pass, 2004; Mercado, 2003; Ang, 2001)*.
- Inadvertant administration of medications the night before or morning of surgery is not typically an indication for cancellation of surgical procedures *(Low Quality Evidence, Weak Recommendation) (Levin, 2009; Pass, 2004; Mercado, 2003; Ang, 2001)*.

Those drugs with a potential to cause harm to the patient in the perioperative period should be discontinued. For example, NSAIDS and other anticoagulants increase bleed risk perioperatively. Some herbal supplements can prolong bleeding time, as well as increase blood pressure. The effects of many herbal supplements are unknown, as the actual composition of each product varies widely (these products are not regulated by the U.S. Food and Drug Administration). Hormone replacement therapies and some osteoporosis agents may promote clot development perioperatively. Optimal time frame for discontinuation before surgery depends on the pharmacokinetic profile of the medication, as well as individual patient factors. In general, it takes a drug approximately five half-lives to be completely eliminated from the system.

There is currently controversy surrounding the potential risk of bleeding associated with the use of omega-3 fatty acids. The risk of bleeding is theoretical, and stems from the biochemical role of omega-3 fatty acids in eicosanoid metabolism. A summary by Harris reviewed research including patients undergoing major vascular surgery, currently taking omega-3 fatty acids, with or without additional anticoagulants. The results of this summary led the author to conclude that omega-3 fatty acids do not increase the risk of significant clinical bleeding episodes. Based on the information provided by this summary, inadvertent administration of omega-3 fatty acids the night before or the day of surgery does not warrant cancellation of the scheduled procedure *(Harris, 2007)*.

Diabetic medications and antithrombotics are dealt with elsewhere in this document. Non-prescription drugs, supplements and vitamins can be held the morning of surgery *(Comfere, 2005)*.

Prevention of Perioperative Infective Endocarditis

Recommendations:

- Patients diagnosed with certain cardiac conditions and undergoing specified procedures should receive appropriate antibiotic prophylaxis *(Low Quality Evidence, Strong Recommendation) (Wilson, 2008)*.

Cardiac conditions for which antibiotic prophylaxis is recommended:

- Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
- Previous infective endocarditis

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- Cardiac transplantation recipients who develop valvulopathy
- Congenital heart disease (CHD)
  - Unrepaired cyanotic CHD, including palliative shunts and conduits
  - Completely repaired congenital heart defect with prosthetic material or device, placed by surgery or by catheter intervention, during the first six months after the procedure
  - Repaired CHD with residual defects at site or adjacent to site of a prosthetic patch or prosthetic device

For patients with any of these conditions, prophylaxis is recommended **only** before:

- all dental procedures that involves manipulation of gingival tissue or of the periapical region of teeth, or perforation of oral mucosa,
- an invasive procedure of the respiratory tract that involves incision or biopsy of respiratory tract mucosa, including tonsillectomy and adenoidectomy, and
- any surgical procedures that involves infected skin or musculoskeletal structures.

Regimens for antibiotics are to be given as a single dose 30-60 minutes prior to procedure (pediatric dosing is in parentheses):

- Amoxicillin – 2 g oral (50 mg/kg)
- Ampicillin – 2 g intramuscular or intravenous (50 mg/kg)
- Cefazolin or Ceftriaxone – 1 g intramuscular or intravenous (50 mg/kg)
- Cephalexin – 2 g oral (50 mg/kg)
- Clindamycin – 600 mg oral; intramuscular or intravenous (20 mg/kg)
- Azithromycin or Clarithromycin – 500 mg oral (15 mg/kg)

(Wilson, 2007)

Diabetic Management

Recommendations:

- Individual patient evaluation and instruction should occur prior to surgery to avoid extremes in glucose levels *(Low Quality Evidence, Strong Recommendation) (Mercado, 2003)*.
- Doses of long-acting insulins (glargine, NPH, etc.) may be decreased by up to 50% preoperatively *(Low Quality Evidence, Strong Recommendation) (Mercado, 2003)*.
- Oral diabetic agents should be held preoperatively *(Low Quality Evidence, Strong Recommendation) (Mercado, 2003)*.
- Short-acting, sliding scale insulin should be used to treat high blood glucose values in patients holding their normal anti-diabetic medications *(Low Quality Evidence, Strong Recommendation) (Mercado, 2003)*.

Given the complexities and wide variety of methodologies employed to achieve glycemic control, individual patient evaluation and instruction are required prior to surgery to avoid extremes in glucose levels.

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Hypoglycemia can lead to harmful effects including cardiac rhythm problems and cognitive deficits. Hypoglycemia is difficult to detect in the sedated patient.

Hyperglycemia can lead to problems with electrolytes, acidosis and fluid balance and is associated with poor wound healing, increased risk of infection, as well as higher mortality in hospitalized patients.

The optimal glucose range needs further investigation.

General principles are as follows:

- Mild hyperglycemia is preferable to hypoglycemia.
- Patients should not take oral hypoglycemics on the day of the procedure.
- Patient should not take short-acting insulin bolus the morning of procedure.
- Long-acting or intermediate insulin may be used to cover basal insulin needs; 50%-100% of usual dose is often reasonable.
- Insulin pumps should be continued but only to provide basal insulin coverage.
- The details of the insulin recommendations are influenced by the insulin sensitivity of the patient, the timing of the procedure, the length of the procedure, and how long the patient will need to take nothing by mouth following the procedure.

Sleep Apnea

Recommendations:

- Clinicians should remind patients who have been formally diagnosed with obstructive sleep apnea and have an oral appliance or continuous positive airway pressure equipment to bring their appliance or equipment with them on the operative day *(High Quality Evidence, Strong Recommendation) (Farney, 2011; Abrishami, 2010; Vasu, 2010; Gupta, 2001)*.
- Clinicians should screen patients for sleep apnea or sleep apnea symptoms and communicate to surgical team *(Low Quality Evidence, Strong Recommendation) (Farney, 2011; Vasu, 2010; Abrishami, 2009; Gupta, 2001)*.

Obstructive sleep apnea increases the patient's risk for intra- and postoperative complications *(Gupta, 2001)*. Patients with a diagnosis of obstructive sleep apnea often have oral appliances or continuous positive airway pressure equipment and should be reminded to bring those appliances or equipment on the operative day, for use during the recovery from anesthesia or sedation.

Some patients may not have a diagnosis of obstructive sleep apnea confirmed by polysomnography studies but are presumed to have obstructive sleep apnea based on the preoperative history and physical examination. Quick and inexpensive surrogates for polysomnography studies are not new and have several variants. Patients who score high on these indices may need to be treated in the perioperative period as though they have a formal diagnosis of obstructive sleep apnea. This information should be communicated to the surgeon and anesthesiologist before the patient undergoes any procedure involving general anesthesia, monitored anesthesia care, conscious sedation or the administration of narcotics *(Farney, 2011; Abrishami, 2010; Vasu, 2010; Gupta, 2001)*.

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Nicotine Cessation

Recommendations:

- Patients should always be strongly encouraged to quit nicotine use *(Low Quality Evidence, Strong Recommendation) (Myers, 2011).*

This work group recognizes that there has been confusion and concern related to nicotine cessation shortly before surgery in terms of increasing postoperative pulmonary complications which arose from misinterpretation of initial studies *(Shi, 2011).* Current literature and this work group consensus is that patients should always be strongly encouraged to abstain from nicotine at any time before surgery.

If patients are using nicotine replacement therapy, this should be continued perioperatively.

For certain procedures, e.g., vascular or orthopedic, the surgeon may require absolute nicotine cessation for at least three months prior to surgery, but that is beyond the scope of this document.

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9. Communicate Results and Instructions to Facility and Patient

The goal of the preoperative assessment is to identify and manage medical conditions that may impact perioperative morbidity and mortality. Accurate communication of preoperative findings and recommendations to the patient, the surgical facility, and the clinicians directly involved in the surgery is an important component of decreasing morbidity and mortality. During the communication process, preoperative clinicians should avoid specific anesthesia recommendations and avoid "clearing" a patient for surgery. "Patient is medically optimized" is a more accurate reflection of the work done during the preoperative process.

The results must be communicated to the location where the procedure will be conducted prior to the date of the scheduled procedure. The report should include a complete summary of the assessment, any adjunctive evaluation, and any specific recommendations.

Sample preoperative forms for relaying preoperative assessment information for adult and pediatric patients are attached in Appendix B, "Preoperative Forms – Adult and Pediatric."

Patient Education

Preoperative patient education is the shared responsibility of all clinicians. This education should include both general and procedure specific information, including the results of any preoperative testing, along with specific recommendations or instructions prior to surgery.

When providing patient education, adequate attention to the patient's reading level, potential visual impairments (provide large print materials) and other potential learning barriers is a critical component for preparing them for surgery.

Preoperative Showering/Shaving

Patients should be given instructions on how to decrease their risk of surgical site infection. These include:

- instructions not to shave or remove any hair at or near the surgical site, and
- instructions for general cleansing of the skin the night before or morning of surgery. The work group is aware of studies supporting the use of 2% chlorhexidine cloths wiped on the surgical site the night before and morning of surgery for some specific procedures, such as total joint procedures.

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Preoperative Fasting Recommendations (Nothing by Mouth)

Preoperative fasting guidelines have been revised and simplified over the last decade. The American Society of Anesthesiologists Task Force on Preoperative Fasting has issued practice guidelines that follow a "2, 4, 6, 8 hour" rule applying to all ages:

- The fasting period for clear liquids, including water, fruit juices without pulp, carbonated beverages, clear tea and coffee is recommended to be **two hours or longer** prior to surgery.
- The fasting period for breast milk is recommended to be **four hours or longer** prior to surgery.
- The fasting period for formula, non-human milk and light meals (such as toast) is recommended to be **six hours or longer** prior to surgery.
- The fasting period for fried and fatty foods or meat may be **eight hours or** longer, as these foods may prolong gastric emptying time. The amount and type of food should be taken into account to determine an appropriate fasting period.

Patients should be educated and informed of fasting requirements sufficiently in advance of the procedure.

(American Society of Anesthesiologists Task Force on Preoperative Fasting, 1999)

Venous Thromboembolism Prophylaxis

Patients should be notified preoperatively that preventive measures regarding venous thromboembolism prophylaxis might be taken, which could include compression stockings, pneumatic boots/leggings and chemoprophylaxis. Special protocols may be necessary in certain circumstances e.g., prior coronary stenting, history of deep vein thrombosis/pulmonary embolism, prior cardiac valve replacement and coagulopathy. Refer to the ICSI Venous Thromboembolism Prophylaxis guideline.

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10. Immediate Pre-Procedure Assessment

The immediate pre-procedure assessment is completed when the patient arrives for the procedure. The purpose is to assure that all necessary information is available, and that the patient's medical condition is stable (i.e., he/she continues to be a non-high-risk patient). The nature of this review is beyond the scope of the guideline but is defined by The Joint Commission and other regulatory agencies.

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11. Out of Guideline

Patients determined to be at high risk for surgery/anesthesia complications fall outside of the scope of this guideline.

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The Aims and Measures section is intended to provide guideline users with a menu of measures for multiple purposes, which may include the following:

- Population health improvement measures
- Quality improvement measures for delivery systems
- Measures from regulatory organizations such as The Joint Commission
- Measures that are currently required for public reporting
- Measures that are part of Center for Medicare Services Physician Quality Reporting initiative
- Other measures from local and national organizations aimed at measuring population health and improvement of care delivery

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

The subdivisions of this section are:

- Aims and Measures
- Implementation Recommendations
- Implementation Tools and Resources
- Implementation Tools and Resources Table

Aims and Measures

1. Increase the percentage of complete preoperative history and physical examination obtained for patients two years of age and older undergoing elective, non-high-risk surgery and eliminate diagnostic tests performed without clinical indications. *(Annotation #4)*

   Measures for accomplishing this aim:

   a. Percentage of patients with a preoperative history and examination completed prior to the day of the scheduled procedure.

   b. Percentage of patients age two years and older undergoing elective non-high-risk surgery having laboratory tests/imaging unrelated to positive findings on preoperative history and physical examination.

   c. Percentage of patients age two years and older undergoing cataract surgery who have electrocardiograms performed as part of the preoperative assessment prior to cataract surgery.

2. Increase the percentage of patients two years of age and older undergoing elective, non-high-risk surgery who receive appropriate management of stable comorbidities prior to procedure. *(Annotation #8)*

   Measures for accomplishing this aim:

   a. Percentage of patients age two years and older undergoing elective non-high-risk surgery who have appropriate management of comorbidities, prior to surgery, including (composite measure):

      - Antithrombotic therapy
      - Recent coronary stent/antiplatelet therapy
      - Beta-blocker therapy
      - Diabetic management
      - Sleep apnea
      - Nicotine cessation

   b. Percentage of patients age two years and older undergoing elective non-high-risk surgery who have preoperative recommendations documented/communicated to the patient and/or surgical facility for all of the following applicable comorbidities (composite measure):

      - Antithrombotic therapy
      - Recent coronary stent/antiplatelet therapy
      - Beta-blocker therapy
      - Diabetic management
      - Sleep apnea
      - Nicotine cessation

   c. Percentage of patients who have preoperative education documented for all of the following applicable comorbidities: (composite measure)

      - Antithrombotic therapy

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- Recent coronary stent/antiplatelet therapy
- Beta-blocker therapy
- Diabetic management
- Sleep apnea
- Nicotine cessation

3. Eliminate canceled or delayed elective, non-high-risk surgical procedures for patients two years of age and older due to incomplete preoperative history and physical examination and ineffective communication between clinicians. *(Annotations #4, 9)*

   Measures for accomplishing this aim:

   a. Percentage of canceled or delayed non-high-risk surgical procedures for patients age two years and older due to incomplete preoperative history and physical examination documentation.

   b. Percentage of canceled or delayed surgical procedures due to ineffective communication regarding patient information as defined by organizational procedures.

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Measurement Specifications

Measurement #1a

Percentage of patients age two years and older undergoing elective non-high-risk surgery with a preoperative history and examination completed prior to the day of the scheduled procedure.

Population Definition

All patients age two years and older undergoing elective non-high-risk surgical procedures.

Data of Interest

$$\frac{\text{\# of patients with documentation of preoperative history and physical examination prior to the day of the scheduled procedure}}{\text{\# of patients age two years and older undergoing elective non-high-risk surgery}}$$

Numerator/Denominator Definitions

Numerator: Number of patients with documentation of preoperative history and physical examination prior to the day of the scheduled procedure.

Denominator: Number of patients age two years and older undergoing elective non-high-risk surgery.

Denominator inclusions:

- Patients age two years and older.
- Elective non-high-risk surgery includes planned, scheduled, non-emergent surgical procedures that allow time for a scheduled preoperative health assessment.

Denominator exclusions:

- Patients younger than two years of age.
- High-risk procedures, such as cardiac or procedures, anticipated to be prolonged (usually greater than four hours), are not included.

Method/Source of Data Collection

Patients who have had a non-high-risk elective surgery within the preceding month can be randomly sampled to produce a list of at least 30 records for review. Selected records are audited using a checklist tool to determine whether all components of the assessment detailed in the guideline were documented in the chart prior to the scheduled surgical date.

Time Frame Pertaining to Data Collection

For more effective tracking of process improvement, data should be collected monthly.

Notes

This is a process measure, and improvement is noted as an increase in the percentage of patients medically optimized for surgery.

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Measurement #1b

Percentage of patients age two years and older undergoing elective non-high-risk surgery having laboratory tests/imaging unrelated to positive findings on preoperative history and physical examination.

Population Definition

All patients age two years and older undergoing elective non-high-risk surgical procedures.

Data of Interest

$$\frac{\text{\# of patients having laboratory tests/imaging unrelated to positive findings on preoperative history and physical examination}}{\text{\# of patients age two years and older undergoing elective non-high-risk surgery}}$$

Numerator/Denominator Definitions

Numerator: Number of patients having laboratory tests/imaging unrelated to positive findings on preoperative history and physical examination.

Denominator: Number of patients age two years and older undergoing elective non-high-risk surgery.

Denominator inclusions:

- Patients age two years and older.
- Elective non-high-risk surgery includes planned, scheduled, non-emergent surgical procedures that allow time for a scheduled preoperative health assessment.

Denominator exclusions:

- Patients younger than two years of age.
- High-risk procedures, such as cardiac or procedures, anticipated to be prolonged (usually greater than four hours), are not included.

Method/Source of Data Collection

Patients who have had a non-high-risk elective surgery within the preceding month can be randomly sampled to produce a list of at least 30 records for review. Selected records are audited using a checklist tool to determine whether all components of the assessment detailed in the guideline were documented in the chart prior to the scheduled surgical date.

Time Frame Pertaining to Data Collection

For more effective tracking of process improvement, data should be collected monthly.

Notes

This is a process measure, and improvement is noted as a decrease in the percentage. Lower percentage is indicative of higher quality of care.

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Measurement #1c

Percentage of patients age two years and older undergoing cataract surgery who have electrocardiograms performed as part of the preoperative assessment prior to cataract surgery.

Population Definition

All patients age two years and older undergoing cataract surgical procedures.

Data of Interest

$$\frac{\text{\# of patients having who have electrocardiograms performed as part of the preoperative assessment}}{\text{\# of patients age two years and older undergoing cataract surgery}}$$

Numerator/Denominator Definitions

Numerator: Number of patients having electrocardiograms performed as part of the preoperative assessment.

Denominator: Number of patients age two years and older undergoing cataract surgery.

Denominator inclusions:

- Patients age two years and older.
- Patients undergoing cataract surgery.

Denominator exclusions:

- Patients younger than two years of age.
- Non-cataract surgical procedures.

Method/Source of Data Collection

Patients who have had a cataract surgery within the preceding month can be randomly sampled to produce a list of at least 30 records for review. Selected records are audited using a checklist tool to determine whether all components of the assessment detailed in the guideline were documented in the chart prior to the scheduled surgical date.

Time Frame Pertaining to Data Collection

For more effective tracking of process improvement, data should be collected monthly.

Notes

This is a process measure, and zero rate is the goal. Zero percentage is indicative of high-quality care.

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Measurement #2a

Percentage of patients age two years and older undergoing elective non-high-risk surgery who have appropriate management of comorbidities prior to surgery, including:

- Antithrombotic therapy
- Recent coronary stent/antiplatelet therapy
- Beta-blocker therapy
- Diabetic management
- Sleep apnea
- Nicotine cessation

Population Definition

All patients age two years and older undergoing elective non-high-risk surgical procedures.

Data of Interest

$$\frac{\text{\# of patients having appropriate management of comorbidities prior to surgery}}{\text{\# of patients age two years and older undergoing elective non-high-risk surgery}}$$

Numerator/Denominator Definitions

Numerator: Number of patients having appropriate management of comorbidities prior to surgery, including:

- Antithrombotic therapy
- Recent coronary stent/antiplatelet therapy
- Beta-blocker therapy
- Diabetic management
- Sleep apnea
- Nicotine cessation

Denominator: Number of patients age two years and older undergoing elective non-high-risk surgery.

Denominator inclusions:

- Patients age two years and older.
- Elective non-high-risk surgery includes planned, scheduled, non-emergent surgical procedures that allow time for a scheduled preoperative health assessment.

Denominator exclusions:

- Patients younger than two years of age.
- High-risk procedures, such as cardiac or procedures, anticipated to be prolonged (usually greater than four hours), are not included.

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Method/Source of Data Collection

Patients who have had a cataract surgery within the preceding month can be randomly sampled to produce a list of at least 30 records for review. Selected records are audited using a checklist tool to determine whether all components of the assessment detailed in the guideline were documented in the chart prior to the scheduled surgical date.

Time Frame Pertaining to Data Collection

For more effective tracking of process improvement, data should be collected monthly.

Notes

This is a process composite measure, and improvement is noted as an increase in the percentage. Higher percentage is indicative of higher quality of care.

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Measurement #2b

Percentage of patients age two years and older undergoing elective non-high-risk surgery who have preoperative recommendations documented/communicated to the patient and/or surgical facility for all of the following applicable comorbidities:

- Antithrombotic therapy
- Recent coronary stent/antiplatelet therapy
- Beta-blocker therapy
- Diabetic management
- Sleep apnea
- Nicotine cessation

Population Definition

All patients age two years and older undergoing elective non-high-risk surgical procedures.

Data of Interest

$$\frac{\text{\# of patients having preoperative recommendations documented/communicated to the patient and/or surgical facility for all applicable comorbidities}}{\text{\# of patients age two years and older undergoing elective non-high-risk surgery}}$$

Numerator/Denominator Definitions

Numerator: Number of patients having preoperative recommendations documented/communicated to the patient and/or surgical facility for all of the following applicable comorbodities:

- Antithrombotic therapy
- Recent coronary stent/antiplatelet therapy
- Beta-blocker therapy
- Diabetic management
- Sleep apnea
- Nicotine cessation

Denominator: Number of patients age two years and older undergoing elective non-high-risk surgery.

Denominator inclusions:

- Patients age two years and older.
- Elective non-high-risk surgery includes planned, scheduled, non-emergent surgical procedures that allow time for a scheduled preoperative health assessment.

Denominator exclusions:

- Patients younger than two years of age.
- High-risk procedures, such as cardiac or procedures, anticipated to be prolonged (usually greater than four hours), are not included.

Method/Source of Data Collection

Patients who have had a cataract surgery within the preceding month can be randomly sampled to produce a list of at least 30 records for review. Selected records are audited using a checklist tool to determine whether all components of the assessment detailed in the guideline were documented in the chart prior to the scheduled surgical date.

Time Frame Pertaining to Data Collection

For more effective tracking of process improvement, data should be collected monthly.

Notes

This is a process composite measure, and improvement is noted as an increase in the percentage. Higher percentage is indicative of higher quality.

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Measurement #3a

Percentage of canceled or delayed elective non-high-risk surgical procedures for patients age two years and older due to incomplete preoperative history and physical examination documentation.

Population Definition

All patients age two years and older undergoing elective non-high-risk surgical procedures.

Data of Interest

$$\frac{\text{\# of surgeries canceled or delayed due to incomplete documentation of preoperative history and physical examination}}{\text{\# of elective non-high-risk surgeries for patients age two years and older}}$$

Numerator/Denominator Definitions

Numerator: Number of surgeries canceled or delayed due to incomplete documentation of preoperative history and physical examination.

Denominator: Number of elective non-high-risk surgeries for patients age two years and older.

Denominator inclusions:

- Patients age two years and older.
- Elective non-high-risk surgery includes planned, scheduled, non-emergent surgical procedures that allow time for a scheduled preoperative health assessment.

Denominator exclusions:

- Patients younger than two years of age.
- High-risk procedures, such as cardiac or procedures, anticipated to be prolonged (usually greater than four hours), are not included.

Method/Source of Data Collection

Sample at least 30 records of elective non-high-risk surgical procedures for review. Selected records are audited to determine whether surgery was canceled or delayed to incomplete documentation of preoperative history and physical examination.

Time Frame Pertaining to Data Collection

For more effective tracking of process improvement, data should be collected monthly.

Notes

This is a process measure, and improvement is noted as a decrease in the percentage.

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Measurement #3b

Percentage of canceled or delayed surgical procedures due to ineffective communication regarding patient information as defined by organizational procedures.

Population Definition

All patients age two years and older undergoing elective non-high-risk surgical procedures.

Data of Interest

$$\frac{\text{\# of surgeries canceled or delayed due to ineffective communication regarding patient information as defined by organizational procedures}}{\text{\# of elective non-high-risk surgeries for patients age two years and older}}$$

Numerator/Denominator Definitions

Numerator: Number of surgeries canceled or delayed due to ineffective communication regarding patient information as defined by organizational procedures.

Denominator: Number of elective non high risk surgeries for patients age two years and older.

Denominator inclusions:

- Patients age two years and older.
- Elective non-high-risk surgery includes planned, scheduled, non-emergent surgical procedures that allow time for a scheduled preoperative health assessment.

Denominator exclusions:

- Patients younger than two years of age.
- High-risk procedures, such as cardiac or procedures, anticipated to be prolonged (usually greater than four hours), are not included.

Method/Source of Data Collection

Sample at least 30 records of elective non-high risk surgical procedures for review. Selected records are audited to determine whether surgery was canceled or delayed due to ineffective communication regarding patient information as defined by organizational procedures.

Time Frame Pertaining to Data Collection

For more effective tracking of process improvement, data should be collected monthly.

Notes

This is a process measure, and improvement is noted as a decrease in the percentage.

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Implementation Recommendations

Prior to implementation, it is important to consider current organizational infrastructure that address the following:

- System and process design
- Training and education
- Culture and the need to shift values, beliefs and behaviors of the organization.

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline:

- Develop a reliable, standardized system to obtain complete preoperative history and physical examinations and appropriate preoperative testing to eliminate unwarranted variation. (See Appendix B, "Preoperative Forms – Adult and Pediatric," Appendix C, "Preoperative Questionnaire – Adult" and Appendix D, "Preoperative Questionnaire – Pediatric.")
- Establish a reliable mechanism to communicate completed preoperative history and physical examinations, associated test results, and instructions to procedure location and patient prior to procedure. (See Appendix A, "Patient Preoperative Guide," and Appendix B, "Preoperative Forms – Adult and Pediatric.")
- Develop a comprehensive patient-centered approach to education and appropriate procedure preparation.

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Implementation Tools and Resources

Criteria for Selecting Resources

The following tools and resources specific to the topic of the guideline were selected by the work group. Each item was reviewed thoroughly by at least one work group member. It is expected that users of these tools will establish the proper copyright prior to their use. The types of criteria the work group used are:

- The content supports the clinical and the implementation recommendations.
- Where possible, the content is supported by evidence-based research.
- The author, source and revision dates for the content is included where possible.
- The content is clear about potential biases and when appropriate conflicts of interests and/or disclaimers are noted where appropriate.

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Implementation Tools and Resources Table

Author/Organization	Title/Description	Audience	Web Sites/Order Information
American Academy of Pediatrics	Comprehensive Web site – includes clinical practice guidelines health topics and patient and family surgical resources.	Health Care Professionals; Patients and Families	http://www.aap.org
American College of Physicians	Contains guidelines and clinical information.	Health Care Clinicians	http://www.acponline.org
American Heart Association	Comprehensive Web site – includes clinical information, guidelines, health topics and patient educations resources.	Health Care Professionals; Patients and Families	http://www.heart.org
American Society of Anesthesiologists	Comprehensive Web site – includes clinical information, patient education brochures (some in Spanish) and patient safety resources.	Health Care Professionals; Patients and Families	http://www.asahq.org

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The subdivisions of this section are:

- References
- Appendices

References

Links are provided for those new references added to this edition (author name is highlighted in blue).

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Appendix A – Patient Preoperative Guide

This guide is designed to assist as you prepare for your surgical procedure.

Your surgery _____ is scheduled for _____ at _____
Date/Time Location

Information you should have after your visit to the surgeon:	
	Reasons for surgery, including alternative treatments, risks of planned surgery, expected outcome, and the expected duration of the surgical procedure.
	If you are having an outpatient procedure or if hospitalization is required, you should know how long you will be at the surgical facility and how it will be decided when you will go home.
	Need for anesthesia, techniques considering the planned operative procedure, how anesthesia will be performed, who will be performing it and when you will meet the individual performing the anesthesia.
	Whether a preoperative evaluation will be required and whether your surgeon or primary care physician will complete it. (If a preoperative clinic is used, you should know where it is and whom to contact at the clinic.)
	If your surgeon requests a preoperative evaluation, you should schedule an appointment no earlier than 30 days before your procedure and no later than 72 hours before your procedure.
	When you will feel better after the procedure and when you will be able to resume regular activities such as return to work.
	Where your family can wait and when and where the surgeon will communicate with your family and friends after your surgery.
	Who will you contact if you should develop symptoms that increase your risk of infection prior to surgery, such as a respiratory infection, fever, etc.
	Answers to any other concerns you have regarding the surgery.
	Check with your insurance plan or the business office of the surgical facility regarding insurance coverage and personal cost.
Preoperative evaluation:	
	Bring bottles of your prescription (including all inhalers and eye drops) and non-prescription medications, vitamins and herbal supplements that you are currently taking.
	You will receive specific instructions regarding what you are to do in the 24 hours preceding your surgery.
No later than one week before your surgical procedure, complete the following list:	
	Read facility specific information on what to expect before, during and after surgery. If you have not received a copy of the information from the surgical facility, please contact your surgeon's office or the surgical facility directly.

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Last 24 hours before surgery:	
	Take prescription and non-prescription medications according to physician's instructions.
	Arrange for a responsible person to drive you home and care for you after your surgery.
Night before surgery:	
	Eat a regular meal unless otherwise directed by your surgeon.
	Pack the items you will bring to the surgical facility.
	Do not bring jewelry, money, credit cards and other valuables.
	Pack storage containers for dentures, removable bridges, contacts and glasses.
	Bring your insurance cards.
	Shower with a special soap, if asked.
	Do not shave or remove any hair at or near the surgical site.
	If you have a continuous positive airway pressure (CPAP) device that you use when you sleep, bring that device with you the morning of surgery.
After midnight:	
	Follow specific instructions for what you may eat and drink.
	Take any medications as directed by your physician.
Especially for children:	
	Call your surgeon's office if your child has an upper respiratory infection or fever 24 hours before the procedure.
	Talk to your child about what is expected.
	Follow any special feeding instructions.
	Bring the child's favorite toy or blanket.
	You may want to arrange for a tour of the facility where available.

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Appendix B – Preoperative Forms – Adult and Pediatric

Preoperative Form – Adult

Primary Clinic _____ Phone Number _____ Primary M.D. _____
Anticipated Anesthesia: Local ☐ Regional ☐ General ☐ Spinal ☐ Unknown ☐
Reason for Procedure: _____

ALLERGIES / INTOLERANCES including over-the-counter drugs, eggs, and latex (*Specify reactions)*

Smoker: Yes ☐ No ☐ Quit ☐ Quit Date: _____ ETOH: Yes ☐ No ☐ Amount: _____
Advanced Directive Available: Yes ☐ No ☐ Location if written: _____

Medical Problems	Comments	Past Surgeries/Trauma
1.		1.
2.		2.
3.		3.
4.		4.
5.		5.

Medications (prescription, over-the-counter medications, herbal and dietary supplements, and illicit drugs)

1.	4.	7.
2.	5.	8.
3.	6.	9.

Pertinent Preop Questionnaire Findings: Refer to attached form
Pertinent Exam Findings:

BP	Pulse Reg ☐ Irreg ☐	Ht.	Wt. Kg. ☐ Lb. ☐
Cardiovascular:		Pulmonary:	
Other:			

Lab/X-ray None ☐ Yes ☐ (see attached)

Assessment:
Patient Medically Optimized for Planned Procedure: Yes ☐ No ☐

Preparer Name (Print): Signature	Physician Name (Print): Signature
Surgeon: _____ Surgery Date and Time _____	Surgical Facility: _____

TODAY'S DATE	**PREOPERATIVE EVALUATION** Surgery:	PATIENT IDENTIFIER LABEL

Adapted from a form developed by HealthPartners Medical Group

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Preoperative Form – Pediatric

Primary Clinic _____ Phone Number _____ Primary M.D. _____
Anticipated Anesthesia: Local ☐ Regional ☐ General ☐ Spinal ☐ Unknown ☐
Reason for Procedure: _____

Birth History: *Full term: Yes ☐ No ☐ Neonatal respiratory complications: Yes ☐ No ☐
*Full term is defined as birth occurring after 37 completed weeks of pregnancy

ALLERGIES / INTOLERANCES including over-the-counter drugs, eggs, and latex
(*Specify reactions)*

Tobacco exposure to personal or secondhand smoke: Yes ☐ No ☐

Medical Problems	Comments	Past Surgeries/Trauma
1.		1.
2.		2.
3.		3.
4.		4.
5.		5.

Medications (prescription, over-the-counter, herbal and dietary supplements, and illicit drugs)

1.	4.	7.
2.	5.	8.
3.	6.	9.

Pertinent Preop Questionnaire Findings: Refer to attached form
Pertinent Exam Findings:

BP	Pulse Reg ☐ Irreg ☐	Ht.	Wt. Kg. ☐ Lb. ☐

Cardiovascular: Pulmonary:

Oropharynx:

Hydration status (if less than two years old): Other:

Muscle strength and tone:

Lab/X-ray None ☐ Yes ☐ (see attached)

Assessment:

Patient Medically Optimized for Planned Procedure: Yes ☐ No ☐

Preparer Name (Print): Physician Name (Print):
Signature Signature

Surgeon: _____ Surgical Facility: _____
Surgery Date and Time _____

TODAY'S DATE	**PREOPERATIVE EVALUATION** Surgery:	PATIENT IDENTIFIER LABEL

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Appendix C – Preoperative Questionnaire – Adult

Patient Name _____
Age _____

Yes	No	
❑	❑	Do you ever have any **pain or discomfort in your chest**?
❑	❑	Have you ever had a **severe pain or pressure** across the front of your **chest** lasting for **half an hour or more**?
❑	❑	Do you have **swelling** in your feet or ankles at times?
❑	❑	Are you **troubled by shortness of breath** when: Walking on the level? Walking up a slight hill? Sleeping at night?
❑	❑	Do you sometimes get **pains in the calves of your legs** when you walk?
❑	❑	Does your chest ever sound **wheezy or whistling**?
❑	❑	Have you been told that you **snore, choke or gasp** most nights while sleeping?
❑	❑	Do you currently have a **cold, bronchitis or other respiratory infection**?
❑	❑	Have you had a cold, bronchitis or other **respiratory infection within the last two weeks**?
❑	❑	Do you usually have a **cough**?
❑	❑	Do you or does anyone in your family have **serious bleeding problems** such as prolonged bleeding following surgeries or cuts?
❑	❑	Have you taken any **aspirin, other blood thinners, or arthritis medicine** in the last two weeks?
❑	❑	Have you ever had problems with anemia or been told to take **iron pills**?
❑	❑	Have you had any **abnormal blood loss** such as black, tarry or bloody stools, (for women) abnormal vaginal bleeding?
❑	❑	Have you or any of your relatives ever had **problems with anesthesia**?
		(For women)
❑	❑	Is there any chance that you may be pregnant? Last period when?_____

-- Please complete and bring with you to your preoperative visit --

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Appendix D – Preoperative Questionnaire – Pediatric

Patient Name_____
Age _____

Yes	No	
❑	❑	Has your child had **good growth, development, and good exercise tolerance**?
❑	❑	Was your child ever intubated (used a **tube** to help them breathe)? How long did your child use it?
❑	❑	Has your child ever been **short of breath** while exercising or been **blue around the lips**?
❑	❑	Does your child's chest ever sound **wheezy or whistling**?
❑	❑	Does your child **snore**?
❑	❑	Has your child had a **cold or other respiratory infection within the last four weeks**?
❑	❑	Does your child have or does anyone in the family have **nerve or muscle problems**?
❑	❑	Does your child have or does anyone in the family have **serious bleeding or bruising problems?**
❑	❑	Has your child been given **ibuprofen aspirin** or similar medications in the past **two weeks**?
❑	❑	Has your child ever had problems with **anemia** or been told to take iron pills?
❑	❑	Has your child or other family member ever had **problems with anesthesia**?
		For female children:
		Has your child started her periods? Yes ❑ No ❑ If yes, complete the following: Last period when? _____
❑	❑	Is there a chance of pregnancy?

- - Please complete and bring with you to your child's preoperative visit --

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Appendix E – Drugs to Stop/Drugs to Continue

Drugs to Continue

Drug Type	Drug/Drug Class	Considerations
Cardiovascular	Beta-blockers	Continue if patient has been taking Consider initiating if patient has high CV risk (ACC/AHA guideline)
	Clonidine	Continue – utilize patch formulation if anticipate extended NPO status
	Calcium channel blockers	Continue (consider holding if left ventricular dysfunction)
	Statins	Continue if patient taking chronically Consider initiating if patient has high CV risk (ACC/AHA guideline)
	Anti-arrythmics	Continue perioperatively
Neuro/Psych	All types	Continue – see factors for consideration – Annotation #8, "Management of Stable Comorbidities"*
HIV	All types	Continue – if necessary to discontinue, re-initiate all medications at the same time
Endocrine	Thyroid replacement	Continue
	Corticosteroid therapy	Continue – add stress dosing if > 5 mg prednisone per day (or equivalent) in six months prior to surgery, or on chronic therapy
Rheumatology	All types	Continue – anecdotal evidence of increased wound infections/delayed healing
Osteoporosis	Tamoxifen	May increase risk of deep vein thrombosis – discuss with oncologist before decided to stop medication preoperatively
Diabetes	Insulin	Decrease basal/long acting insulin by up to 50% Cover with sliding scale, short-acting insulin

* Refer to Annotation #8, "Management of Stable Comorbidities," for associated references.

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Appendix E – Drugs to Stop/Drugs to Continue

Drugs to Stop

Drug Type	Drug/Drug Class	Considerations
Cardiovascular	ACEI/ARB	Hold morning of surgery/suspend for 1 dosage interval before surgery If drug already taken, watch blood pressure closely at induction
NSAID	Non-COX selective	Short-acting (ibuprofen, indomethacin, etc.) – stop one day before surgery Long-acting (naproxen, sulindac, etc.) – stop three days before surgery
	Cox-2 Inhibitors	Stop at least two days before surgery due to renal effects
Anticoagulant/ Antiplatelet	VKA (warfarin)	Stop at least five days before surgery (see factors for consideration – Annotation #8, "Management of Stable Comorbidities," for possible exceptions/need for bridging)
	Dabigatran	Stop two days before surgery (CrCl >/= 50 mL/min.) Stop five days before surgery (CrCl < 50 mL/min.)
	Aspirin	Stop at least five days before surgery
	Plavix	Stop at least five days before surgery – may need to hold elective procedures off for at least six months after stent
	Ticlopidine	Stop at least five days before surgery
	Aggrenox	Stop at least seven days before surgery
	Cilostazol	Stop three days before surgery
Endocrine	Hormone therapy (estrogen)	Stop four weeks before surgery if able If unable to stop, ensure adequate venous thromboembolism prophylaxis perioperatively Weigh risk of symptoms/unwanted pregnancy vs. risk for developing clot
Osteoporosis	Raloxifene	Stop at least one week before high risk venous thromboembolism procedures
	Alendronate	Stop perioperatively due to difficult administration during hospitalization
Herbals	All types	Stop at least one week before surgery Many prolong bleeding time/increase blood pressure Inadvertent omega-3 administration day of surgery is not a contraindication to surgery
Diabetes	Oral agents	Hold morning of surgery/while nothing by mouth
	Metformin	Hold at least 24 hours before surgery to prevent lactic acidosis

* Refer to Annotation #8, "Management of Stable Comorbidities," for associated references.

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Appendix F – ICSI Shared Decision-Making Model

ICSI Institute for Clinical Systems Improvement

The technical aspects of Shared Decision-Making are widely discussed and understood.

- **Decisional conflict** occurs when a patient is presented with options where no single option satisfies all the patient's objectives, where there is an inherent difficulty in making a decision, or where external influencers act to make the choice more difficult.
- **Decision support** clarifies the decision that needs to be made, clarifies the patient's values and preferences, provides facts and probabilities, guides the deliberation and communication and monitors the progress.
- **Decision aids** are evidence-based tools that outline the benefits, harms, probabilities and scientific uncertainties of specific health care options available to the patient.

However, before decision support and decision aids can be most advantageously utilized, a Collaborative Conversation™ should be undertaken between the provider and the patient to provide a supportive framework for Shared Decision-Making.

Collaborative Conversation™

A collaborative approach toward decision-making is a fundamental tenet of Shared Decision-Making (SDM). The Collaborative Conversation™ is an inter-professional approach that nurtures relationships, enhances patients' knowledge, skills and confidence as vital participants in their health, and encourages them to manage their health care.

Within a Collaborative Conversation™ , the perspective is that both the patient and the provider play key roles in the decision-making process. The patient knows which course of action is most consistent with his/her values and preferences, and the provider contributes knowledge of medical evidence and best practices. Use of Collaborative Conversation™ elements and tools is even more necessary to support patient, care provider and team relationships when patients and families are dealing with high stakes or highly charged issues, such as diagnosis of a life-limiting illness.

The overall framework for the Collaborative Conversation™ approach is to create an environment in which the patient, family and care team work collaboratively to reach and carry out a decision that is consistent with the patient's values and preferences. A rote script or a completed form or checklist does not constitute this approach. Rather it is a set of skills employed appropriately for the specific situation. These skills need to be used artfully to address all aspects involved in making a decision: cognitive, affective, social and spiritual.

Key communication skills help build the Collaborative Conversation™ approach. These skills include many elements, but in this appendix only the questioning skills will be described. (For complete instruction, see O'Connor, Jacobsen "Decisional Conflict: Supporting People Experiencing Uncertainty about Options Affecting Their Health" [2007], and Bunn H, O'Connor AM, Jacobsen MJ "Analyzing decision support and related communication" [1998, 2003].)

1. **Listening skills:**

   Encourage patient to talk by providing prompts to continue such as "*go on, and then?, uh huh,"* or by repeating the last thing a person said, "*It's confusing*."

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Paraphrase content of messages shared by patient to promote exploration, clarify content and to communicate that the person's unique perspective has been heard. The provider should use his/her own words rather than just parroting what he/she heard.

Reflection of feelings usually can be done effectively once trust has been established. Until the provider feels that trust has been established, short reflections at the same level of intensity expressed by the patient without omitting any of the message's meaning are appropriate. Reflection in this manner communicates that the provider understands the patient's feelings and may work as a catalyst for further problem solving. For example, the provider identifies what the person is feeling and responds back in his/her own words like this: *"So, you're unsure which choice is the best for you."*

Summarize the person's key comments and reflect them back to the patient. The provider should condense several key comments made by the patient and provide a summary of the situation. This assists the patient in gaining a broader understanding of the situations rather than getting mired down in the details. The most effective times to do this are midway through and at the end of the conversation. An example of this is, *"You and your family have read the information together, discussed the pros and cons, but are having a hard time making a decision because of the risks."*

Perception checks ensure that the provider accurately understands a patient or family member, and may be used as a summary or reflection. They are used to verify that the provider is interpreting the message correctly. The provider can say *"So you are saying that you're not ready to make a decision at this time. Am I understanding you correctly?"*

2. **Questioning Skills**

Open and closed questions are both used, with the emphasis on open questions. Open questions ask for clarification or elaboration and cannot have a yes or no answer. An example would be *"What else would influence you to choose this?"* Closed questions are appropriate if specific information is required such as *"Does your daughter support your decision?"*

Other skills such as summarizing, paraphrasing and reflection of feeling can be used in the questioning process so that the patient doesn't feel pressured by questions.

Verbal tracking, referring back to a topic the patient mentioned earlier, is an important foundational skill (Ivey & Bradford-Ivey). An example of this is the provider saying, *"You mentioned earlier…"*

3. **Information-Giving Skills**

Providing information and **providing feedback** are two methods of information giving. The distinction between providing information and giving advice is important. Information giving allows a provider to supplement the patient's knowledge and helps to keep the conversation patient centered. Giving advice, on the other hand, takes the attention away from the patient's unique goals and values, and places it on those of the provider.

Providing information can be sharing facts or responding to questions. An example is *"If we look at the evidence, the risk is…"* Providing feedback gives the patient the provider's view of the patient's reaction. For instance, the provider can say, *"You seem to understand the facts and value your daughter's advice."*

Additional Communication Components

Other elements that can impact the effectiveness of a Collaborative Conversation™ include:

- Eye contact
- Body language consistent with message
- Respect

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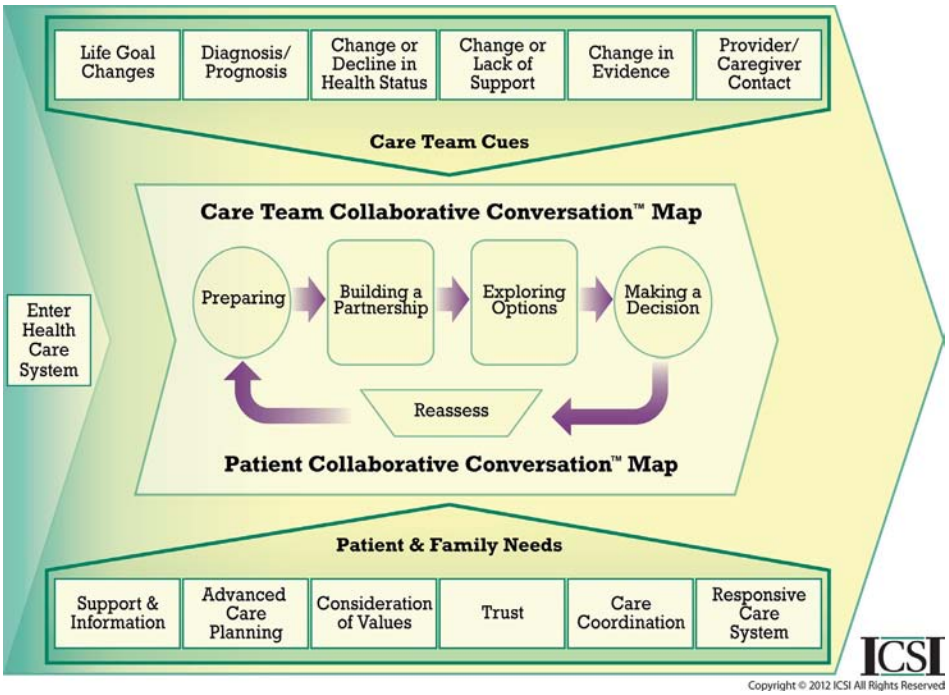
- Empathy
- Partnerships

Self-examination by the provider involved in the Collaborative Conversation™ can be instructive. Some questions to ask oneself include:

- Do I have a clear understanding of the likely outcomes?
- Do I fully understand the patient's values?
- Have I framed the options in comprehensible ways?
- Have I helped the decision-makers recognize that preferences may change over time?
- Am I willing and able to assist the patient in reaching a decision based on his/her values, even when his/her values and ultimate decision may differ from my values and decisions in similar circumstances?

When to Initiate a Collaborative Conversation™

A Collaborative Conversation™ can support decisions that vary widely in complexity. It can range from a straightforward discussion concerning routine immunizations to the morass of navigating care for a life-limiting illness. Table 1 represents one health care event. This event can be simple like a 12 year-old coming to the clinic for routine immunizations, or something much more complex like an individual receiving a diagnosis of congestive heart failure. In either case, the event is the catalyst that starts the process represented in this table. There are cues for providers and patient needs that exert influence on this process. They are described below. The heart of the process is the Collaborative Conversation™. The time the patient spends within this health care event will vary according to the decision complexity and the patient's readiness to make a decision.



Regardless of the decision complexity there are cues applicable to all situations that indicate an opportune time for a Collaborative Conversation™. These cues can occur singularly or in conjunction with other cues.

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Cues for the Care Team to Initiate a Collaborative Conversation™

- **Life goal changes:** Patient's priorities change related to things the patient values such as activities, relationships, possessions, goals and hopes, or things that contribute to the patient's emotional and spiritual well-being.
- **Diagnosis/prognosis changes:** Additional diagnoses, improved or worsening prognosis.
- **Change or decline in health status:** Improving or worsening symptoms, change in performance status or psychological distress.
- **Change or lack of support:** Increase or decrease in caregiver support, change in caregiver, or caregiver status, change in financial standing, difference between patient and family wishes.
- **Change in medical evidence or interpretation of medical evidence:** Providers can clarify the change and help the patient understand its impact.
- **Provider/caregiver contact:** Each contact between the provider/caregiver and the patient presents an opportunity to reaffirm with the patient that his/her care plan and the care the patient is receiving are consistent with his/her values.

Patients and families have a role to play as decision-making partners, as well. The needs and influencers brought to the process by patients and families impact the decision-making process. These are described below.

Patient and Family Needs within a Collaborative Conversation™

- **Request for support and information:** Decisional conflict is indicated by, among other things, the patient verbalizing uncertainty or concern about undesired outcomes, expressing concern about choice consistency with personal values and/or exhibiting behavior such as wavering, delay, preoccupation, distress or tension. Generational and cultural influencers may act to inhibit the patient from actively participating in care discussions, often patients need to be given "permission" to participate as partners in making decisions about his/her care.

  Support resources may include health care professionals, family, friends, support groups, clergy and social workers. When the patient expresses a need for information regarding options and his/her potential outcomes, the patient should understand the key facts about options, risks and benefits, and have realistic expectations. The method and pace with which this information is provided to the patient should be appropriate for the patient's capacity at that moment.

- **Advance Care Planning:** With the diagnosis of a life-limiting illness, conversations around advance care planning open up. This is an opportune time to expand the scope of the conversation to other types of decisions that will need to be made as a consequence of the diagnosis.
- **Consideration of Values:** The personal importance a patient assigns potential outcomes must be respected. If the patient is unclear how to prioritize the preferences, value clarification can be achieved through a Collaborative Conversation™ and by the use of decision aids that detail the benefits and harms of potential outcomes in terms the patient can understand.
- **Trust:** The patient must feel confident that his/her preferences will be communicated and respected by all caregivers.
- **Care Coordination:** Should the patient require care coordination, this is an opportune time to discuss the other types of care-related decisions that need to be made. These decisions will most likely need to be revisited often. Furthermore, the care delivery system must be able to provide coordinated care throughout the continuum of care.

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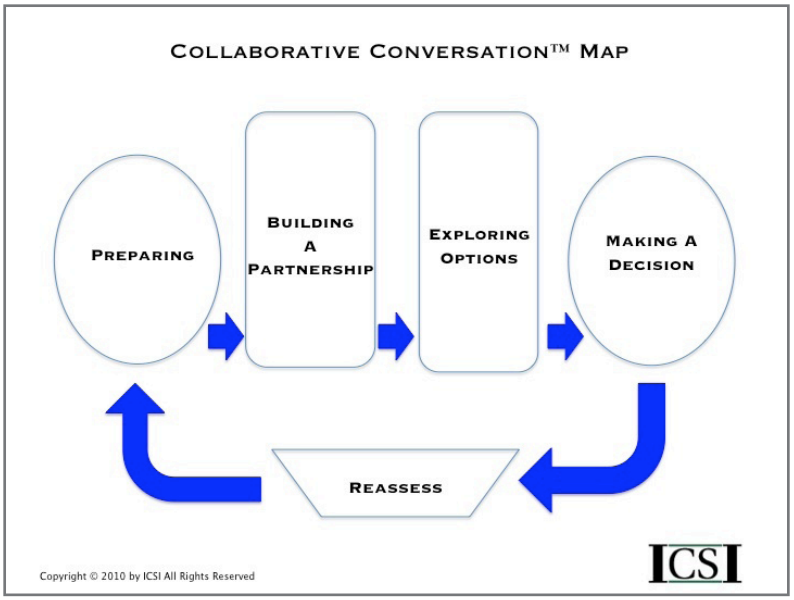
- **Responsive Care System:** The care system needs to support the components of patient- and family-centered care so the patient's values and preferences are incorporated into the care he/she receives throughout the care continuum.

The Collaborative Conversation™ Map is the heart of this process. The Collaborative Conversation™ Map can be used as a stand-alone tool that is equally applicable to providers and patients as shown in Table 2. Providers use the map as a clinical workflow. It helps get the Shared Decision-Making process initiated and provides navigation for the process. Care teams can used the Collaborative Conversation™ to document team best practices and to formalize a common lexicon. Organizations can build fields from the Collaborative Conversation™ Map in electronic medical records to encourage process normalization. Patients use the map to prepare for decision-making, to help guide them through the process and to share critical information with their loved ones.



Evaluating the Decision Quality

Adapted from O'Connor, Jacobsen "Decisional Conflict: Supporting People Experiencing Uncertainty about Options Affecting Their Health" [2007].

When the patient and family understand the key facts about the condition and his/her options, a good decision can be made. Additionally, the patient should have realistic expectations about the probable benefits and harms. A good indicator of the decision quality is whether or not the patient follows through with his/her chosen option. There may be implications of the decision on patient's emotional state such as regret or blame, and there may be utilization consequences.

Decision quality can be determined by the extent to which the patient's chosen option best matches his/her values and preferences as revealed through the Collaborative Conversation™ process.

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ICSI has long had a policy of transparency in declaring potential conflicting and competing interests of all individuals who participate in the development, revision and approval of ICSI guidelines and protocols.

In 2010, the ICSI Conflict of Interest Review Committee was established by the Board of Directors to review all disclosures and make recommendations to the board when steps should be taken to mitigate potential conflicts of interest, including recommendations regarding removal of work group members. This committee has adopted the Institute of Medicine Conflict of Interest standards as outlined in the report, Clinical Practice Guidelines We Can Trust (2011).

Where there are work group members with identified potential conflicts, these are disclosed and discussed at the initial work group meeting. These members are expected to recuse themselves from related discussions or authorship of related recommendations, as directed by the Conflict of Interest committee or requested by the work group.

The complete ICSI policy regarding Conflicts of Interest is available at http://bit.ly/ICSICOI.

Funding Source

The Institute for Clinical Systems Improvement provided the funding for this guideline revision. ICSI is a not-for-profit, quality improvement organization based in Bloomington, Minnesota. ICSI's work is funded by the annual dues of the member medical groups and five sponsoring health plans in Minnesota and Wisconsin. Individuals on the work group are not paid by ICSI but are supported by their medical group for this work.

ICSI facilitates and coordinates the guideline development and revision process. ICSI, member medical groups and sponsoring health plans review and provide feedback but do not have editorial control over the work group. All recommendations are based on the work group's independent evaluation of the evidence.

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Disclosure of Potential Conflicts of Interest

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The ICSI Patient Advisory Council meets regularly to respond to any scientific document review requests put forth by ICSI facilitators and work groups. Patient advisors who serve on the council consistently share their experiences and perspectives in either a comprehensive or partial review of a document, and engaging in discussion and answering questions. In alignment with the Institute of Medicine's triple aims, ICSI and its member groups are committed to improving the patient experience when developing health care recommendations.

All ICSI documents are available for review during the revision process by member medical groups and sponsors. In addition, all members commit to reviewing specific documents each year. This comprehensive review provides information to the work group for such issues as content update, improving clarity of recommendations, implementation suggestions and more. The specific reviewer comments and the work group responses are available to ICSI members at http://bit.ly/Preop0712.

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Acknowledgements

ICSI Patient Advisory Council

The work group would like to acknowledge the work done by the ICSI Patient Advisory Council in reviewing the Preoperative Evaluation guideline and thank them for their suggestions to improve patient education and patient checklist suggestions.

Invited Reviewers

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Affiliated Community Medical Centers, Willmar, MN
Mayo Clinic, Rochester, MN
Multicare Associates, Fridley, Blaine, Roseville, MN

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ICSI
Institute for Clinical Systems Improvement

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The next scheduled revision will occur within 24 months.

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ICSI Document Development and Revision Process

Overview

Since 1993, the Institute for Clinical Systems Improvement (ICSI) has developed more than 60 evidence-based health care documents that support best practices for the prevention, diagnosis, treatment or management of a given symptom, disease or condition for patients.

Audience and Intended Use

The information contained in this ICSI Health Care Guideline is intended primarily for health professionals and other expert audiences.

This ICSI Health Care Guideline should not be construed as medical advice or medical opinion related to any specific facts or circumstances. Patients and families are urged to consult a health care professional regarding their own situation and any specific medical questions they may have. In addition, they should seek assistance from a health care professional in interpreting this ICSI Health Care Guideline and applying it in their individual case.

This ICSI Health Care Guideline is designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and is not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition.

Document Development and Revision Process

The development process is based on a number of long-proven approaches and is continually being revised based on changing community standards. The ICSI staff, in consultation with the work group and a medical librarian, conduct a literature search to identify systematic reviews, randomized clinical trials, meta-analysis, other guidelines, regulatory statements and other pertinent literature. This literature is evaluated based on the GRADE methodology by work group members. When needed, an outside methodologist is consulted.

The work group uses this information to develop or revise clinical flows and algorithms, write recommendations, and identify gaps in the literature. The work group gives consideration to the importance of many issues as they develop the guideline. These considerations include the systems of care in our community and how resources vary, the balance between benefits and harms of interventions, patient and community values, the autonomy of clinicians and patients and more. All decisions made by the work group are done using a consensus process.

ICSI's medical group members and sponsors review each guideline as part of the revision process. They provide comment on the scientific content, recommendations, implementation strategies and barriers to implementation. This feedback is used by and responded to by the work group as part of their revision work. Final review and approval of the guideline is done by ICSI's Committee on Evidence-Based Practice. This committee is made up of practicing clinicians and nurses, drawn from ICSI member medical groups.

Implementation Recommendations and Measures

These are provided to assist medical groups and others to implement the recommendations in the guidelines. Where possible, implementation strategies are included that have been formally evaluated and tested. Measures are included that may be used for quality improvement as well as for outcome reporting. When available, regulatory or publicly reported measures are included.

Document Revision Cycle

Scientific documents are revised every 12-24 months as indicated by changes in clinical practice and literature. Each ICSI staff monitors major peer-reviewed journals every month for the guidelines for which they are responsible. Work group members are also asked to provide any pertinent literature through check-ins with the work group midcycle and annually to determine if there have been changes in the evidence significant enough to warrant document revision earlier than scheduled. This process complements the exhaustive literature search that is done on the subject prior to development of the first version of a guideline.

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