TEAM ANESTHESIA

435

Patient Safety

{Color index: Important★| Notes | Book | 433 Notes | Extra | Editing File}

Objectives:

➢ Not given.

Done by: *Ghadeer Asiri , Dalal Alhuzaimi*
Revised by: *Dalal Alhuzaimi*

Safety? Whose safety?

Anesthesia is an area in which very impressive improvements in safety have been made.

- Anaesthesiology is a **high-risk speciality** as compared with other specialities in medicine

Never ever use propofol for those suffering of cardiac impairment as it decreases the blood pressure significantly and blocking the baroreceptor reflex which used to compensate for the low blood pressure by increasing the the heart rate. So, the patient can't compensate ---> Consequently, end up having cardiac arrest! Bottom line: Try to avoid giving propofol for cardiac/elderly patients.

How safe is surgery and anesthesia?

- 1 death per 5,000 anesthetics administered during the 1970s to 1 death per 100,000 in 2015.
- Today's surgical patients are sicker and aged than ever.

In 1970, we used to have 1 death per 5000 anesthetic administration. In 2015, it has declined to be 1 death per 100,000. The medical care for patients who are old and/or sick has improved to the point that they become with the good medical care candidates/fit for surgery. Today's surgical patients are sicker and aged than ever, but despite that there are more old/sick patients, the mortality rate is less than before because of the safer medications and advanced equipment and the development of anesthesia practice generally.

- **5%** of all surgical patients die within one year of surgery.
- Surgical Patients over 65 years, 10% die within one year of surgery .

Dr. Jeana Havidich; 2014 ASA Convention:

- ➔ 3.2 million anaesthesia case data: 2010-2013.
- ➔ Complication rate: decreased from 11.8 percent to 4.8 percent
  - Note that the percentage of complications has **dropped by more than half** from what is used to be before.
- ➔ Evening or holiday procedures: **no increase in complications**
  - Logically, the complications may increase in the evening (as the health care providers will be exhausted by that time of the day). Also, it logically increases in holidays (assuming shortage of healthcare providers in holidays). **Yet, the reality is that there is NO increase in complications in neither evening nor holiday procedures nowadays unlike in the past**. This is mainly because nowadays they are concerning more about anesthesiologists fatigue; so they are trying to give them more time to rest by not giving them 24 hours of work like what used to happen in the past! In the past, there was a shortage of anesthesiologists, so one anesthesiologist tend to cover many things in one day. Nowadays, even in the weekends, there are at least 3-4 anesthesiologists are on call during the weekends. Additionally, now there are shifts; so they either work on the morning or in the evening and not the whole day!
- ➔ Healthier patients having elective daytime surgery: highest minor complications
- ➔ **Serious complications highest in pt>50 years**

Complication of anesthesia:

Major Complications	Minor complications
• **Cardiac arrest** • Perioperative MI • Aspiration It simply occurs **if the patient is full stomach.** That's why patients must be on fasting prior to surgery to prevent this complication. So, you have to check: is the patient's last meal is less than 6 hrs ago? - If the surgery is ELECTIVE ---> POSTPONE the surgery. - If the surgery is EMERGENCY ---> RAPID SEQUENCE INDUCTION. • Anaphylaxis You have to check the allergy history of the patient. If the patient is allergy to a known drug, simply avoid it. But, we can also pre medicate the patient with H1 (e.g: Loratadine) and H2 blockers (e.g. Ranitidine) and we can also give corticosteroid in case of the patient has a history of anaphylactic intra-operatively. Keep in mind that some patients might develop anaphylaxis due to Latex allergy (Latex is the material the gloves are made of). So, in these patients use latex free gloves. • Drug overdose • Convulsion • nerve pulses • Organ injury • Malignant hyperthermia	• Airway obstruction It is the **MOST COMMON** minor complication. It takes place in recovery room. Did you see any laryngeal spasm in the OR? You didn't see any because thanks God it becomes very rare nowadays; because the OR anesthetics effect are terminated quickly (their effect quickly wear off). - **Laryngeal spasm** occurs when the patient is deeply sedated in recovery room. Then, the posterior part of the tongue closes the airway by touching the pharyngeal wall. However, nowadays, anesthetics safety has been improved, so this event is rarely seen nowadays. • Postop nausea, vomiting **I want you to know that post op N/V is very common!** N/V is being introduced by anesthesia itself! Either by mechanical (when inserting the tube), or pharmacological (e.g: morphine overdose may induce N/V). How can you manage it? Use multimodal antiemetic medications • Sore throat How come? From the intubation itself! If you use a proper size tube and you intubate the patient gently; it won't happen. Don't fight with the patient while intubating him. Use a proper endotracheal tube size. • Hemodynamic instability How can manage this? 1) Be selective with the choice of anesthetic agents. 2) Titrate the dose. • Pneumonia Especially if the patient has an upper respiratory tract infection. • Delirium Especially with elderly • Organ dysfunction (kidney, liver) • Cognitive defect • Shivering It's serious. We have to warm the patient well because shivering will increase the O2 demand ---> Cardiac problems.

★ 10 common causes of cardiac arrest under anaesthesia:

- Drug overdose/ adverse reaction.
- Rhythm disturbances.
  Arrhythmia is common especially if the patient has a history of arrhythmia or any electrocyte abnormalities
- Peri-Op MI.
  If the patient complain of chest pain or chest tightness, don't ignore the patient. Any pain above the waist must be investigated carefully, especially with female patients.
- Airway obstruction.
- High spinal.

High spinal anesthesia. It can happen when you are giving epidural, but the catheter migrated intrathecally! In order to prevent that: whenever you are giving epidural anesthesia, you have to do an aspiration test first: No CSF leakage from the catheter? Then, you are safe and can inject your medication now!

What's the typical high spinal scenario? Hypotension + Bradycardia + Respiratory arrest.

- Lack of vigilance.
- Bleeding.

Obstetric case: Suppose there is a CS., and you saw in the suction cluster one liter of blood. 1 liter that's mean it's not that bad, you are at the borderline ---> Can still be managed by fluid. BUT sometimes there is an underestimation of the amount of blood loss! (Blood at the floor, blood at the patient's site; all of these aren't calculated!) and in such case the patient will be tachycardic and hypotensive and that's mean that patient has lost more than 1.5 Litre, so in such scenario the patient must be given blood rather than fluid.

- Over-dosage of inhalation agent.

Overdose it is usually a pediatric case. You give inhalation induction, you put the patient into sleep but then you find that the child is hypotensive!!! So there must be something went wrong which is you forget to lower the dose! That's why the child become hypotensive!

- Aspiration. What is the aim of cricoid pressure during RSI?
- To close the esophagus to prevent aspiration. So, aspiration/regurgitation can be prevented but vomiting can't be prevented by doing so. However, it is not a problem; because don't forget that the patient is under anesthesia; so the patient can't vomit! :)
- Technical problem in anaesthesia system.
- General Note:

1) For elderly sick patients:
   a) Don't use propofol! Instead use **ETOMIDATE!**
   b) Titre the dose.
   c) Check their renal and hepatic functions. If impairment in any; be selective in choosing your medications by using extra-hepatic/extra-renal metabolized drugs.

2) What should you do if you find difficult intubation? Call for help immediately. There're only 4 trails allowed for patients. 1 trail for you and 3 trails for seniors. However, if the case is a known case of difficult intubation, the first trail should be done by senior of course!

★ Anaesthesia Vs Aviation industry:

- The safety of airline travel-highest.
- Increased in air traffic density; More take-offs and landings with less separation between aircraft.
- Practice of anesthesiology similar like aviation
- Take off and landing: similar to induction and recovery.
- Increased No of Surgical patient; diverse age group.
- Increasing comorbidities; complex surgical procedure.
- Fatal accident complications still happened.
- Anaesthesia is like aviation! Take-off is the induction of anaesthesia, the time while the patient is being anesthetized is the flight time, and landing is the recovery/extubation from anaesthesia.
- One of the autonomic reflexes is the baroreceptor reflex (it simply the reflux of tachycardia as a result of vasodilation/hypotension). However, this protective reflux is going to be lost if the patient is under anesthesia.

★ Mortality: GA Vs RTA:

➔ The mortality from Anaesthesia:

- In 1950: 3.7 in 1000 anaesthetics
- 1980: 1 in 10,000 anaesthetics
- 2015: 1 in 100,000- anaesthetics.

Now Let's Compare the Mortality from GA with an event that anyone, anywhere on this Mother earth can face.

- 2013: WHO released "**Global Status report on road safety;**
- RTA mortality 18 per 100,000 people/year.
- Mortality From GA: 1 in 100,000

So, A patients has HIGHER chances of dying from RTA than from exposure to General Anaesthesia.

* If you have a diabetic patient, and you can put the patient on general anesthesia, please put the patient on GENERAL anesthesia. Because If you give spinal anesthesia to the patient you will block the suprarenal adrenal gland. So, what will happen if you block the adrenal gland? There will be no increase in stress hormones, and consequently, no increase in blood sugar.

What makes anesthesia safe?

- Pre operative assessments. What makes the anesthesia safe? Preoperative assessment!!! Very important! If you do the pre operative assessment of your patient well, the safety will be significantly improved!
- Monitors and anesthesia machines. Anesthesia machine should be checked daily by the anesthesia technician
- Safe drug equipment.
- Anesthesia skills and knowledge.
- Guidelines and protocol.

Suppose that the patient has a family history of malignant hyperthermia what should you do? Follows the guideline and the protocols. For malignant hyperthermia **DON'T GIVE INHALATION AGENTS AT ALL!!!** (The doctor said: This is a **MCQ!!!**)

- Surgical skills.

Always watch the alarms carefully. Suppose it is alarming that there is no end tidal CO_2, what is the most likely cause? Circuit disconnection circuit disconnection is common.
So, if you have low end tidal CO_2 and the saturation started to come down, what will you do?
First of all, you'll check the commonest cause which is circuit disconnection, but it was connected.
So, what should you do next? Just give an Ambu bag, it is an easy thing, don't forget it! Don't panic, always keep a plan B in your mind.
How about if the patient cough? Cough means that the patient's anesthesia is now light, what should you do next? Deep the anesthesia, that's it!

★ Factors influencing risk of Anaesthesia:

- **Patient status:** age, comorbidities.
- **Procedure** –: urgency, invasive.
- **Facility**: resources, equipment, monitoring.
- **Skill/ expertise-** anaesthetist, surgeon.
- **Readiness**, fatigue of the physicians.

★ So, where safety starts?

Patient > Facilities, Equipment, and Medications > Anaesthetist's Skill > Surgeon's skill.

➔ The survival depends on what?

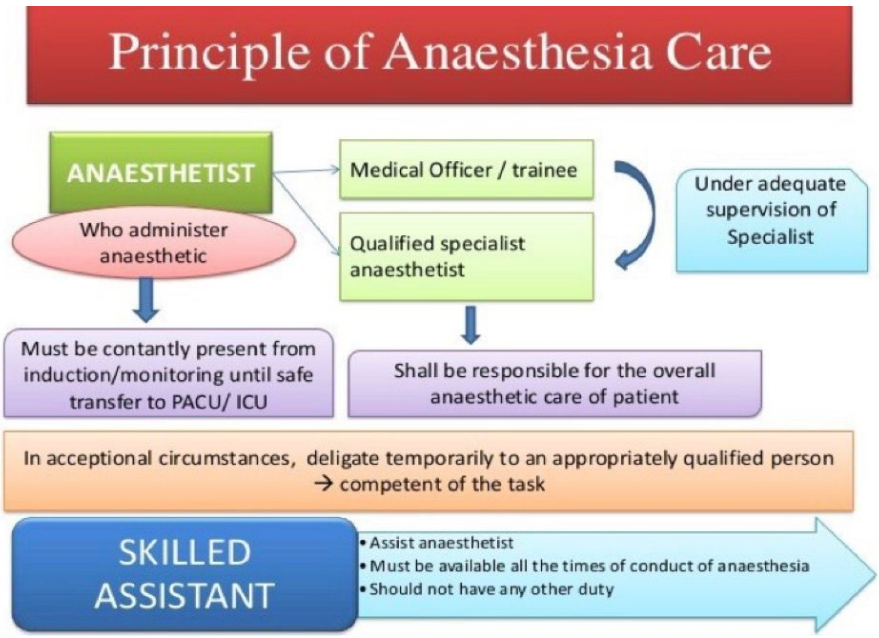
- **60%** (Facilities, resources. Equipment and medications Quantity and Quality) So the vast majority is here
- **20%** (Anaesthetist skill)
- **10%** (HELP!)
- **10%** (Referral)

★ Safe Anaesthesia Practice:

- Protocol.
- Crisis management / guideline.
- Training / activities skill development/ updation- CPD
- Evidence based medicine; Transforming evidence into practice.

The goal is to provide highest standard of care and safety in any settings.

International Task Force on Anaesthesia Safety Approved by:
World Federation of Societies of Anaesthesiologists (WFSA)



Unless Safe Anaesthesia is provided> Safe Surgery will not be possible and safety of patient can NOT be ensured

So, Safe Anaesthesia-->Safe surgery-->Safe Patient

★ STANDARD OF ANESTHESIA:

STANDARD OF ANESTHESIA (in order of adoption)	SITTING	INFRASTRUCTURE
Highly recommended	Level 1: • Small Hospital/ health center.	Basic
Highly recommended + recommended	Level 2: • Small Hospital/ health center.	Intermediate
Highly recommended + recommended +suggested	Level 3: • Referral hospital.	Optimal

Minimum infrastructure requirements for general anesthesia include :

- A well-lit space of adequate size.
- A source of pressurized oxygen (most commonly piped in).
- An effective suction device.

➔ **Standard ASA monitors:**

- Heart rate, blood pressure, ECG, pulse oximetry, capnography, temperature; and inspired and exhaled concentrations of oxygen and applicable anesthetic agents.

HIGHLY RECOMMENDED!

1. Minimum standards that would be expected in all anaesthesia care for elective surgical procedures.
2. **"Mandatory" standards.**
   - ➔ **What are the mandatory standards**
     - **Pre-anaesthesia checks/ Care.**
       - **Check patient risk factor:**
         - ASA 1,2,3,4,5, E in case of emergency, - Airway assessment.
         - Aspiration risk, - Allergies, - Abnormal investigation., - Comorbidity.
         - Medication.(**Human error: most common**, All drugs should be clearly labelled; cross check before administering) What is the most common human error? Medication.
         - Formulate anesthesia plan.

- **Check resources? Before starting Anaesthesia.**

- **Safe Conduct of anaesthesia.**
- **Monitoring during anaesthesia.**
- **Post Anaesthesia Care:**
  - Facilities and personnels.
  - Monitoring Pain Relief
  - Discharged criteria.

Choice of Anaesthesia:

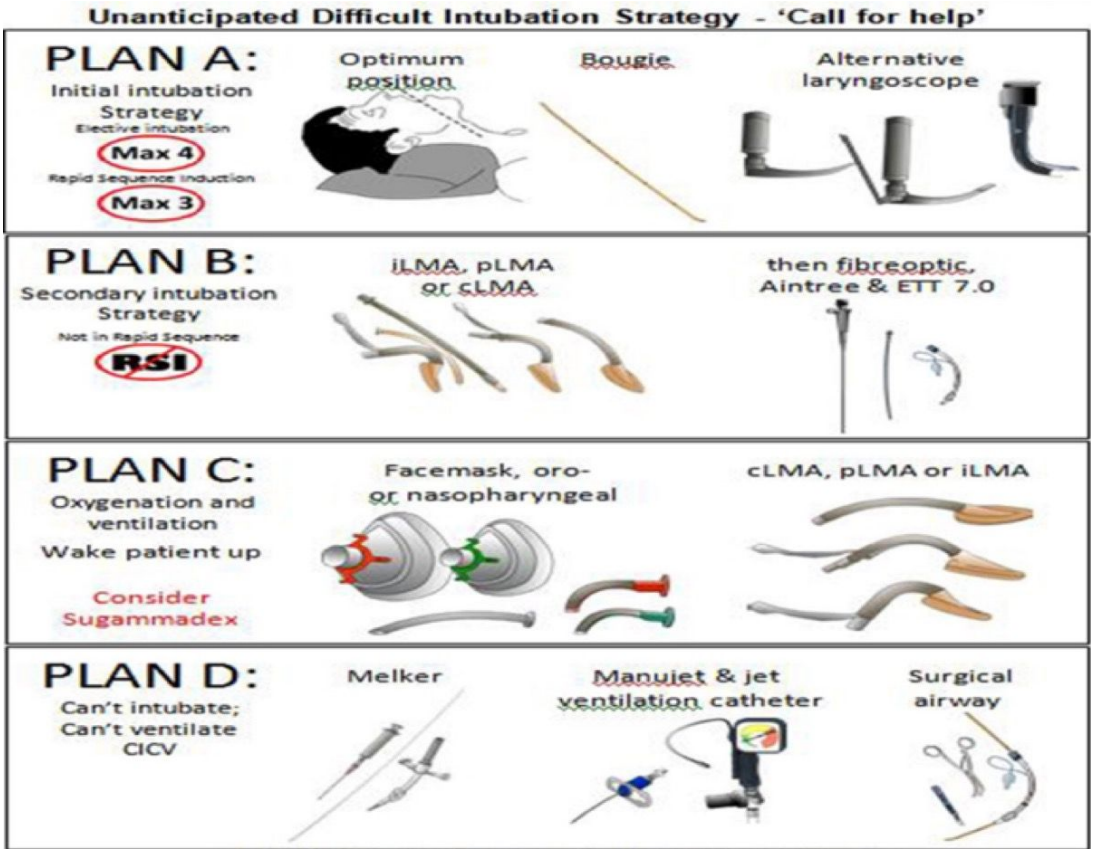
- Judged by type of patient / procedure/ facility.
- Choose the Simplest and safest technique.
- Variety of options available: (LA, LA + Sedation, Regional +/- sedation, GA with LMA/i-gel, GA with ETT and GA + Regional combination)
- Try to minimise the multiple combinations.
-

★ Medication:

- Human error: most common. The medications errors are very common. Even if the medications are colored, still errors happen because some medications are different, yet they are colored the same. So, don't rely only on the name of the medication, you have to check the color too.
- All drugs should be clearly labelled; cross check before administering

What is the most common human error? Medication. (MCQ).

★ Unanticipated difficult airway:



Dr said: This is a MCQ that will come in the exam:

If you can't intubate and you can't ventilate (You can't do neither intubation nor ventilation) what should your next step be?

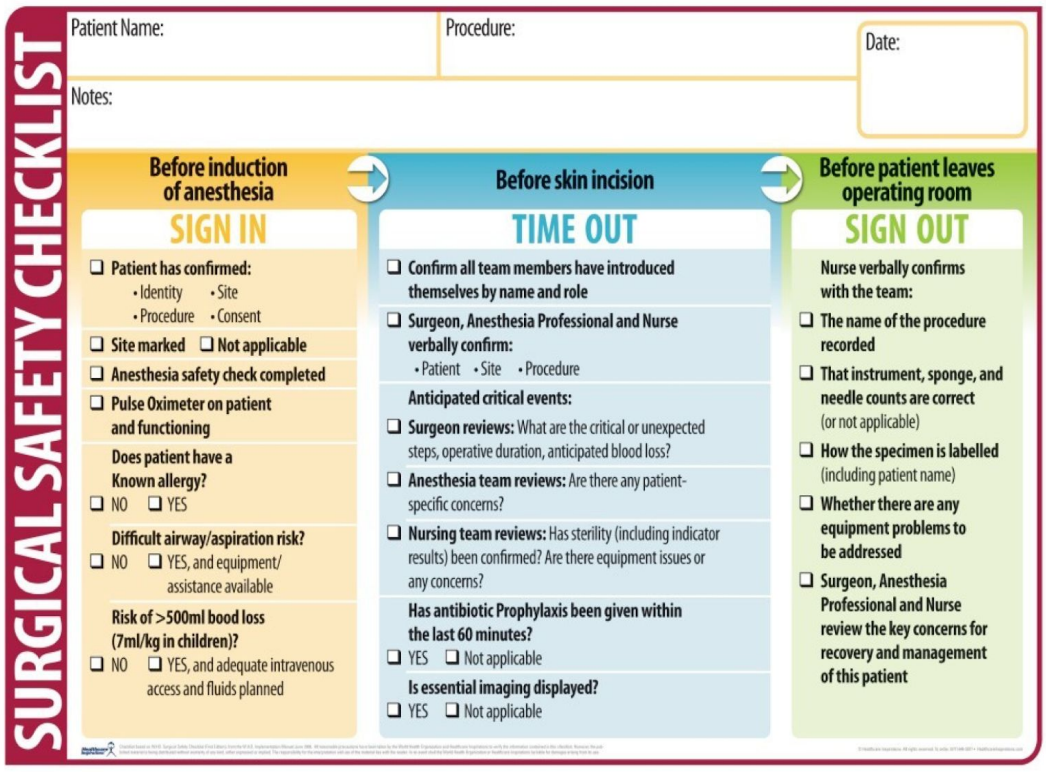
A) awake the patient.

B) Ask for help.

The right choice is **B: (ASK FOR HELP)**

Very important. Make sure you know all the 3 very well; because every year we put many MCQ from here.

★ **We always ask about prophylactic antibiotic! Please remember this point very well.**



Post Crisis: Recommendations for colleagues

THE DOCTOR SAID THIS IS FOR POSTGRADUATE LEVEL; DON'T GO INTO DETAILS.

- Be aware that such an adverse event could happen to you also.
- Discuss with your colleague or seniors. This is not weakness. This represents appropriate professional behaviour.
- Listen to what your colleague wants to tell and support him/her with your professional expertise.
- A professional work-up of that case based on fact is important for analysis and learning out of medical error.
- Senior/ colleague should offer support in discussing and briefing with patient/relative after an medical error.
- Avoid blame culture > Develop Help Culture

Changing definition of Anesthesia

- Word anaesthesia was coined from two greek words: "an" meaning without and "**aesthesis**" meaning sensation.
- Traditionally the goal of anaesthesia were described as **Amnesia, analgesia, and muscle relaxant.**
- More recently, Anaesthesia can be considered as a science of **reflex management.**

ANAESTHESIA "A Modern Concept"

➔ **General Anesthesia can thus be defined as:**

A reversible iatrogenic state characterised by unarousable unconsciousness and reflex depression.

★ Aims of general anesthesia:

1. ***In real there are Only 2 aims of GA***; Narcosis: unrousable unconsciousness and Reflex Depression.
2. ***Reflexes may:***

- Motor : Movement, coughing.
- Autonomic reflexes.
- Cardiovascular: BP, HR changes.
- Neuro-endocrine: Cortisol, vasopressin.

Present global scenario:

Anesthesiologist worked in:

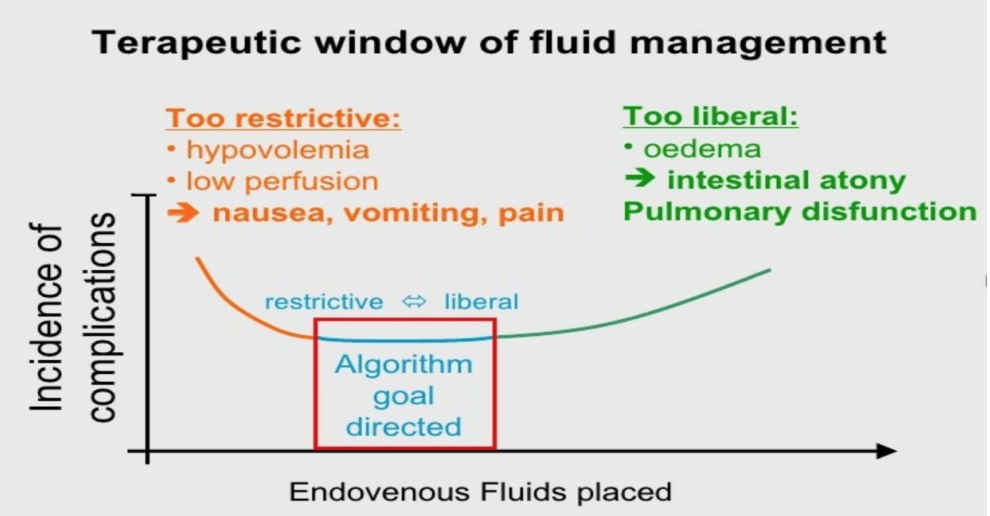
1. Operating theatre.
2. Perioperative physician.
3. Trauma , ICU care , Emergency.
4. Pain physician.
5. Palliative care provider.

★ Reducing aspiration risk (fasting guideline)

- All Trauma patients; Pregnant Patient in labour: Considered to be **full stomach.**
- Obese, Diabetic, Pt with GERD, Hiatus Hernia: Considered to be high risk for aspiration: **Gastric Prophylaxis even in full fasted state.**

Infant and children	- formula milk- 6 hrs - Breast milk: 4 hrs - Clear fluid: 2 hrs
Adults	- Heavy meal: 8 hrs - Light meal 6 hrs - Clear fluid: 2 hrs

★ Restrictive Vs liberal fluid:



★ Rational use of Blood: (Doctor skipped it, but read it just in case)

Transfusion trigger checklist List has to be filled for each RBC IIII
(Exception: massive bleeding)

➔ **Hb < 6 g/dl :**
Independent of any compensation possibility

➔ **Hb 6 - 8 g/dI :**

- **Clinical symptoms for Anemic hypoxia** (tachycardia, hypotension, ischemic ECG changes, lactate acidosis)
- **Limited compensation, existing risk factors** (e.g. coronary artery disease, heart failure, cerebrovascular insufficiency)
- Other indication.

➔ **In case of Hb > 8 g/dl :**
- transfusion is related to an unclear risk-benefit balance

Hb > 8 g/dl (only indicated in individual cases) Very low recommendation level (2 C)

★ GENERAL THROMBOPROPHYLAXIS RECOMMENDATIONS:

Level of risk:	Estimated DVT risk	Suggested thromboprophylaxis
Low: - Minor surgery in mobile patients - Medical patients who are fully mobile	**10%**	Early and aggressive ambulation
Moderate: 1. Medical pts, bed rest or sick Most general, open gynecologic or urologic surgery patients, 2. Moderate VTE + High bleeding risk	**10 % -40%**	**For(1):** LMWH, LDUH BID/TID or Fondaparinux, **For (2):** Mechanical Thromboprophylaxis

High Risk: 1. hip or knee arthroplasty, Major Trauma, SCI. 2. High VTE + High Bleeding risk	**40% - 80%**	**For(1):** LMWH **For (2):** Mechanical Thromboprophylaxis**.**

★ Post operative pain:

- Multimodal analgesia Multimodal anesthesia as a part of postoperative care. Don't relay on one medications.
- Preemptive preventive analgesia
- Greater use of regional anesthesia technique
- Regular analgesia technique not PRN. Medications should be given regularly not when the patient ask (PRN).
- Identify problematic patient and formulate management plan

➔ Why opioid free analgesia:

Opioids ---> not able to cough well ---> pneumonia

- **Because opioids lead to:**
  - PONVàdelay of start feeding
  - Bladder bowel function
  - Sedation delay mobilization , patient discharge, Pulmonary complication
  - immunosuppressive effects infection cancer recurrent /mets
  - Inadequate analgesia persistence post-op pain into chronic pain.

★ Hypothermia: perioperative morbidity/mortality

➔ Consequences of hypothermia

- **Shivering/oxygen requirement increased:** myocardial oxygen supply / demand,
- **Infection:** Directly depress immune function > Vasoconstriction > reduced tissue oxygen > predispose to infection
- **Delay wound healing**
- **Bleeding / transfusion:** Decreased platelet and coagulation
- **Depressed Cardiac function and risk for arrhythmias**
- **Delay recovery from anaesthesia**

★ Postoperative infection-Anesthetic role:

- **Antibiotic prophylaxis 60 minutes prior to surgery**
- **Hand hygiene**
- **Aseptic precautions for invasive procedures**
- **Fluid balance , blood transfusion**
- **Oxygen: avoiding hypoxia/hyperoxia**

Figure 8.1 Patient journey

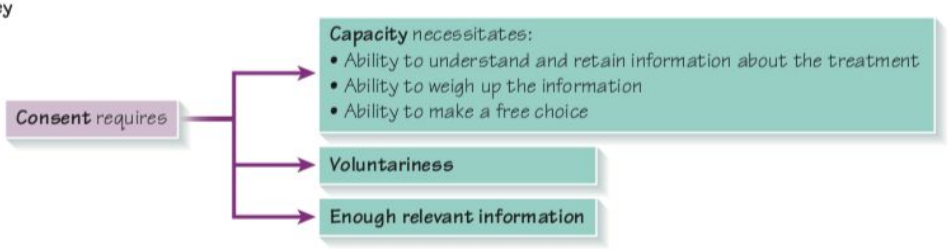


Figure 8.2 Surgical safety checklist

Sign in occurs before anaesthesia starts. The patient's details are checked, as well as the operation, consent, appropriate marking of site, allergies, potential airway issues and the anticipated blood loss.

Time out occurs in the operating theatre before the start of the operation. The team all introduce themselves, formally identify the patient and the planned operation and site (including anticipated blood loss), as well as any medical concerns about the patient. A check of availability of all equipment and imaging for the proposed operation is also established.

Sign out at the end of the operation. There is a summary of the procedure, including a check of swabs and instruments, and there is a log of any unexpected events during the operation.

World Health Organization

Surgical Safety Checklist (First edition)

Before induction of anaesthesia → Before skin incision → Before patient leaves operating room

Sign in

- ☐ Patient has confirmed
  - Identity
  - Site
  - Procedure
  - Consent
- ☐ Site marked/not applicable
- ☐ Anaesthesia safety check completed
- ☐ Pulse oximeter on patient and functioning

Does patient have a:

Known allergy?
- ☐ No
- ☐ Yes

Difficult airway/aspiration risk?
- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500mL blood loss (7mL/kg in children)?
- ☐ No
- ☐ Yes, and adequate intravenous access and fluids planned

Time out

- ☐ Confirm all team members have introduced themselves by name and role
- ☐ Surgeon, Anaesthesia professional and nurse verbally confirm
  - Patient
  - Site
  - Procedure

Anticipated critical events
- ☐ Surgeon reviews: what are the critical or unexpected steps, operative duration, anticiptaed blood loss?
- ☐ Anaesthesia team reviews: are therw any patient-specific concerns?
- ☐ Nursing team reviews: has sterility (including indicator results) been confirmed? Are the equipment issues or any concerns?

Has antibiotic prophylaxis been given within the last 60 minutes?
- ☐ Yes
- ☐ Not applicable

Is essential imaging displayed?
- ☐ Yes
- ☐ Not applicable

Sign out

Nurse verbally confirms with the team:
- ☐ The name of the procedure recorded
- ☐ That instrument, sponge and needle counts are correct (or not applicable)
- ☐ How the specimen is labelled (including patient name)
- ☐ Whether ther are any equipment problems to be addressed
- ☐ Surgeon, anaesthesia professional and nurse review the key concerns for recovery and management of this patient

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged