

INTERNATIONAL SURGICAL PATIENT SAFETY OBJECTIVES



Introduction to the Guidelines for Safety Recommendations in Plastic Surgery

In 2009, a global alliance for patient safety was formed, under the principle of «Safe, life-saving surgery». The World Health Organization (WHO) developed «WHO guidelines for safe Surgery 2009» (safe surgery). The issued recommendations were well accepted by the medical community and their application has allowed to reduce the morbidity and mortality of the patients who are operated by more than 50%. Since it was created, they have had several reviews and updates. Several medical specialties have adapted to their needs. Using these principles for 5 years, we have implemented Safety Guidelines for the Plastic Surgery Patient and we have developed infographics as quick, simple guides, with enough information, that allow the surgeon to make a safety decision with his/her patients. Physicians seeking more information on the topics discussed may consult the book with the WHO guidelines (free access) or the articles that are included in the bibliography of this work. We have divided the guides into 2 major chapters: the first with the infographics of the safety objectives in surgery dictated by WHO and adapted to the specialty of Plastic Surgery; the second with specific recommendations for the most frequent or most risky procedures of the specialty. In this issue we will only present the safety objectives in surgery.

The safety recommendations in these guides are addressed to all plastic surgeons. To achieve greater impact and circulation, we publish them in English and Spanish.

Like any guide, it requires periodic reviews and updates. Likewise, the comments sent by the surgeons who use them will be very useful, to give them a better foundation and make them more effective.

The original design of the infographics included in this issue of Cirugía Plástica was modified and adapted to the format of the Journal. However, the original contents were not altered.



AMCPEP
Asociación Mexicana de Cirugía Plástica
Estética y Reconstructiva, A.C.



Jesús Cuenca Pardo, M.D.,
Ma. Isabel Caravantes C, M.D.,
Livia Contreras Bulnes, M.D.,
Guillermo Ramos, M.D.,
Ernesto Theurel, M.D.,
Rufino Irribarren, M.D.,
Martín Morales, M.D.,
Estela Vélez, M.D.,
Eugenio Rodríguez Olivares M.D.

Desing:
Liz Cárdenas
Jonathan Morales



**Do you have any patient with complications? Do you need help?
Technical orientation? Do you need an expert to help you?
Do not hesitate to contact us!**

comitedeseguridad@amcper.org.mx

INTERNATIONAL SURGICAL PATIENT SAFETY OBJECTIVES



1st Safety Objective Safety in Plastic Surgery

Correct site, patient and procedures

«Surgical Safety Checklist»



Surgeon must supervise
and verify that the
requirements on this checklist
(sign in, time out) are met.



Correct patient

Patient identification: with bracelets, wristbands or mark on surgical site.

Comprehensive assessment: to include risk factors and functional cardiorespiratory assessment.

Effective communication: with both patient and families.

Signed informed consent form: include programmed procedure, explicit, identifying treatments risks and alternatives. Verify patient and family read and sign the form.

Correct operating room

Perioperative monitoring:

It detects up to 87% of anesthetic problems and decreases mortality and complications in surgical patients.

Surgical procedures performed at clinics can be safe:

- If operating rooms have all the resources and are authorized by the corresponding government health body
- Minor or moderate surgeries
- ASA I patients
- Procedures with low occurrence of complications and death

- ✓ Well-defined surgical areas and appropriate for surgical procedures
- ✓ Working anesthetic equipment
- ✓ Monitors
- ✓ Suction system
- ✓ Oxygen
- ✓ Crash cart and emergency kit
- ✓ Trained and sufficient personnel



Correct procedure

Plastic surgeons perform most procedures correctly. The goal is to do it for all patients and every time.

- Overconfidence, multiple surgical procedures, tiredness and lack of effective communication with the team **are the most frequent causes of complications.**
- **An engaged** and experienced team can detect risks and prevent them. **The surgeon must supervise** and verify that **the Safety Checklist** requirements are met, since the surgeon is the main responsible for reducing surgical risk for patients.

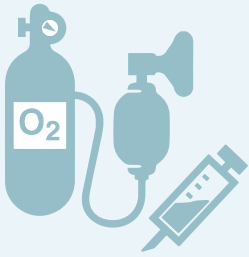


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2nd Safety Objective

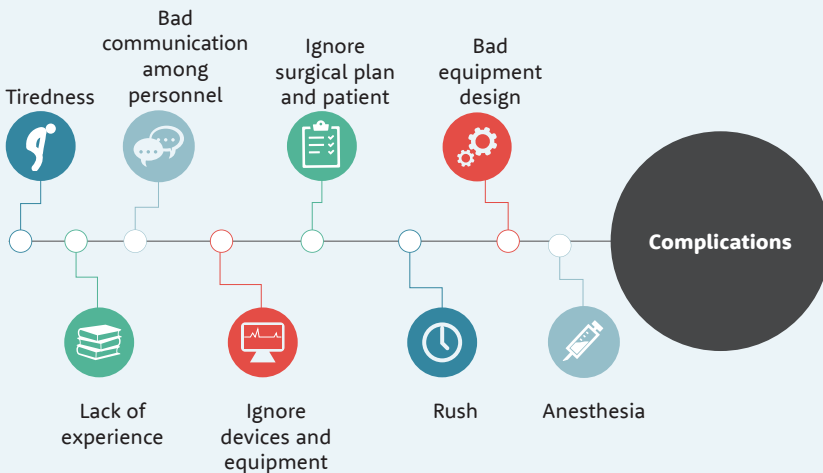
To prevent the damage by anesthesia



The **most common** cause of fatal complications in surgical patients is due to anesthetic procedures.



Mortality attributed to anesthesia goes from **1:5,000 in developing countries up to 1:80,000 to 1:100,000 in developed countries**. Patients with minor surgeries or ASA I have minimal risk.



Failure to strictly **monitor** during anesthetic procedures is **1,000 times** more likely to cause **complications**.



Failure to effectively **communicate** among every **surgical team member** is the cause of **70% of surgical complications**.

Anesthetic safety recommendations in plastic surgery

- Anesthesiologist experienced in Plastic Surgery.
- Comprehensive assessment: look for risk factors and dynamic assessment.
- Constant perioperative monitoring. Include oximetry and capnography, cardiorespiratory function.
- Working equipment. Verify maintenance.
- Safe facilities.
- Open airway.

- To have a solution and a resuscitation-medication kit available.
- To analyze complications with all the surgical team.
- Anesthesiologist is integrated with surgical team.
- Effective communication with surgical team.
- Start surgery only if the patient is stable.
- To meet the international safety goals.
- Complete safety checklist.
- The type of anesthesia should be decided by the anesthesiologist.



To have an **Anesthesiologist experienced** in Plastic Surgery available and integrated with surgical team is a safety guarantee.



The **surgical team**: surgeon, anesthesiologist and nurses are responsible for verifying and **complying with the safety checklist**.

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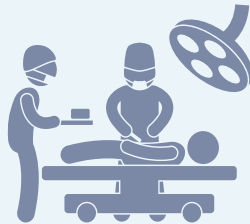


3rd Safety Objective

The team will prepare for loss of airway or respiratory function

Most common causes of adverse results from anesthesia

- Inadequate ventilation
- Esophageal intubation
- Tracheal intubation
- Pulmonary aspiration



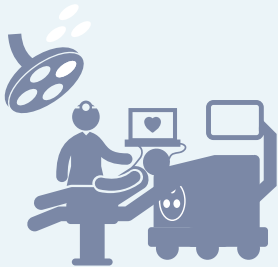
Airway assessment

Backgrounds

- History of sleep apnea and EPOC
- History of difficult anesthesia
- Obesity
- Short thick neck
- Dentures, implants or prosthetics

Primary factors that can be prevented

When anesthesiologist facing difficulty that was not suspected to ensure the airway in a patient, it requires urgent resolution of ventilation with:



- Face mask
- Laryngeal mask
- Insisting on orotracheal intubation
- Fiberoptic intubation
- Surgical access

Success will depend on the surgical team experience.

There is a high likelihood of failure!

In order to prevent critical conditions, patients with this difficulty must be detected, and the team must be prepared for offering a solution.



Airway assessment

1. **Thyromental distance (Patil-Aldrete test)**
 - Grade I: More than 6.5 cm: no difficulty for intubation
 - Grade II: 6 to 6.5 cm: moderate difficulty for intubation
 - Grade III: Less than 6 cm: high difficulty for intubation
2. **Sterno-mental distance (very sensitive test)**
 - Less than 12 cm: difficulty for intubation
3. **Head extension**
 - Less than 80 degrees: difficulty for intubation.
4. **Some clinical findings with difficult airway suspicions**
 - Jaw protrusion
 - Small chin (micro-retrognathia)
 - Inter-incisor distance of more than 1 cm
 - Mouth opening of less than 4 cm
 - Impossibility of biting one's lower lip



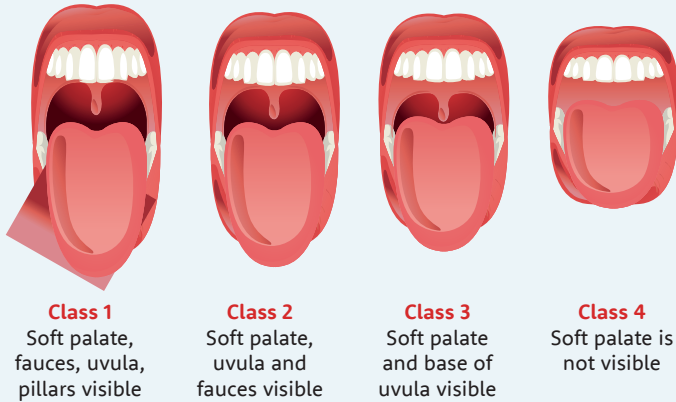
For airway crisis prevention

- Preoperative assessment by surgeon is required
- Detection of patients with difficult airway
- Notification to anesthesiologist
- Assessment performed by anesthesiologist, days prior to surgery
- Preparation by surgical team for any event

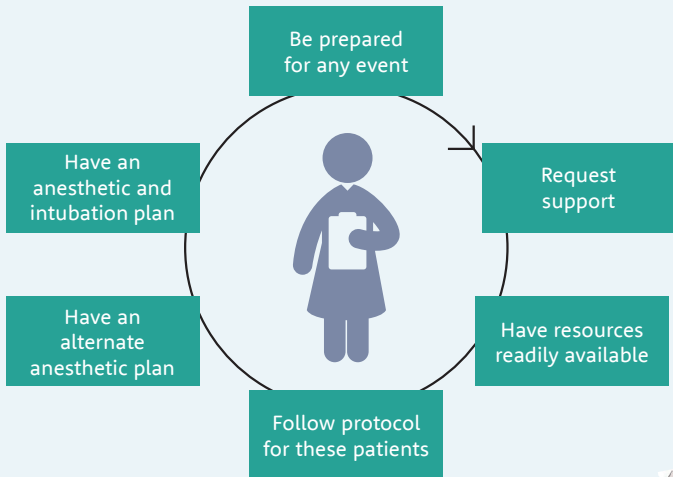
3rd Safety Objective. The team will prepare for loss of airway or respiratory function

Airway assessment
Mallampati classification

Based on tongue size. Class 3 and 4 will have a higher difficulty of orotracheal intubation.



In patients with difficult airway, anesthesiologist must do the following days prior to surgery:



Anesthesia devices to address a difficult airway

In every case, it is mandatory to have the following:

- Operational aspirator
- Multimodal monitor for vital signs with oximeter and capnograph
- Cannula, laryngoscope and other essential anesthesia devices



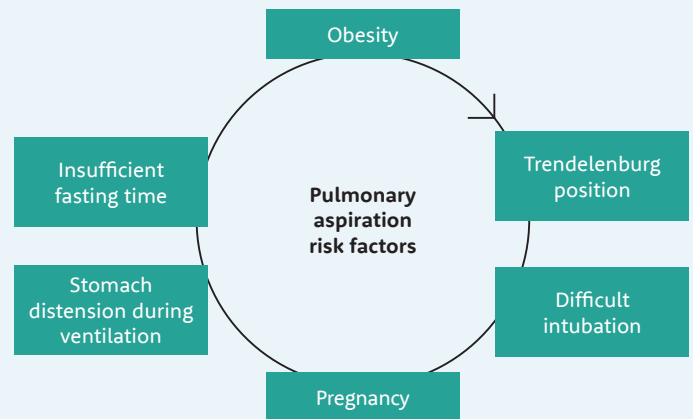
Recommendations for management of difficult airway



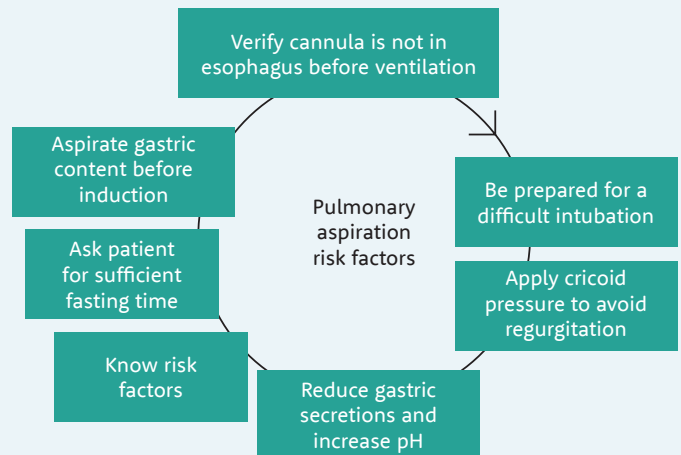
- To confirm endotracheal **intubation**
- To prepare a clear extubation strategy
- In case of a difficult airway, to consider managing patient while awake

The crucial requirement for managing a difficult airway is a trained professional with the appropriate assistance, as well as a clear action plan and adequate equipment. Anesthesiologist must always confirm endotracheal intubation by listening to respiratory sounds and using capnography.

Practice guidelines for management of the difficult airway. An updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology. 2003;98:1269-77.



Pulmonary aspiration of gastric content is a severe complication that can occur during anesthesia



INTERNATIONAL SURGICAL PATIENT SAFETY OBJECTIVES



4th Safety Objective To prevent and prepare for blood loss during surgery

Blood loss has been associated with a poor surgical outcome.

Blood loss during surgery can have catastrophic consequences. Hypovolemia identification due to blood loss, and its timely and appropriate handling reduce surgical morbimortality.



In order to avoid blood loss, the surgical team must act in the three perioperative periods:

1. Preoperative
2. Intraoperative
3. Postoperative



Preoperative period

Anemia or alterations that can produce hemorrhage during surgery must be investigated, such as:

- Blood dyscrasias
- Malnutrition.
- Alcohol abuse
- History of bariatric surgery
- Antiplatelet drugs
- Supplements with anticoagulant action
- Anticoagulant therapy
- Hepatopathy
- Food supplements: garlic, *Garcinia Cambogia*, ginseng, vitamins



For asymptomatic patients, abnormal findings have been reported in preoperative assessments in hemoglobin figures within a range from 0.5-65.4% of patients. Also, in asymptomatic patients abnormalities were found in coagulation tests in a range of 0.06-21.2% of the patients.

Laboratory tests

- a) Hemoglobin
- b) Hematocrit
- c) Coagulation tests
- d) Liver function



Calculate probable blood loss

Maximum allowable blood loss. The formula used is.
$$Mabl = [(hb - \text{minimum } hb) / hb] \times (\text{weight in kilograms}) \times (\text{mL of blood per kg in weight})$$

Objective:

1. The surgical team will recognize and effectively prepare for risk of high blood loss.
2. In plastic surgery, excessive bleeding and hematoma formation should be avoided.

Plastic surgery procedures with likelihood of large-volume blood loss:

- Brain surgery
- Orthognathic surgery
- Facial fracture
- Arteriovenous malformation
- Free tissue microsurgical transfer
- Post-bariatric body contouring surgery
- Liposuction
- Combined aesthetic procedures



Average blood volumes

Adult man: 75 mL/kg

Adult woman: 65 mL/kg

Anesthesiologist use 70 mL/kg, regardless of gender

There are BMI calculators online



In losses above 20% of blood volume:

- Have blood donors available
- Have blood available during surgery
- Assess autotransfusion

Preoperative recommendations:

- Before surgery, a satisfactory coagulation status must be ensured.
- Suspend antiplatelet drugs 10 days before surgery.
- Suspend supplements two weeks prior to surgery.
- Allowable blood loss must be determined, and the expected bleeding due to procedure must be calculated.
- If bleeding above the allowable level is expected, have blood available and assess the possibility of autotransfusion.

4th Safety Objective. To prevent and prepare for blood loss during surgery

Safety in Plastic Surgery

- Perform careful hemostasis
- Recover blood loss
- Keep venous line open and large-bore
- Keep patient normothermic
- Correct acidosis

There are different methods to calculate blood loss during the intraoperative period:

- Anesthesiologist report about estimated blood loss
- Suction of fluid
- Blood contained in gauzes and compresses
- Clinical manifestations

Blood loss quantification:

1. Anesthesiologist report about estimated blood loss
2. Suction of fluid
3. Blood contained in gauzes and compresses
4. Clinical manifestations



Meier and cols. calculation.

$$E = \text{blood volume} - [(\text{blood volume} \times \text{hb2})/\text{hb1}]$$

Where E is the blood volume to be replaced, hb1 is the initial hemoglobin, hb2 is the final hemoglobin.

Blood volume is calculated using the formula:

$$BV = 0.414 \times T^3 + 0.0328 \times BW - 0.03$$

Where T is height in meters and BW is weight in kilograms. Allowable blood loss and surgical blood loss calculations are approximate. They are handled by anesthesiology and in combination with clinical medicine, they can help determine its handling.

	Class I	Class II	Class III	Class IV
Blood loss	≤ 750 mL	750-1,500 mL	1,500-2,000 mL	> 2,000 mL
% of blood volume lost	15%	15-30%	30-40%	> 40%
Pulse rate	< 100	> 100	> 120	> 140
Blood pressure	Normal	Normal to decreased	Decreased	Markedly decreased
Mental status	Normal to slightly anxious	Mildly anxious	Anxious and confused	Confused or lethargic
Urine output	Normal	Reduced	Minimal	Nil
Fluid replacement	Crystalloid	Crystalloid	Crystalloid and blood	Crystalloid and blood

Classification of hypovolemic shock associated with acute blood loss (from American College of Surgeons Advanced Trauma Life Support Manual). It is used for the calculation of blood loss and fluid replacement in intra and postoperative periods.

In addition to fluid replacement, handling blood loss must include the following:

- Surgical control of hemorrhage
- Coagulopathy treatment
- Maintaining body temperature
- Acidosis correction

Postoperative period

Recommendations to avoid patient critical conditions due to blood loss:

- Loss correction during surgery
- Careful reversion from anesthesia
- Nausea and vomit control
- Pain control (effective analgesia)
- Avoid effort, relative rest
- Keep patient normotensive
- Control room temperature
- Postoperative laboratory tests
- Strict monitoring for 18 hours
- Search for hypovolemic shock manifestations



Perioperative foundations to transfuse blood to a patient:

1. Criteria from the American College of Surgeons Advanced Trauma Life Support manual.
2. 500 to 1,000 ml of blood loss; assess patient general conditions.
3. Hematic biometry, hematocrit and blood gas laboratory tests.
4. Blood availability.

Recommendations before surgery:

1. Anesthesiologist must consider the possibility for high blood loss during surgery.
2. Keep venous line open and large-bore.
3. Discuss with the whole surgical team about the risk of high blood loss.
4. In case risk is unknown, the team must be prepared for a high blood loss and have blood available.
5. Sufficient blood must be guaranteed to replace possible loss.



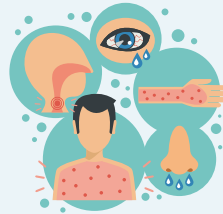
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5th Safety Objective The team will avoid inducing an allergic or adverse drug reaction



Is it the same?
Adrenaline = Epinephrine



Errors in the administration of medications during anesthesia

Have a mortality of 24% and a morbidity of 34%.

Medication errors

- Prescription
- Dispensation
- Administration

Medication errors:

- **Replacement** of a syringe filled with medication for another.
- Unnoticed incident.
- Many errors are not identified or reported.
- Adverse reactions in susceptible patients.
- Overdose effects.
- Harm due to omission.
- Omission
- Repetition
- Substitution (wrong drug)
- Incorrect dose
- Incorrect rate of infusion
- Incorrect patient

Most frequent causes of anaphylaxis:

1. Antibiotics
2. Anesthetics
3. Opioids
4. Colloid
5. Latex



Safety in medication:

- Correct drug
- Correct patient
- Correct dose
- Correct time
- Correct route



Errors when preparing solutions:



- Concentration calculation
- Mix of solutions
- Rate of infusion
- Incompatible drugs



Opioid medication error can have fatal consequences

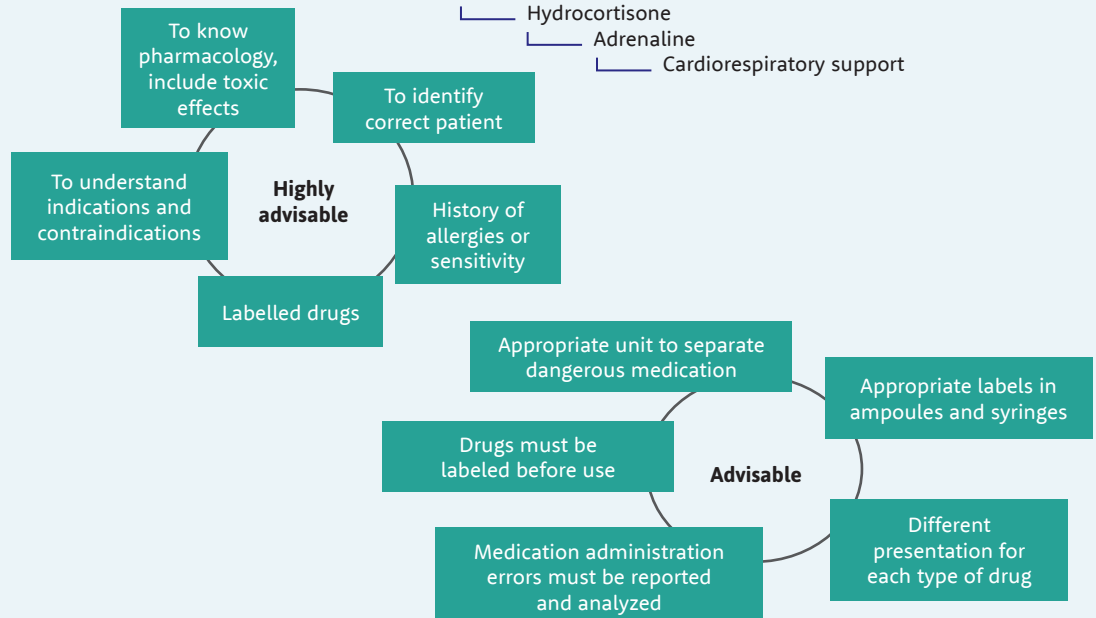
Medication administration errors

- Sounds the same
- Similar aspect
- Syringe labels
- Illegible marks
- Similar drug storage
- Not using color coding



Anaphylaxis treatment

- Suspend medication
 - ___ Antihistaminic
 - ___ Hydrocortisone
 - ___ Adrenaline
 - ___ Cardiorespiratory support



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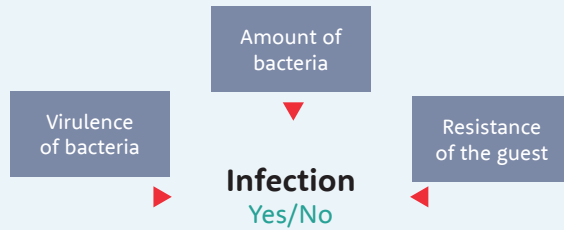


6th Safety Objective

Use method to reduce infections

! The incidence of infection of the surgical wound ranges from 2 to 15

- + hospital stay
- 2 times more the possibility of death
- 2 times more the possibility of ICU
- 2 times more the possibility of readmission

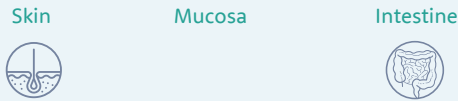


Characteristics of a wound that increase infections:

- Dead spaces
- Presence of sutures
- Presence of foreign bodies
- Drains

$$\frac{\text{Amount of bacteria} \times \text{virulence}}{\text{Resistance of the guest}} = \text{Risk of infection}$$

The majority of infections are endogenous flora pollution



Types of surgical site infection		
Superficial	Profound	Visceral

SENIC; risk of infection

0 = minimum risk
1 = moderate risk
2 = high risk

- Abdominal surgery
- Surgery > 2 hours
- Contaminated or dirty surgery
- Three or more major diagnostics

Factors that increase infections

- Contamination with bacteria from other sites such as the intestine
- Local bacteria with poor host defenses
- Inoculum greater than 100,000 bacteria per gr. tissue
- Local bacteria or minor inoculum + sutures

INDEX NNIS (ASA) risk of infection

0 = minimum risk
1 = moderate risk
2 = high risk

- Preoperative classification (ASA)
- Duration of surgery
- Type of wound

Pollution with exogenous flora:

- Air conditioner
- Instrumental
- Surgeons hands
- Implants



Classification of wounds:

- Clean
- Clean contaminated
- Contaminated
- Dirty

6th Safety Objective. Use method to reduce infections

Characteristics of the WOUND	% of the affected wound					
	0	< 20	20-39	40-59	60-79	≥ 80
Serous exudate	0	1	2	3	4	5
Erythema	0	1	2	3	4	5
Purulent exudate	0	2	4	6	8	10
Separation of deep tissues	0	2	4	6	8	10
Antibiotic for wound infection	No = 0	Yes = 10				
Drainage of pus	No = 0	Yes = 5				
Debridement of wound	No = 0	Yes = 10				
Cultivation of pathogenic bacteria	No = 0	Yes = 10				
Prolonged hospital stay	No = 0	Yes = 5				

Asepsis score; Wilson et al
 A. Additional treatment
 S. Serous discharge
 E. Erythema
 P. Purulent exudates
 S. Separation of deep tissue
 I. Isolation of bacteria
 S. Stay duration as inpatient

Asepsis score; Wilson et al
 0-10. Satisfactory healing
 11-20. Disturbance in healing
 21-30. Less infection
 31-40. Moderate infection
 > 40. Severe infection

Risk factors for patient infection:



- Remote Infections
- Diabetes
- Smoking
- Steroids
- Obesity
- Age
- Nutrition
- Blood transfusion

Most important factors in the prevention of infection

- Purified surgical technique
- Aseptic surgical technique

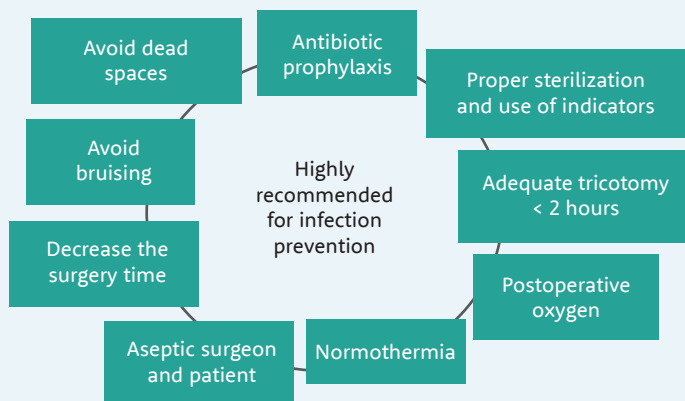
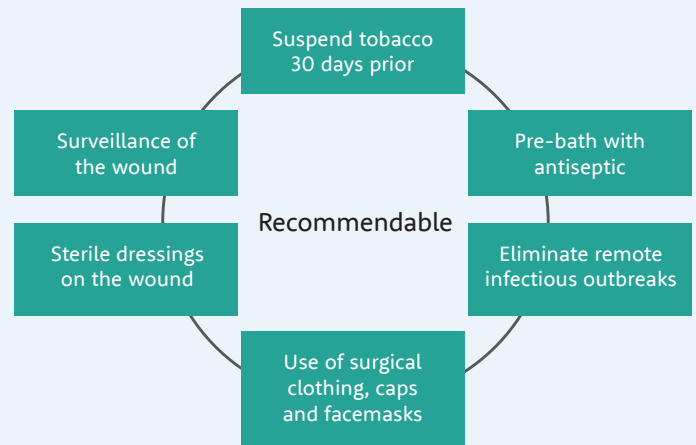
Factors related to the technique:

- Traumatic surgery
- Surgery > 2 hours
- Inadequate hand asepsis
- Inadequate patient asepsis
- Excessive electrocoagulation
- Too many sutures
- Excessive bleeding



Factors related to resources:

- Inadequate sterilization
- Contaminated operating rooms
- Unlimited areas
- Polluted air
- Air conditioner
- Lack of antibiotic prophylaxis
- Excessive bleeding



Infection prevention suggestions:

- Disinfection of the operating rooms in dirty surgery
- Equipment prepared for the control and care
- Standardization of care

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7th Safety Objective Prevent inadvertent retention of instrumental and sponges in the wound

Severe surgical error; 1 case is calculated in 5,000-19,000 surgeries. The greatest risk is surgery with great bleeding, where many instruments and surgical sponges are used.



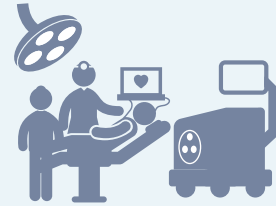
Sponges



Instrumental



Surgical accessories



In 88% of the cases, of inadvertent retention of surgical material, a full account was reported.

Unforgettable retention of material

Before starting the surgery, count all the material and instruments; do it by items and by two people (circulating and instrumentalist)

Organize and count:

- Cutting
- Instrumental
- Needles
- Accessories
- Sponges

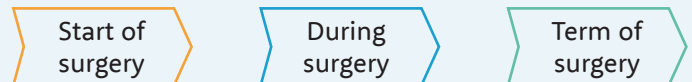
Causes of error in the count:

- Staff fatigue
- Distractions
- Staff without experience
- Staff outside the operating room
- Communication not effective



Safe surgical sponges:

- With RX markers
- With ultrasound markers
- Barcode or microchip

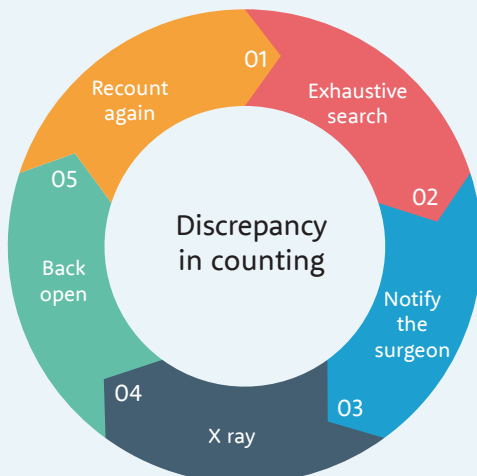


- Organize material
- Count
- Cutting
- Instrumental
- Needles
- Accessories
- Sponges

- Exploration before closing
- Material count
- Record in the counting file

Highly recommended:

- Count performed by instrumentalist and circulating
- Exploration before closing
- Account at the beginning and at the end of the surgery
- **The account must be registered in the file**
- Report the result to the surgeon

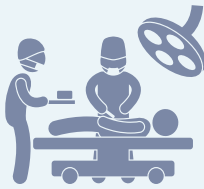


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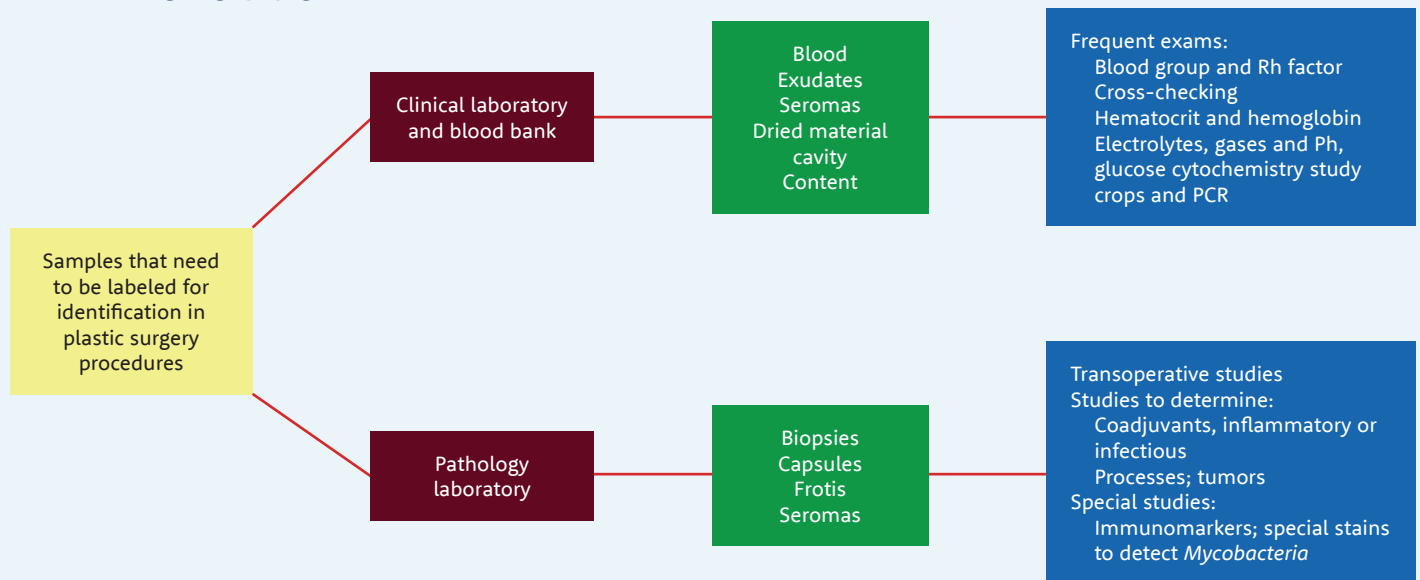


8th Safety Objective

The team will ensure and accurately identify all surgical specimens

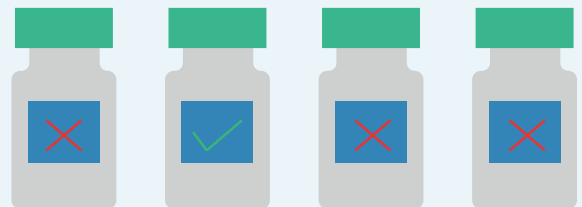


In a study of identification errors in laboratory samples from 417 institutions in the United States, almost 50% was due to labeling errors. Of every 18 marking errors, one ends in an adverse event. It is estimated that about 160,000 adverse events per year occur in the United States, for bad labeling.



Most frequent errors:

- Disparity between the specimen and the requisition, lack of labeling or mislabeling of specimens.
- The correct identification of the patient in his/her specimens and requisition forms are critical to prevent errors in clinical laboratory and pathology.
- Better identification is crucial to prevent errors on labeling of laboratory samples.
- Identification bands can decrease the error rates of sample labeling.



Recommendations:

- The team must confirm that all surgical specimens are correctly labeled with the patient's identity, the name of the specimen and its location (place and side) from where the specimen was obtained. One team member must read the label aloud and another member confirm verbally.
- The periprosthetic seroma fluid is placed in a sterile tube with the correct labeling. From 6 to 12 hrs. in refrigeration. Greater than 12 hrs. mix from the start in carbowax in solution 1 to 1.
- The capsules of the implants immediately extracted must be put in a Formaldehyde solution 1 to 10, from 12 to 22 degrees. An experienced pathologist is sent for tumor markers CD45, CD20, CD3, CD4, CD8, CD30, ALK-1, CD43 and EMA.
- Skin tumors with border marking (upper or lower) with suture refinements, with the correct labeling.



INTERNATIONAL SURGICAL PATIENT SAFETY OBJECTIVES



9th Safety Objective Effective communication; exchange of critical information



The objective is to create a robust and practical system against human and operational risks



What is the origin of a catastrophe?

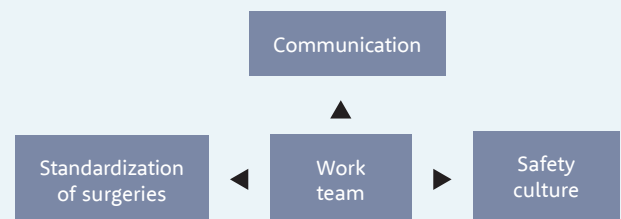
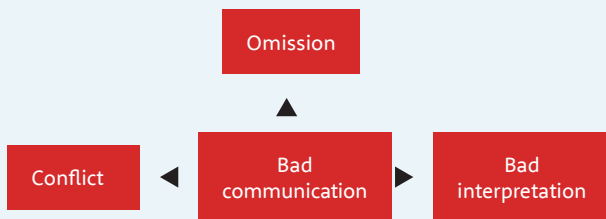
- Most catastrophes are because of **human error**.
- **Technical failures** can be corrected; human failures can be minimized.



Catastrophe:

- Work overload
- Inadequate knowledge
- Lack of skill and experience
- Poor intercommunication
- Lack of supervision or instructions
- Stressful environment
- Fatigue and rapid changes

Lack of communication causes **70%** of complications



Safety culture:

- Previous study
- Joint planning
- Informed team
- Verification of security lists (check list)



Surgeon must determine:

- Critical stages of surgery
- Calculated bleeding
- Instruments and material needed
- Analysis and discussion of scheduled surgery with the surgical team



Anesthesiologist must determine:

- Preoperative assessment
- Determine the type of anesthesia will be used
- Determine preanesthetic medication
- Critical moments in security
- Liquids (blood) that will be needed
- Patient risk diseases



The nurses must determine:

- Count the instruments
- Remain in the operating room until the patient leaves it
- Critical moments in security
- The conditions of the equipment, instruments and material

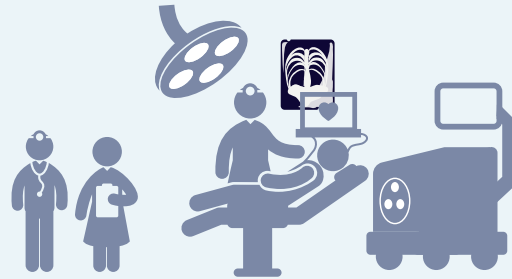


INTERNATIONAL SURGICAL PATIENT SAFETY OBJECTIVES

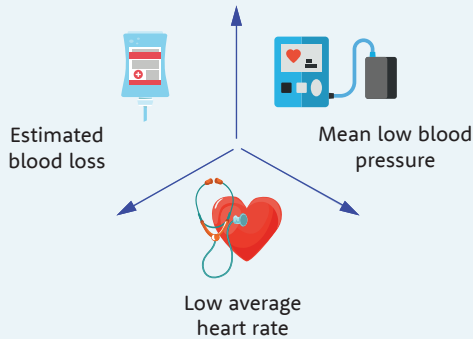


10th Safety Objective Establish a surveillance system of the surgeries performed, their results and complications

The Apgar score for surgeries, is a simple measurement system of up to 10 points for surgical patients, which serves to give feedback on the condition of the patient after surgery.

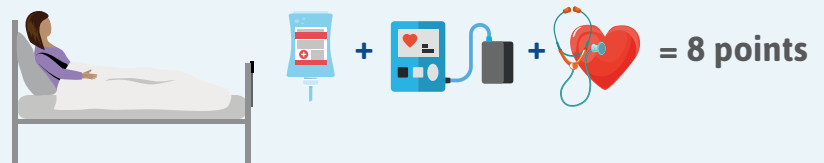


The score is based on 3 parameters:



	0 points	1 points	2 points	3 points	4 points
Estimated blood loss (mL)	> 1,000	601 – 1,000	101 – 600	≤ 100	
Mean low blood pressure (mmHg)	< 40	40 – 54	55 – 69	≥ 70	
Low average heart rate (beats per minute)	> 85	76 – 85	66 – 75	56 – 65	≤ 55

Therefore, if a patient had an estimated blood loss of 50 mL (3 points), a mean low blood pressure of 67 mmHg (2 points) and a low average heart rate of 56 (3 points), he/she will have a total score of 8.



The more points present in the patient, the better the prognosis of recovery and less complications after surgery

This score should be made in hospitals to ALL patients to detect patterns of possible complications and analyze the different surgical capabilities of medical personnel in order to standardize in which groups of patients and in which surgeries, complications will occur and then prevent them.





Do you have any patient with complications? Do you need help?
Technical orientation? Do you need an expert to help you?
Do not hesitate to contact us!

comitedeseguridad@amcper.org.mx