Pathways to Preventing Adverse Events in Ambulatory Surgery

The American Society of Plastic Surgeons

About the Guide…

Most plastic surgical procedures are performed in one of three outpatient settings: hospital-based ambulatory surgical units, freestanding ambulatory surgery centers, or office based surgery facilities. These ambulatory surgery facilities offer several advantages for both patients and providers, including greater control over scheduling, greater privacy and convenience for the patient, increased efficiency and consistency in nursing staff and support personnel, and possibly decreased cost to the patient. Despite the many benefits of ambulatory surgery, there remain inherent risks associated with any surgical care environment that have the potential to jeopardize patient safety. Additionally, many medical malpractice claims occur with patients who request elective procedures and are then dissatisfied with the outcome. This guide offers recommendations on how to best minimize these risks and ultimately improve patient safety and satisfaction.

Effective risk management is a team effort. To gain a range of perspectives, we suggest that the physician, office manager, and staff review this guide and utilize the enclosed risk management and patient safety checklists.

Guide Topics	Page

This guide has been brought to you by the ASPS Patient Safety Committee and The Doctors Company and can be downloaded at: plasticsurgery.org/pathwaystoprevention.

AMERICAN SOCIETY OF PLASTIC SURGEONS

THE DOCTORS COMPANY

Letter from the Patient Safety Committee Chair

This evidence based, interactive guide is the end result of a collaborative effort embarked upon by many dedicated individuals. The inspiration for this project originated from Gary Culbertson, MD, who in an October 2010 Patient Safety Committee meeting suggested that the committee compile an evidence-based, comprehensive, concise patient safety resource to serve the needs of community based plastic surgeons, "who like me do not have the time or resources to pull the materials together themselves." The Patient Safety Committee accepted Dr. Culbertson's challenge and compiled and edited the contents of this guide.

It should be pointed out that the recommendations discussed throughout this guide are the product of the 2009 ASPS Patient Safety Committee supplement, Evidence Based Patient Safety Advisory for Ambulatory Surgery, spearheaded by Phillip Haeck, MD and the 2011 Venous Thromboembolism Task Force Report, chaired by Robert X Murphy Jr., MD. An updated literature search of the Patient Safety Supplement recommendations was performed in 2011 to ensure that all of the evidence-based recommendations are current. Additionally, on page 3, The Doctors Company, the nation's leading physician owned medical malpractice insurer, provided tips on risk management and a patient selection checklist. This excellent tool allows you to evaluate your office and key systems as a whole by answering all of the risk management questions or focus only on the sections that are areas of concern. And finally, thanks to staff members Karie Rosolowski, Sr. Quality Associate, for the literature reviews and design work and to DeLaine Schmitz, Sr. Director of Quality Initiatives, for ensuring the resources were available to complete the project.

Loren Schechter, Chair, Patient Safety Committee

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DISCLAIMER

Evidence-based guides are strategies for patient management, developed to assist physicians in clinical decision making. This guide based on a thorough evaluation of the scientific literature and relevant clinical experience, describes a range of generally acceptable approaches to diagnosis, management, or prevent specific diseases or conditions. This guide attempts to define principles of practice that should generally meet the needs of most patients in most circumstances.

However, this guide should not be construed as a rule, nor should it be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the appropriate results. It is anticipated that it will be necessary to approach some patients' needs in different ways. The ultimate judgment regarding the care of a particular patient must be made by the physician in light of all the circumstances presented by the patient, the diagnostic and treatment options available and available resources.

This guide is not intended to define or serve as the standard of medical care. Standards of medical care are determined on the basis of all the facts or circumstances involved in an individual case and are subject to change as scientific knowledge and technology advance, and as practice patterns evolve. This guide reflects the state of knowledge current at the time of publication. Given the inevitable changes in the state of scientific information and technology, periodic review, updating and revision will be done.

Patient Selection: Risk Management Tips

There is no scoring system to the checklist below. The options for responding to the statements are Yes or No. The ideal response to every statement is indicated at the beginning of each section. Any other response indicates an area of potential malpractice exposure in your practice that should be addressed and resolved. Respond to the statements as objectively and honestly as you can. The effectiveness of this interactive checklist depends on how candid you are.

Step 1: Assess the Patient's Behavior for Warning Signs

***The ideal response is No; any Yes response should be investigated further as a warning sign.**

Yes No

__ __ Has undergone repeated surgical procedures by other physicians
__ __ Has sued another provider as a result of a plastic surgery outcome
__ __ Appears to have an exaggerated concern over a minor or nonexistent problem
__ __ Has recently experienced a major life change, such as divorce
__ __ Appears to looking for a quick fix to a long-term problem
__ __ Thinks that plastic surgery will fix psychological or social problems
__ __ Exhibits resentment when asked questions and/or answers questions defensively
__ __ Appears to be engaged in "doctor shopping"

Step 2: Assess Patient Suitability for Ambulatory Plastic Surgery

***The ideal response is Yes; any No response should be investigated further as a warning sign.**

Yes No

__ __ There is a history of compliance with pre- and post-op instructions (if applicable).
__ __ He or she will not experience periods of extended sedentary situations (e.g., long flights, bed rest, extended car rides) during the two weeks prior to surgery.
__ __ The patient's risk for VTE has been evaluated. **(See VTE recommendations on page 5)**
__ __ If the patient is a smoker, the patient can desist from smoking for a period of time necessary for maximum healing. (**See smoking recommendations on page 9**)
__ __ The patient's BMI is appropriate for ambulatory surgery. (**See BMI recommendations on page 10**)
__ __ The patient's risk factors for pulmonary complications have been evaluated. (**See obstructive lung disease and obstructive sleep apnea recommendations on pages 11 & 12**)
__ __ The risk factors associated with the patient's age (if older than 60) have been considered. (**See age recommendations on page 14**)
__ __ The patient's risk factors for cardiovascular conditions have been evaluated. (**See cardiovascular recommendations on page 14**)
__ __ The patient's ASA status is appropriate for ambulatory surgery. (**See ASA recommendations on page 15**)

Step 3: Risk Management

***The ideal response is Yes; any No response should be investigated further as a warning sign.**

Yes No

__ __ The patient can financially handle the costs associated with the procedure.
__ __ The patient is requesting a procedure that you are credentialed and competent to perform.
__ __ You have an in-depth discussion with the patient regarding his or her expectations from the surgery.
__ __ You carefully use "before" and "after" pictures of previous patients who have physical features similar to those of the current patient.
__ __ You do not make any implied warranty with the use of imaging.
__ __ You make it absolutely clear there is no guarantee that the degree of improvement will be the same as that in the photos.
__ __ You document this conversation in the record.
__ __ You discuss the patient with staff who may have made observations or heard comments that were not shared with the physician.
__ __ A preoperative pregnancy test has been performed on female patient of childbearing age.
__ __ The patient has signed appropriate informed consent, and the process has been documented.

ASPS Evidence Rating Scales

The ASPS utilizes evidence based processes when developing clinical practice recommendations. The recommendations included in this guide were developed through a comprehensive search and review of the scientific literature and consensus of the ASPS Patient Safety Committee. The supporting literature was critically appraised for study quality and assigned a corresponding level of evidence (I though V) according to the ASPS Evidence Rating Scales below.

Evidence Rating Scale for Therapeutic Studies

Level of Evidence	Qualifying Studies
I	High-quality, multi-centered or single-centered, randomized controlled trial with adequate power; or systematic review of these studies
II	Lesser-quality, randomized controlled trial; prospective cohort or comparative study; or systematic review of these studies
III	Retrospective cohort or comparative study; case-control study; or systematic review of these studies
IV	Case series with pre/post test; or only post test
V	Expert opinion; case report or clinical example; or evidence based on physiology, bench research or "first principles"

Evidence Rating Scale for Diagnostic Studies

Level of Evidence	Qualifying Studies
I	High-quality, multi-centered or single-centered, cohort study validating a diagnostic test (with "gold" standard as reference) in a series of consecutive patients; or a systematic review of these studies
II	Exploratory cohort study developing diagnostic criteria (with "gold" standard as reference) in a series of consecutive patient; or a systematic review of these studies
III	Diagnostic study in nonconsecutive patients (without consistently applied "gold" standard as reference); or a systematic review of these studies
IV	Case-control study; or any of the above diagnostic studies in the absence of a universally accepted "gold" standard
V	Expert opinion; case report or clinical example; or evidence based on physiology, bench research or "first principles"

Evidence Rating Scale for Prognostic/Risk Studies

Level of Evidence	Qualifying Studies
I	High-quality, multi-centered or single-centered, prospective cohort study with adequate power; or a systematic review of these studies
II	Lesser-quality prospective cohort or comparative study; retrospective cohort or comparative study; untreated controls from a randomized controlled trial; or a systematic review of these studies
III	Case-control study; or systematic review of these studies
IV	Case series with pre/post test; or only post test
V	Expert opinion; case report or clinical example; or evidence based on physiology, bench research or "first principles"

ASPS Recommendation Grading Scale

Grade	Qualifying Evidence	Implications for Practice
A: Strong Recommendation	Level I evidence or consistent findings from multiple studies of levels II, III, or IV	Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.
B: Recommendation	Levels II, III, or IV evidence and findings are generally consistent	Clinicians should follow a recommendation but should remain alert to new information and sensitive to patient preferences.
C: Option	Levels II, III, or IV evidence, but findings are inconsistent	Clinicians should be flexible in their decision-making regarding appropriate practice, although they may set bounds on alternatives; patient preference should have a substantial influencing role.
D: Option	Level V: Little or no systematic empirical evidence	Clinicians should consider all options in their decision-making and be alert to new published evidence that clarifies the balance of benefit versus harm; patient preference should have a substantial influencing role.

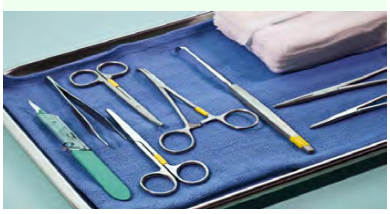
Evidence based medicine is the integration of best research evidence with clinical expertise and patient values. Evidence based medicine is vital to the world of medicine because it allows clinicians and healthcare organizations to use research evidence efficiently for the purposes of implementing best practices and developing quality measures.

EBM Resources

Centre for Evidence Based Medicine

Evidence Based Medicine Tutorial

National Guideline Clearinghouse



VTE: ASPS Evidence Based Recommendations

The 2008 release of "Surgeon General's Call to Action to Prevent Deep Vein Thrombosis and Pulmonary Embolism," prompted ASPS members to take quick action. In response, ASPS hosted the "Partners in Quality Leadership Summit" in Chicago in July 2009 to discuss the impact of VTE on plastic surgery. The VTE Task Force was convened in October 2009 and charged with the following:

- develop tools and aids to assist plastic surgeons, across the health system, with the implementation of best practices for DVT/PE prevention;
- develop VTE risk assessment and prevention recommendations specific to plastic surgery cases;
- Assess the current VTE research efforts underway in plastic surgery and recommend areas where further research is needed.

After thorough review of the scientific literature, the VTE Task Force:

- endorsed the 2005 Caprini Risk Assessment Scale (page 6), which has been validated for use in plastic surgery patients and consists of a comprehensive list of risk factors associated with the development of deep vein thrombosis (DVT).
- developed risk assessment and prevention recommendations. After you have calculated the patient's risk score on page 6, refer to the VTE Task Force Recommendations on page 7 when determining the appropriate prevention strategy.
- developed a patient handout on the signs and symptoms of VTE (page 8).
- compiled a Final VTE Task Force Report, which can be accessed at plasticsurgery.org/vte.

ADDITIONAL VTE RESOURCES

ASPS Campaign for VTE Awareness

DVT Risk: Self Assessor for Patients

The Coalition to Prevent DVT

The Surgeon General's Call to Action to Prevent Deep Vein Thrombosis and Pulmonary Embolism

AHRQ Preventing Hospital Acquired Venous Thromboembolism

VTE References

Level I (T): Barrellier MT, Level B, Parienti JJ, et al. Short versus extended thromboprophylaxis after total knee arthroplasty: A randomized comparison. Thrombosis Research. 2010.Oct; 126(4):e298-304. Article Link

Level I (T): Turpie AG, Bauer KA, Caprini JA, et al; Apollo Investigators. Fondaparinux combined with intermittent pneumatic compression vs. intermittent pneumatic compression alone for prevention of venous thromboembolismafter abdominal surgery: a randomized, double-blind comparison. J Thromb Haemost. 2007 Sep;5(9):1854-61. Article Link

Level II (R): Bahl V, Hu HM, Henke PK, Wakefield TW, Campbell DA Jr, Caprini JA. A validation study of a retrospective venous thromboembolism risk scoring method. Ann Surg. 2010 Feb;251(2):344-50. Article link

Level II (T): Bottaro FJ, Elizondo MC, Doti C, Bruetman JE, et al. Efficacy of extended thrombo-prophylaxis in major abdominal surgery: what does the evidence show? A meta-analysis. Thromb Haemost. 2008 Jun;99(6):1104-11. Article Link

Level II (T): Chin PL, Amin MS, Yang KY, et al. Thromboembolic prophylaxis for total knee arthroplasty in Asian patients: a randomised controlled trial. J Orthop Surg (Hong Kong). 2009 Apr;17(1):1-5. Article Link

Level II (T): Colwell CW Jr, Kwong LM, Turpie AG, et al. Flexibility in administration of fondaparinux for prevention of symptomatic venous thromboembolism in orthopaedic surgery. J Arthroplasty. 2006 Jan;21(1):36-45. Article Link

Level II (T): Edwards JZ, Pulido PA, Ezzet KA, et al. Portable compression device and low-molecular-weight heparin compared with low-molecular-weight heparin for thromboprophylaxis after total joint arthroplasty. J Arthroplasty. 2008 Dec;23(8):1122-7. Epub 2008 Apr 2. Article Link

Level II (R): Hatef DA, Kenkel JM, Nguyen MQ, Farkas JP, Abtahi F, Rohrich RJ, Brown SA. Thromboembolic risk assessment and the efficacy of enoxaparin prophylaxis in excisional body contouring surgery. Plast Reconstr Surg. 2008 Jul;122(1):269-79. Article Link

Level II (T): Kakkos SK, Caprini JA, Geroulakos G, et al. Combined intermittent pneumatic leg compression and pharmacological prophylaxis for prevention of venous thromboembolism in high-risk patients. Cochrane Database Syst Rev. 2008 Oct 8;(4):CD005258. Review. Article Link

Level III (T): Kim EK, Eom JS, Ahn SH, et al. The efficacy of prophylactic low-molecular-weight heparin to prevent pulmonary thromboembolism in immediate breast reconstruction using the TRAM flap. Plast Reconstr Surg. 2009 Jan;123(1):9-12. Article Link

Level III (T): Liao EC, Taghinia AH, Nguyen LP, et al. Incidence of hematoma complication with heparin venous thrombosis prophylaxis after TRAM flap breast reconstruction. Plast Reconstr Surg. 2008 Apr;121(4):1101-7. Article Link

Level II (R): Pannucci CJ, Bailey SH, Dreszer G, et al. Validation of the Caprini risk assessment model in plastic and reconstructive surgery patients. J Am Coll Surg. 2011 Jan;212(1):105-12. Article Link

Level III (T): Pannucci CJ, Dreszer G, Wachtman CF, et al. Post-operative enoxaparin prevents symptomatic venous thromboembolism in high-risk surgery patients. Plastic Reconstr Surg. [Accepted for publication; in press]

Level II (T): Rasmussen MS, Jørgensen LN, Wille-Jørgensen P. Prolonged thromboprophylaxis with low molecular weight heparin for abdominal or pelvic surgery. Cochrane Database Syst Rev. 2009 Jan 21;(1):CD004318. Article Link

Level II (T): Rasmussen MS, Jorgensen LN, Wille-Jørgensen P, et al; FAME Investigators. Prolonged prophylaxis with dalteparin to prevent late thromboembolic complications in patients undergoing major abdominal surgery: a multicenter randomized open-label study. J Thromb Haemost. 2006 Nov;4(11):2384-90. Article Link

Level II (T): Senaran H, Acaroğlu E, Ozdemir HM, et al. Enoxaparin and heparin comparison of deep vein thrombosis prophylaxis in total hip replacement patients. Arch Orthop Trauma Surg. 2006 Jan;126(1):1-5. Article Link

Level III (T): Seruya M, Venturi ML, Iorio ML, Davison SP. Efficacy and safety of venous thromboembolism prophylaxis in highest risk plastic surgery patients. Plast Reconstr Surg. 2008 Dec; 122(6): 1701-8. Article Link

* (T)= Therapeutic Study; (R)= Risk Study

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THROMBOSIS RISK FACTOR ASSESSMENT

VTE
ASPS CAMPAIGN FOR AWARENESS

CHOOSE ALL THAT APPLY

EACH RISK FACTOR REPRESENTS 1 POINT

- ❒ Age 41-60 years
- ❒ Minor surgery planned
- ❒ History of prior major surgery (< 1 month)
- ❒ Varicose veins
- ❒ History of inflammatory bowel disease
- ❒ Swollen legs (current)
- ❒ Obesity (BMI > 25)
- ❒ Acute myocardial infarction
- ❒ Congestive heart failure (< 1 month)
- ❒ Sepsis (< 1 month)
- ❒ Serious lung disease including pneumonia (< 1 month)
- ❒ Abnormal pulmonary function (COPD)
- ❒ Medical patient currently at bed rest
- ❒ Other risk factors

_____

EACH RISK FACTOR REPRESENTS 2 POINTS

- ❒ Age 60-74 years
- ❒ Arthroscopic surgery
- ❒ Malignancy (present or previous)
- ❒ Major surgery (> 45 minutes)
- ❒ Laparoscopic surgery (> 45 minutes)
- ❒ Patient confined to bed (> 72 hours)
- ❒ Immobilizing plaster cast (< 1 month)
- ❒ Central venous access

EACH RISK FACTOR REPRESENTS 3 POINTS

- ❒ Age over 75 years
- ❒ History of DVT/PE
- ❒ Family history of thrombosis*
- ❒ Positive Factor V Leiden
- ❒ Positive Prothrombin 20210A
- ❒ Elevated serum homocysteine
- ❒ Positive lupus anticoagulant
- ❒ Elevated anticardiolipin antibodies
- ❒ Heparin-induced thrombocytopenia (HIT)
- ❒ Other congenital or acquired thrombophilia
  If yes:

Type:_____

** most frequently missed risk factor*

EACH RISK FACTOR REPRESENTS 5 POINTS

- ❒ Elective major lower extremity arthroplasty
- ❒ Hip, pelvis or leg fracture (< 1 month)
- ❒ Stroke (< 1 month)
- ❒ Multiple trauma (< 1 month)
- ❒ Acute spinal cord injury (paralysis) (< 1 month)

FOR WOMEN ONLY (EACH REPRESENTS 1 POINT)

- ❒ Oral contraceptives or hormone replacement therapy
- ❒ Pregnancy or postpartum (< 1 month)
- ❒ History of unexplained stillborn infant, recurrent spontaneous abortion (≥3), premature birth with toxemia or growth-restricted infant

TOTAL RISK FACTOR SCORE

2005 Caprini Risk Assessment Model Reprinted with permission from Joseph A. Caprini, MD

PATIENTS' NAME: _____

AGE: _____ SEX: _____

WEIGHT: _____

ASPS VTE TASK FORCE
RISK ASSESSMENT AND PREVENTION RECOMMENDATIONS

Approved by the ASPS Executive Committee in July 2011

Disclaimer: The recommendations were developed to provide strategies for patient management and to assist physicians in clinical decision making. The recommendations should not be construed as a rule, nor should it be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the appropriate results. The recommendations are not intended to define or serve as the standard of medical care. The ultimate judgment regarding the care of a particular patient must be made by the physician in light of all the circumstances presented by the patient, the diagnostic and treatment options available, and available resources.

STEP ONE: RISK STRATIFICATION

PATIENT POPULATION	RECOMMENDATION
In-patient adult aesthetic and reconstructive plastic surgery who undergo general anesthesia	**Should complete** a 2005 Caprini risk factor assessment tool in order to stratify patients into a VTE risk category based on their individual risk factors. **Grade B** **or** **Should complete** a VTE risk assessment tool comparable to the 2005 Caprini RAM in order to stratify patients into a VTE risk category based on their individual risk factors. **Grade D**
Out-patient adult aesthetic and reconstructive plastic surgery who undergo general anesthesia	**Should consider** completing a 2005 Caprini risk factor assessment tool in order to stratify patients into a VTE risk category based on their individual risk factors. **Grade B** **or** **Should consider** completing a VTE risk assessment tool comparable to the 2005 Caprini RAM in order to stratify patients into a VTE risk category based on their individual risk factors. **Grade D**

STEP TWO: PREVENTION

PATIENT POPULATION	2005 CAPRINI RAM SCORE*	RECOMMENDATION
Elective Surgery Patients adult aesthetic and reconstructive plastic surgery who undergo general anesthesia	**7 or more**	**Should consider** utilizing risk reduction strategies such as limiting OR times, weight reduction, discontinuing hormone replacement therapy and early postoperative mobilization. **Grade C**
Patients undergoing the following major procedures when the procedure is performed under general anesthesia lasting more than 60 minutes: ▸ Body contouring, ▸ Abdominoplasty, ▸ Breast reconstruction, ▸ Lower extremity procedures, ▸ Head/neck cancer procedures	**3 to 6**	**Should consider** the option to use postoperative LMWH or unfractionated heparin. **Grade B**
	3 or more	**Should consider** the option to utilize mechanical prophylaxis throughout the duration of chemical prophylaxis for non-ambulatory patients. **Grade D**
	7 or more	**Should strongly consider** the option to use extended LMWH postoperative prophylaxis. **Grade B**

The scores listed apply to the 2005 Caprini RAM and were not intended for use with alternative VTE risk assessment tools.

For the full task force report and prophylaxis medication, dosage, and timing protocol examples, visit plasticsurgery.org/vte

GRADE	QUALIFYING EVIDENCE	IMPLICATIONS FOR PRACTICE
A: Strong Recommendation	Level: I evidence or consistent findings from multiple studies of levels II, III, or IV	Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.
B: Recommendation	Levels: II, III, or IV evidence and findings are generally consistent	Clinicians should follow a recommendation but should remain alert to new information and sensitive to patient preferences.
C: Option	Levels: II, III, or IV evidence, but findings are inconsistent	Clinicians should be flexible in their decision-making regarding appropriate practice, although they may set bounds on alternatives; patient preference should have a substantial influencing role.
D: Option	Level: V little or no systematic empirical evidence	Clinicians should consider all options in their decision-making and be alert to new published evidence that clarifies the balance of benefit versus harm; patient preference should have a substantial influencing role.

** The 2005 Caprini VTE Risk Assessment Model has been validated in the plastic surgery population.*

Source: Pannucci CJ, Bailey SH, Dreszer G, et al. Validation of the Caprini risk assessment model in plastic and reconstructive surgery patients. J Am Coll Surg. 2011 Jan; 212(1):105-12.

What is Deep-Vein Thrombosis (DVT)?

DVT occurs when a blood clot forms in one of the large veins, usually in the lower limbs, leading to either partially or completely blocked circulation. The condition may result in health complications, such as a pulmonary embolism (PE) and even death if not diagnosed and treated effectively.

Most common risk factors for DVT:

- Major surgery
- Congestive heart failure or respiratory failure
- Restricted mobility
- Recent injury
- Cancer
- Obesity
- Age over 40 years
- Recent surgery
- Smoking
- Prior or family history of venous thromboembolism (VTE)

Signs and Symptoms of DVT:

About half of people with DVT have no symptoms at all. For those who do have symptoms, the following are the most common and can occur in the affected part of the body, typically in the leg or calf region:

- Swelling unrelated to the surgical site,
- Pain or tenderness, unrelated to the surgical site and often worse when standing or walking,
- Redness of the skin,
- Warmth over the affected area.

** If you develop symptoms of a deep vein thrombosis, contact your health care provider for guidance.*

What is a Pulmonary Embolism (PE)?

A pulmonary embolism (PE) is a very serious condition that occurs when a blood clot blocks the artery that carries blood from the heart to the lungs (pulmonary artery). A clot that forms in one part of the body and travels in the bloodstream to another part of the body is called an embolus. PEs often come from the deep leg veins and travel to the lungs through blood circulation.

Signs and Symptoms of PE

- Difficulty breathing;
- Faster than normal heart beat;
- Chest pain or discomfort, which usually worsens with a deep breath or coughing;
- Coughing up blood; or
- Very low blood pressure, lightheadedness, or blacking out.

**If you develop symptoms of a Pulmonary Embolism, seek emergency medical attention immediately.*

Sources: http://www.cdc.gov/ncbddd/dvt/faq_dvt.htm; http://www.mayoclinic.com/health/deep-vein-thrombosis/DS01005/DSECTION=symptoms; http://www.preventdvt.org/questions/dvt-questions.aspx

Geerts WH, Pineo GF, Heit JA et al. Prevention of venous thromboembolism: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest.2004; 126(suppl): 338S-400S.

VTE
ASPS CAMPAIGN FOR AWARENESS
Help reduce risk of Venous Thromboembolism

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Smoking: ASPS Evidence Based Recommendations

PATIENT SELECTION

- The patient should be asked about smoking history, including number of pack-years; if the patient is not a smoker, the patient should be asked whether anyone in the household smokes. Grade B Recommendation
- The patient should be asked about co-morbidities that could exacerbate the effects of smoking (e.g., airway obstruction, COPD, chronic cough). Grade B Recommendation

PREOPERATIVE

- Preoperative smoking cessation should be recommended and should depend on the patient's overall health and the surgical procedure; optimal timing of cessation has not been fully determined and varies from 24 hr before surgery to 6–8 wk before surgery. Grade B Recommendation
- The physician should discuss available options to aid in smoking cessation: counseling and behavioral interventions, nicotine replacement (i.e., gum, transdermal patch, nasal spray, inhaler, and sublingual tablets/lozenges), and drugs such as Zyban (bupropion hydrochloride) and Chantix (varenicline). Grade A Recommendation

POSTOPERATIVE

- Continued smoking cessation should be recommended (at least 7 days after surgery). Grade D Recommendation

Smoking References

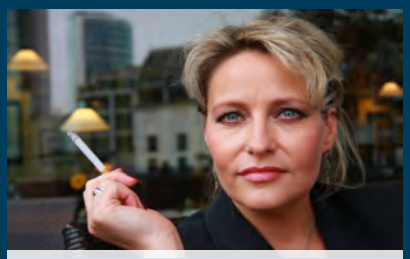
Risk/Complications

- Level I (R): Myles PS, Iacono GA, Hunt J, et al. Risk of respiratory complications and wound infection in patients undergoing ambulatory surgery: Smokers versus nonsmokers. Anesthesiology 2002;97:842–847. Article Link
- Level I (R): Kotani N, Hashimoto H, Sessler D, et al. Smoking decreases alveolar macrophage function during anesthesia and surgery. Anesthesiology 2000;92:1268–1277. Article Link
- Level II (R): Bluman LG, Mosca L, Newman N, Simon DG. Preoperative smoking habits and postoperative pulmonary complications. Chest 1998;113:883–889. Article Link
- Level II (R): Nakagawa M, Tanaka H, Tsukuma H, Kishi Y. Relationship between the duration of the preoperative smoke-free period and the incidence of postoperative pulmonary complications after pulmonary surgery. Chest 2001;120:705–710. Article Link
- Level II (R): Skolnick ET, Vomvolakis MA, Buck K, Mannino SF, Sun LS. Exposure to environmental tobacco smoke and the risk of adverse respiratory events in children receiving general anesthesia. Anesthesiology 1998;88:1144–1153. Article Link
- Level III (R): Brooks-Brunn JA. Predictors of postoperative pulmonary complications following abdominal surgery. Chest 1997;111:564–571. Article Link

Treatment

- Level I (T): Moller AM, Villebro N, Pedersen T, Tønnesen H. Effect of preoperative smoking intervention on postoperative complications: A randomised clinical trial. Lancet 2002;359:114–117. Article Link
- Level II (T): Rice VH, Stead L. Nursing intervention and smoking cessation: Meta-analysis update. Heart Lung 2006;35:147–163. Article Link
- Level II (T): Rice VH, Stead LF. Nursing interventions for smoking cessation. Cochrane Database Syst Rev. 2008;1:CD001188. Article Link
- Level II: (T) Rigotti N, Munafo M, Stead L. Interventions for smoking cessation in hospitalised patients. Cochrane Database Syst Rev. 2007;3:CD001837. Article Link
- Level II (T): Sadr Azodi O, Lindström D, Adami J, Tønnesen H, Nåsell H, Gilljam H, Wladis A. The efficacy of a smoking cessation programme in patients undergoing elective surgery: a randomised clinical trial. Anaesthesia. 2009 Mar;64(3):259-65. Article Link
- Level II (T): Stead LF, Perera R, Bullen C, Mant D, Lancaster T. Nicotine replacement therapy for smoking cessation. Cochrane Database Syst Rev. 2008 Jan 23; (1):CD000146. Article Link

* (T)= Therapeutic Study; (R)= Risk Study



Risk Management

To ensure patient compliance with smoking cessation recommendations, some surgeons test their patient's nicotine levels through Continine Testing. A simple laboratory test can measure cotinine in:

- **blood,**
- **urine,**
- **or saliva.**

Smoking Resources

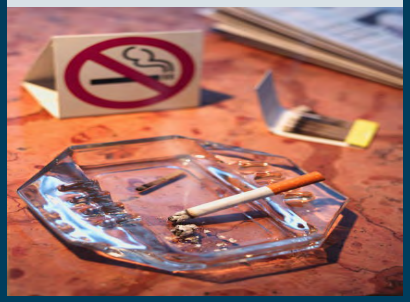
American Cancer Society Guide to Quitting Smoking

Smokefree.gov

American Heart Association Quit Smoking Program

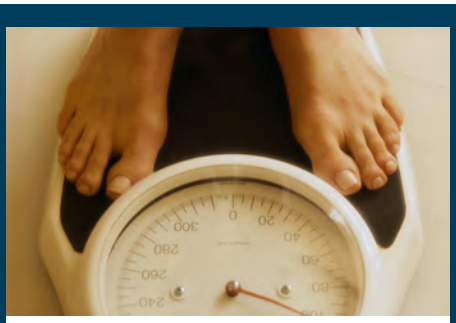
American Lung Association Freedom from Smoking Program

CDC Smoking Cessation Materials



BMI: ASPS Evidence Based Recommendations

- Ambulatory surgery can be considered for patients with:
  - BMI 18.5–24.9 (normal weight)
  - BMI 25–29.9 (overweight)
  - BMI 30–34.9 (moderately obese)
    Grade D Recommendation
- A hospital setting should be considered for patients with:
  - BMI 35–39.9 (severely obese) Grade D Recommendation
- A hospital setting is recommended for patients with:
  - BMI ≥40 (morbidly obese) Grade D Recommendation
- General management of obese patients:
  - Consider histories/comorbidities that may complicate patient management. Grade B Recommendation
  - Consider prophylaxis against DVT (i.e., with low-dose heparin, sequential compression devices, and postoperative ambulation). See VTE Recommendations on page 7
- Management of obese patients with respiratory abnormalities:
  - Ensure proper patient positioning and monitoring. Grade B Recommendation
  - Use a semi-upright position in a chair for patients under sedation. Grade B Recommendation
  - Consider supplemental oxygen. Grade D Recommendation
  - Carefully sized airway adjuncts (e.g., oral/nasal pharyngeal airways, endotracheal tubes, laryngeal mask airways) should be immediately available for patients under moderate sedation or general anesthesia. Grade D Recommendation
  - Consider intravascular monitoring of arterial pressure (or other approaches) if blood pressure measurements and auscultation of the heart and lungs is difficult to obtain. Grade D Recommendation
- Pharmacologic approaches to sedation and pain management in obese patients: All Grade D Recommendations
  - Use a catheter-over-needle system to prevent loss of intravenous access.
  - Short operation times and lighter levels of sedation are recommended.
  - Consider a hospital setting if deeper anesthesia is required.
  - Calculate initial doses of pharmacologic agents based on ideal body weight (as a reflection of lean body mass) rather than actual body weight.
  - Consider possible drug interactions.
  - Exercise caution for patients taking appetite suppressants or other medications.
  - Consider avoiding opioids, especially in patients with diagnosed or suspected OSA



BMI References

Level I (R): Nielsen KC, Guller U, Steele SM, Klein SM, Greengrass RA, Pietrobon R. Influence of obesity on surgical regional anesthesia in the ambulatory setting: an analysis of 9,038 blocks. Anesthesiology. 2005 Jan;102(1):181-7. Article Link

Level I (R): Myles PS, Iacono GA, Hunt J, et al. Risk of respiratory complications and wound infection in patients undergoing ambulatory surgery: Smokers versus nonsmokers. Anesthesiology 2002;97:842–847. Article Link

Level II (R): Chung F, Mezei G, Tong D. Pre-existing medical conditions as predictors of adverse events in day-case surgery. Br J Anaesth. 1999 Aug;83 (2):262-70. Article Link

Level II (R): Hofer RE, Kai T, Decker PA, Warner DO. Obesity as a risk factor for unanticipated admissions after ambulatory surgery. Mayo Clin Proc. 2008Aug;83(8):908-16. Article Link

Level III (R): Samama MM. An epidemiologic study of risk factors for deep vein thrombosis in medical outpatients: The Sirius study. *Arch Intern Med*. 2000;160:3415–3420 Article Link

Level IV (R): Mandal A, Imran D, McKinnell T, Rao GS. Unplanned admissions following ambulatory plastic surgery--a retrospective study. Ann R Coll Surg Engl. 2005 Nov;87(6):466-8. Article Link

(R)= Risk Study

Obstructive Lung Disease: ASPS Evidence Based Recommendations

PATIENT SELECTION

All Recommendations below are Grade D

- The medical history should include questions about current symptoms (e.g., cough, dyspnea, wheezing) and frequency of symptoms; intensity of treatment (did patient require therapy at a medical facility?); current medications; recent use of rescue medications; tolerance to aspirin, cold air, dust, or smoke; smoking history; and previous exposures to general anesthesia and endotracheal intubation.
- A complete physical examination should be performed, including chest auscultation, assessment of skin coloration, and chest radiography when indicated.
- Patients should be free of symptoms and have optimal lung function. If a patient presents with symptoms, elective surgery should be postponed, if possible, pending resolution of symptoms.
- Patients with severe or uncontrolled disease, or those in which pulmonary status is uncertain, should be referred to a pulmonologist for assessment of pulmonary function.
- If patients have been on steroid therapy during the past 6 mo before surgery, additional steroid support may be necessary.

PREOPERATIVE

- If endotracheal intubation is required, consider preoperative prophylaxis (corticosteroids, topical lidocaine, B_2-adrenergic agonists). Grade A Recommendation
- Consider preoperative sedation with benzodiazepines. Grade D Recommendation

INTRAOPERATIVE

- If possible, consider regional anesthesia over general anesthesia. Grade D Recommendation
- If general anesthesia is required, consider the volatile anesthetics, halothane and sevoflurane, or intravenous propofol. Grade A Recommendation
- Avoid anesthetics and muscle relaxants with histamine-releasing properties (e.g., thiopental, atracurium, mivacurium, succinylcholine). Grade D Recommendation

TREATMENT OF INTRAOPERATIVE BRONCHOSPASM

Grade D Recommendations

- If intraoperative bronchospasm is suspected, it is important to first rule out alternative diagnoses (e.g., mechanical obstructions, pneumothorax, pulmonary edema).
- If the diagnosis of intraoperative bronchospasm is confirmed, initial treatment includes deepening of anesthesia.
- For persistent bronchospasm, additional options for treatment include administration of B_2-adrenergic agonists, parasympatholytics, systemic corticosteroids, magnesium, and lidocaine.

POSTOPERATIVE

Grade D Recommendations

- Avoid analgesics with histamine-releasing properties (e.g., meperidine, morphine).
- Consider the use of lung expansion maneuvers.

Obstructive Lung Disease References

Level I (T): Groeben H, Schlicht M, Stieglitz S, Pavlakovik G, Peters J. Both local anesthetics and salbutamol pretreatment affect reflex bronchoconstriction in volunteers with asthma undergoing awake fiberoptic intubation. *Anesthesiology* 2002;97: 1445–1450. Article Link

Level I (T): Maslow AD, Regan MM, Israel E, et al. Inhaled albuterol, but not intravenous lidocaine, protects against intubation-induced bronchoconstriction in asthma. *Anesthesiology* 2000; 93:1198–1204. Article Link

Level I (T): Pizov R, Brown RH, Weiss Y, et al. Wheezing during induction of general anesthesia in patients with and without asthma: A randomized, blinded trial. *Anesthesiology* 1995;82:1111–1116. Article Link

Level II (T): Goff MJ, Arain SR, Ficke D, Uhrich TD, Ebert TJ. Absence of bronchodilation during desflurane anesthesia: A comparison to sevoflurane and thiopental. *Anesthesiology* 2000;93:404–408. Article Link

Level II (T): Groeben H, Silvanus MT, Beste M, Peters J. Combined lidocaine and salbutamol inhalation for airway anesthesia markedly protects against reflex bronchoconstriction. *Chest* 2000;118:509–515. Article Link

Level II (T): Groeben H, Schafer B, Pavlakovic G, Silvanus MT, Peters J. Lung function under high thoracic segmental epidural anesthesia with ropivacaine or bupivacaine in patients with severe obstructive pulmonary disease undergoing breast surgery. *Anesthesiology* 2002;96:536–541. Article Link

Level II (T): Silvanus MT, Groeben H, Peters J. Corticosteroids and inhaled salbutamol in patients with reversible airway obstruction markedly decrease the incidence of bronchospasm after tracheal intubation. *Anesthesiology* 2004;100:1052–1057. Article Link

Level III (R): Warner DO, Warner MA, Barnes R, et al. Perioperative respiratory complications in patients with asthma. *Anesthesiology* 1996;85:460–467. Article Link

Level IV (T): Celiker V, Basgu l E. Anaesthesia in aspirin-induced asthma. *Allergol Immunopathol (Madr.)* 2003;31:338–341. Article Link

* (T)= Therapeutic Study; (R)= Risk Study

Obstructive Sleep Apnea: ASPS Evidence Based Recommendations

PATIENT SELECTION

- For patients without previous diagnosis of OSA, inquire about the following symptoms: airway obstruction during sleep; loud and frequent snoring; frequent arousal from sleep, especially with choking sensation; daytime somnolence or fatigue; falling asleep in nonstimulating environments (e.g., watching television, reading, driving); it may also be helpful to interview family members, as they may have witnessed some of the symptoms (e.g., apneic events, restless sleep, vocalizations). Grade D Recommendation
- For patients with suspected OSA, the surgeon and anesthesia provider may decide to refer the patient for additional tests (e.g., sleep studies, more extensive airway assessment) and OSA treatment before surgery.
- The physical examination should include an evaluation of the airway, nasopharyngeal characteristics, tonsil and tongue size, neck circumference, and BMI. Grade B Recommendation

SURGICAL SETTING

All Recommendations below are Grade D

- Only minor procedures under local or regional anesthesia should be performed in a freestanding ambulatory or office-based settings.
- Much consideration should be given to factors such as sleep apnea status, anatomical and physiologic abnormalities, status of comorbidities, nature of surgery, type of anesthesia, need for postoperative opioids, patient age, adequacy of postdischarge observation, and capabilities of the outpatient facility.
- The ASA believes that patients at significantly increased risk of perioperative complications generally are not appropriate candidates for procedures in freestanding outpatient settings.
- If it is determined that a patient with OSA can safely undergo ambulatory surgery, the facility should be appropriately equipped to handle potential complications and have transfer arrangements with an inpatient facility.

PREOPERATIVE

- CPAP has been shown to be effective at treating OSA; preoperative CPAP may be beneficial, especially in patients who are already using home CPAP. Grade B Recommendation
- If premedication, such as benzodiazepines, will be administered, patients must be monitored continuously for any signs of respiratory compromise; CPAP should be available for use if the patient becomes sleepy and cannot control his or her own airway. Grade B Recommendation

INTRAOPERATIVE

- If possible, consider local or regional anesthesia. Grade D Recommendation
- If sedatives will be used, ventilation should be monitored by capnography. Grade D Recommendation
- Patients who have been using CPAP preoperatively may benefit from its continued use during sedation. Grade B Recommendation
- If general anesthesia is necessary, it is important to secure the airway, especially for procedures that may compromise the airway; consider shortacting drugs; avoid large doses of long-acting drugs, such as neuromuscular blockers. Grade D Recommendation
- If endotracheal intubation is necessary, consider intubating in the sniffing position under fiberoptic scope. Grade D Recommendation
- Time to extubate should be based on severity of OSA, surgical site, cardiopulmonary comorbidities, difficult intubation, and intraoperative course; if possible, extubate in semiupright, lateral, or prone position when patient is fully awake with adequate airway muscle tone. Grade D Recommendation

POSTOPERATIVE

- If possible, systemic opioids should be avoided; other options, such as local or regional anesthetics and analgesics, a pain pump, nonsteroidal antiinflammatory drugs, or ice, should be considered to avoid use of opioids. Grade D Recommendation
- For patients at increased perioperative risk from OSA, consider administering continuous supplemental oxygen. Grade D Recommendation
- If patient experiences recurrent hypoxemia, consider treatment with CPAP and supplemental oxygen. If patient used CPAP preoperatively, resume CPAP when patient is awake and alert. Grade B Recommendation
- Monitor patients longer than non-OSA counterparts; if an episode of airway obstruction or hypoxemia occurs, patients should be continually monitored after the last episode while breathing room air in unstimulated environment; if the patient is in an ambulatory setting, transfer arrangements to an inpatient facility should be made for further monitoring. Grade D Recommendation

OSA References

Level I (T): Ballester E, Badia JR, Hernandez L, et al. Evidence of the effectiveness of continuous positive airway pressure in the treatment of sleep apnea/hypopnea syndrome. Am J Respir Crit Care Med. 1999;159:495–501. Article Ink

Level I (T): Spicuzza L, Bernardi L, Balsamo R, Ciancio N, Polosa R, Di Maria G. Effect of treatment with nasal continuous positive airway pressure on ventilatory response to hypoxia and hypercapnia in patients with sleep apnea syndrome. Chest 2006;130:774–779. Article link

Level II (R): Liao P, Yegneswaran B, Vairavanathan S, Zilberman P, Chung F. Postoperative complications in patients with obstructive sleep apnea: a retrospective matched cohort study. Can J Anaesth. 2009 Nov;56(11):819-28. Article Link

Level II (T): Jenkinson C, Davies RJ, Mullins R, Stradling JR. Comparison of therapeutic and subtherapeutic nasal continuous positive airway pressure for obstructive sleep apnoea: A randomized prospective parallel trial. Lancet 1999;353:2100–2105. Article link

Level II (T): Hoijer U, Hedner J, Ejnell H, Grunstein R, Odelberg E, Elam M. Nitrazepam in patients with sleep apnoea: A double-blind placebo-controlled study. Eur Respir J. 1994;7:2011–2015. Article link

Level II (T): Dolly FR, Block AJ. Effect of flurazepam on sleep-disordered breathing and nocturnal oxygen desaturation in asymptomatic subjects. Am J Med. 1982;73:239–243. Article link

Level III (R): Gupta RM, Parvizi J, Hanssen A, Gay PC. Postoperative complications in patients with obstructive sleep apnea syndrome undergoing hip or knee replacement: A case-control study. *Mayo Clin Proc.* 2001;76:897–905. Article Link

Level III (R): Sabers C, Plevak DJ, Schroeder DR, Warner DO. The diagnosis of obstructive sleep apnea as a risk factor for unanticipated admissions in outpatient surgery. Anesth Analg. 2003 May;96 (5):1328-35, table of contents. Article Link

Level III (R): Regli A, von Ungern-Sternberg BS, Strobel W, Pargger H, Welge-Luessen A, Reber A. The impact of postoperative nasal packing on sleep-disordered breathing and nocturnal oxygen saturation in patients with obstructive sleep apnea syndrome. *Anesth Analg.* 2006;102:615–620. Article Link

Level III (R): Siyam MA, Benhamou D. Difficult endotracheal intubation in patients with sleep apnea syndrome. *Anesth Analg.* 2002; 95:1098–1102. Article Link

Level III (R): Liistro G, Rombaux P, Belge C, Dury M, Aubert G, Rodenstein DO. High Mallampati score and nasal obstruction are associated risk factors for obstructive sleep apnoea. Eur Respir J. 2003;21:248–252. Article Link

Level III (R): Waters KA, McBrien F, Stewart P, Hinder M, Wharton S. Effects of OSA, inhalational anesthesia, and fentanyl on the airway and ventilation of children. J Appl Physiol. 2002;92:1987–1894. Article link

Level III (R): Kheterpal S, Han R, Tremper K, et al. Incidence and predictors of difficult and impossible mask ventilation. Anesthesiology 2006;105:885–891. Article link

Level IV (T): Rennotte MT, Baele P, Aubert G, Rodenstein DO. Nasal continuous positive airway pressure in the perioperative management of patients with obstructive sleep apnea submitted to surgery. Chest. 1995 Feb;107(2):367-74. Article Link

Level V (T): Practice Guidelines for the Perioperative Management of Patients with Obstructive Sleep Apnea. A Report by the American Society of Anesthesiologists Task Force on Perioperative Management of Patients with Obstructive Sleep Apnea. Anesthesiology 2006; 104:1081–93 Article Link

* (T)= Therapeutic Study; (R)= Risk Study

APNEA-HYPOPNEA INDEX

The American Academy of Sleep Disorders has classified the severity of sleep apnea by the apnea-hypopnea index (AHI). The AHI is a measurement of the average number of apneas and hypopneas that occur per hour of sleep.

Severity of OSA	AHI
Mild	5-15
Moderate	15-30
Severe	>30

Source: Sleep-related breathing disorders in adults: recommendations for syndrome definition and measurement techniques in clinical research. The Report of an American Academy of Sleep Medicine Task Force. Sleep. 1999 Aug 1;22(5):667-89 Article Link

OBSTRUCTIVE SLEEP APNEA RESOURCES

American Academy of Sleep Medicine

American Sleep Apnea Association

Age: ASPS Evidence Based Recommendations

All recommendations below are Grade B:

- Patients older than 60 years can be considered for ambulatory surgery but may be at increased risk for cardiac events, other complications, and unanticipated admissions.
- Cardiovascular monitoring is important; however, the level of monitoring depends on the patient's overall health, the presence and severity of cardiovascular disease, and the nature of the surgical procedure.
- Standard monitoring should include:
  - Noninvasive blood pressure
  - Heart rate
  - Electrocardiography
  - Pulse oximetry
  - Respiratory rate

Cardiovascular Conditions: ASPS Evidence Based Recommendations

- Patients with a history of cardiovascular conditions can be considered for ambulatory surgery; however, the surgery location depends on the severity of disease. Patients with moderate to severe cardiovascular disease may not be appropriate candidates for surgery outside of the hospital setting. Grade D Recommendation
- General management of patients with cardiovascular conditions:
  Grade B Recommendations
  - Evaluate the risk of bleeding and thromboembolism.
  - Adjust medications such as aspirin, warfarin, or clopidogrel bisulfate accordingly.
  - Refer patients to their cardiologist, hematologist, or internist for preoperative evaluation and treatment.

Cardiovascular References

Level II (T): Ardekian L, Gaspar R, Peled M, Brener B, Laufer D. Does low-dose aspirin therapy complicate oral surgical procedures? J Am Dent Assoc. 2000;131:331–335. Article Link

Level II (R): Bartlett GR. Does aspirin affect the outcome of minor cutaneous surgery? Br J Plast Surg. 1999;52:214–216. Article Link

Level II (T): Partridge CG, Campbell JH, Alvarado F. The effect of platelet-altering medications on bleeding from minor oral surgery procedures. J Oral Maxillofac Surg. 2008;66: 93–97. Article Link

Level II (R): Custer PL, Trinkaus KM. Hemorrhagic complications of oculoplastic surgery. Ophthal Plast Reconstr Surg. 2002 Nov;18(6):409-15. Article Link

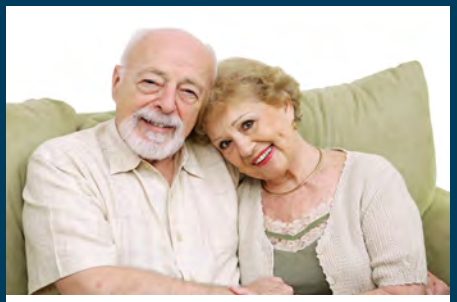
Level II (R): Dhiwakar M, Khan NA, McClymont LG. Surgical resection of cutaneous head and neck lesions: Does aspirin use increase hemorrhagic risk? Arch Otolaryngol Head Neck Surg. 2006;132:1237–1241. Article Link

Level III (T): Burger W, Chemnitius JM, Kneissl GD, Ru¨cker G. Low-dose aspirin for secondary cardiovascular prevention: Cardiovascular risks after its perioperative withdrawal versus bleeding risks with its continuation. Review and meta-analysis. J Intern Med. 2005;257:399–414. Article Link

Level IV (R): George EN, Simpson D, Thornton DJ, Brown TL, Griffiths RW. Re-evaluating selection criteria for local anaesthesia in day surgery. Br J Plast Surg. 2004 Jul;57(5):446-9. Article Link

Level V (T): Fleisher LA, Beckman JA, Brown KA, et al. ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines J Am Coll Cardiol. 2007 Oct 23;50(17):1707-32. Article Link

* (T)= Therapeutic Study; (R)= Risk Study



Age References

Level II (R): Chung F, Mezei G, Tong D. Pre-existing medical conditions as predictors of adverse events in day-case surgery. Br J Anaesth. 1999 Aug;83(2):262-70. Article Link

Level II (R): Custer PL, Trinkaus KM. Hemorrhagic complications of oculoplastic surgery. Ophthal Plast Reconstr Surg. 2002 Nov;18(6):409-15. Article Link

Level II (R): Fleisher LA, Pasternak LR, Lyles A. A novel index of elevated risk of inpatient hospital admission immediately following outpatient surgery. Arch Surg. 2007;142:263–268. Article Link

Level IV (R): Aldwinckle RJ, Montgomery JE. Unplanned admission rates and postdischarge complications in patients over the age of 70 following day case surgery. Anaesthesia. 2004 Jan;59(1):57-9. Article Link

Level IV (R): Mandal A, Imran D, McKinnell T, Rao GS. Unplanned admissions following ambulatory plastic surgery--a retrospective study. Ann R Coll Surg Engl. 2005 Nov;87(6):466-8. Article Link

Level IV (R): George EN, Simpson D, Thornton DJ, Brown TL, Griffiths RW. Re-evaluating selection criteria for local anaesthesia in day surgery. Br J Plast Surg. 2004;57:446–449. Article Link

(R)= Risk Study

ASA Status: ASPS Evidence Based Recommendations

- Patients categorized as ASA class 1–3 can be considered for ambulatory surgery; however, the setting should be determined by the ASA class, the type of procedure, and the type of anesthesia. Grade B Recommendation
- ASA class 4 patients can be considered for ambulatory surgery; however, the setting is dependent on the type of procedure and type of anesthesia. Grade D Recommendation
- Office-based procedures: All Recommendations below are Grade D
    - ASA class 1 and 2 patients are generally considered the best candidates for ambulatory surgery and reasonable candidates for the office-based surgery setting.
    - ASA class 3 patients may also be reasonable candidates for office-based surgery facilities when local anesthesia, with or without sedation, is planned and the facility is accredited.
    - ASA class 4 patients are appropriate candidates for the office-based surgery setting only when local anesthesia without sedation is planned.
- If a free-standing ASC or office-based setting is chosen, it should be accredited with appropriate hospital transfer arrangements.

ASA Status: Plastic Surgery Example

ASA 1: A fit patient with no underlying systemic disease or on no medications:

- A 43 year old female for bilateral breast enhancement.
- A 32 year old male for cosmetic rhinoplasty.
- A 16 year old female for ear lobe reconstruction due congenital anomaly.

ASA 2: A patient with mild systemic disease, i.e. slightly limiting organic heart disease, mild diabetes, essential hypertension or anemia, obesity (by itself), chronic bronchitis, or any healthy individual under 1 year old or over 70 years old. *e.g.* Patients:

- who smoke, drink alcohol frequently or excessively, or use street drugs.
- who are obese.
- who have any of the following but under control without systemic compromise: diabetes, hypertension, asthma, GERD, PUD, hematological disorders, arthritis, neuropathy.
- with anatomic abnormalities of significance to health, such as hiatal hernia, difficult airways, non-debilitating heart anomaly, Down syndrome patients.
- with mild psychiatric illness that is under control, such as depression or anxiety disorder
- with a remote history of coronary artery disease and no other systemic illnesses, and their progress afterwards showed no further chest pain and documented good exercise tolerance.
- A 4-month-old male or female for cleft palate repair.
- A 73 year old female for bilateral breast enhancement.
- A 21 year old female for breast augmentation with truncal obesity.
- A 43 year old female for bilateral breast enhancement, who is a smoker and has COPD.
- A 32 year old asthmatic male for cosmetic rhinoplasty.

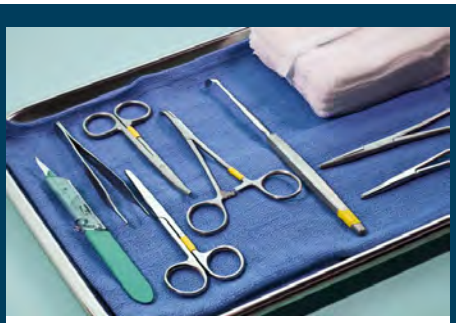
ASA 3: A patient with a systemic disease or multiple significant mild systemic diseases, organic heart diseases, severe diabetes with vascular complications, moderate to severe degrees of pulmonary insufficiency, angina pectoris, or healed myocardial infarction:

- Any 3rd and 4th degree burn patient who is hemodynamically stable and undergoing graft surgery.
- A 16 year old female for ear lobe reconstruction due congenital anomaly, with a symptomatic VSD.
- A 26 year old male for back lipoma excision, with controlled end-stage renal disease.
- A 53 year old male for liposuction, who is hypertensive and has occasional chest pain.

ASA 4: Organic heart disease showing marked signs of cardiac insufficiency, persistent anginal syndrome, active myocarditis, advanced degrees of pulmonary, hepatic, renal or endocrine insufficiency.

- A 71 year old female for bilateral breast enhancement under general anesthesia, who is asthmatic, a smoker and has COPD.
- A 16 year old female for ear lobe reconstruction due to congenital anomaly, with a cyanotic heart anomaly.
- A 53 year old male for liposuction, who is hypertensive and has CHF within the last 6 month.

*Examples of ASA classifications created by Rebecca S. Twersky, M.D., Member of the ASPS Task Force on Patient Safety in Office-Based Surgery Facilities and Chair of the ASA Committee on Ambulatory Surgical Care.



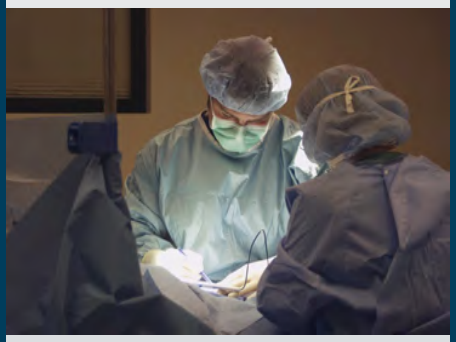
ASA Status References

Level III (R): Fortier J, Chung F, Su J. Unanticipated admission after ambulatory surgery--a prospective study. Can J Anaesth. 1998 Jul;45(7):612-9. Article Link

Level III (R): Ansell GL, Montgomery JE. Outcome of ASA III patients undergoing day case surgery. Br J Anaesth. 2004 Jan;92(1):71-4. Article Link

Level IV (R): George EN, Simpson D, Thornton DJ, Brown TL, Griffiths RW. Re-evaluating selection criteria for local anaesthesia in day surgery. Br J Plast Surg. 2004 Jul;57(5):446-9. Article Link

(R)= Risk Study



ASA STATUS RESOURCES

American Society of Anesthesiologists

"The surgeon and/or anesthesiologist should assign an ASA physical status classification rating for each patient to select the appropriate facility for ambulatory surgery"

(Haeck et al, "Evidence Based Patient Safety Advisory for Ambulatory Surgery, 2009).

Hypothermia: ASPS Evidence Based Recommendations

All Recommendations below are Grade B:

- General strategies:
  - Equip the ambulatory surgery suite so that temperatures can be adequately monitored and adjusted.
  - Have equipment available such as forced-air arming blankets, intravenous fluid warmers to warm the patient, as necessary, especially during more extensive procedures.
  - When no hypothermia prevention measures are available, the procedures performed should be of short duration (1–2 hr) and limited to no more than 20% of the body surface area.
- Recommended protocol for hypothermia prevention during general or regional anesthesia:
  - Actively pre-warm patients.
  - Monitor core temperature throughout administration of general and regional anesthesia.
  - Cover as much body surface area as possible with blankets or drapes to reduce radiant and convective heat loss through the skin.
  - Actively warm patients intraoperatively with a forced-air heater or resistive-heating blanket to prevent heat loss and add heat content; rearrange covers every time the patient is repositioned to warm as much surface area as possible.
  - Minimize repositioning time as much as possible so that the active warming method can be quickly continued.
  - Warm intravenous fluids and/or infiltration fluids if large volumes are used.
  - Warm incision irrigation fluids.
  - Aggressively treat postoperative shivering with a forced-air heater or resistive-heating blanket and consider pharmacologic intervention.



HYPOTHERMIA RESOURCES

PREVENThypothermia.org

U.S. Healthcare Initiatives on Normothermia

Hyperthermia References

Level I (T): Ng SF, Oo CS, Loh KH, Lim PY, Chan YH, Ong BC. A comparative study of three warming interventions to determine the most effective in maintaining perioperative normothermia. *Anesth Analg.* 2003;96:171–176. Article Link

Level II (T): Andrzejowski JC, Turnbull D, Nandakumar A, Gowthaman S, Eapen G. A randomised single blinded study of the administration of pre-warmed fluid vs active fluid warming on the incidence of peri-operative hypothermia in short surgical procedures. Anaesthesia. 2010 Sep;65(9):942-5. Article Link

Level II (T): Fossum S, Hays J, Henson MM. A comparison study on the effects of prewarming patients in the outpatient surgery setting. J Perianesth Nurs. 2001;16:187–194. Article Link

Level II (T): Smith CE, Gerdes E, Sweda S, et al. Warming intravenous fluids reduces perioperative hypothermia in women undergoing ambulatory gynecological surgery. Anesth Analg. 1998; 87:37–41. Article Link

Level II (R): Agrawal N, Sewell DA, Griswold ME, Frank SM, Hessel TW, Eisele DW. Hypothermia during head and neck surgery. Laryngoscope 2003;113:1278–1282. Article Link

Level II (T): Cavallini M, Baruffaldi Preis FW, Casati A. Effects of mild hypothermia on blood coagulation in patients undergoing elective plastic surgery. Plast Reconstr Surg. 2005;116:316–321; discussion 322–323. Article Link

Level II (T): Negishi C, Hasegawa K, Mukai S, Nakagawa F, Ozaki M, Sessler DI. Resistive-heating and forced-air warming are comparably effective. Anesth Analg. 2003;96:1683–1687. Article Link

Level II (T): Robles-Cervantes JA, Martı´nez-Molina R, Ca´rdenas-Camarena L. Heating infiltration solutions used in tumescent liposuction: Minimizing surgical risk. *Plast Reconstr Surg*. 2005;116:1077–1081. Article Link

Level II (T): Vanni SM, Braz JR, Modolo NS, Amorim RB, Rodrigues GR Jr. Preoperative combined with intraoperative skin-surface warming avoids hypothermia caused by general anesthesia and surgery. *J Clin Anesth*. 2003;15:119–125. Article Link

(T)= Therapeutic Study; (R)= Risk Study

Wrong Site Surgery

Evidence-based data for the prevention of wrong site surgery is presently not available; however, the implementation of protocols for preventing wrong site surgery, such as checklists, are required by many accrediting agencies. Wrong site surgery is considered a reportable event in many states and is classified as a "never event" by the Centers for Medicare and Medicaid Services and other payers. Below is an example of a comprehensive surgical safety checklist, developed by the Association of periOperative Registered Nurses (AORN), that incorporates the safety checks from both the World Health Organization's Surgical Safety Checklist and The Joint Commission's Universal Protocol. This comprehensive checklist can be used in all facility types.

COMPREHENSIVE SURGICAL CHECKLIST

Blue = World Health Organization (WHO) Green = The Joint Commission - Universal Protocol (JC) 2010 National Patient Safety Goals Orange = JC and WHO

PREPROCEDURE CHECK-IN	SIGN-IN	TIME-OUT	SIGN-OUT
In Holding Area	**Before Induction of Anesthesia**	**Before Skin Incision**	**Before the Patient Leaves the Operating Room**
Patient/patient representative actively confirms with Registered Nurse (RN):	**RN and anesthesia care provider confirm:**	**Initiated by designated team member** All other activities to be suspended (unless a life-threatening emergency)	**RN confirms:**
Identity □ Yes Procedure and procedure site □ Yes Consent(s) □ Yes Site marked □ Yes □ N/A by person performing the procedure **RN confirms presence of:** History and physical □ Yes Preanesthesia assessment □ Yes Diagnostic and radiologic test results □ Yes □ N/A Blood products □ Yes □ N/A Any special equipment, devices, implants □ Yes □ N/A Include in Preprocedure check-in as per institutional custom: Beta blocker medication given (SCIP) □ Yes □ N/A Venous thromboembolism prophylaxis ordered (SCIP) □Yes □ N/A Normothermia measures (SCIP) □ Yes □ N/A	Confirmation of: identity, procedure, procedure site and consent(s) □ Yes Site marked □ Yes □ N/A by person performing the procedure Patient allergies □ Yes □ N/A Difficult airway or aspiration risk? □ No □ Yes (preparation confirmed) Risk of blood loss (> 500 ml) □ Yes □ N/A # of units available _____ Anesthesia safety check completed □ Yes **Briefing:** All members of the team have discussed care plan and addressed concerns □ Yes	Introduction of team members □ Yes **All:** Confirmation of the following: identity, procedure, incision site, consent(s) □ Yes Site is marked and visible □ Yes □ N/A Relevant images properly labeled and displayed □ Yes □ N/A Any equipment concerns? **Anticipated Critical Events** **Surgeon:** States the following: □ critical or nonroutine steps □ case duration □ anticipated blood loss **Anesthesia Provider:** □ Antibiotic prophylaxis within one hour before incision □ Yes □ N/A □ Additional concerns? **Scrub and circulating nurse:** □ Sterilization indicators have been confirmed □ Additional concerns?	Name of operative procedure Completion of sponge, sharp, and instrument counts □ Yes □ N/A Specimens identified and labeled □ Yes □ N/A Any equipment problems to be addressed? □ Yes □ N/A **To all team members:** What are the key concerns for recovery and management of this patient? _____ _____ _____ _____ _____ _____ _____ _____ April 2010 AORN

The JC does not stipulate which team member initiates any section of the checklist except for site marking.
The Joint Commission also does not stipulate where these activities occur. See the Universal Protocol for details on the Joint Commission requirements.

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Multiple Procedures: ASPS Evidence Based Recommendations

All Recommendations below are Grade B:

- The presumed benefits of combining procedures, particularly liposuction, must be weighed against the possibility of adverse events.
- Liposuction can be performed safely in the ambulatory setting when performed in accordance with ASPS recommendations to limit the total aspirant (supernatant fat and fluid) to ≤5000 cc.
- Combining large-volume liposuction with certain other procedures (e.g., abdominoplasty) should be avoided because of the possibility of serious complications.

MULTIPLE PROCEDURE REFERENCES

Level III (T)**:** Stevens WG, Vath SD, Stoker DA. "Extreme" cosmetic surgery: A retrospective study of morbidity in patients undergoing combined procedures. *Aesthetic Surg J*. 2004;24:314–318. Article Link

Level III (T): Stevens WG, Cohen R, Vath SD, Stoker DA, Hirsch EM. Is it safe to combine abdominoplasty with elective breast surgery? A review of 151 consecutive cases. *Plast Reconstr Surg*. 2006;118:207–212; discussion 213–214. Article Link

Level III (T)**:** Kim J, Stevenson TR. Abdominoplasty, liposuction of the flanks, and obesity: Analyzing risk factors for seroma formation. *Plast Reconstr Surg*. 2006;117:773–779; discussion 780–781. Article Link

Level III (T): Simon S, Thaller SR, Nathan N. Abdominoplasty combined with additional surgery: A safety issue. *Aesthetic Surg J*. 2006; 26:413–416. Article Link

Level III (T): Stokes RB, Williams S. Does concomitant breast surgery add morbidity to abdominoplasty? *Aesthetic Surg J*. 2007;27:612– 615. Article Link

Level III (T): Heller JB, Teng E, Knoll BI, Persing J. Outcome analysis of combined lipoabdominoplasty versus conventional abdominoplasty. Plast Reconstr Surg. 2008 May;121(5):1821-9. Article Link

Level IV (T)**:** Ca´rdenas-Camarena L. Aesthetic surgery of the thoracoabdominal area combining abdominoplasty and circumferential lipoplasty: 7 years' experience. *Plast Reconstr Surg*. 2005;116:881–890; discussion 891–892. Article Link

Level IV (T): Ca´rdenas-Camarena L, Paillet JC. Combined gluteoplasty: Liposuction and gluteal implants. Plast Reconstr Surg. 2007; 119:1067–1074. Article Link

(T)= Therapeutic Study

Procedure Duration: ASPS Evidence Based Recommendations

All Recommendations below are Grade B:

- Long procedures should be scheduled sufficiently early in the day to allow for adequate recovery time before discharge.
- If possible, surgery should be completed by 3 pm to allow adequate time for recovery and discharge.
- The overall duration of the procedure(s) should ideally be completed within 6 hr.
- Attention to patient selection, intraoperative management, and postoperative care is of particular importance when procedures of longer duration are to be performed in the ambulatory setting.

PROCEDURE DURATION REFERENCES

Level II (R)**:** Fleisher LA, Pasternak LR, Lyles A. A novel index of elevated risk of inpatient hospital admission immediately following outpatient surgery. *Arch Surg*. 2007;142:263–268. Article Link

Level III (R): Fortier J, Chung F, Su J. Unanticipated admission after ambulatory surgery: A prospective study. Can J Anaesth. 1998;45:612–619. Article Link

Level III (R): Shirakami G, Teratani Y, Namba T, Hirakata H, Tazuke Nishimura M,. Delayed discharge and acceptability of ambulatory surgery in adult outpatients receiving general anesthesia. J Anesth. 2005;19:93–101. Article Link

Level III (T): Gordon NA, Koch ME. Duration of anesthesia as an indicator of morbidity and mortality in office-based facial plastic surgery: A review of 1200 consecutive cases. Arch Facial Plast Surg. 2006;8:47–53. Article Link

Level IV (R): Mandal A, Imran D, McKinnell T, Rao GS. Unplanned admissions following ambulatory plastic surgery: A retrospective study. *Ann R Coll Surg Engl*. 2005;87:466-468. Article Link

Surgical Fires: ASPS Evidence Based Recommendations

All Recommendations below are Grade D:

PREOPERATIVE

- The surgeon, anesthesia provider, and all members of the surgical staff should be apprised of the surgical plan with respect to the use of potential oxidizers, ignition sources, and fuel sources.
- Drapes should be positioned to prevent accumulation of oxidizers under the drapes and should not be placed on patient until flammable preparations have dried.
- Moistened towels should be placed around the face and neck if a laser is used on the face or oral region.
- If endotracheal intubation is necessary, the use of metal or laser-safe tubes should be considered if appropriate for the procedure, or the tube should be wrapped in a nonflammable material such as aluminum foil or moistened gauze, cotton, or sponges.
- If supplemental oxygen is required, the lowest oxygen concentration needed to provide adequate saturation should be considered.
- If possible, nitrous oxide anesthetics should be avoided and alternatives such as intravenous sedation and localized blocks should be considered.
- If the use of oxygen and/or nitrous oxide is unavoidable, a separate suction tube is recommended for scavenging excess gases in the oropharynx.

INTRAOPERATIVE

- The surgeon, anesthesia provider, and other surgical staff should communicate effectively to avoid simultaneous use of potential oxidizers, ignition sources, and fuel sources.
- If possible, oxygen administration should be discontinued at least 1 min before and during the use of potential ignition sources (e.g., electrocautery and electrosurgical units, lasers, and fiberoptic lights).
- Potential ignition sources should be placed in standby mode when not in immediate use

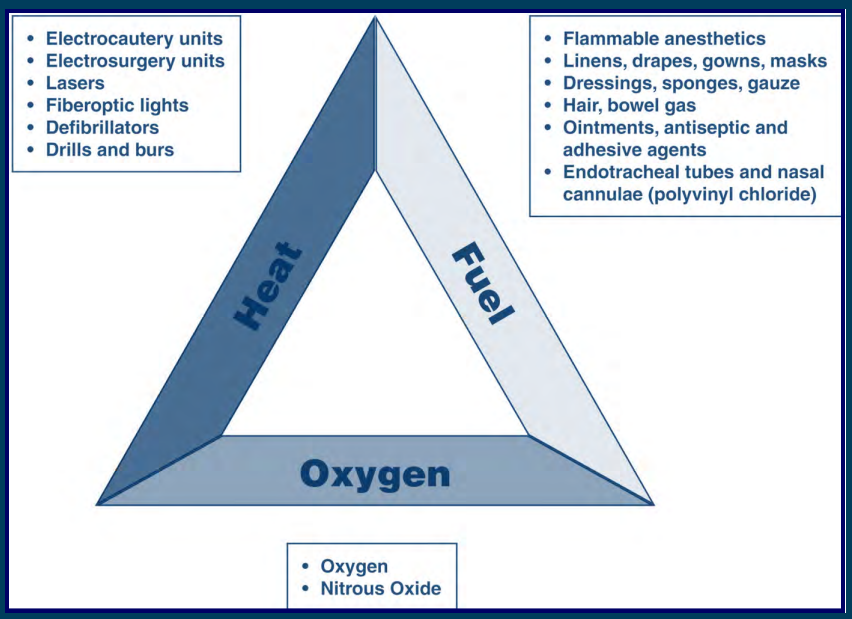


Fig. 1. The surgical fire triangle and examples of common oxidizers, ignition sources, and fuel sources used in the operating room. (Source: Haeck et al, 2009)

Surgical Fire References

Level II (T): Meneghetti SC, Morgan MM, Fritz J, Borkowski RG, Djohan R, Zins JE. Operating room fires: optimizing safety. Plast Reconstr Surg. 2007 Nov;120(6):1701-8. Article Link

Level V (T): Greco RJ, Gonzalez R, Johnson P, Scolieri M, Rekhopf PG, Heckler F. Potential dangers of oxygen supplementation during facial surgery. Plast Reconstr Surg. 1995;95:978–984. Article Link

Level V (T): Prasad R, Quezado Z, St Andre A, O'Grady NP. Fires in the operating room and intensive care unit: Awareness is the key to prevention. Anesth Analg. 2006;102:172–174. Article Link

Level V (T): Meltzer HS, Granville R, Aryan H, Billman G, Bennett R, Levy ML.. Gel-based surgical preparation resulting in an operating room fire during a neurosurgical procedure: Case report.. J Neurosurg. 2005;102:347–349. Article Link

Level V (T): American Society of Anesthesiologists Task Force on Operating Room Fires, Caplan RA, Barker SJ, Connis RT, Cowles C, de Richemond AL, Ehrenwerth J, Nickinovich DG, Pritchard D, Roberson D, Wolf GL. Practice advisory for the prevention and management of operating room fires. Anesthesiology. 2008 May;108(5):786-801. Article Link

SURGICAL FIRE RESOURCES

Emergency Care Research Institute
Downloadable Fire Prevention Posters

Joint Commission:
Creating a Fire Plan

Anesthesia Patient Safety Foundation:
Fire Safety Video

Malignant Hyperthermia: ASPS Evidence Based Recommendations

PATIENT SELECTION

- During patient assessment, patients should be asked about personal and family history of (Grade D Recommendation):
  - MH
  - Adverse anesthesia reactions (unexplained fever or death during anesthesia)
- Patients with suspected MH should be referred for appropriate diagnostic testing (Grade B Recommendation):
  - CHCT or in vitro contracture test is the standard.
  - Genetic testing for mutations in the *RYR1* gene may be considered; however, it typically cannot replace contracture tests, as it has low sensitivity. Results do not always correlate with a positive contracture test, which suggests that there may be other loci involved with MH.
- Patients susceptible to MH may undergo outpatient surgery, provided that non-triggering anesthetics are used. All office surgical suites should be equipped to manage an MH emergency. However, anyone identified with MH susceptibility should be referred to an accredited ambulatory surgical center or hospital for surgery. Grade D Recommendation

PREOPERATIVE MANAGEMENT

- In patients susceptible to MH, *do not use* the following MH-triggering drugs (Grade B Recommendation):
  - Inhaled general anesthetics:
  - Desflurane
  - Enflurane
  - Halothane
  - Isoflurane

  Depolarizing muscle relaxants:
  - Succinylcholine
- The surgical suite should be equipped to manage malignant hyperthermia. Drugs and supplies should include: (Grade D Recommendation)
  - Dantrolene sodium IV (The number of vials is often determined by the location of the ASC/OBSC or by the accrediting agency)
  - Sterile water for dantrolene reconstitution
  - Sodium bicarbonate
  - Furosemide
  - Dextrose
  - Calcium chloride
  - Regular insulin (refrigerated)

ANESTHESIA

All Recommendations below are Grade D:

- Local or regional anesthesia and monitored anesthesia care are considered to be safe for individuals susceptible to MH; this includes spinal, epidural, and nerve block anesthesia using local anesthetics (e.g., lidocaine, bupivacaine).
- General anesthesia can be performed with alternative anesthetic regimens, including barbiturates (e.g., thiopental), propofol, nondepolarizing paralytic agents (e.g., vecuronium) and their reversal agents, nitrous oxide, and opioids (e.g., fentanyl) (anesthesia machine preparation: change circuits, disable or remove the vaporizers, flush the machine at a rate of 10 liters/ min for 20 min).
- If general anesthesia will be used, patients should undergo body temperature and capnographic monitoring.

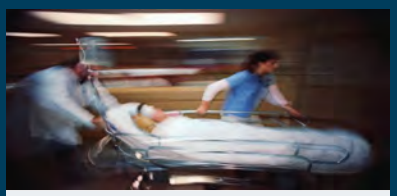
INTRAOPERATIVE MANGEMENT

All Recommendations below are Grade D:

- Monitor for clinical signs of MH:
  - Signs of respiratory acidosis: $ETCO_2$ >55 mmHg, $PaCO_2$ >60 mmHg (with appropriately controlled ventilation); $ETCO_2$ >60 mmHg, $PaCO_2$ >65 mmHg (with spontaneous ventilation); inappropriate hypercarbia and/or tachypnea
  - Trunk or total body rigidity
  - Masseter muscle spasm or trismus
  - Sinus tachycardia; ventricular tachycardia; ventricular fibrillation
  - Rapidly increasing temperature, or inappropriately increased temperature (>38.8°C); may be a late sign
  - Signs of muscle breakdown: elevated serum creatine kinase after anesthetics that included succinylcholine (>20,000 IU) or anesthetics without succinylcholine (>10,000 IU); cola-colored urine; excess myoglobin in urine (>60 mg/ liter) and serum (>170 mg/liter); blood/ plasma/serum K^+ >6 mEq/liter (in absence of renal failure)
  - Other: arterial base excess <–8 mEq/ liter; arterial pH <7.25; rapid reversal of MH signs of respiratory and/or metabolic acidosis with IV administration of dantrolene

TREATMENT OF MH CRISIS

- Call for help; summon emergency medical service.
- Patient should be transferred to an acute care facility as soon as possible.
- Administer dantrolene. Grade B Recommendation
- Hyperventilate with 100% oxygen. Grade D Recommendation
- Cool the patient.
- Check electrolytes, especially potassium.
- For specific treatment recommendations, consult the Malignant Hyperthermia Association of the United States Guidelines at: http://medical.mhaus.org/



MH Crisis Hotline for Medical Professionals

1-800-MH-HYPER
(1-800-644-9737)

The hotline provides medical professionals with access to MH experts who can be reached for help with MH crises treatment 24 hours per day, 365 days per year.

For more information, visit:
MH Hotline Information

Malignant Hyperthermia References

Level III (R): Ibarra MC, Wu S, Murayama K, et al. Malignant hyperthermia in Japan: Mutation screening of the entire ryanodine receptor type 1 gene coding region by direct sequencing. *Anesthesiology* 2006;104:1146–1154. Article Link

Level IV (D): Allen GC, Larach MG, Kunselman AR. The sensitivity and specificity of the caffeine-halothane contracture test: A report from the North American Malignant Hyperthermia Registry. The North American Malignant Hyperthermia Registry of MHAUS. *Anesthesiology* 1998;88:579–588. Article Link

Level IV (T): Kolb ME, Horne ML, Martz R. Dantrolene in human malignant hyperthermia. *Anesthesiology* 1982;56:254–262. Article Link

Level IV (D): Ording H, Brancadoro V, Cozzolino S, et al. In vitro contracture test for diagnosis of malignant hyperthermia following the protocol of the European MH Group: Results of testing patients surviving fulminant MH and unrelated lowrisk subjects. The European Malignant Hyperthermia Group. *Acta Anaesthesiol Scand.* 1997;41:955–966. Article Link

Level V (D): Flewellen EH, Nelson TE. Masseter spasm induced by succinylcholine in children: Contracture testing for malignant hyperthermia. Report of six cases. *Can Anaesth Soc J.* 1982; 29:42–49. Article Link

Level V (D): Larach MG, Localio AR, Allen G, et al. A clinical grading scale to predict malignant hyperthermia susceptibility. *Anesthesiology* 1994;80:771–779. Article Link

Level V (R): Snoeck MM, Gielen MJ, Tangerman A, van Egmond J, Dirksen R. Contractures in skeletal muscle of malignant hyperthermia susceptible patients after in vitro exposure to sevoflurane. *Acta Anaesthesiol Scand.* 2000;44:334–337. Article Link

(T)= Therapeutic Study; (R)= Risk Study; (D)= Diagnostic Study

MH RESOURCES

Dantrolene FAQs

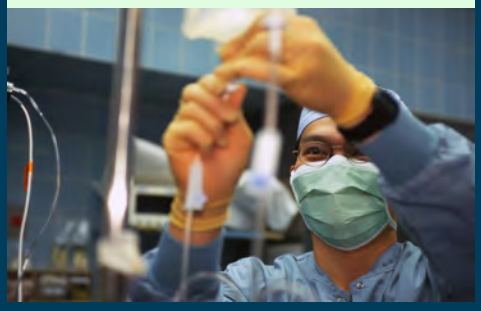
Testing for Malignant Hyperthermia

MH Association of the United States

MH Educational Case Reviews

North American MH Registry

European MH Group



EVIDENCE BASED PATIENT SAFETY ADVISORY FOR AMBULATORY SURGERY SUPPLEMENT ARTICLES

Patient Selection and Procedures in Ambulatory Surgery

Liposuction

Patient Assessment and Prevention of Pulmonary Side Effects in Surgery. Part 1- Obstructive Sleep Apnea and Obstructive Lung Disease

Patient Assessment and Prevention of Pulmonary Side Effects in Surgery. Part 2- Patient and Procedural Risk Factors

Malignant Hyperthermia

Blood Dyscrasias

Online ASPS Resources

ASPS Key Issues in Plastic Surgery

ASPS Clinical Practice Guidelines

ASPS Policy Statements/ Guiding Principles

Patient Safety Resources

Plastic Surgery Foundation: Grant Opportunities

ASPS Publications & Online Education

Online Educational Courses: MOC and CME

PSEN PLASTIC SURGERY EDUCATION NETWORK

Plastic Surgery News Extra

Plastic Surgery NEWS EXTRA

Plastic and Reconstructive Surgery Journal

The American Society of Plastic Surgeons
The Plastic Surgery Foundation

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