

a **LANGE** clinical manual

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# **Surgery**

## **Diagnosis & Therapy**

# '89/'90

Edited by

**Richard M. Stillman, MD, FACS**



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# Preface

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## PURPOSE

This manual provides a complete, concise, portable source of practical information on the care of the surgical patient, emphasizing preoperative and postoperative management. Residents and students in surgery will find it particularly helpful as a convenient, current, quick reference source. It will also prove valuable to surgeons and emergency physicians.

## ORGANIZATION AND SCOPE

The manual is organized into five major sections: General Considerations, Medical Problems in Surgical Patients, Specific Surgical Problems, Special Topics, and Diagnostic and Therapeutic Procedures.

The General Considerations section includes chapters on such topics as fever, fluid, electrolyte, and acid-base disorders, infections and wound healing, nutritional support, and other problems related to all surgical care. Medical Problems in Surgical Patients includes cardiovascular risk factors and hypertension, respiratory problems, renal insufficiency, and diabetes mellitus and other endocrine problems. The section on Specific Surgical Problems is organized by anatomic region but includes chapters on pediatric surgery, transplantation, and trauma.

The Special Topics section discusses psychiatric problems and legal medicine. The section on Diagnostic and Therapeutic Procedures includes illustrated descriptions of procedural technique, supplemented with practical tips.

Concrete, unequivocal clinical guidelines based on the authors' experience are given, and the convenient outline format and selective use of boldface type afford easy access to key aspects of diagnosis and therapy.

## OTHER USEFUL FEATURES

- Detailed information on medical problems in surgical patients
- Unique format for quick recognition and interpretation of dysrhythmias
- Specific assessment and management of upper and lower GI bleeding and abdominal pain
- Specific management of surgical infections and practical measures for their prevention
- Special chapter on common surgical procedures, with illustrated descriptions of procedural technique (supplemented with practical tips), lists of necessary instruments and equipment, indications, and contraindications
- Most current life support procedures
- Complications of anesthesia
- Psychiatric problems during the perioperative period
- Medicolegal guidelines for surgical patients
- Introductory chapter on general aspects of perioperative care, including preoperative workup, preparation of the patient for surgery, intraoperative monitoring, complications of anesthesia and their management, and postoperative care (supplemented by numerous practical tables)



The editor would like to acknowledge Kathleen O'Brien and James Ransom for their excellent assistance in developing and editing this manual.

The editor welcomes suggestions and comments about any aspect of this Manual. Letters should be addressed to

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## PURPOSE

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## SECTION I: General Considerations

# 1 Guidelines for Perioperative Care

Richard M. Stillman, MD, FACS

The information provided in this chapter on perioperative care is adequate for management of most patients undergoing routine elective surgery. For perioperative care of patients with complicating nonsurgical problems, the reader should consult appropriate sections in Chapters 2–11. Chapters 12–26 supply details about perioperative care of patients with specific surgical problems. Procedures useful for diagnosis and therapy are discussed and illustrated in Section V.

- I. **Preoperative workup.** The purpose of the preoperative workup is to define the surgical problem and identify other conditions that may influence anesthesia or surgery. For elective surgery, most or all of the preoperative workup should be performed prior to hospital admission.
  - A. **History and physical examination.** A complete history and physical examination—including neurologic assessment, peripheral vascular examination, and rectal and pelvic examinations—are essential. A stool test for occult blood is advisable for patients over 40 years of age.
  - B. **Routine laboratory tests.** Hospital policy usually dictates which laboratory tests are required routinely before surgery, eg, urinalysis, hemoglobin, hematocrit, white blood cell count, coagulation studies, and serum sodium, potassium, chloride, CO<sub>2</sub>, and glucose. In the interest of cost containment, it should be understood that the yield of meaningful results from routine preoperative blood testing is quite low (0.2%). If the physician is free to use discretion in ordering preoperative blood tests, the guidelines outlined in Table 1–1 may be considered.
  - C. **Electrocardiography.** Electrocardiography is obtained for patients with findings suggestive of cardiovascular disease and for all patients 45 years of age or older. For patients with known cardiovascular disease, routine electrocardiography will reveal an abnormality in 8.5% of patients 45 years of age or older and in 2.5% of those under age 45. Among patients under age 45 with no cardiac abnormalities disclosed or suggested by the history or physical examination, the yield is 1%. Few electrocardiographic abnormalities lead to changes in surgical or anesthetic management. (See pp 139–143 and 145–147.)
  - D. **Chest x-ray.** Chest x-ray is usually obtained routinely prior to surgery requiring general or regional anesthesia. Risk factors for pulmonary disease are cancer at any site, valvular heart disease, stroke, myocardial infarction, angina, asthma, chronic obstructive pulmonary disease, cigarette smoking, fever, dyspnea, tachycardia, tachypnea, abnormal breath sounds, cardiac murmurs, S<sub>3</sub> gallop, ascites, and age over 50 years. Twenty-two percent of patients with any of these risk factors will have a positive chest x-ray, 19% of which will be significant enough to require modification of surgical or anesthetic management. Only 0.3% of patients with none of these risk factors will have an abnormal chest x-ray.
  - E. **Evaluation of pulmonary function.** Pulmonary spirometry and arterial blood gas determinations are indicated for patients who are to undergo thoracic surgery and for patients with pulmonary disease who are to undergo any major surgery. Thoracic surgery decreases forced vital capacity (FVC) by as much as 75% and decreases midexpiratory flow rate (MEFR) and functional residual capacity, thereby impairing oxygenation. Abdominal surgery impairs diaphragmatic motion, which decreases MEFR, increases the closing volume,

TABLE 1-1. PREOPERATIVE TESTING: CONDITIONS FOR WHICH ROUTINE PREOPERATIVE LABORATORY TESTS ARE MOST LIKELY TO BE COST-EFFECTIVE.

Laboratory Test	Conditions for Which Test Is Most Likely to Be Cost-Effective
Serum glucose	History of diabetes mellitus, hypoglycemia, steroid treatment, pancreatic disease, pituitary disease, or adrenal disease.
Hemoglobin and hematocrit	Anemia, chronic renal insufficiency, bleeding disorder, hematologic disease, radiotherapy, chemotherapy, or anticipated large intraoperative blood loss.
White blood cell count and differential	Infection, diseases of white blood cells, radiotherapy, chemotherapy, immunosuppressive therapy, hypersplenism, or aplastic anemia.
Coagulation studies	Known coagulation or platelet abnormality, anticoagulant use, hemorrhage, purpura, hypersplenism, hematologic cancer, radiotherapy, chemotherapy, thrombosis, or anemia.
Serum sodium, potassium, chloride, and CO <sub>2</sub>	Gastrointestinal or third-space loss, or for patients receiving parenteral fluid therapy.

Adapted from Kaplan EB et al: The usefulness of preoperative laboratory screening. *JAMA* 1965; 233:3576.

and impairs the efficacy of coughing—all of which increase the risk of atelectasis. Major anesthetic risk is associated with FVC < 50% of predicted, forced expiratory volume at 1 second (FEV<sub>1</sub>) < 1.5 L, MEFR < 70% of normal or < 0.6 L/s, P<sub>CO2</sub> > 53 mm Hg, or P<sub>O2</sub> < 50 mm Hg. Baseline P<sub>CO2</sub> > 42 mm Hg or P<sub>O2</sub> < 60 mm Hg suggests that intensive perioperative pulmonary care will be required. (See Chap 9.)

**F. Consultations.** If nonsurgical problems are identified that may affect anesthesia and surgery, appropriate consultations should be obtained. In high-risk patients, consultation with the anesthesiologist should be obtained several days prior to surgery, if possible.

**G. Physiologic preparation for surgery.** The degree of surgical risk depends upon the patient's general condition and the urgency of surgery (Table 1-2). The operative mortality rate ranges from 0.01% for patients in ASA class 1 to 50% for those in class 5. Emergency surgery doubles the risk for patients in classes 1, 2, and 3 but does not increase the already high risk for patients in classes 4 and 5. Minimizing operative risk requires attention to the following potential problems. The hospital admission and preoperative orders (Table 1-3) should address many of these suggestions.

TABLE 1-2. CLASSIFICATION OF OPERATIVE RISK (AMERICAN SOCIETY OF ANESTHESIOLOGISTS).<sup>a</sup>

1. Normal healthy patient	0.01%
2. Patient with mild systemic disease	0.1%
3. Patient with severe disease that limits activity but is not incapacitating	1%
4. Patient with an incapacitating disease that is a constant threat to life	10%
5. Moribund patient not expected to survive 24 hours with or without surgery	50+%

E1, E2, etc. In the event of emergency surgery, the prefix E precedes the number.

<sup>a</sup> Percentages given in this table are gross overall estimations of mortality based on disparate clinical reports. The actual mortality rates vary substantially depending upon the nature of the surgical procedure, age of the patient, and type of anesthesia.

TABLE 1-3. ADMISSION AND PREOPERATIVE ORDERS.

Order	Comments and Examples
Specify the service and floor	General surgery floor, intensive care unit, etc.
Give the admission diagnosis and condition	Good, fair, serious, critical, etc.
Specify exactly what the nursing staff should observe and record	Blood pressure, pulse, respirations, and temperatures are usually recorded every 4 hours, although a critically ill patient should have vital signs recorded as often as every 15 minutes or even continuously, using automated monitoring equipment. Patients with diabetes mellitus should have blood or urine glucose recorded every 4 hours. Body weight is recorded on admission to help with drug dosage calculations and then every other day if prolonged hospitalization is anticipated.
Specify under what conditions the physician should be notified	Examples: BP < 90/60 mm Hg or > 180/110 mm Hg; P < 60/min or > 100/min; T > 38.6 °C (101.5 °F); R > 30/min; urine output < 30 mL/h for 2 consecutive hours; change in neurologic or vascular status.
Specify the level of activity permitted	Examples: Complete bed rest, bathroom privileges with assistance, unlimited activity. If possible, ambulation should be encouraged in order to prevent venous stasis, thromboembolism, and pulmonary complications. If at bed rest, specify position in bed, eg, elevation of head or feet, turn side-to-side every 2 hours to prevent decubiti and thromboembolism.
Prescribe a suitable diet or order nothing by mouth (NPO)	Examples: Salt restriction (varies with severity) for the patient with hypertension; low-fat, low-cholesterol diet for the patient with atherosclerotic disease; NPO for the patient with abdominal pain and for 8 hours prior to elective surgery; soft diet for the edentulous patient; 1800-kcal diabetic diet for the patient with controlled diabetes mellitus. Although an unlimited diet may have little adverse effect during a short hospital stay, prescribing an appropriate diet during hospitalization may set an example for suitable dietary habits upon discharge. When in doubt about plans for urgent diagnostic or therapeutic procedures, prescribe nothing by mouth until such plans are verified.
Consider intravenous fluid therapy	Patients who are NPO on admission and those who require intravenous administration of drugs require insertion of an intravenous catheter and administration of intravenous fluids, eg, 5% dextrose in 0.45% saline + 20 meq potassium chloride per L at 125 mL/h (see Chap 3).
Consider nutritional support	See Chapter 4.
Prescribe medications	Consider each of the patient's current medications and decide whether it should be continued during the hospital stay. OTC medications should be included in the appraisal. Determine whether antibiotics or analgesics are indicated. Withhold analgesia in patients with abdominal pain until a decision is made about operation. For patients who are NPO, dosage and formulation adjustments may have to be made so the medications can be continued by a parenteral route. Pay particular attention to diabetic and cardiac medications.
Consider thromboembolism prophylaxis	See Chapter 15, section on Venous Thromboembolism, p 375, VII.
Consider antibiotic prophylaxis	See Chapter 5, p 87, A.5.

TABLE 1-3. ADMISSION AND PREOPERATIVE ORDERS. (Continued)

Order	Comments and Examples
Consider H <sub>2</sub> blocker therapy	See p 6.
Order antiseptic showers or scrubs	Example: Chlorhexidine (Hibiclens) shower twice daily.
Consider bowel preparation	See p 87, 4.a.
Order skin shaving	Shaving the operative site is best performed just before the operation.
Order laboratory and radiographic studies	Appropriate blood, urine, and radiographic studies (see p 1, I.B and D).
Send blood for type and cross-match	Assemble 6 units for abdominal aortic aneurysmectomy, 3 units for gastric surgery, type and hold for routine cholecystectomy, etc.
Consider invasive monitoring	Advise the nursing staff what invasive monitoring parameters must be measured and recorded, eg, pulmonary artery wedge pressure every hour (see p 8, B.2).
Consider respiratory therapy	Encourage coughing and deep breathing; incentive spirometry for 15 minutes every 2 hours while awake (see p 165, II).
Specify care required for drains and tubes	Examples: Nasogastric tube to low continuous suction, irrigate every 2 hours with 20 mL water, and flush blue side port every 2 hours with 20 mL air.
Consider the need for consultations	Social service, physical therapy, etc.
Check the consent form	The consent form must be signed by the appropriate person (usually the patient), witnessed, and dated. The nature of the operation must be specified correctly and the correct surgeon listed. The consent is valid only if it is obtained before the patient receives any anesthetic premedications that may alter consciousness.

1. **Preventing pulmonary aspiration:** A gastric volume over 25 mL and reduced tone of the esophageal sphincter (due to many drugs, eg, narcotics, anticholinergics) are major risk factors for pulmonary aspiration of gastric contents. Gastric pH less than 2.50 substantially increases the severity of pulmonary aspiration syndrome. Therefore, it is vital to ensure an empty stomach at the time of induction of anesthesia or to modify anesthetic techniques if an empty stomach cannot be assured.
  - a. The patient should receive nothing by mouth (NPO) for 8 hours preoperatively. For the vast majority of patients, this is all that is required to minimize the chances of pulmonary aspiration.
  - b. **Nasogastric suction** is indicated for intestinal obstruction or paralytic ileus. For the patient who has recently eaten and requires emergency surgery, a large-bore nasogastric tube (eg, Ewald tube) may be used to aspirate particulate gastric contents, but it is never completely effective.
  - c. **Diminishing secretions.** Premedication with an anticholinergic drug (Table 1-4) diminishes vagal activity and secretions and may be appropriate when there are excessive salivary and airway secretions. Be-



**TABLE 1-4. CLINICALLY SIGNIFICANT PROPERTIES AND EFFECTS OF AGENTS USED DURING GENERAL ANESTHESIA.**

Agent	Comments
<b>Ultra-short-acting barbiturates</b>	
Thiopental (Pentothal)	Depresses myocardial contractility, which decreases myocardial oxygen demand but can also lead to heart failure if ventricular function is marginal. Induces histamine release and hypotension; decreases cerebral blood flow and intracranial pressure.
Ketamine (Ketalar)	Has sympathomimetic properties that increase myocardial oxygen demand. Causes hypertension, tachycardia, psychotomimetic reactions, and emergence hallucinations; increases cerebral blood flow, intracranial pressure, intraocular pressure, and airway reactivity; induces salivation.
<b>Inhalational anesthetic agents</b>	
Nitrous oxide	Low potency; diffusion into gas-filled spaces such as intestine.
Halothane (Fluothane)	Depresses myocardial contractility, which decreases myocardial oxygen demand but can also lead to congestive heart failure if ventricular function is marginal. Sensitizes the heart to catecholamines, increasing the chance of cardiac dysrhythmias, especially junctional rhythms. Causes bronchodilatation and depresses airway reflexes. Rare hepatotoxicity.
Enflurane (Ethrane)	Causes tachycardia; induces bronchodilatation; irritates the upper airway, increasing the incidence of coughing and laryngospasm. Possible fluoride nephrotoxicity.
Isoflurane (Forane)	Causes tachycardia; induces bronchodilatation; irritates the upper airway, increasing incidence of coughing and laryngospasm.
<b>Muscle relaxants</b>	
Atracurium (Tracrium)	Onset of action 2-3 minutes; duration of action 20-40 minutes. Histamine release, causing hypotension.
Pancuronium (Pavulon)	Onset of action 2-3 minutes; duration of action 30-90 minutes. Interacts with halothane to increase ventricular irritability; causes hypertension and tachycardia.
Succinylcholine (Anectine)	Onset of action in 1 minute; duration of action 10-15 minutes. Causes depolarizing type of neuromuscular blockage with fasciculations; this may cause postoperative myalgias and hyperkalemia. Bradycardia, sinus arrest, and hypotension may occur during manipulation of the trachea, peritoneum, or eye. Occasionally, prolonged duration of action due to abnormal pseudo-cholinesterase will require prolonged mechanical ventilation.
Tubocurarine	Onset of action 5-8 minutes; duration of action 30-90 minutes. Histamine release and ganglionic blockade may cause hypotension.
Vecuronium (Norcuron)	Onset of action 2-3 minutes; duration of action 20-40 minutes. Less cardiovascular effect than other neuromuscular blocking agents.
<b>Anticholinergic drugs</b>	
Atropine	Reduces excessive airway and salivary secretions; protects against bradycardia, sinus arrest, and hypotension, which may be induced by succinylcholine. Patients often complain of hot, flushed sensations and dry mouth. Cardiac dysrhythmias may occur.
Glycopyrrolate (Robinul)	Similar to atropine but more potent and lacks central anticholinergic activity.
Scopolamine	Similar to atropine but more potent. Side effects include dizziness, delayed awakening, prolonged postoperative confusion.